


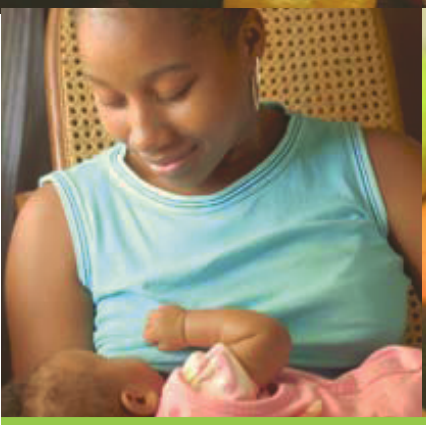


California Food Guide:

Fulfilling the Dietary Guidelines for Americans

www.cafoodguide.ca.gov

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State of California

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2008





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The California Food Guide is a collaborative effort between the California Department of Public Health, the California Department of Health Care Services and the InterAgency Nutrition Coordinating Council

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PREFACE

The California Food Guide (CFG) is the culmination of over four years of collaborative work with nutrition experts within the state of California. It originated as a joint project between the California Department of Health Services (CDHS) and the InterAgency Nutrition Coordinating Council (IANCC). IANCC represents the California Departments of Health Care Services, Public Health, Education, Aging, Corrections and Rehabilitation; the Universities of California at Berkeley and Davis; the University of California Cooperative Extension; and California Dairy Council. Since the completion of CFG, CDHS has split into two new departments, the California Department of Public Health (CDPH) and the Department of Health Care Services (DHCS). As a result, it will be apparent to the reader that many of the references refer to the old department, CDHS. In subsequent versions the appropriate departments will be referenced.

This web-based edition is an update of the original 1990 hard copy document, which was formerly titled the California Daily Food Guide. In 2003 CDHS and IANCC formed the CFG Editorial Committee to assist with the selection of authors and the review process. Over a three-year period, the CFG Editorial Committee worked with the authors, outside academic reviewers, and California departmental staff in reviewing new dietary and physical activity recommendations, and revising chapters.

CFG Editorial Committee members developed chapter outlines and a comprehensive review system for chapters. Chapters are structured to address information about dietary patterns, dietary recommendations, public health implications, and opportunities for improvement. The contents of each chapter were based on a extensive review of the literature along with editorial review by experts.

During the development phase, CDHS, in collaboration with IANCC, invited food and nutrition experts in various state agencies to assist in the revision of the food guide so that the revised version would reflect updated federal nutrition guidelines, such as the Dietary Guidelines for Americans 2005 and the Dietary Reference Intakes. In addition, authors were also enlisted to develop chapters devoted to certain specialty topics, such as ethnic foods, pregnancy, lactation, and certain important topics such as obesity and environmental food contaminants.

The manuscript preparation and review process included the following:

- CFG Editorial Committee and IANCC members selected chapter authors. Each chapter usually has one to four authors with one lead author and several co-authors. Lead authors and co-authors were provided with

instructional letters and guidelines for development of topic chapters. They were requested to select a minimum of three expert reviewers: one reviewer from within CDHS and two additional reviewers from outside CDHS. If the authors required assistance, CFG Editorial Committee members and authors provided suggestions for reviewers. Reviewers completed structured review forms with comments to the authors. Once the reviewer suggestions were incorporated, the lead author submitted the draft chapter, along with the completed reviewer forms, to the Editorial Chair. The Editorial Chair and assisting Research Scientist, conducted a preliminary review of the chapter, along with any additional edits, and sent the draft chapter to CFG Editorial Committee members. CFG Editorial Committee members reviewed the chapter and provided comments back to the Editorial Chair who worked closely with the authors to address the Editorial Committee concerns. Draft chapters underwent further review with Dr. Don Lyman, Chief of the Chronic Disease and Injury Control Division (CDPH)

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California Food Guide Chapter

Introduction

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Chair, California Food Guide Editorial Committee

New web-based format

Optimum nutrition throughout the lifecycle plays a central role in health. It begins with healthy prenatal circumstances and sets the stage for healthy senior years. The California Food Guide (CFG) is designed to provide dietitians and other health professionals information relevant to their practice and support the promotion of healthy eating and physical activity.

What's New

New Title: The title has been changed from the *California Daily Food Guide* to *California Food Guide: Fulfilling the Dietary Guidelines for Americans*, to reflect the incorporation of U.S. Department of Agriculture's and Health and Human Services' Dietary Guidelines for Americans 2005 (Dietary Guidelines) as well as the Institute of Medicine's (IOM) Dietary Reference Intakes (DRIs).

New Content: CFG now includes new or expanded chapters addressing: food groups, physical activity, weight management, vegetarianism, food insecurity, cardiovascular disease, diabetes, food contaminants, and specific lifecycle dietary recommendations, such as perinatal nutrition.

New Web-based Format: CFG is now available as a web-based document only, and is copyright-free. With on-line publication, the document will be easier to update and distribute. Although hard copies will not be published, individual or institutional users are encouraged to print and distribute copies as needed. Chapters are available in PDF format and designed to be placed in a three-ring binder.

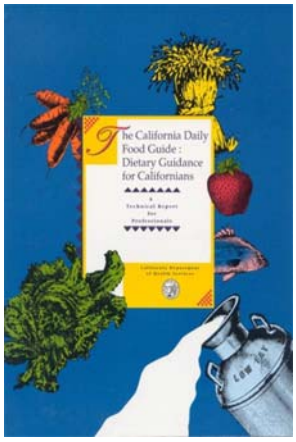
CFG website is available at:

http://www.cafoodguide.ca.gov/

Background

CFG is designed to provide up-to-date dietary and physical activity guidance for health care professionals. It highlights issues related to populations at-risk for nutrient inadequacies, such as low-income communities; racial and ethnic groups; pregnant and lactating women; and other high-risk age groups throughout the lifecycle. The overarching goal of CFG is to help more Californians adopt healthy dietary habits and active lifestyles.

1st Edition



The California Daily Food Guide was initially published in 1990. Since that time there has been significant growth in knowledge related to nutrition and physical activity which has resulted in several revisions to key national guidelines. Federal authorities have placed increased emphasis on the importance of physical activity, in addition to healthy eating, for improving overall health and preventing chronic disease. CFG incorporates the latest information on nutrition and physical activity from a variety of national sources including: the Institute of Medicine's expanded DRIs; the USDA's and Health and Human Services' Dietary Guidelines for Americans 2005; and the USDA's MyPyramid document.[1, 2, 3]

Over the last decade obesity rates have steadily climbed in all age and socioeconomic groups not only in California but also throughout the United States, leading to heightened concern over escalating health care costs resulting from the many obesity-related diseases.[4] Communities, governmental entities, health care organizations, and private industry have recently demonstrated new interest in how dietary and physical activity habits can be improved from both individual and environmental perspectives.

In September 2005, Governor Arnold Schwarzenegger convened the Governor's Summit on Health, Nutrition, and Obesity to coordinate and empower California's initiatives relating to the promotion of healthy eating and lifestyles. At the Summit, Governor Schwarzenegger's Vision for a Healthy California was unveiled. The Governor took action to ensure California's students have access to healthy food and beverages in schools as he signed Senate Bill (SB) 12 and SB 965, by Senator Martha Escutia (D-Montebello). This landmark legislation

gives California's public schools the strongest nutrition standards in the nation, and SB 281, by Senator Abel Maldonado (R- San Luis Obispo), which provides a framework to provide more fresh fruits and vegetables in school meal programs. The Governor also called upon his Cabinet to implement new policies throughout his administration to create an environment that encourages the health and fitness of Californians.[5]

As a result of a legislative mandate (Budget Act of 2005, SB 77), the former California Department of Health Services (CDHS) developed a strategic plan for nutrition, physical activity, and obesity prevention for the state of California that sets the framework for the Governor's Vision for a Healthy California. There are four major goals for the plan:[6]
Goal 1: Ensure state level leadership and coordination that reaches into communities across the state.
Goal 2: Create a statewide public education campaign that frames healthy eating and active living as California living.
Goal 3: Support local assistance grants and implement multi-sectoral policy strategies to create healthy eating and active living community environments.
Goal 4: Create and implement a statewide tracking and evaluation system.

The Critical Role of Healthy Eating and Physical Activity

The World Health Organization's publication, "Diet, Nutrition, and the Prevention of Chronic Disease," states: "Nutrition is coming to the fore as a major modifiable determinant for chronic disease, with scientific evidence increasingly supporting the view that alterations in diet have strong effects, both negative and positive, on health throughout life. Most importantly, dietary factors not only influence present health, but may determine whether an individual will develop diseases such as cancer, cardiovascular disease, and diabetes, later in life."[7]

Mortality data summarized by the Centers for Disease Control and Prevention (CDC) provides evidence that of the top 13 causes of death in America, at least five (coronary artery disease, malignant neoplasms, cerebrovascular disease, diabetes mellitus, and renal disorders), have nutritional and physical activity attributable risks.[8, 9] Moreover, healthy eating habits and regular physical activity have been found to prevent obesity. Obesity is one of the major risk factors associated with heart disease, stroke, and type 2 diabetes mellitus, along with certain types of cancer, and joint disorders.[10]

The costs of obesity are great, not only in terms of morbidity and mortality, but also in terms of dollars. In 2003, obesity-related medical expenditures in the United States were estimated at $75 billion, with approximately one-half of these expenditures financed by Medicaid and Medicare.[11] Furthermore, the economic costs of physical inactivity, obesity, and overweight in California adults estimated that, in the year 2000, these risk factors cost California approximately $21.7 billion a year in direct and indirect medical care; workers' compensation; and lost

productivity. These costs were projected to rise to greater than $28 billion for 2005.[12]

Special Populations

The highest rates of obesity exist among low-income groups.[13] Recent studies have shown that low-cost, energy dense diets that are the most affordable to low-income populations tend to be nutrient deficient.[14] California has one of the most culturally diverse populations of any geographic region of the world, many of whom are newly arrived immigrants, who work at low-income jobs. Consequently, California sees some of the highest rates of not only obesity, but also type 2 diabetes, among high-risk racial and ethnic groups, particularly African Americans, Latinos, and Native American Indians.[15]

Certain segments of the population may be at risk for imbalances in specific nutrient intakes. In October 2005 the USDA published an electronic report on the risks of nutrient intakes in vulnerable subgroups of the American population. Information obtained from the Continuing Survey of Food Intakes by Individuals (CSFII), using data from 1994-96, examined the risks of inadequate nutrient intake in adolescent females; older adults; children and adults at risk of overweight; individuals living in food insufficient households; low-income individuals; and individuals targeted by and participating in food and nutrition assistance programs. The study found inadequate intakes of key micronutrients, especially magnesium, calcium, folate, and vitamin E. It also found that energy intakes less than recommended for some food insecure adults and older adults, too much food energy from fat, and not enough from carbohydrates, along with inadequate intakes of fiber. Nutrient adequacy of diet also was found to deteriorate with age, with seniors being most at risk.[16] The accuracy of this study may have been compromised by under-reporting of dietary intake by adult participants.

The extent to which California's immigrant groups have incorporated the food patterns of their new home depends largely upon their degree of acculturation, length of time in the country, and social status. It has been observed that, through the acculturation process, food choices tend to shift away from the more healthy patterns of the native country and toward consumption of less healthy American foods that are high in fats, refined sugars, and sodium and low in fiber.[17, 18, 19] For this reason, new CFG chapters are devoted to specific racial/ethnic dietary patterns and the impact of modern American diets on dietary intake and health outcomes.

Nutrition education is most effective when presented in the appropriate cultural context, taking into consideration the shared knowledge, traditions, beliefs, and values of the culture. It is essential that educators understand and respect cultural and individual differences in beliefs, practices, and values. In addition, the content of the education programs should incorporate diversity in food

selection, preparation, and handling; meal and snacking patterns; familiar and unfamiliar foods; child feeding practices; and the nutritional and non-nutritional roles that food plays within a culture.

Although many studies have looked at the association of individual foods and nutrients with the development of chronic diseases, fewer studies have examined the effect of overarching dietary patterns. A recent study of U.S. dietary patterns, utilizing data from the National Health Interview Survey and the National Death Index, found that all-cause mortality for men and women could be decreased by 16 percent and 9 percent, respectively, through the high consumption of such foods as fruits, vegetables, low-fat foods, and whole grains.[20]

Cardiovascular disease is the leading cause of death for adults in the United States.[21] There is strong evidence that at least three dietary strategies are effective in preventing coronary heart disease:[22]

1) Consume a diet high in fruits, vegetables, nuts and whole grains, and low in refined grain products.
2) Substitute non-hydrogenated unsaturated fats for saturated fats and *trans* fats.
3) Increase the consumption of omega-3 fatty acids from fish, fish oil supplements, or plant sources.

A dietary pattern consistent with a traditional Mediterranean diet may be beneficial for the prevention of both coronary heart disease and some types of cancer.[23] Although it is still not clear which components of the Mediterranean diet are responsible for positive health effects, evidence suggests that consumption of both olive oil and wine may play beneficial roles with adults.[23]

Characteristics of a Mediterranean diet are:[23]

1) High intake of vegetables, legumes, fruits, nuts, and unrefined cereals.*
2) High intake of olive oil, but low intake of saturated lipids.
3) Moderate intake of dairy products, mostly in the form of cheese or yogurt.
4) Low intake of meat and poultry.
5) Regular but moderate intake of alcohol, primarily in the form of wine and generally with meals.

*Please note the term “High” is not clearly defined in the references cited. These studies were conducted in Greece, using Mediterranean diet reference scores.[24]

Nutrition Throughout the Lifecycle

Perinatal and Maternal Nutrition

The benefits of optimum dietary patterns start in the perinatal period. Maternal nutrition is critical to the healthy development and subsequent well being of the offspring. It is important to ensure that adequate intake of micronutrients, particularly folic acid, iron, and calcium occur in the perinatal period.[25] It is also equally important that expectant mothers get adequate exercise, as medically recommended during pregnancy, and that they breastfeed for at least six months.[26, 27] In 1990 the IOM published guidelines for weight gain in pregnancy.[28] Research has demonstrated that weight gain within the IOM's recommended ranges is associated with better pregnancy outcomes. Maternal obesity is associated with maternal complications such as infertility, gestational diabetes, pregnancy induced hypertension, and cesarean section. Fetal complications include congenital malformations, prematurity, macrosomia, stillbirth, and neonatal death. Low maternal body mass index and poor weight gain during pregnancy can lead to increased risk of preterm delivery and low birthweight.[29]

Breastfeeding, on a sustained basis, is a very important nutrition intervention that a mother can do to improve the immediate and long-term health of her infant. Breast milk contains bioactive substances that optimize the immune system, decrease infections, and promote growth of optimal gut flora. The endogenous qualities of breast milk change over time to meet the specific biological needs of the infant. Furthermore there is growing evidence that some of the major adult chronic diseases, such as cancer, diabetes, and heart disease can be positively impacted by exclusively breastfeeding in the first six months of life.[30]

California currently monitors hospital discharge trend data for rates of "in-hospital exclusive" and "any breastfeeding." Although rates of "any in-hospital breastfeeding initiation" have increased, the rates of "exclusive in-hospital breastfeeding initiation" have declined during the past seven years. Breastfeeding duration rates have also fallen.[31, 32] See Table 1 for trend data for these rates from 1995 to 2004. It is important to realize that in-hospital breastfeeding rates are not the best indicator for correlation with the long-term health benefits associated with breastfeeding. Furthermore large race/ethnic disparities exist for both exclusive breastfeeding initiation and duration.[32]

Table 1: California In-Hospital "Any" vs. "Exclusive" Breastfeeding Initiation Trends as Reported on the Newborn Screening Test Form: 1995-2004*[33]

In-Hospital Rate	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
"Any" Breastfeeding	74.7%	76.4%	78.3%	80.3%	81%	82%	82.9%	83.5%	83.6%	83.9%
"Exclusive" Breastfeeding	42.2%	41.8%	42.8%	43.5%	42.9%	42.6%	42.2%	41.8%	41.2%	40.5%

*There were 536,446 births in 2004 (feeding type was known in 521,559 births, and unknown in 2.8 percent of births).

The American Academy of Pediatrics' recent report on breastfeeding recommends that infants be breastfed exclusively for at least six months and continued breastfeeding occur for at least one year duration.[27] 2004 breastfeeding duration rates in California were 45.1 percent at six months but dropped to 23.4 percent at 12 months. Exclusive breastfeeding rates at six months were only 17.8 percent.[34] Findings indicate that although California breastfeeding initiation trends have improved, there is still a need to improve breastfeeding duration rates for six months to one year.

Childhood and Adolescent Nutrition

The 1999 California Children's Healthy Eating and Exercise Practice Survey found that only one percent of children met all recommendations for diet and nutrition. Only 20 percent ate five or more servings of fruits and vegetables daily. Even so 72 percent ate two or more servings of protein rich foods and 66 percent ate or drank three or more servings of milk products daily.[35] See Tables 2A and 2B.

Table 2A: Proportion of California Children Who Met Minimum Recommendations, 1999[35]

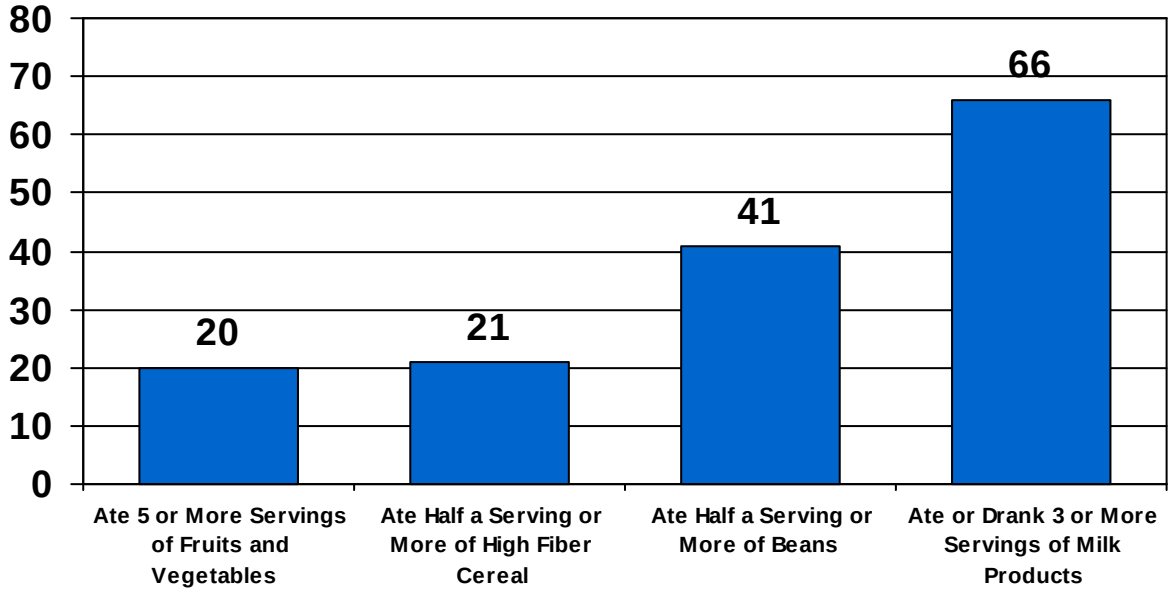
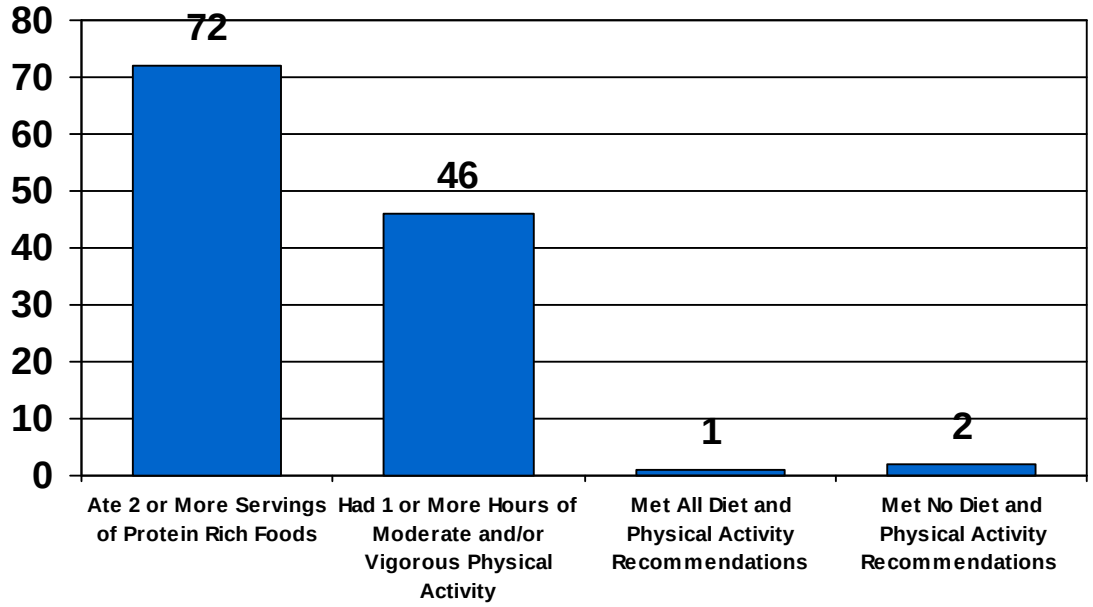
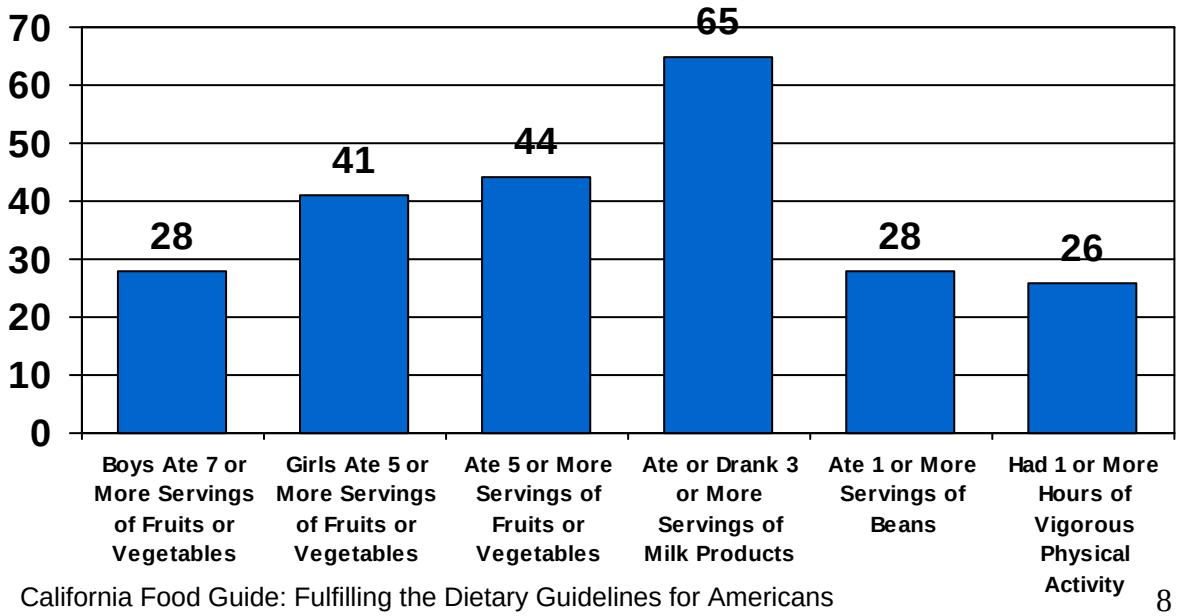


Table 2B: Proportion of California Children Who Met Minimum Recommendations, 1999[35]



Data from the 2000 California Teen Eating and Nutrition Survey indicated that only 26 percent of California teens had one or more hours of vigorous physical activity the previous day, only 28 percent of boys ate the recommended seven or more servings of fruit and vegetables, and only 41 percent of girls ate five or more servings of fruits and vegetables the previous day.[36] California teens fared better with the consumption of milk products--65 percent of teens ate or drank three or more servings of milk products the previous day.[36] See Table 3.

Table 3: California Adolescents Meeting Minimum Recommendations, 2000[36]



A recent report by IOM on food marketing to children and youth indicates that "there is strong evidence that marketing of foods and beverages to children influences their preferences, requests, purchases, and diets." The report also concludes that "overall, children are not achieving basic nutritional goals and they are consuming excess calories and exceeding recommended intakes for total fat, saturated fats, and added sugars, and sodium." Moreover the report identifies that dietary intakes of whole grains, fiber, calcium, potassium, magnesium, and vitamin E are well below recommended intakes. Teen girls and low-income toddlers are at risk for inadequate intakes of iron. The IOM report recommends that food and beverage companies, along with media and the entertainment industry, promote and support healthful diets for children and youth. It also advises government agencies to partner with the private sector and schools to create a social marketing campaign supporting parents, caregivers, and families to promote healthful diets for children and youth.[37] Critical to the implementation of the IOM's report will be adequate funding both at a government and private sector level.

With respect to the 1.5 million low-income children in California, some pediatric nutrition indicators show improved prevalence rates, however, others show little improvement or increased prevalence rates. The Pediatric Nutrition Surveillance System (PedNSS) is a child-based public health surveillance system that monitors the nutritional status of low-income children, aged 0-20 years of age, in federally funded maternal and child health programs. In California, PedNSS data is collected through the Child Health and Disability Prevention (CHDP) Program, which includes children who participate in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), the federally funded Title V Maternal and Child Health Program, the Head Start Program, and other programs. The system includes trend data on birthweight, breastfeeding, anemia, short stature, underweight, and overweight. It is available according to race/ethnic groups, age, and county.[38, 39]

Rates for both low birthweight and high birthweight for PedNSS children less than five years of age in California have improved between 1995 and 2004. Those for pediatric overweight for children less than five years of age have not. Moreover, overweight prevalence rates for PedNSS children 5 $\leq$ 20 years have increased by 48 percent from 1995 to 2004.[38, 39] (See Table 4)

National trend data for anemia prevalence in PedNSS children six months to five years of age declined from 15.8 percent in 1994 to 12.8 percent in 2003, whereas anemia prevalence for California PedNSS children six months to five years of age have only declined by four percent (from 14.6 percent in 1995 to 14.0 percent in 2004).[40, 38] Anemia prevalence rates for California children 5 $\leq$ 20 years of age declined by eight percent.[39]

Table 4: Changes in Pediatric Nutrition Indicators for Low-Income Children in California, PedNSS Data Files[38, 39]

Year	Prevalence	% Relative Change
Overweight*-Children 2≥5 Years		
1995	14.4%	
2004	17.5%	21.5% increase over 10 years
Overweight*-Children 5≤20 Years		
1995	15.1%	
2004	22.4%	48% increase over 10 years
Anemia¥- Children 6 months<5 Years		
1995	14.6%	
2004	14.0%	4% decrease over 10 years
Anemia§- Children 5≤20 Years		
1995	13.8%	
2004	12.7%	8% decrease over 10 years
Low Birthweight- Children < 5 Years		
1995	8.9%	
2004	7.4%	20% decrease over 10 years
High Birthweight-Children < 5 Years		
1995	9.2%	11% decrease over 10 years
2004	8.3%	

*Overweight is defined as greater than or equal to (≥) 95th percentile for body mass index (BMI)-for-age. When reviewing prevalence data on a yearly basis, an increasing trend in prevalence is noted for overweight in both age groups. The comparison between ten year points is reflective of the upward increase in prevalence.

¥Anemia cutoff points vary for different age groups. Please refer to *Recommendations to Prevent and Control Iron Deficiency in the United States:* Table 6 "Maximum hemoglobin concentration and hematocrit values for anemia."[41]

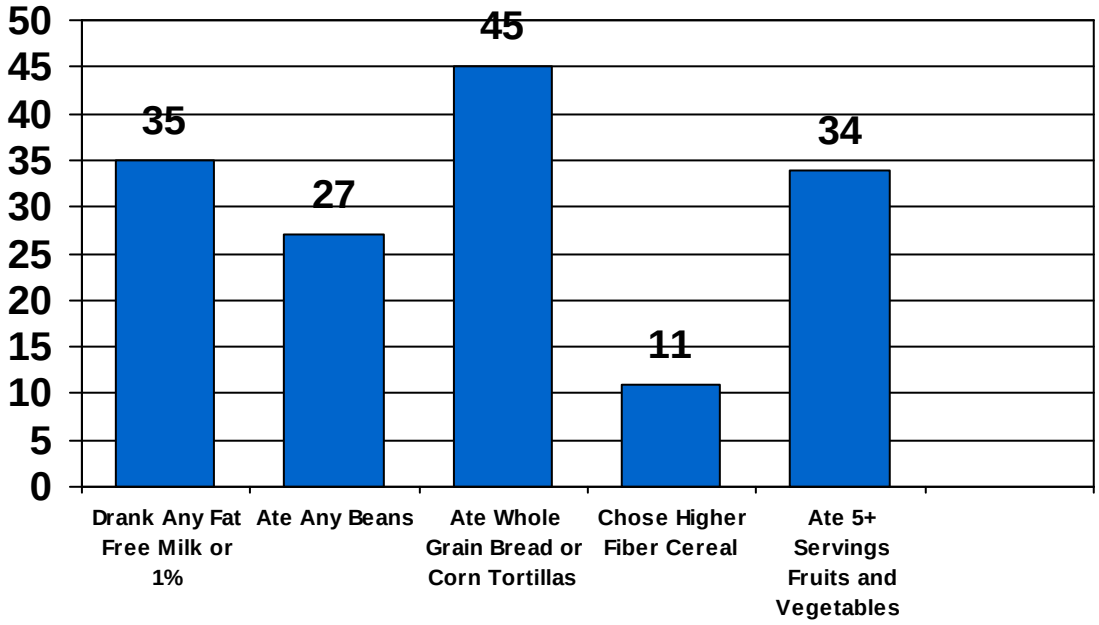
One area that has received increasing national and state attention has been the rising rates of pediatric overweight. Although there are a variety of core indicators for childhood nutritional well-being, pediatric growth profiles in relationship to BMI have attained government and public attention. In 2005, the IOM released "Preventing Childhood Obesity: Health in the Balance," an evidence-based review of pediatric overweight, which sets national goals and recommendations for the United States.[42] The report highlights the fact that over the past three decades, the rate of overweight for preschool children aged 2-5 years has more than doubled, and the rate for children aged 6-11 years has more than tripled. The rate for adolescents aged 12-19 years has doubled.[42] National prevalence trends for U.S. children and teens, using NHANES III data (1988-1994) indicates that the prevalence of pediatric overweight was 10.4 percent for children 2-5 years old, 15.3 percent for 6-11 year olds, and 15.5 percent for 12-19 year olds, a significant increase from the NHANES II survey (1988-1994), 7.2 percent, 11.3 percent, and 10.5 percent, respectively.[43]

With respect to California, the California Health Interview Survey (CHIS) reports that approximately 12 percent of adolescents are overweight.[44] Both national and state data confirm that these rates are highest among Latino, African American, and Native American/Alaska Native racial and ethnic groups.[43, 44]

Adult Nutrition

The California Dietary Practices Survey, which examined overall trends of healthy eating among California adults in 2001, found that most Californians did not meet the minimum dietary requirements for consuming five or more fruits and vegetables, choosing high fiber cereal, or eating any beans the previous day (see Table 5).[45]

Table 5: California Adults Who Met Minimum Dietary Recommendations, 2001[45]



Senior Nutrition

Americans over the age of 65 are often a neglected population when considering nutritional status. Older Americans may be on fixed incomes, alone, with poor mobility, and poor transportation access. They may also be edentulous and have limited smell and taste capacities. This may put them at risk for nutrient inadequacies, including obesity, hypercholesterolemia, and hypertension. Evidence suggests that potential inadequacies may occur with the intakes of calcium, magnesium, zinc, and vitamins D, B_6, and B_{12}.[16] According to a federal interagency forum on aging related statistics, 19 percent of seniors age 65 and older rated the quality of their diet as good whereas 67 percent stated their diet

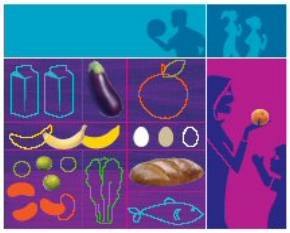
needs improvement. Furthermore, older people living in poverty were less likely to report a good diet (nine percent) than older people living above the poverty level (21 percent). Moreover, the rate of older people engaging in regular physical activity tends to decline at older ages. 2001-2002 national data indicates that the prevalence of regular physical activity declines from 26 percent among adults age 65-74 to nine percent for those 85 and older.[46] Older Americans are also being affected by increasing rates of obesity. The rate of increasing obesity has actually been more dramatic among older adults than younger adults with most of the increase in prevalence of obesity and overweight occurring since 1976-80. By 1999-2002 more than one-third (36 percent) were obese and nearly three-quarters (73 percent) of adults age 65-74 were overweight.[46]

Compared to other states, California ranked 22nd for prevalence rates of obesity for adults 65 years and older (19.1 percent in 2002). In 2001, data indicated that only 35.6 percent of California adults 65 and older were eating five or more fruits and vegetables each day.[47] Poor dietary and physical activity habits can put seniors at risk for chronic diseases and lead to increased health care costs. As a result of reduced wage earning capacity, declining cognitive abilities as well as physical limitations, seniors often require nutrition assistance programs to help with daily meal planning and preparation. Nutrition services can help with maintaining the health of older Californians by preventing premature institutionalization and improving overall quality of life.[48]

Federal and State Government Initiatives

Federal Initiatives

Dietary Guidelines for Americans 2005[2]



The California Food Guide Editorial Committee and authors support the USDA and Health and Human Services' (HHS) Dietary Guidelines for Americans 2005 (Dietary Guidelines) but also recognize that some areas may be improved upon over the next five-year cycle. The Dietary Guidelines are updated every five years and the 2005 update is a joint effort between the USDA and HHS and can be found at http://www.healthierus.gov/dietaryguidelines/. USDA and HHS jointly developed key recommendations based on an external scientific Advisory Committee's report and public agency comments. One of the basic premises of the Dietary Guidelines is that nutrient needs should be met primarily through consuming foods, and in certain cases, fortified foods and dietary supplements may be consumed.

It is not the intent of the California Food Guide to repeat all recommendations in the Dietary Guidelines, however, there are some key tables, recommendations,

as well as changes in the Dietary Guidelines 2005 that should be highlighted. Relevant CFG chapters reflect updated information based on the 2005 Dietary Guidelines.

Two central tables from the Dietary Guidelines are included in Appendix A Eating Patterns: A-1: The DASH Eating Plan, and A-2 the USDA Food Guide. Appendix A is found at: http://www.health.gov/dietaryguidelines/dga2005/document/html/appendixA.htm.

Major Changes to the Dietary Guidelines for Americans 2005:

The following major changes have been incorporated into the revised Dietary Guidelines:

- There are new sections including a glossary of terms and appendixes with information about the USDA Food Guide and Dietary Approaches to Stop Hypertension (DASH) Eating Plan, plus tables listing sources of some nutrients.
- The 2005 edition now includes eating patterns for 12 calorie levels ranging from 1,000 to 3,200 calories/day in the USDA Food Guide (found in Appendix A-2 in the guidelines).
- There has been a switch from using serving sizes for meat and beans; and grains food groups to ounce equivalents.
- A list of key recommendations has been added for the following: adequate nutrients within calorie needs; weight management; physical activity; food groups to encourage; fats; carbohydrates; sodium and potassium; alcoholic beverages; food safety; and key recommendations for specific population groups (infants, young children, pregnant women, older adults, and those who are immunocompromised).
- There is an emphasis on weight management and physical activity.
- There is an emphasis on types of vegetables, grains, milk products, and fats to consume.
- There is an appendix devoted to discretionary calorie allowance (A-3).

MyPyramid[3]

The MyPyramid Food Guidance System was developed to provide food-based guidance for consumers and professionals and is based on both the Dietary Guidelines and the IOM's Dietary Reference Intakes (DRIs). Materials are available on the web at http://www.mypyramid.gov/. The MyPyramid website includes interactive and print materials for consumers, and also includes materials designed for professionals. These materials include information on food intake patterns, an education framework, and glossary. There are four main themes to the educational framework: variety, proportionality, moderation, and activity.

The MyPyramid educational framework is also based on the following core recommendations:

- Increased intake of vitamins, minerals, dietary fiber, and other essential nutrients, especially those that are often low in typical diets.
- Lowered intake of saturated fats, *trans* fats, and cholesterol and increased intake of fruits, vegetables, and whole grains to decrease the risk of some chronic diseases.
- Calorie intake balanced with energy needs to prevent weight gain and/or promote a healthy weight.

Consumer basic messages include the following:

- Eat at least three ounces of whole-grain cereals, rice, or pasta every day;
- Go low-fat or fat-free when you choose milk, yogurt, and other milk products, and;
- Choose food and beverages low in added sugars.

Although the revised pyramid system has an improved focus on promoting whole grains and the reduced consumption of added sugars, it could be improved upon by having additional consumer and professional guidance on plant-based sources of protein, especially milk substitutes, as well as information for vegetarians. An additional concern is that the MyPyramid website may not be that accessible to low-income populations. At the time of this writing the website includes consumer materials for pregnant and breastfeeding women, children, and Spanish-speaking consumers. Additional multilingual materials would be an asset.

Dietary Reference Intakes[1]

In response to the ever growing knowledge base in nutrition, the Food and Nutrition Board, in partnership with Health Canada, has taken on the monumental task of revising the Recommended Dietary Allowances. One text is

now expanded to over ten related publications. The new primary title for these related reports is DRIs. Updated DRIs have been or are being developed for each nutrient or food component where adequate scientific data are available and include the following:

- **Estimated average requirement (EAR**): intake value that is estimated to meet the requirement defined by a specified indicator of adequacy in 50 percent of an age-and gender-specific group. At this level of intake, the remaining 50 percent of the specified group would not have met its need.
- **Recommended Dietary Allowance (RDA)**: is the dietary intake level that is sufficient to meet the nutrient requirements of nearly all individuals in this group.
- **Tolerable Upper Intake Level (UL)**: is the maximum level of daily nutrient intake that is unlikely to pose risks of adverse health effects to almost all of the individuals in the group for whom it is designed.

The DRI project has nutrient groups which include the following:

- Calcium, vitamin D, phosphorus, magnesium, fluoride
- Folate, antioxidants, and other B vitamins (vitamins C & E, selenium and choline)
- Macronutrients (e.g., protein, fat, carbohydrates)
- Trace elements (e.g., iron, zinc)
- Electrolytes and water
- Other food components (e.g., fiber, phytoestrogens)

Detailed information about the DRIs are available at IOM's website at: http://www.iom.edu/?id=4574&redirect=0. Also a complete set of Dietary Reference Intakes Tables, in PDF format, are available on the IOM's website at: http://www.iom.edu/?id=21381.

California State Government Initiatives

California state departments and programs involved with nutrition issues include the California Department of Health Care Services (DHCS)*, Department of Public Health (CDPH)*, Department of Education (CDE), Department of Social Services (DSS), Department of Aging (DA), and the University of California Cooperative Extension (UCCE). For a comprehensive summary of nutrition initiatives within California please refer to "Understanding Nutrition: A Primer on Programs and Policies in California," produced by the California Center for Research on Women and Families.[49] Relevant activities of DHCS, CDPH, and CDE, are summarized below.

* Please note that July 1, 2007 the California Department of Health Services (CDHS) split into two new departments: the Department of Health Care Services and the Department of Public Health. Please note that some websites and references may still refer to the old department. In subsequent revisions these items will be corrected.

California Department of Health Care Services

Office of Clinical Preventive Medicine

http://www.dhs.ca.gov/ps/ocpm/default.htm

The Office of Clinical Preventive Medicine works to integrate preventive care and public health policy into clinical settings, particularly Medi-Cal and managed health care systems. Recent projects include participation in the editorial coordination of the California Food Guide, development and implementation of the Medi-Cal Managed Care "Staying Healthy" assessment; development of an adolescent overweight provider toolkit; conducting a body mass index prevalence study with Medi-Cal managed care health plans; and, in the past, assistance with coordination of CDHS's physical activity and nutrition programs.

Children's Medical Services

http://www.dhs.ca.gov/pcfh/cms/

The Children's Medical Services (CMS) Branch provides a comprehensive system of health care for children through preventive screening, diagnostic, treatment, rehabilitation, and follow-up services. CMS includes the Child Health and Disability Prevention Program that provides preventive screening services to low-income children. These services include behavioral and nutritional risk assessments. CMS also provides advanced secondary and tertiary preventive services to eligible high risk infants and children through California Children's Services and the Medically Vulnerable Infant Program.

The California Department of Public Health

CDPH administers a variety of nutrition and physical activity promotion programs, conducts surveys, and provides supplemental food to special needs populations. CDPH also works collaboratively with other state departments, community based organizations, local health agencies, and academic institutions.

Listed below are the key nutrition-related programs in CDPH:

Network for a Healthy California

www.networkforahealthycalifornia.net

The *Network for a Healthy California (Network)* is a statewide social marketing initiative led by the California Department of Public Health's Cancer Prevention and Nutrition Section. The *Network* represents a movement of local, state, and national partners working collectively toward improving the health status of low-income Californians by increasing fruit and vegetable consumption, increasing daily physical activity, and reducing food insecurity. Multiple venues are used to facilitate behavior change and create supportive environments in the homes, schools, worksites, and communities of low-income Californians.

The *Network* works with Local Incentive Awardees (LIAs) that represent almost 100 local agencies in a variety of different community channels, including low

resource school districts, local health departments, county offices of education, public colleges and universities, Indian tribal organizations, city governments, First Five Commissions, cooperative extension agencies, as well as sister programs within the California Department of Public Health, park and recreation departments, and non-profit organizations. These projects are supported by a statewide infrastructure of 11 Regional Networks, targeted campaigns and programs, research and evaluation, media and public relations, partnership and leadership development, and community empowerment.

California Project LEAN
http://www.californiaprojectlean.org/
California Project LEAN: Leaders Encouraging Activity and Nutrition (Project LEAN) is a joint program of CDPH and the Public Health Institute. Project LEAN focuses on youth empowerment, policy and environmental change strategies, and community-based solutions. The goals of Project LEAN are to: 1) create healthier communities through policy and environmental change that support healthy eating and physical activity;
2) educate Californians to choose healthier foods and be more physically active; 3) conduct research-based, consumer driven nutrition and physical activity campaigns; and 4) serve as leaders by providing training and technical assistance and coordinating state and local efforts to promote healthy eating and physical activity.
Current Project LEAN programs include: 1) ***Food on the Run,*** which utilizes youth empowerment and policy and environmental change strategies to influence policies that will increase access to healthy food and physical activity options for low-income youth in California public schools; 2) ***Successful Students Through Healthy Food and Activity Policies*** educates local school board members about the link between healthy eating, physical activity, and academic achievement as a way to encourage healthy public school nutrition and physical education policy; 3) ***Strong Bones, Healthy Family Campaign*** seeks to increase lifestyle behaviors that promote bone health among Spanish-speaking women and their children as a way to improve health and reduce the risk of osteoporosis.

California Center for Physical Activity
http://www.caphysicalactivity.org/
The California Center for Physical Activity creates opportunities for everyday activity by connecting partners to active living resources and helping develop more walkable and bikeable communities. The Center works through collaboration with national physical activity experts, local health departments, community-based organizations and others in the public and private sectors to provide minigrants, technical assistance, and model programs to promote physical activity through active community environments. Projects include: Walkable Community Workshops, Healthy Transportation Network, the California Walk to School Headquarters website, Walkable Neighborhoods for Seniors, Active Aging Community Task Forces and the Take Action! web site.

California Obesity Prevention Initiative
http://www.dhs.ca.gov/ps/cdic/copi/default.htm
The California Obesity Prevention Initiative (COPI) evolved from a grant project with the Centers for Disease Control and Prevention. COPI partners with national, state, and local organizations focusing on reducing the lifelong risks associated with obesity by creating environments that support healthy eating, and physical activity, especially for youth. Major projects include a collaborative report titled: "Reversing the Obesity Epidemic: California's Plan for Action," along with a pilot project to promote quality physical education in low-resource schools in San Diego, tools to reduce TV viewing time of girls ages 11-14, and partnering to increase youth involvement in state and local policy issues related to obesity.

California Diabetes Program
http://www.caldiabetes.org/
The California Diabetes Program works with organizations in California and nationwide to: monitor diabetes and implement and evaluate diabetes interventions; initiate or sustain good public health policy for diabetes; increase access to quality diabetes care and treatment; and raise public awareness about diabetes. Program highlights include California's Plan for Diabetes; the California Diabetes Public Health System Assessment; the Diabetes Information Resource Center (DIRC), clinical guidelines for diabetes care, and development of the Diabetes Health Record card.

Safe Routes to School
http://www.dot.ca.gov/hq/LocalPrograms/saferoute2.htm
This program provides funding through the Department of Transportation to local California areas for construction of pedestrian and bike paths, bike lanes, new sidewalks, and crosswalks.

Maternal, Child and Adolescent Health/Office of Family Planning Branch
http://www.mch.dhs.ca.gov/
One of the Maternal, Child and Adolescent Health/Office of Family Planning (MCAH/OFP) Branch Title V Priority areas for California (2005-2010) is "Promote healthy lifestyle practices among MCAH populations and reduce the rate of overweight children and adolescents." The MCAH/OFP Branch promotes healthy eating and physical activity through all MCAH/OFP Branch programs and initiatives at the state and local level by:

- Encouraging the development of health care policies, training, and guidelines that support healthy eating and physical activity for all programs, health care providers, schools, child care centers, and employers.
- Supporting MCAH/OFP partners throughout the state in the development and participation in local healthy eating and physical activity related coalitions.

- Using healthy eating and physical activity epidemiological information that is obtained from multiple sources design, implement, and evaluate initiatives that are effective and reach individuals with the most need.

Some examples of MCAH programs and initiatives involved in this effort are the Adolescent and Family Life Program, the health jurisdiction MCAH allocations, the Black Infant Health Program, and the breastfeeding promotion initiative.

Special Supplemental Nutrition Program for Women, Infants and Children
http://www.wicworks.ca.gov/
The Special Supplemental Nutrition Program for Women, Infants and Children (WIC) serves low-income pregnant, postpartum, and breastfeeding women and children under five years old and is 100 percent funded by USDA. WIC offers special vouchers to provide specific foods such as milk, eggs, cheese, dry beans, juice, cereals, and infant formula. WIC also provides nutrition education and breastfeeding promotion under specific federal requirements for expenditures on these activities. California operates the largest WIC program in the nation. In addition, WIC administers the WIC Farmers' Market Nutrition Program between May and November to provide WIC families with coupons to purchase produce at certified farmers' markets. USDA funded California to lead a "Fit WIC" special project. "Fit WIC" was a three-year, five-state project to evaluate childhood obesity prevention strategies. The California Fit WIC project developed several approaches targeting WIC families, WIC staff, and communities. The project results provide a model for local and state WIC agencies to use in implementing their own "Fit WIC" programs.

California Department of Education

While the California Department of Education's (CDE) primary focus is to create a dynamic education system that equips all students with the knowledge and skills to excel in college and careers, it also focuses on the importance of healthy eating and physical activity with the goal of preparing children so they are healthy and ready to learn. CDE participates in the following nutrition and physical activity-related activities as detailed below.

Coordinated School Health
The Learning Support Division within CDE administers the Coordinated School Health Program. CDE supports and encourages a coordinated approach to school health for many reasons; one being that such an approach has been shown to improve students' health and their capacity to learn through the support of families, schools, and communities working together. A coordinated school health approach is a school-wide attitude and commitment that supports and integrates eight components: 1) health education, 2) physical education, 3) parent/community involvement, 4) nutrition services, 5) health services, 6)

psychological and counseling services, 7) safe and healthy school environment, and 8) health promotion for staff. These components work together to develop and reinforce health-related knowledge, skills, attitudes, behaviors, and make health an important priority at school.

Building Infrastructure for Coordinated School Health California's Blueprint. This Blueprint delineates the foundation upon which children and adolescents in California can develop their capabilities for leading rewarding and productive lives. It creates a joint effort of public and private agencies, individuals, and communities, and assists in building infrastructure for implementing coordinated school health. Additional information is located on the CDE web site at www.cde.ca.gov/ls/he/cs.

Health and Physical Education Frameworks and Content Standards for California Public Schools, Kindergarten through Grade Twelve

The Health Framework for California Public Schools, Kindergarten through Grade Twelve provides a foundation for curriculum and instruction and describes the scope and sequence of knowledge and skills that students need to master. It emphasizes students' acquisition of health literacy – the capacity to obtain, interpret, and understand basic health information, the promotion of health education through a coordinated school health systems and the collaborative efforts of the school, the family, and the community. The Framework addresses the physical, mental, emotional, and social dimensions of health. Recently a bill (Assembly Bill 689) was signed into law stating that on or before March 1, 2008, based on recommendations of the Superintendent, the State Board of Education shall adopt content standards in the curriculum area of health education. The content standards shall provide a framework for instruction that a school may offer in the curriculum area of health education with a goal of providing school districts with the fundamental tools for developing health education curriculum and improve student assessment.

The Physical Education Framework describes a sequential, developmental, age-appropriate physical education program designed to provide students with the knowledge and ability to maintain a healthy active lifestyle. Additionally, the California State Board of Education recently adopted Physical Education Model Content Standards for California Public Schools outlining what students need to know and be able to do in physical education at each grade level. The State Board of Education adopted the standards in January 2005. The Physical Education Content Standards will assist schools in establishing specific learning goals and objectives for physical education. A sequential, developmentally appropriate curriculum still needs to be designed and implemented to help students acquire the knowledge, skills, attitudes, and confidence needed to adopt and maintain a physically active, healthy lifestyle.

Superintendent's Task Force on Obesity, Type 2 Diabetes, and Cardiovascular Disease

Citing an epidemic of obesity among children and youth, State Superintendent of Public Instruction Jack O'Connell established a task force on childhood obesity, type 2 diabetes, and cardiovascular disease to examine the factors that contribute to the increase in these diseases among California school children. Members of the task force included nutritionists, parents, physical education specialists, physicians, public health experts, school nurses, students, and other educators.

The Task Force's recommendations included actions schools and their partners can and should take to address the trends facing California: 1) The need to increase the quality and quantity of instruction in physical education, to provide more physical activity, and enhance student achievement of California's Physical Education Model Content Standards; 2) The need to increase the quality and quantity of health education to promote healthful eating and physical activity; and 3) Ensure the availability and quality of healthy foods and beverages served and sold at schools.

Healthy Children Ready to Learn – A White Paper on Health, Nutrition, and Physical Education

This document recently published (2005) by CDE addresses the issues surrounding student nutrition, physical activity and fitness, and the recommendations from The Superintendent's Task Force on Childhood Obesity, Type 2 Diabetes, and Cardiovascular Disease. Research shows that healthy, active, and well-nourished children and youths are more likely to attend school and are more prepared and motivated to learn. Yet an alarming number of students in California are overweight, unfit, or both. These children and youth are developing serious health problems now and face dire consequences in the future.

This document describes CDE's perspectives and plans to ensure that students are healthy and ready to learn. Specifically, it outlines four goals:
1) Support high-quality instructional programs in health education and physical education that provide students with the skills, knowledge, and confidence to develop and maintain active, healthy lifestyles; 2) Implement nutrition standards for all food and beverages sold on campus; 3) Increase participation in school meal programs so that no child goes hungry; and 4) Create a school environment that supports the health of students.

Advisory Committee on Nutrition Implementation Strategies

To assist schools and communities in their fight against childhood overweight and obesity, Superintendent O'Connell established the Advisory Committee on Nutrition Implementation Strategies. The 23 members represent students, school food service directors, school administrators, state agencies, teachers, parents, professional associations, and advocacy organizations and worked

together to improve the nutrition environment on school campuses. The Committee developed a comprehensive set of strategies that schools can use to improve the quality of food and beverages sold or served on school campuses. The final report is scheduled to be available in the spring of 2006.

Healthy School Nutrition Environment

Schools are central in providing students with the skills, social support, and environmental reinforcements to develop and practice healthy eating and physical activity behaviors. Creating a healthy school environment begins with a strong, comprehensive district policy that promotes the health and wellness of students.

The Child Nutrition and WIC Reauthorization Act of 2004 (Public Law 108-265) requires school districts participating in the U.S. Department of Agriculture National School Lunch Program to adopt a Local School Wellness Policy by the beginning of 2006 school year. These policies should apply to curriculum, instruction, and practices in the classroom, as well as non-instructional opportunities throughout the school day that guide and influence student behaviors. The California School Boards Association has released a sample board policy related to the federal requirement that districts develop local school wellness policies. http://www.csba.org/ps/samples/bp5030.pdf This sample policy includes recommendations that will be helpful to districts in examining nutrition, physical activity/education, and coordinated school health.

A school health council within the context of coordinated school health should develop policies. A school health council could include teachers, school food service staff, parents, administrators, health care professionals, and other community members. Once policies are established, schools can address the physical environment to identify where changes can be made to further support the health and fitness of all students. Additional regulations and laws regarding the sale and service of foods and beverages on campuses will impact the school health environment. In September 2005, with support from California's Governor Arnold Schwarzenegger, two Senate Bills were signed into law to become effective July 2007 in kindergarten through grade twelve. Senate Bill 12 puts nutritional limits on the types of foods sold beyond the federal meal programs. Senate Bill 965 restricts beverages sold on school campuses. These new laws will be the most stringent ever implemented in the State of California. For the specific California Education Code's that contain this enacted legislation refer to Sections 49430 - 49434.

Shaping Health As Partners In Education (SHAPE)

Shaping Health as Partners in Education (SHAPE) is a network of over 130 school districts committed to improving the health and academic success of the children they serve. Working as a team, child nutrition staff, teachers, school administrators, family, and community members provide a consistent nutrition message in child nutrition programs, classrooms, and throughout the school

environment by applying nutrition policies and practices and building partnerships.

Child Nutrition Programs

CDE administers the USDA's Child Nutrition Programs, which include the National School Lunch Program, School Breakfast Program, Child and Adult Care Food Program, and the Food Distribution Program. These federally funded programs assist schools, residential child care institutions, child care agencies and homes, and adult day care facilities in providing nutritious meals to children and adults at reasonable prices. In addition to financial assistance, the Child Nutrition Programs provide donated commodity foods to help reduce meal costs.

In June 1995, the School Meals Initiative (SMI) and Public Law 104-149 amended the Federal Regulations establishing the National School Lunch and School Breakfast Programs nutrition standards and incorporating the Dietary Guidelines for Americans. Schools must serve meals that comply with the nutrition standards. Meals must provide one-third of the Recommended Dietary Allowances (RDA) for protein, calcium, iron, vitamin A, vitamin C, and specific levels of calories varying with the age/grade of the students, and meet the Dietary Guidelines for Americans over a week's time.

Farm-to-School

Farm-to-School is administered by CDE's Nutrition Services Division and directly addresses the connection between farmers, consumers, and school children. This program educates children about their relationship to agriculture by highlighting their interactions with the community, the environment and the food they eat. Through Farm-to-School, the breakfast, lunch, and snack programs bring fresh California produce into schools, providing the opportunity to teach children to make their own healthy eating choices, and giving them the opportunity to try new foods. This is an investment that can improve children's health and education through garden-based learning, increased consumption of fresh fruits and vegetables, improved awareness of nutrition, and a sense of stewardship of our food and farming systems.

State Nutrition Action Plans (SNAP)

To support states as they strive to improve eating and lifestyle behaviors as a preventive approach to reducing diet-related health problems in America, the USDA has provided limited financial assistance for state nutrition education interventions and activities aimed at promoting healthy eating and related lifestyle behaviors. State groups initially met to identify a common nutrition goal and begin formulating a plan for working together to achieve the goal. California's goal in this endeavor is to create and encourage partnerships and collaborative interventions between the nutrition assistance programs and other related groups, such as health programs, health care providers, schools, faith-based

groups, and community organizations in the consumption of at least five servings of fruits and vegetables a day.

State agencies in California that have begun collaboration efforts include CDE, CDPH, Department of Social Services, and the Department of Aging. Some of the primary objectives established to meet the goal include maximizing the use of California grown fruits and vegetables in all USDA Food and Nutrition Programs in California; providing workshops for sponsors of the Summer Food Service Program and National School Lunch Program that include strategies to expand program participation and encourage fruit and vegetable consumption; expanding statewide efforts to promote Farm-to-School initiatives; developing an action plan that includes local input to overcome barriers and fill gaps in achieving the goal; and expanding cooperation between growers, retailers, and food banks to get more California products to food banks.

California Physical Fitness Test (FITNESSGRAM®)

The goal of the California physical fitness test is for students to achieve the minimum fitness levels, or performance standards, in various areas. State law requires school districts to administer a physical fitness test, designated by the State Board of Education, to all fifth, seventh, and ninth graders annually. The physical fitness test designated for California public school students is the FITNESSGRAM®, developed by The Cooper Institute. The test assesses six major fitness areas, including aerobic capacity (cardiovascular endurance), body composition (percentage of body fat), abdominal strength and endurance, trunk strength and flexibility, upper body strength and endurance, and overall flexibility. A number of test options are provided for most of the fitness areas so students with special needs have an opportunity to participate.

In 2005, just 25 percent of the students in grade five, 29 percent in grade seven, and 27 percent in grade nine achieved the fitness standards for all six areas of the test. A comparison of the results for the last three years reveals some improvement, with approximately three to four percent more students achieving the minimum fitness levels across all areas of the test. There are still far too many students failing to reach even minimal levels of physical fitness. Recent research associates good aerobic capacity with a reduction in many health problems. Overall, 56 percent of the students across the three grade levels met the targeted performance standard for aerobic capacity, considered the most important of the six areas tested.

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Web Resources

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5. California Department of Education Physical Fitness Testing. http://www.cde.ca.gov/ta/tg/pf/index.asp

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9. Local School Wellness Policy resources. http://www.californiahealthykids.org

10. National School Lunch Program, U.S. Department of Agriculture. http://www.fns.usda.gov/cnd/lunch/

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California Food Guide

Fruits and Vegetables

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What's New?

The 2005 Dietary Guidelines for Americans recommends a range from 2½ to 6½ cups of fruits and vegetables depending on the calorie range of 1,200 - 3,200 calories.[1]

Public Health Implications

Healthy People 2010 nutrition and overweight objectives:[2]

- Objective 19.5: Increase the proportion of persons aged two years and older who consume at least two daily servings of fruit.
- Objective 19.6: Increase the proportion of persons aged two years and older who consume at least three daily servings of vegetables, with at least one-third being dark green or orange vegetables.

Reduced risk of some cancers and cardiovascular disease for those with higher fruit and vegetable intake.[3, 4]

Potential reduced risk of overweight/obesity and type 2 diabetes for those with higher fruit and vegetable intake.[5, 6]

Fruits and Vegetables and Health[7]

A variety of nutrients in fruits and vegetables promote good health:

- Folic acid helps reduce neural tube defects.
- Magnesium promotes healthier bones.
- Fiber contributes to bowel health, prevents constipation, and helps with satiety.
- Vitamin A (beta-carotene) and vitamin C help maintain healthy skin, eyes, and gums.
- Potassium may help to reduce blood pressure in subgroups of the population with various forms of hypertension.
- Phytochemicals may reduce the risk of multiple chronic diseases, such as cancer and cardiovascular disease.

Definition

Dietary Requirements

One of the most important recommendations of the 2005 Dietary Guidelines for Americans (Dietary Guidelines) and the MyPyramid food guidance system is to consume a sufficient amount of fruits and vegetables while staying within energy needs.[1] The Dietary Guidelines recommend two cups[∞] of fruits and two and a half cups of vegetables per day for a reference 2,000 calorie intake, with higher or lower amounts depending on the age, gender, physical activity level, and caloric needs of each individual. The Dietary Guidelines do not set a "basic minimum" such as five daily servings of fruits and vegetables.

The Dietary Guidelines also provide specific direction about choosing a variety of vegetables by identifying five vegetable subgroups (dark green, orange, legumes, starchy vegetables, and other vegetables) and setting a recommendation to eat from each group several times per week. The vegetable subgroups were established to promote increased consumption of vitamin A (carotenoids), vitamin C, folate, and potassium, which are nutrients that are often lacking in the American adult diet.[1]

Vegetable Groups Established by the 2005 Dietary Guidelines for Americans

Dark green	Broccoli, spinach, greens, dark green lettuce, bok choy
Orange	Carrots, sweet potatoes, winter (orange) squash, pumpkin
Legumes	Dry beans, lentils, chickpeas, tofu, soybeans (edamame)
Starchy vegetables	Corn, white potatoes, green peas, lima beans, taro
Other vegetables	Tomatoes, cabbage, Chinese cabbage, Brussels sprouts, peppers, cauliflower, mushrooms, onions, green beans, summer squash, lettuce, cucumber, and others

[∞] A half cup of most vegetables or a half cup of juice has a volume of about 125 milliliters and weighs roughly 100 grams.

In contrast to the vegetable group, fruits are not divided into subgroups. To ensure adequate fiber intake, however, the Dietary Guidelines promote whole fruit rather than juice in meeting the majority of the fruit requirement.[1]

As shown in Tables 1 and 2, the recommended daily number of cups for the fruit group ranges from one cup to 2.5 cups and the recommended daily number of cups for the vegetable group ranges from one cup to four cups. To obtain information about cup equivalents for fresh, frozen, or canned fruit; dried fruit; fruit juice; cut-up raw or cooked vegetables; raw leafy vegetables; and vegetable juice, go to http://www.mypyramid.gov.

Table 1: Recommended Daily Number of Cups and Servings for the Fruit Group[1]

Calorie Level	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200
Fruits	1 cup	1 cup	1.5 cups	1.5 cups	1.5 cups	2 cups	2 cups	2 cups	2 cups	2.5 cups	2.5 cups	2.5 cups
	2 servings	2 servings	3 servings	3 servings	3 servings	4 servings	4 servings	4 servings	4 servings	5 servings	5 servings	5 servings

Table 2: Recommended Daily Number of Cups and Servings for the Vegetable Group, with Subgroup Amounts Listed as Weekly Cups[1]

Calorie Level	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200
Vegetables	1 cup	1.5 cups	1.5 cups	2 cups	2.5 cups	2.5 cups	3 cups	3 cups	3.5 cups	3.5 cups	4 cups	4 cups
	2 servings	3 servings	3 servings	4 servings	5 servings	5 servings	6 servings	6 servings	7 servings	7 servings	8 servings	8 servings
Dark green vegetables	1 cup/ week	1.5 cups/ week	1.5 cups/ week	2 cups/ week	3 cups/ week	3 cups/ week	3 cups/ week	3 cups/ week	3 cups/ week	3 cups/ week	3 cups/ week	3 cups/ week
Orange vegetables	.5 cup/ week	1 cup/ week	1 cup/ week	1.5 cups/ week	2 cups/ week	2 cups/ week	2 cups/ week	2 cups/ week	2.5 cups/ week	2.5 cups/ week	2.5 cups/ week	2.5 cups/ week
Legumes	.5 cup/ week	1 cup/ week	1 cup/ week	2.5 cups/ week	3 cups/ week	3 cups/ week	3 cups/ week	3 cups/ week	3.5 cups/ week	3.5 cups/ week	3.5 cups/ week	3.5 cups/ week
Starchy vegetables	1.5 cups/ week	2.5 cups/ week	2.5 cups/ week	2.5 cups/ week	3 cups/ week	3 cups/ week	6 cups/ week	6 cups/ week	7 cups/ week	7 cups/ week	9 cups/ week	9 cups/ week
Other vegetables	4 cups/ week	4.5 cups/ week	4.5 cups/ week	5.5 cups/ week	6.5 cups/ week	6.5 cups/ week	7 cups/ week	7 cups/ week	8.5 cups/ week	8.5 cups/ week	10 cups/ week	10 cups/ week

What are fruits and vegetables?

Deciding whether a produce item is a fruit or a vegetable can be challenging because they are defined by their botanical parts. A fruit is the edible reproductive body of a plant that contains seeds, such as apples, peaches, and pears.[8] Common garden vegetables that are actually fruits include cucumbers, squash, peppers, and tomatoes. Although they grow around a seed, olives are classified in the MyPyramid food guidance system as a member of the oil group. Vegetables, in contrast, encompass all other edible parts of a plant including stems, leaves, roots, tubers, bulbs, and flowers.[8] Celery, salad greens, carrots, potatoes, onion, and broccoli are just a few examples of vegetables.

Despite their botanical differences, fruits and vegetables are essential to maintain good health and prevent chronic diseases. The fruit and vegetable group is rich in vitamins and minerals, such as vitamin A, vitamin C, folic acid, and potassium, as well as dietary fiber and the phytochemicals that give fruits and vegetables their color. Most fruits and vegetables are also low in fat, calories, and sodium. Avocado, a fruit high in mono-unsaturated fat, is one of the few exceptions.

Research shows that the more colors of fruits and vegetables consumed, the greater the health benefits. Phytochemicals contained in the different colored fruits and vegetables include lycopene (red), anthocyanins (red, blue/purple), phenolics (blue/purple), lutein (green), indoles (green or white and from the crucifer family), beta-carotene (orange), bioflavonoids (orange/yellow), and allacin/allium (mostly white-members of the onion family).[9]

Burden

Current research demonstrates a positive association with fruit and vegetable intake and improved health. Health benefits of fruit and vegetable consumption include a reduced risk of major diseases and health conditions, such as cardiovascular disease, hypertension, stroke, cancer, obesity, birth defects, and diverticular disease. Other possible health benefits of eating fruits and vegetables include reduced risk for type 2 diabetes and possibly delayed onset of age-related indicators, such as cataracts and macular degeneration.[7]

- Cardiovascular Disease - Heart disease and stroke, the principal components of cardiovascular disease, are the first and third leading causes of death for both men and women in the United States and California.[10, 11] In addition, approximately 70 million Americans are living with some type of cardiovascular disease. The cost of cardiovascular disease was estimated to be $393.5 billion in 2005.[12] Large, prospective studies have demonstrated a direct, inverse relationship between consumption of fruits and vegetables and development of medical conditions such as heart attack and stroke.[13] Increasing evidence also indicates that dietary patterns characterized by a high intake of fruits and vegetables are associated with lower cardiovascular risk factors including obesity, hypertension, and type 2 diabetes.[13]

- Cancer - Cancer is the second leading cause of death in the United States and California.[10, 14] It is estimated that for 2005, approximately 570,280 Americans - more than 1,500 each day - are expected to have died of cancer and 1,372,910 new cases are expected to have been diagnosed.[14] Scientific evidence suggests that about one-third of those deaths are related to nutrition, physical inactivity, obesity, or overweight and could have been prevented.[15]

  The National Institutes of Health put a national estimate of $189.9 billion as the projected cancer cost burden in 2004.[16] Scientists at the National Cancer Institute found in their review of worldwide cancer research that, for most cancer sites, persons with low fruit and vegetable intake (at least the lower one-fourth of the population) experience about twice the risk of cancer compared to those with high intake.[17] In addition, an evidence based review of the literature shows a strong and consistent protective association of fruit and vegetable intake against cancers of the mouth, pharynx, esophagus, stomach, lung, colon, and rectum and probable for larynx, pancreas, breast, and bladder.[3] Some of these findings, however, are not unequivocal.[18, 19]

- Obesity - According to Eric Bost, the Undersecretary of Food, Nutrition, and Consumer Services of the USDA, approximately 60 million adults in the United States are obese and, if the trend continues, it is expected to rise to 69 million by 2010.[20]

  The cost of obesity in the United States was $117 billion in the year 2000, which included both indirect and direct costs.[21] In California, the total cost of physical inactivity, obesity, and overweight was estimated at $21.7 billion in 2000 and projected to be $28 billion in 2005.[22] There is an inverse relationship between eating fruit and being overweight. Adults and children who reported eating more servings of fruit daily had a lower body mass index (BMI) than others.[23] Consumption of fruits and vegetables, which are low in calories and high in fiber and water, may be useful in weight reduction and weight management.[5]

- Diabetes - In 2002, there were 13.3 million cases of diagnosed diabetes in the United States and five million undiagnosed cases. Total direct and indirect cost of diabetes in the United States in 2002 was estimated at $132 billion. The cost includes disability, work loss, and premature mortality.[24] Some studies have suggested an association between increased fruit and/or vegetable consumption and decreased risk of developing type 2 diabetes and better control of blood sugars, especially for women.[6, 25, 26]

- Age-related conditions - Approximately 50 million people in the world are blind due to cataracts. Cataracts are most commonly found in the elderly. In the United States, age-related cataracts cost $5 billion per year. Studies suggest that consuming high levels of antioxidants, such as vitamin C and carotenoids found in fruits and vegetables, are associated with delayed development of cataracts.[27]

- Birth defects - Birth defects affect approximately 120,000 newborns in the United States each year. They are the leading cause of infant mortality and contribute substantially to

illness and long-term disability. Lifetime costs for those infants born in a single year with one or more of the 17 most clinically important birth defects have been estimated to total $6 billion. Folic acid, which is found in many fruits and vegetables, plays an important role in the prevention of neural tube defects.[28]

Incidence and Prevalence

Mean fruit and vegetable consumption falls short of recommended levels among adults, adolescents, and children in California and the nation. This statement is consistent despite the use of various methods to measure fruit and vegetable intake through detailed 24-hour recalls or records, 24-hour recalls of limited foods, food frequency questionnaires, and single or two-item measures. In some national and California-based surveys, serving sizes are assumed (not quantified); in others they are explicitly explained or asked (quantified).[29] In some cases, all potatoes are included in the count of vegetable servings, and at other times only potatoes that are not fried are included. In addition, legumes may or may not be included in the data collection instruments. Consequently, one cannot easily compare findings from a study using one method to that using a different method. Yet another complicating factor is the use of "servings" rather than "cups" in the data collection instruments, data analyses, and published results. As such, all available data within this section describes fruit and vegetable consumption as measured by servings.

The California Dietary Practice Survey (CDPS) uses a structured, non-quantitative, limited 24-hour dietary recall to measure fruit and vegetable consumption of California adults biennially. In 2005, California adults reported eating an average 4.4 servings of fruits and vegetables, with 42 percent reporting five or more servings on the day prior to the interview.[30] Orange juice, bananas, and apples were the most frequently consumed fruit by Californians of all racial/ethnic groups and lower income Californians. Green salad, tomatoes, and potatoes were the top three vegetables for all groups except Asian/Other, in which case lettuce replaced tomatoes.[31]

For California adolescents, the biennial California Teen Eating, Exercise, and Nutrition Survey (CalTEENS) uses a structured, more quantitative 24-hour dietary recall focused on fruits and vegetables. In 2004, California teens reported an average 4.4 servings of fruits and vegetables, with 42 percent reporting eating five or more servings on an average day.[32] In addition, the California Children's Healthy Eating and Exercise Practices Survey (CalCHEEPS) collects fruit and vegetable consumption data biennially from nine to 11-year-old children through a semi quantified, two-day, parent-assisted food diary. In 2005, CalCHEEPS participants reported an average 3.0 servings of fruits and vegetables, with 14 percent reporting eating at least five servings of fruits and vegetables on a typical school day.[33]

Only one fruit and vegetable surveillance instrument makes state-to-nation or between state comparisons possible. The Behavioral Risk Factor Surveillance System (BRFSS) is administered in all states and territories in the United States. The BRFSS questionnaire contains nonquantified questions about "how often" the respondents eat six categories of fruits and vegetables (i.e., fruit juice, fruit, green salad, non-fried potatoes, carrots, and other

vegetables).[34] In 2003, 27 percent of California adult respondents reported consuming fruits and vegetables five or more times per day; this compares with the national average of 23 percent.[35]

A comparable survey for adolescents is the Youth Risk Behavior Survey (YRBS). Nationwide, 22 percent of teens reported eating five or more daily servings of fruits and vegetables in 2003. Comparable population data for California is not available because the survey was given in only three California cities.[36] A different California statewide survey of seventh, ninth, and eleventh graders, the California Student Survey, asks the fruit and vegetable consumption question in a similar way. In 2003-04, 40 percent of seventh graders, 35 percent of ninth graders, and 30 percent of eleventh graders reported eating fruits and vegetables at least five times on the prior day.[37]

One in-depth source of nationally representative data is the Continuing Survey of Food Intake by Individuals (CSFII), a two-day, detailed, quantitative, 24-hour recall. This survey was supplanted by the National Health and Nutrition Examination Survey (NHANES) in 1999-00, which used the CSFII methodology. In 1999-00, individuals two years of age and older averaged, 4.7 daily servings of fruits and vegetables. Reported fruit consumption averaged 1.5 servings and vegetable consumption averaged 3.2 servings. Total mean vegetable intake included 0.3 servings of dark green/deep yellow vegetables, 1.4 serving of starchy vegetables (primarily fried potatoes), and 1.5 servings of tomatoes and other vegetables.[38]

National survey data also demonstrate that vegetable consumption tends to increase as individuals age, but fruit consumption is highest among the very young and oldest individuals in the population. Individuals of lower education and income levels tend to eat fewer servings of vegetables and fruits than do those with more education and higher income. In addition, African Americans tend to have the lowest intake of fruits and vegetables as compared to other ethnic and racial groups.[39, 40]

Trends/Contributing Factors

According to *CDPS* data from the Network's 1997 baseline to 2005, fruit and vegetable intake showed a statistically significant increase from 3.8 to 4.4 mean servings among adults. The percent eating at least five daily servings of fruits and vegetables rose from 33 percent to 42 percent ($p<.001$). Statistically significant increases were also seen in a variety of population sub groups, including those with at least high school education, who were white, who earned less than $15,000 per year, who earned $50,000 or more per year, who were women, and who were men, aged 25-50 years.[30] These findings coincide well with an increased, statewide social marketing effort to improve fruit and vegetable consumption, especially among Food Stamp eligible adult Californians, through the California Department of Public Health's Network for a Healthy California.

For California adolescents, CalTEENS data from 1998 to 2000 showed an increase in mean fruit and vegetable consumption from 4.3 to 4.5 servings; this increase was short of significance ($p<.06$). White teens reported a significant increase from 4.1 one to 4.7 servings

(p<.01). These gains were not reflected in other racial/ethnic groups.[32] Given the short timeframe of the CalTEENS data, it is too soon to suggest that these findings are trends.

From 1999-2005, CalCHEEPS data showed that mean fruit and vegetable consumption remained statistically unchanged (3.2 to 3.0 servings) among 9-11 year-old children in California.[33, 41] Among children from Food Stamp households, however, there was nearly a serving increase in fruit and vegetable intake during this period (3.5 to 4.3 servings; p<.05) from 1999-2003, while in 2005 fruit and vegetable intake dropped to 3.2 serings.[33, 41, 42] From 1999-2003, the proportion of children from Food Stamp households eating five or more servings of fruits and vegetables a day also doubled (25 to 50 percent; p<.01); however, deceased significantly (50 to 22 percent; p<.01) between 2003 and 2005.[33, 42] Interestingly, these increases coincide with the statewide implementation of the Network for a Healthy California--Children's Power Play! Campaign and projects within the Network for a Healthy California, which are designed to increase fruit and vegetable consumption among children from Food Stamp eligible households.

Between 1994 and 2002, national BRFSS data showed little change in fruit and vegetable intake, with a low of 22 percent eating five or more servings of fruits and vegetables per day in 1994, a peak of 24 percent in 1998, and a drop back to 23 percent in 2002.[43, 44] For teens, the national YRBS, with questions similar to BRFSS, showed no significant change in consumption of five or more daily servings between 1999 (24 percent) and 2003 (22 percent).[36]

Looking at both CSFII and NHANES daily servings of fruits and vegetables for individuals two years of age and older averaged 4.5 servings in1989-91; 4.9 servings in 1994-96, and 4.7 servings in 1999-00. Daily vegetable intake increased from 3.2 to 3.4 servings, then decreased to 3.2 servings. Fruit intake increased from 1.3 to 1.5 servings over the same time frame. Neither trend is statistically significant.[45]

Increased out-of-home eating may be one of the most important factors contributing to the flat or falling state of fruit and vegetable consumption among many population segments nationally. From 1994-96 and in 1998, CSFII data showed that Americans ate about one-third of their calories from out-of-home foods, compared to less than one-fifth in 1977-78. To compound the issue, foods eaten away from home equal less than half a serving of fruit and one and a quarter servings of vegetables, 35 percent of which are French fries.[46] Among California adults, between 1989 and 1999, eating out, particularly fast food, was consistently related to lower fruit and vegetable consumption.[47]

Barriers to Implementation/Myths

There are a variety of barriers associated with inadequate fruit and vegetable consumption. According to the 2005 CDPS, the most common reasons Californian's gave for not eating fruits and vegetables were they were hard to buy in fast food places, hard to get at work, hard to buy in restaurants, and too expensive. For lower income and less educated groups, cost was an even greater barrier.[48] When the respondents of CDPS were asked why they are not eating more fruits and vegetables, the most common reasons were that fruits and vegetables take too

much time to prepare, they are eating enough now, fruits and vegetables are not available, and they are not in the habit of eating fruits and vegetables. In addition to these barriers, there are numerous myths surrounding fruits and vegetables, which may contribute to decisions made by consumers to purchase, prepare, and eat them.

Myth: There are only a few fruits and vegetables that are the best for your health.
Fact: There is no single fruit or vegetable that is "the healthiest." Different fruits and vegetables are rich in different nutrients, and that is why it is important to eat a variety of fruits and choose vegetables from each of the five vegetable subgroups (dark green, orange, legumes, starchy, and other vegetables) every day.[1]

Myth: Fresh fruits and vegetables are more nutritious than frozen, canned, or dried.
Fact: Most frozen, canned, and dried fruits and vegetables are processed immediately after harvest, preserving much of the produce's nutrient content. For people who do not have access to local produce, frozen, canned, or dried fruits and vegetables can be just as nutritious or may even have more nutrients as compared to produce that has been shipped a long distance. Eating fruits and vegetables in a variety of forms (fresh, frozen, dried, and canned) will ensure a balance of important nutrients, as well as save money and preparation time. When choosing frozen, canned, or dried fruits and vegetables, select those without added sugar, high fat sauces, or added sodium.[49]

Myth: Drinking 100 percent fruit and vegetable juices throughout the day is just as healthy as eating whole fruits and vegetables.
Fact: The majority of daily fruit and vegetable requirements should be met by consuming whole fruits and vegetables. Consuming large amounts of juice can increase caloric intake without the health promoting properties of the fiber found in whole fruits and vegetables.[1]

Myth: Taking a daily multi-vitamin reduces the requirements for fruits and vegetables.
Fact: Pills, powders, or supplements cannot replicate the combined effects of the vitamins, minerals, fiber, and phytochemicals found in fruits and vegetables and other healthy plant foods. Taking a multi-vitamin may supplement vitamins and minerals that are missed on a given day, but it does not change the recommended daily amounts of fruits and vegetables that a person needs.[50]

Myth: Organically grown fruits and vegetables are much more nutritious than those that are not organically grown.
Fact: Organically grown food is food grown and processed using no synthetic fertilizers or pesticides. Pesticides derived from natural sources (e.g., biological pesticides) may also be used in producing organically grown food. There is no evidence, however, that organically grown fruits and vegetables have more vitamins, minerals, and phytochemicals than those that are not organically grown.[51]

Myth: Fruits and vegetables contain a lot of pesticides and are unsafe to eat.

Fact: The United States has strict standards to protect the food supply. While pesticides are used to protect food from pests, such as insects, rodents, weeds, mold, and bacteria, the Environmental Protection Agency sets standards on the amount of pesticides that may remain on food. These standards are monitored closely to ensure that food, including fruits and vegetables, are safe for all people to eat.[52]

Myth: Fruits and vegetables take too much time to prepare.
Fact: Fruits and vegetables are the "original fast food." Many are ready-to-eat, like fresh or canned fruit for snacking, and ready-to-cook, like frozen pre-cut vegetables. Cooking vegetables in the microwave is another way to prepare a healthy entrée or side dish in minutes.

Myth: Fruits and vegetables are expensive.
Fact: According to a study conducted by the Economic Research Service of USDA that used 1999 A.C. Nielson Homescan data, a consumer can eat three servings of fruits and four servings of vegetables daily for 64 cents (this may under-represent costs in some states such as California).[53] This represents 12 percent of daily food expenditures per person, so consumers have 88 percent of their food dollars left to purchase food from the other primary food groups and low-income households have 84 percent of their food dollars left. The authors of the study note that the prices in 2003 would be ten percent higher on average than the prices in 1999. Likewise, prices vary widely depending upon the region, state, season, and type of produce items. To get the most produce at the best price, it is helpful to buy fresh fruits and vegetables in season, shop for daily or weekly specials, use fruit and vegetable coupons, and choose produce at local farmers' markets.

Myth: Fruits and vegetables spoil too quickly, so buying them is a waste.
Fact: Fresh fruits and vegetables, like apples, sweet potatoes, and oranges, can last several weeks in the refrigerator, while other produce, such as strawberries, raspberries, and peaches need to be consumed shortly after purchase. The key to preventing spoilage is to select a reasonable quantity of fresh, high-quality, in-season produce that is free of bruises and not overripe. Once the produce is brought home, it needs to be stored in appropriate conditions and consumed in a timely fashion.[54] Fresh fruits and vegetables can also be canned or frozen to extend their shelf life for months.

Common Concerns/Strategies

An overarching concern among the public health community, advocates, and consumers is that fruits and vegetables are not as readily available to purchase and consume as are other unhealthy foods, especially in low-income communities.[55] California cities and even rural areas are also surrounded with advertising and marketing messages and images that encourage unhealthy dietary practices. These conditions require the implementation of large scale, population-based, and systemic environmental and policy changes to make it easier for individuals and families to choose healthy foods.[56] The following approaches may contribute

to the development of communities that empower Californians to make healthy food choices on a regular basis:

- Support and invest in evidence-based social marketing campaigns that use a social ecological approach to increase fruit and vegetable consumption.
- Encourage the purchase of fruits and vegetables through point-of-sale merchandising, promotions, and advertising, and by increasing convenience and reducing costs.[57, 58]
- Increase the availability of affordable, quality fruits and vegetables and decrease the availability of unhealthy foods in schools, community youth organizations, child care centers, worksites, foodservice establishments, churches, grocery stores, convenience stores, and other places where Californians make food choices.[57, 58]
- Work with the media to publicize the need for increased fruit and vegetable consumption and communicate environmental, policy, and consumer oriented solutions and steps to action.
- Work with the entertainment industry and health advocates to achieve a better balance of healthy eating messages and images on television, radio, billboards, and in print publications.
- Work with the restaurant and vending industries and health advocates to achieve a better balance of healthful, competitively priced fruit and vegetable choices.
- Advocate for increased high quality, well prepared fruit and vegetable offerings through the federal school meal programs.
- Advocate for increased fruit and vegetable offerings through federal food programs, such as the Child and Adult Care Food Program and Woman Infants and Children (WIC) food package.
- Advocate for the implementation of innovative, practical, and effective programs, such as the California 5 a Day-for Better Health! Campaign and Fruit and Vegetable Snack Program for schools.

Opportunities for Improvement

Access to a variety of colorful, affordable fruits and vegetables is essential to the short- and long-term health, vitality, and productivity of California's children, adolescents, and adults. Although little is known about the impact of policy approaches in increasing fruit and vegetable consumption among Californians, the following recommendations hold promise in shaping communities throughout the state where choosing fruits and vegetables is easy and socially supported.[56]

Opportunities for schools and after-school programs

The California Obesity Prevention Plan Summary recommends that schools:[59]

- Advertise only healthy foods and beverages on school grounds and use alternatives to foods in fundraising, incentive, and other programs.
- Maximize the availability of fresh and regional foods through initiatives such as farm-to-school programs.

The California Nutrition Network for Healthy, Active Families and California 5 a Day-for Better Health! Campaign Joint Steering Committee had some of the following recommendations: [60]

- School boards overseeing schools that participate in child nutrition programs can adopt local school wellness policies that, at a minimum, implement and enforce nutrition and beverage standards, as defined in the California Education Code, for all foods and beverages available on school campus. The local school wellness policies can also promote increased consumption of fruits and vegetables.
- School boards can also adopt policies that:
  - Require the implementation of comprehensive Farm to School programs, which include school gardens, local purchasing of fruits and vegetables, salad bars, and comprehensive nutrition education where the school cafeteria models healthy eating.
  - Ensure full participation in federal nutrition assistance programs, including National School Lunch, School Breakfast, Summer Lunch, and the After School Snack programs.
  - Offer breakfast where it is not currently available and, where breakfast is already available, establish policies to increase participation through requirements for universal free breakfast and second chance breakfast.
  - Require all schools, where 50 percent or more of the children are at or below 185 percent of the Federal Poverty Level, to utilize the Provision two option to provide all children with National School Lunch and School Breakfast.
  - Schools and after-school programs can implement healthy fundraising policies, healthy reward policies, and incorporate healthy eating and sound nutrition principles into lessons and activities.

Opportunities for worksites[61, 62]

Employers can:

- Assure that healthy foods, including fruits and vegetables, are served at meetings, potlucks, and other workplace gatherings.
- Arrange with local growers or produce distributors to have a box of fresh produce delivered weekly or at regular intervals to each subscribing employee.
- Collaborate with nearby restaurants to offer healthy foods to their employees and promote nutritious specials at reasonable prices.
- Take advantage of existing tax laws in order to provide healthy foods for their employees on a pre-tax basis and collect it through payroll deductions.
- Establish a culture that supports fruit and vegetable consumption by promoting healthy eating to employees.

Employers and employees can:

- Establish on-site farmers' markets.
- Work with catering truck owners and operators to encourage them to offer low cost, healthy choices, with an emphasis on fruits and vegetables.
- Set nutrition standards for worksite vending machines and cafeterias to ensure that quality, affordable fruits and vegetables are readily available.

Opportunities for supermarkets and other retail establishments[56, 57]

Retailers can:

- Offer quality, affordable, and tasty fruits and vegetables in their stores.
- promote fruits and vegetables through point-of-purchase signs, multimedia advertisements, food demonstrations, in-store promotions, and store tours.
- Increase their produce display space and locate fruits and vegetables in high-traffic areas.

Opportunities for restaurants and other food service establishments[56, 58, 60]

- Cities and counties can adopt policies that promote increased consumption of healthy foods, including fruits and vegetables, by requiring nutrition labeling in restaurants.
- Restaurants can:
  - Promote an appealing, tasty, and healthy menu items through point-of-purchase signs, labels, advertisements, and other forms of information sharing.
  - Offer more appealing, affordable, and tasty fruit and vegetable options.
  - Provide discounts and coupons for healthy entrées, side dishes, desserts, beverages, and entire meals.
  - Offer fruit and vegetable substitutions for French fries and other less than healthy side dishes at no extra charge to their customers.

Opportunities for communities[60]

- Cities can design public transportation routes so that residents can access markets that sell fresh fruits and vegetables.

Cities and counties can:

- Establish general plan and zoning policies that require and encourage the development of community gardens, retail stores, farmers' markets, and other sources of healthy foods in communities throughout California, and establish restrictions on the density and location of fast food venues.
- Adopt policies that require and encourage all certified farmers' markets, particularly in low-income communities, to accept Electronic Benefit Transfer cards for the Food Stamp Program.
- Adopt local ordinances that promote outdoor advertising of healthy foods, including fruits and vegetables, and restrict outdoor advertising of unhealthy foods and beverages.
- Adopt policies that require at least 50 percent of all foods and beverages sold in vending machines and in food service venues at public facilities meet nutrition and beverage standards identified within California statute and that the pricing structure is designed to encourage the purchase of healthy options.

Clinical Implications[7]

A variety of nutrients in fruits and vegetables promote good health and can help prevent or reduce such medical conditions as neural tube defects, high blood pressure, and chronic diseases such as cancer and cardiovascular disease.

Resources/Web Sites

- American Cancer Society, http://www.cancer.org.
- American Diabetes Association, http://www.diabetes.org.
- American Heart Association, http://www.americanheart.org.
- California Avocado Commission, http://www.avocado.org.
- California Certified Organic Farmers, http://www.ccof.org.
- California Department of Education, http://www.cde.ca.gov/re.
- California Department of Food and Agriculture, http://www.cdfa.ca.gov.
- California Fig Advisory Board, http://www.californiafigs.com.
- California Foundation for Agriculture in the Classroom, http://www.cfaitc.org.
- California Kiwifruit Commission, http://www.kiwifruit.org.
- California Pear Advisory Board, http://www.calpear.com.
- California Project LEAN, http://www.californiaprojectlean.org.
- California Prune Board, http://www.prunes.org.
- California Strawberry Advisory Board, http://www.calstrawberry.com.
- California Table Grape Commission, http://www.tablegrape.com.
- California Tomato Board, http://www.tomato.org.
- California Tree Fruit Agreement, http://www.caltreefruit.com.
- Centers for Disease Control and Prevention, http://www.cdc.gov.
- Certified Farmers' Market, http://cafarmersmarkets.com.
- Dole Food Company, Inc., http://www.dole5aday.com.
- Fresh Produce and Floral Council, http://www.fpfc.org.
- Healthy Kids Resource Center, Alameda County Office of Education, http://www.hkresources.org.
- Melissa's/World Variety Produce Inc., http://www.melissas.com.
- Monterey Mushroom, Inc., http://www.montmush.com.
- National Cancer Institute, National 5 A Day For Better Health Program, http://www.5aday.gov.
- Network for a Healthy California, www.networkforahealthycalifornia.net
- Produce for Better Health Foundation, http://www.5aday.com.

- Produce Marketing Association, http://www.pma.com.
- Sunkist Growers, Inc., http://www.sunkist.com.
- United Fresh Fruit and Vegetable Association, http://www.uffva.org.
- United States Department of Agriculture, http://www.usda.gov.
- United States Department of Agriculture, MyPyramid, http://www.MyPyramid.gov; http://www.mypyramid.gov/pyramid/vegetables.html; and http://www.mypyramid.gov/pyramid/fruits.html.

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California Food Guide

Whole Grains

By Susan Mattingly, M.S., R.D.

What's New:

The Dietary Guidelines for Americans 2005 includes key recommendations for consuming three or more ounce-equivalents of whole-grain products per day, with the rest of the recommended grains coming from enriched or whole-grain products. In general at least half the grains should come from whole grains. Similarly, children and adolescents should consume whole- grain products often; at least half the grains should be whole grains.[1] MyPyramid also includes information about grains. It can be viewed at www.mypyramid.gov

The following each count as "1 ounce-equivalent" (one serving) of grains: ½ cup cooked rice, pasta, or cooked cereal; one ounce (oz) rice or dry pasta; one slice bread; one small muffin (one oz); one cup ready-to-eat cereal flakes.[1]

*In addition, Gold and Black stamps, known as Whole Grain Stamps, started in early 2005 but revised in 2006, are packaging symbols designed by the Whole Grains Council to help consumers identify whole-grain products at a glance. The stamps are used only by companies who are members of the Whole Grains Council and are used on a voluntary basis. The 2006 version of the symbol indicates the level of whole-grain content:

- **100% Whole Grain Stamp:** designates products where all of the grain is whole grain, with 16 grams or more whole grain per serving.
- **Whole Grain Stamp:** designates products with at least 8 grams of whole grain per serving.[2]

(16 grams = a full MyPyramid serving 2)

Public Health Implications

- Healthy People 2010 Objective 19-7: (http://www.healthypeople.gov/document/tableofcontents.htm) Increase the proportion of persons aged two years and older who consume at least six daily servings of grain products, with at least three being whole grains. Target: 50 percent.

Other related health benefits related to whole grain consumption:

- Reduced risk of heart disease and stroke with increased whole grain consumption.[3, 4, 5]
- Reduced cancer mortality rate with increased whole grain consumption.[6]
- Whole grains and dietary fiber are increasingly shown to be important in preventing digestive disorders such as constipation, hemorrhoids, and diverticular disease.
- Reduced risk of developing diabetes with increased whole grain intake.[7]

Definition

Grain is a member of the grass family that produces a dry edible one seeded fruit called the kernel, grain, or berry. Common grains found in the United States include wheat, oats, corn, rice, rye, barley, millet, sorghum, quinoa, flaxseed, and buckwheat. Grains are divided into two subgroups by amount of processing: whole grains and refined grains.

Whole grains or foods made from them contain the entire grain seed, usually called the kernel, which includes the bran, germ, and endosperm. If the kernel has been cracked, crushed, or flaked, it must retain nearly the same relative proportions of bran, germ, and endosperm as the original grain in order to be called whole grain.[8]

Refined grains have been processed to remove the bran and germ. This gives grains a finer texture and improves their shelf life, but it also removes dietary fiber, iron, minerals, many B vitamins, lignans, phytoestrogens, phenolic compounds, and phytic acid. Most refined grains are enriched or fortified with certain B vitamins (thiamin, riboflavin, niacin, and folic acid) and iron after processing. Fiber and other minerals and vitamins are not added back to enriched grains.

Often food companies will make a health claim about grains on a food label. A health claim is a statement on a food label that shows a relationship between a nutrient or other substances in a food and a disease or health-related condition. The U.S. Food and Drug Administration require that a food product contain at least 51 percent by

weight of whole grain in order to use the FDA approved whole grain health claim on the food label.

In 2005 the U.S. Department of Health and Human Services and the U.S. Department of Agriculture revised the Dietary Guidelines for Americans' recommendations for the Grain group. See Table 1 for the recommended number of daily servings for grains. See Table 2 for the definition of serving sizes for whole grains.

Table 1: Recommended Number of Daily Servings of Grains:[1]

Calorie Level	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800
Grains All oz eq	3	4	5	5	6	6	7	8	9	10
Whole grains All oz eq	1.5	2	2.5	3	3	3	3.5	4	4.5	5
Other grains All oz eq	1.5	2	2.5	3	3	3	3.5	4	4.5	5

*The following each count as 1 ounce-equivalent (1 serving) of grains: ½ cup cooked rice, pasta, or cooked cereal; 1 ounce rice or dry pasta; 1 slice bread; 1 small muffin (1 oz); 1 cup ready-to-eat cereal flakes.[1]

Table 2: A Serving of Whole Grain Is:

Product	Serving size
Whole grain cereal	1 oz dry cereal or ½ cup cooked
Whole grain bread	1 slice, 1 small roll or ½ medium bagel
Whole grain crackers	3-4 small crackers
Brown rice	½ cup cooked
Whole grain pancakes	4 inch pancake
Popcorn	3 cups popped
Whole wheat pasta	½ cup cooked

Grains are important foundations for a healthy diet. The grain group contributes complex carbohydrates, thiamin, riboflavin, niacin, folic acid, magnesium, and iron to the diet. Grains themselves are also low in fat, but sometimes fats or oils are added in processing or preparation of foods containing grains. Whole grains provide B vitamins, vitamin E, selenium, zinc, copper, magnesium, and fiber. Whole grain products provide more dietary fiber, calcium, niacin, magnesium, and potassium than enriched grain products. Whole grain products also contain a variety of nonnutritive substances known as phytochemicals which are thought to protect the body's natural defenses against chronic disease.

Burden

Evidence from clinical trials, prospective cohort studies, and metabolic research has linked increasing intake of whole grains to a reduction in coronary heart disease; reduced risk of some types of cancer, and diabetes; and may help with weight management.[9] Approximately 70 million Americans are living with some type of cardiovascular disease. The cost of cardiovascular disease is estimated to be $393.5 billion in 2005.[10] Cancer is the second leading cause of death in the United States. In 2005, approximately 570,280 Americans are expected to die of cancer, which are greater than 1,500 each day.

Scientific evidence suggests that about one-third of those deaths are related to nutrition, physical inactivity, obesity or overweight, and could be prevented.[11] Whole grains play a part in a low-fat diet for prevention of heart disease as a means to decrease serum cholesterol. Whole grains may reduce the cancer risk by providing fiber and starches that ferment in the colon to improve gastrointestinal health. Phytochemicals with anti-carcinogenic properties are found in whole grains. Whole grain and fiber along with a low-fat diet may be helpful in managing risk factors that are related to diabetes by improving glucose responses and decreased insulin resistance.[12]

Incidence and Prevalence

Per capita grain consumption has increased nearly 50 percent since the early 1970s through 2000 which can mainly be attributed to increased refined grain consumption.[13] The average American eats less than one serving daily of whole grains, and over 30 percent of Americans never eat whole grains.[14] Increased intake of whole grains shows a positive correlation with age, education, and income level.[15, 16, 17] Although many Californians may be consuming significant amounts of grain products, they are not reaching the recommended daily intake of whole grain products. Only 52 percent of adults interviewed for the 1997 California Dietary Practices Survey reported eating at least one serving per day of whole grain bread or corn tortillas on the day preceding the survey.[18] More importantly, 44 percent of adults did not consume any whole grain breads, corn tortillas or high fiber cereals on the day preceding the survey.[18] Twenty-eight percent of California adolescents interviewed for the 1998 California Teen Eating, Exercise, and Nutrition Survey reported eating no serving of whole grain products on the day preceding the survey and 53 percent reported eating one to three servings.[19]

Trends/Contributing Factors

The knowledge of the importance of grains in the human diet has spanned decades. Early processing of grains crushed the grain but kept the bran, endosperm, and germ. When the need for large scale processing increased, manufacturers developed methods that refined the grain to produce white flour which made the bread softer and lighter in color. The refinement process, unfortunately, removed the germ and the bran. In 1998, the Food and Drug Administration required enriched grain products be fortified with folic acid.

Intake of grain products has increased from record lows in the 1970s but intake of whole grains still remains low. There are a number of reasons to explain the low intake of whole grain foods. Based on focus groups and interviews, consumers reported problems in identifying whole grains foods and in familiarity with methods of preparation and cooking whole grains. In addition, the cost of whole grain rice, bread, and pasta tends to be greater than the cost of refined grain products, which is a deterrent for low income families.

Barriers to Implementation/Myths

- All brown or dark colored bread/grain products are not necessarily whole grain. The color of a bread/grain product may be dark due to other ingredients such as molasses or brown sugar.
- Bran products are not whole grain. Bran is only one part of the whole grain.
- Words such as “multi-grain,” “stone ground,” “100% wheat,” “organic,” “cracked wheat” and “7 grain,” etc., are not necessarily whole grain products. Consumers should find the following words on the ingredient label of foods, if the food contains whole grains: whole wheat, wild rice, whole oats, whole-grain corn, oatmeal, bulgur, brown rice, and graham flour.

Common Concerns/Strategies

Ease of identification of food products that are good sources of whole grains is a challenge. Adoption of universal labeling, similar to the Whole Grain Stamp used by the Whole Grains Council is a possible strategy. It is important to emphasize the role of whole grains as part of a healthful diet. Contributing strategies could include development of positive, practical, and simple key educational messages similar to those used in the USDA’s 5 A Day fruit and vegetable campaign. In a nationwide survey, Nutrition and You: Trends 2000, conducted by the American Dietetic Association found that 90 percent of people who completed the survey believed whole-grain breads and cereals were “healthier” than regular products. Despite this, it is not clear why this knowledge is not being translated into higher consumption of grains. Industry should be encouraged to continue to develop high quality, tasteful whole grain food products so that consumers will more frequently choose whole grains over processed grain products. Excessive intake of processed grain products and by products such as high fructose corn syrup may contribute to the current obesity epidemic.

Common strategies for consumers to increase whole grain intake include:

- Eat whole grain cereals for breakfast.
- Purchase whole grain breads, grain tortillas, grain bagels, and grain pasta.
- Use whole grain foods such as brown rice, cracked wheat, or quinoa as a side dish.

- Make pancakes and muffins with whole grains by using half whole wheat flour and half white flour. Also add oats and other whole grains to your batter mix.

Opportunities for Improvement

- Promote consumption of whole grain products through nutrition education in the Food Stamp Program.
- Encourage Food programs, such as Child Care Nutrition Programs, School Nutrition Programs, and Adult Nutrition Programs, to provide whole grain products daily.
- Develop a universally accepted standardized seal for packaging indicating the amount of whole grain in each product such as the Whole Grain Stamp.
- Encourage the food industry to increase the number of products on the market that promote increased use of whole grains.
- Implement a social marketing campaign to promote increased whole grain consumption.

Resources/Web Sites

- 2005 Dietary Guidelines, http://www.health.gov/dietaryguidelines/dga2005/document/
- American Association of Cereal Chemists, http://www.aaccnet.org
- American Cancer Society, http://www.cancer.org
- American Heart Association, http://www.americanheart.org
- Healthy People 2010, http://www.healthypeople.gov
- The American Dietetic Association, http://www.eatright.org
- The Bell Institute of Health and Nutrition, http://www.bellinstitute.com
- The Popcorn Institute, http://www.popcorn.org
- The Whole Grains Council, http://www.wholegrainscouncil.org
- United States Department of Agriculture, MyPyramid, http://www.MyPyramid.gov
- University of Minnesota, The Whole Grain http://www.thewholegrain.com
- Wheat Foods Council: The Grain Nutrition Information Center, http://www.wheatfoods.org

Clinical Implications

- Consumption of whole grains contributes to bowel health, preventing constipation and possibly reducing the risk of colon cancer.
- Whole grains provide protein, which is essential for growth, maintenance and repair of tissue.
- Folic acid found in fortified grains and whole grains helps to reduce neural tube defects and appears to be a factor in reducing homocysteine, which may be a risk factor in coronary artery disease.
- Zinc, found in whole grains, helps the body fight infection.
- Vitamin E and selenium, found in whole grains, can protect cells from damage from free radicals.
- Whole grains provide bulk which aids satiety and, therefore; may facilitate weight control.
- Whole grains provide complex carbohydrates as an energy source for active lifestyles.

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* Photo source: Courtesy of Oldways Preservation Trust and the Whole Grains Council, www.wholegrainscouncil.org

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California Food Guide

Milk and Milk Products

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What's New?

- MyPyramid recommends that for adults and children over the age of two, most milk group choices be fat-free or low-fat.[1]
- Based on food intake data, 78 percent of children ages 9-18 and 85 percent of adults 51 years of age and older do not meet their daily calcium requirements.[2]
- Americans two years of age and older consume, on average, one and a half cups a day of milk and milk products vs. the two to three cups recommended in the Dietary Guidelines for Americans 2005 (Dietary Guidelines).[3, 4] Nonfat and low-fat milks are not recommended for use during the first two years of life.[5]
- Many African Americans and Asian Americans do not get enough calcium from their daily diets.[6, 7]

Public Health Implications

At least three cups of milk and milk products, or other non-dairy sources of calcium, are needed for those nine years of age or older to meet their calcium requirements.[4] Adequate consumption during adolescence is particularly important because peak bone mass is largely achieved during this life stage and continues until the mid 20's.

Healthy People 2010 Objective 2-9: Reduce the overall number of cases of osteoporosis. Target: eight percent of adults. Baseline: ten percent of adults aged 50 years and older.[8] In California approximately 15 percent of women 50 years and older have been told that they have bone loss, osteopenia, or osteoporosis.[9]

Healthy People 2010 Objective 19-11: Increase the proportion of persons aged two years and older who meet the dietary recommendations for calcium. Target: 75 percent. National baseline: 46 percent.[8]

Definition

Milk and Milk Products

Milk Group: The United States Department of Agriculture (USDA) released its MyPyramid recommendations in 2005. The Milk Group is also known as the milk, yogurt and cheese group and includes all fluid milk products and many foods made from milk that retain their calcium content. Foods made from milk that have little or no calcium, such as cream cheese, cream, and butter are not considered part of the milk group.[1] See Table 1 for the calcium content of milk and milk products.

One cup equivalent for the milk group is defined in the Dietary Guidelines for Americans[4] as:

- One cup low-fat/fat-free milk, yogurt
- One and a half ounces of low-fat or fat-free natural cheese
- Two ounces of low-fat or fat-free processed cheese

Dairy Products: Dairy products, currently not defined in the Dietary Guidelines, include a broader range of milk products including all ranges of fluid milk (fat-free to whole milk, buttermilk, acidophilus milk, and flavored milks), cheeses, cottage cheese, yogurt and yogurt drinks, butter, cream, sour cream, and ice cream. Of these, milk, natural and aged cheeses, and yogurt products are excellent calcium sources (see Table 1). In contrast, butter, cream, and cream cheese contain no or minimal calcium.

Note that for the purposes of this chapter, we will be referencing primarily to cow's milk. While some individuals do consume goat and sheep's milk and cheeses, such products are not part of this discussion. There is a section in this chapter on non-dairy calcium containing alternatives.

The calcium content of fluid milk has to meet California standards, which exceed federal standards. This has been accomplished through the fortification of milk with non-fat milk solids. These offer improved taste in addition to nutritional benefits. The additional calcium content is most pronounced in the one percent fat version of milk. For example, one cup of federal standard one percent milk contains 311 mg calcium, while one cup of California standard one percent milk contains 380 mg calcium. Furthermore milk produced under California standards contains up to 33 percent more protein than milk produced under federal standards. Other nutrients are affected minimally by the fortification of fluid milks.[10]

Table 1: Calcium Content of Milk and Milk Products[10, 11]

High calcium sources (about 300 mg/serving)	Serving Size	Mg Calcium
Fluid milk (fat-free or one percent preferred)	1 cup	311* 380 †
Evaporated milk (fat-free preferred)	½ cup	320
Sweetened condensed milk (fat-free preferred)	½ cup	292
Yogurt, fat-free or low fat preferred	1 cup	355
Natural or processed hard cheeses, low fat preferred (Cheddar, Monterey Jack-types)	1 ½ oz natural; 2 oz processed	287
Ricotta cheese	½ cup	335
Parmesan cheese	¼ cup	276
Pudding	1 cup	306
Custard or flan	¾ cup	296
Frozen yogurt	1 cup	304
Cream soup	1 ½ cup	320
Medium calcium sources (about 100 mg/serving)		
Cottage cheese	1 cup	138
Ice cream	½ cup	85

* 311 mg calcium for fat free milk using the Federal Standards for milk.
† 380 mg calcium for one percent milk using the California Standards for milk.

Milk Nutrient Profile

Milk and dairy products provide about 63 percent of the calcium available in the United States food supply.[12] Milk and dairy products are also good sources of phosphorous, riboflavin, vitamin B-12, protein, potassium, zinc, magnesium, and vitamin A (32 percent, 26 percent, 21 percent, 19 percent, 19 percent, 16 percent, 16 percent, and 15 percent of food supply of these nutrients, respectively). Vitamin D fortified milk and breakfast cereals are the primary sources of dietary intake of vitamin D in the United States.[13]

This unique package of nutrients speaks to the benefits of including milk and dairy products in the diet for reasons other than their calcium content.[14] Numerous studies have reported that consumption of milk and dairy products improves the overall nutrient density and quality of the diet in women, older adults, children, and adolescents.[15]

Health Benefits of Milk and Milk Products

Milk and milk products are an easy and economical way to meet calcium requirements. Recent research supports the beneficial role of milk and milk products in the diet beyond bone health. Specifically, several studies suggest that adequate milk or calcium

intake may reduce the risk of several chronic diseases besides osteoporosis, including mild hypertension, kidney stone formation, and some cancers.[16, 17, 18, 19, 20] Cultured fat free and low-fat dairy foods such as yogurt may offer health benefits including improved lactose digestion, control of intestinal infections, and enhanced immune function.[21]

Milk and milk products have traditionally been associated with bone health in western societies. To be sure, dietary calcium has been demonstrated to enhance bone health throughout life, with high intakes being associated with formation of greater bone mass in childhood and adolescence, and reduced bone loss and fracture risk in the elderly. Children and adolescents especially require adequate calcium, vitamin D, protein and other dairy nutrients for proper bone growth. Bone mass later in life is determined primarily by peak bone mass, of which more than 90 percent is attained by age 20 years.[22]

Vitamin D is necessary for proper bone growth from infancy through puberty and for bone maintenance in adulthood. Vitamin D is found in fortified milk, cheese, whole eggs, liver, salmon, and fortified margarine. The skin also has the ability to synthesize vitamin D if exposed to sunlight on a regular basis.[23] It is estimated that 30 percent of adolescents nationwide may be vitamin D deficient, putting them at risk for fractures, stunted growth and debilitating osteoporosis later in life.[24] Recently, cases of rickets or vitamin D deficiency have resurfaced in the United States, making the adequate consumption of vitamin D-fortified fluid milk even more important.[25] In addition, increased use of sunscreens in the United States has further contributed to vitamin D deficiencies.[26, 27]

Considerable scientific evidence indicates that calcium or calcium-rich, low-fat dairy foods have a beneficial effect on blood pressure regulation.[16, 18] Among those studies is the landmark controlled-feeding intervention trial Dietary Approaches to Stop Hypertension (DASH). This study demonstrated that a low-fat dietary pattern high in fruits and vegetables (eight to nine servings a day) coupled with low-fat dairy products (three servings a day) produced greater reductions in systolic and diastolic blood pressure than a control diet or a diet high only in fruits and vegetables.

A role for milk and dairy products in weight management for children and adults is beginning to emerge.[28, 29] Recent studies showed that people on a reduced-calorie diet who consumed three servings of milk, cheese or yogurt each day lost significantly more weight and more body fat than those who just cut calories while consuming little or no dairy.[28] Consumption of dairy foods resulted in greater weight loss benefits than when a calcium supplement was taken; indicating that other factors in dairy foods may work synergistically to exert this effect. A recent study concluded that dairy calcium, age, and physical activity were significantly associated with lower body fat in 9-14 year old girls.[29] However research results are not completely consistent and health professionals are encouraged to monitor ongoing findings documented in this area.

Dietary Recommendations

The Dietary Guidelines recommend daily consumption of two to three cups of fat-free or low-fat milk or equivalent milk products (however this does not apply to children under two years of age[5]).[4] This recommendation is made to ensure that the majority of the population meets its needs for calcium. The dietary recommendation for calcium, defined by the "Adequate Intake" (AI), varies with age to meet the body's varying needs for calcium at different life stages – increased needs during childhood and adolescence when bone is being accrued, and in old age when bone losses naturally occur. See Table 2 for age-specific calcium recommendations.[28]

Table 2: Dietary Recommendations for Calcium in North America[28]

Population	Age (yrs)	Calcium recommendation* (mg)
Infants	0 - 0.5	210
Infants	0.5 – 1	270
Children	1 – 3	500
Children	4 – 8	800
Teenagers	9 – 18	1,300
Adults	19 – 50	1,000
Adults	51 – 70	1,200
Adults	70+	1,200
Pregnant or nursing teenagers		1,300
Pregnant or nursing women		1,000

*Adequate Intake as defined by the Dietary Reference Intakes (Institute of Medicine, 1997).

Burden

Milk and milk products are the primary sources of calcium in the United States.[29] As described above, calcium plays a critical role in bone health and, hence, in reducing osteoporosis risk.

About ten million Americans have osteoporosis and another 18 million have low bone mass (osteopenia) and are at risk of developing osteoporosis.[30] In California, data from the California Health Interview Survey show that nearly 15 percent of women aged 50 years and older have been told by a doctor that they have bone loss, osteopenia or osteoporosis.[9]

Osteoporosis-related medical expenditures were estimated nationally at $14 billion in 1996 and $2 billion in California in 1998.[31, 32] Women, Whites, and Asians are more likely to develop osteoporosis than men, and Blacks, respectively. Lower socioeconomic status is also associated with increased osteoporosis risk in White and Black women.[33]

As indicated earlier, calcium and other nutrients in milk and dairy products not only play a role in bone health, but also in other chronic health conditions. Using data from

prospective and randomized controlled trials, McCarron and Heaney (2004) have suggested that eating three to four servings of dairy foods each day, as part of a healthy diet, could result in cost savings of $26 billion in the first year, and more than $200 billion over five years.[34] These savings would be realized by reducing the disease burden of several common medical conditions: obesity, hypertension, type 2 diabetes, osteoporosis, kidney stones, certain outcomes of pregnancy, and some cancers.

Consumption Patterns

Nationally, representative data (1999-02) show that Americans two years of age and older consume an average of only 1.7 cups of milk a day.[35] This is half of the recommendation of the current Dietary Guidelines.[4]

When looking at a breakdown of population by age segments, we see that certain groups are at higher risk for calcium deficiency because of inadequate consumption of milk and dairy products. According to the 1999-00 National Health and Nutrition Examination Survey, only 30 percent of Americans aged two years and older met the recommendation for milk and dairy consumption. Mean calcium intake fell short of dietary recommendations especially for adolescent girls, older women, and older males.[36]

Calcium intake varies by ethnic background. African Americans and Asian Americans tend to have lower calcium intakes than Whites.[6] Eighty-six percent of African Americans do not get the daily recommended amount of calcium in their diet and only about half of all African Americans consume one or more servings of dairy products a day.[37]

In California, only about half of all California adults report drinking milk on any given day. Milk tends to be consumed most often by the youngest and oldest age groups, and the least by African Americans. About one in ten report eating yogurt and about half report eating cheese at least once in a given day. One in four California adults report consuming no milk or milk products on a given day.[38] In summary, fewer than one in three adults is likely to meet the recommendation of three servings a day.

Trends/Contributing Factors

Milk, and consequently calcium intake has been declining in children and adolescents over the past few decades. Between 1970 and 2000, mean daily calcium decreased for children and adolescents aged 3-15 years by as much as 20 percent depending on age group. In contrast, mean calcium intake increased for adult women, and remained stable for men aged 20–39 years.[36] The decline in calcium intake in children and adolescents is a public health concern; it is during adolescence (puberty) that bone mass is acquired rapidly so that by the end of puberty, about 90 percent of peak bone mass has been acquired.

In immigrant groups, more acculturated individuals tend to have lower intakes of calcium.[39] Interventions developed to improve bone health in immigrant groups should consider cultural food preferences and food ways when promoting the use of milk and dairy products.

Barriers to Implementation/Myths

Common Concerns About Milk and Milk Products

"*Lactose intolerance means I can't drink milk.*"
Lactose intolerance or lactose maldigestion is the inability to fully digest lactose, the sugar in milk, due to a deficiency of the enzyme lactase. Symptoms include bloating, abdominal discomfort and flatulence. Many people with lactose intolerance are under the impression that they need to omit all dairy products from their diet. However, there is evidence to show that the majority of people with lactose intolerance can tolerate milk products,[40] and that gradual exposure to dairy foods can improve tolerance to lactose in some individuals.[37] Suarez and associates have observed that some lactose-intolerant individuals can tolerate milk products if they are consumed in smaller amounts and spaced throughout the day.[41] Cultured milk products such as yogurt and cheeses, are often better tolerated. Finally, lactose-reduced milks are available.

"My child has a milk allergy."
Milk allergies are often due to allergic reactions to the protein components of milk, casein or whey. True milk allergies are uncommon. Only about one to three percent of children experience cow's milk allergy and they usually outgrow this by age three.[42] In adults the incidence is even lower. Individuals with true milk allergies would need to consume a milk substitute, such as a soy or rice beverage. Keep in mind that these alternatives are not a substitute for many of the nutrients in milk. In particular, calcium-fortified beverages should be selected.

"Flavored milks are too high in sugar to be part of a healthful diet."
Both unflavored and flavored 100 percent milks can be nutritious beverage choices in the context of an overall healthy diet. Flavored milks provide calcium, vitamin D and a package of nutrients comparable to unflavored milks. Children like the taste of flavored milks, and often accept them more readily. However they should be consumed in moderation as part of a healthy, balanced diet.[43] Fat-free and low-fat (1 percent) flavored 100 percent milks are generally considered acceptable beverages on K-12 campuses.[44]

"Milk is fattening; I can't drink it because I'm trying to lose weight."
There is no clear scientific evidence to indicate that consuming recommended daily servings of reduced fat milk increases risk of overweight. In fact, there is some evidence to suggest that consuming at least three servings of milk, yogurt or cheese as part of a reduced calorie diet, may help people burn more fat and lose more weight than just cutting calories alone.[28] This observation needs to be confirmed in further studies.

Alternative Sources of Calcium

While milk and dairy foods are important sources of calcium in the United States, when they are not tolerated, or consumed due to personal or religious decisions, there are other foods that provide adequate calcium. Some individuals choose to avoid animal milk because they are following a vegan or total vegetarian diet; or are lactose intolerant; have allergies; wish to avoid cholesterol, or dislike dairy products. Furthermore, the emergence of animal rights and ethics college courses and the proliferation of information on vegetarian diets has led to increased interest in plant sources for calcium.[45]

Sources of well absorbed calcium include calcium fortified soy milk and juice; calcium set tofu; soy beans and soy nuts; bok choy, broccoli, collard greens, Chinese cabbage, kale, mustard greens, and okra.[46] Other grains, beans, fruits, and vegetables can also contribute to calcium intake but cannot replace key calcium rich foods. Moreover, fortified foods such as soy milks, meat analogs, juices and breakfast cereals can add substantially to intakes of calcium, iron, zinc, vitamin B-12, vitamin D, and riboflavin.[45] However, alternative non-dairy food sources of calcium do not completely replace the nutrient package of fortified cow's milk. "Milk type" beverages such as soy, rice, or almond-based drinks are available in most California stores. Table 3, derived from the Dietary Guidelines, shows the amount of calcium in some non-dairy food sources of calcium. See Table 3 for non-dairy food sources of calcium.

While taking supplements increases one's nutrient intake and may be necessary for some individuals, it should not preclude the consumption of healthy foods rich in micronutrients. Many nutrients present in whole foods work in concert with each other, an effect not found when individual supplements are taken. Most calcium supplements do not contain the full package of nutrients found in foods like milk and dairy products.

Table 3: Alternate Food Sources of Calcium[4]

Non-Dairy Food Sources of Calcium ranked by milligrams of calcium per standard amount; also calories in the standard amount. The bioavailability may vary. (The AI for adults is 1,000 mg/day.)[a]

Food, Standard Amount	Calcium (mg)	Calories
Fortified ready-to-eat cereals (various), one ounce	236-1043	88-106
Soy beverage, calcium fortified, one cup	368	98
Sardines, Atlantic, in oil, drained, three ounces	325	177

(Cont'd) Food, Standard Amount	Calcium (mg)	Calories
Tofu, firm, prepared with nigari[b] , a half cup	253	88
Pink salmon, canned, with bone, three ounces	181	118
Collards, cooked from frozen, a half cup	178	31
Molasses, blackstrap, one tablespoon	172	47
Spinach, cooked from frozen, a half cup	146	30
Soybeans, green, cooked, a half cup	130	127
Turnip greens, cooked from frozen, a half cup	124	24
Ocean perch, Atlantic, cooked, three ounces	116	103
Oatmeal, plain and flavored, instant, fortified, one packet prepared	99-110	97-157
Cowpeas, cooked, a half cup	106	80
Food Standard Amount	**Calcium (mg)**	**Calories**
White beans, canned, a half cup	96	153
Kale, cooked from frozen, a half cup	90	20
Okra, cooked from frozen, a half cup	88	26
Soy beans, mature, cooked, a half cup	88	149
Blue crab, canned, three ounces	86	84
Beet greens, cooked from fresh, a half cup	82	19

(Cont'd) Food Standard Amount	Calcium (mg)	Calories
Pak-choi, Chinese cabbage, cooked from fresh, a half cup	79	10
Clams, canned, three ounces	78	126
Dandelion greens, cooked from fresh, a half cup	74	17
Rainbow trout, farmed, cooked, three ounces	73	144

[a] Both calcium content and bioavailability should be considered when selecting dietary sources of calcium. Some plant foods have calcium that is well absorbed, but the large quantity of plant foods that would be needed to provide as much calcium as in a glass of milk may be unachievable for many. Many other calcium-fortified foods are available, but the percentage of calcium that can be absorbed is unavailable for many of them.

[b] Calcium sulfate and magnesium chloride.

Source: Nutrient values from Agricultural Research Service (ARS) Nutrient Database for Standard Reference, Release 17. Foods are from ARS single nutrient reports, sorted in descending order by nutrient content in terms of common household measures. Food items and weights in the single nutrient reports are adapted from those in 2002 revision of USDA Home and Garden Bulletin 72, Nutritive Value of Foods. Mixed dishes and multiple preparations of the same food item have been omitted from this table.

It should be noted that calcium absorption in green vegetables varies. Oxalic acid, which is found in spinach, rhubarb, chard, and beet greens binds with the calcium in those foods and reduces its absorption. These foods should not be considered good sources of calcium. However, calcium in other green vegetables, like kale, collard greens, Chinese mustard greens and Chinese cabbage flower leaves is well absorbed.[46, 47] Also, fiber appears to have little effect on calcium absorption except the fiber in wheat bran, although somewhat variable effect.[48]

Opportunities for Improvement

The USDA MyPyramid food guidance system currently recommends two to three cups of milk and milk products each day for individuals two years of age or older. Numerous research studies, as well as recommendations from the Dietary Reference Intakes suggest that a minimum of three cups of milk or milk equivalents should be consumed daily to ensure not only adequate intake of calcium, but other key nutrients such as magnesium, phosphorus and vitamin D.[28]

Moreover, the Dietary Guidelines for Americans recommend that those who cannot tolerate or prefer not to consume milk and milk products should make sure they meet their calcium requirements by consuming non-dairy sources rich in calcium.[4]

The final report released in January 2005 by the committee preparing the Dietary Guidelines for Americans indicates the important role of low-fat dairy products in the diet, which is emphasized much more strongly than in previous releases of the guidelines.[4] Given the high nutritional quality of dairy foods, particularly low-fat dairy products, emphasis should be placed on ensuring their adequate consumption in adults and children over two years of age. Children under the age of two years should not be given nonfat or low-fat milk as they need the nutrients in breast milk or infant formula during the first 12 months of life, or in whole milk, or its equivalent during the second year of life, for growth and development. Fat intake should then be subsequently decreased during the toddler years so that fat intake, averaged across several days, should provide approximately 30 percent of total energy.[5]

The following recommendations have been made by the American Dietetics Association in their position paper on vegetarianism.[45]

- Offer both dairy and non-dairy calcium foods in child nutrition programs. In the United States National School Lunch Program (NSLP), few public schools regularly feature vegetarian menu items. School lunches are usually not adequate for vegans even when some vegan options are available because soymilk is typically only served as part of a school lunch in cases of lactose intolerance.
- Offer both dairy and non-dairy calcium foods to families enrolled in the Women, Infants and Children (WIC) Supplemental Nutrition Program. Provide WIC vouchers, coupons, or groceries to those who meet the income and nutritional risk criteria for the WIC program. Vouchers can be used for some foods acceptable to vegetarians, including fortified soy milk, as well as milk, calcium- fortified juices and cheese.
- Offer alternative food sources of calcium in other institutions and quantity food service organizations. As interest in non-dairy calcium food sources grows and because of the nutritional and health benefits of choosing a vegetarian diet; increased provision of recommended alternative food sources of calcium on a daily basis should be encouraged in other institutions, including colleges, universities, hospitals, restaurants, and publicly funded museums and parks.

Clinical Implications

- Milk and milk products can be part of a low-calorie diet as there are a wide variety of reduced fat, low-fat, and fat-free milk and milk products to choose from.
- One should not assume that all African Americans, Hispanics or Asian are lactose intolerant. If someone is lactose intolerant, milk and milk products do not always have to be eliminated from the diet.
- Individuals do not outgrow their need for the nutrients found in milk and milk products. Children, adults and seniors can benefit from the unique nutrient package and accompanying health benefits that milk and milk products provide. There are also viable alternatives if milk and milk products cannot be consumed as part of an overall healthy diet plan.
- The majority of adolescent and adult females do not meet recommended levels of calcium intake, in part because of their lower consumption of milk products relative to soft drinks and this may be a contributing factor to their increased risk for osteoporosis.[8]

Resources/Web Sites

Dairy Council of California – www.dairycouncilofca.org
Online Calcium Quiz – www.dairycouncilofca.org/activities/quiz/acti_calc_main.htm
Meals Matter – www.mealsmatter.org
California Milk Advisory Board – www.realcaliforniacheese.com
National Dairy Council – www.nationaldairycouncil.org
Foundation for Osteoporosis Research and Education – www.fore.org/index.html
California Department of Food and Agriculture – www.cdfa.ca.gov
National Osteoporosis Foundation – http://www.nof.org/prevention/index.htm
USDA Food Guide Pyramid – http://mypyramid.gov
The National Bone Health Campaign – www.cdc.gov/powerfulbones
California Project LEAN *Huesos Fuertes, Familia Saludable (Strong Bones, Healthy Family)* – www.californiaprojectlean.org
University of California Cooperative Extension – FSNEP Bone Health Curriculum (available Fall, 2006)

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California Food Guide

Protein Foods

By Paula Benedict Griffin, M.P.H., R.D.

What's New

A key recommendation from the Dietary Guidelines for Americans 2005 is to make choices that are lean, low-fat, or fat-free when selecting and preparing meat, poultry, dry beans, and milk or milk products. The USDA MyPyramid uses "ounce equivalents" (oz-eq) to identify standard portion sizes within the Meat and Beans group. Recommended intakes of protein in terms of ounce equivalents are based upon energy intakes between 1,000 and 3,200 calories per day. Actual protein intake requirements range from 2 ounce equivalents at the 1,000 calorie level up to 7 ounce equivalents for intakes at the 3,200 calorie level. A one ounce equivalent from the Meat and Beans Group is one ounce of meat, poultry or fish, ¼ cup dry beans or peas, 1 egg, 1 tablespoon of peanut butter, ½ ounce of nuts or seeds, or ¼ cup of tofu.[1]

Soy Protein Approved Health Claim on Food Labels

In 1999, the U.S. Food and Drug Administration approved a health claim for labels of soy-based foods after reviewing studies that demonstrated soy's ability to lower total and LDL cholesterol. The following model claim may be used: *"Diets low in saturated fat and cholesterol that include 25 grams of soy protein a day may reduce the risk of heart disease. One serving of (name of food) provides ___ grams of soy protein."* To use this claim, the food must contain at least 6.25 grams of soy protein, less than 3 grams of fat , less than 1 gram of saturated fat, less than 20 milligrams (mgs) of cholesterol per serving, and less than 480 mgs of sodium for individual foods or less than 960 mgs for foods considered a meal. Foods made with the whole soybean are exempt from the low fat requirement if it has no fat other than that which naturally occurs in the soybean.[2]

Public Health Implications

- Protein foods from animal sources contribute a significant amount of calories, saturated fat, and cholesterol to the diet of most Americans. Saturated fat and cholesterol are linked to cardiovascular disease, the major cause of death in Americans. The American Heart Association recommends that saturated fat be limited to less than seven percent of energy intake and cholesterol be limited to less than 300 milligrams per day, choosing lean meats and limiting processed meats, removing the skin from poultry before eating, and using vegetable alternatives.[3]

- High protein diets, popularized in low–carbohydrate weight loss plans, do not appear to impair or cause a decline in renal function in healthy individuals.[4, 5] However, a high intake of protein, specifically proteins not from dairy sources, is associated with an increased decline in renal function in individuals with mild renal insufficiency.[5]

- To avoid food-borne illnesses, restaurants, institutions and home kitchens should observe safe food handling practices for eggs, meat, poultry, and fish. Foods must be stored, cooked, and held at proper temperatures to minimize growth of pathogens. To reduce the risk of cross-contamination, raw meat and poultry need not be rinsed before cooking, so that bacteria from raw meat will not be spread to counter tops, sinks, kitchen utensils, and ready-to-eat foods.[1]

- The Dietary Guidelines for Americans 2005 provide these key recommendations for specific population groups:[1]

  Infants and young children, pregnant women, older adults, and those who are immuno-compromised should not eat or drink raw (unpasteurized) milk or any products made from unpasteurized milk; raw or partially cooked eggs or foods containing raw eggs; raw or undercooked meat and poultry; raw or undercooked fish or shellfish; unpasteurized juices; and raw sprouts. Pregnant women, older adults, and those who are immuno-compromised: only eat certain deli meats and frankfurters that have been reheated to steaming hot.

Definition

Beef, poultry, fish, dry beans or peas, eggs, soybean products, nuts and seeds, milk, cheese, yogurt, and foods made from these provide protein for essential body functions. Foods from the Meat and Beans and the Milk Group of MyPyramid supply the major source of protein in the diets of most Americans. Plant-based foods, such as those found in legumes, provide excellent and inexpensive sources of protein as well as dietary fiber. This chapter will focus on the Meat and Beans Group of MyPyramid; additional information about the Milk Group can be found in the Milk and Milk Products chapter of this guide.

Protein is a large, complex molecule comprised of amino acids. When proteins are consumed in the diet, digestive processes break down the protein molecule into smaller amino acid components, which are then used to synthesize new proteins for body functions and processes. Thousands of different proteins, each with a unique function, can be formed from the various combinations of amino acids. The configuration of the amino acid sequence in the new protein determines how it will be used in the body. Proteins are crucial for the maintenance and regulation of the body, and are needed to make the body's structural components. Cells, connective tissue, bone, hormones, antibodies, immune factors, and enzymes that regulate the body's chemical reactions all require protein.[6, 7]

The body uses 20 different amino acids for protein synthesis (Table 1). Eleven of these amino acids can be made in the body, thus they are not required to be consumed from dietary sources. However, the other nine amino acids are considered "indispensable" and must be obtained from foods. Without adequate protein intake, the body will decrease metabolic processes to conserve the indispensable amino acids, and in a prolonged state of depletion will cannibalize its own muscles and internal organs to obtain these indispensable amino acids to build new proteins. One effect of protein malnutrition is the decreased efficiency of the immune system, leading to increased risk for infection, disease and death.[7]

Table 1: Amino Acids Needed in Human Nutrition

Indispensable Amino Acids[a]	Dispensable Amino Acids[b]
1. Histidine 2. Isoleucine 3. Lysine 4. Leucine 5. Methionine 6. Phenylalanine 7. Threonine 8. Tryptophan 9. Valine	1. Alanine 2. Arginine 3. Asparagine 4. Aspartic Acid 5. Cysteine 6. Glutamic Acid 7. Glutamine 8. Glycine 9. Proline 10. Serine 11. Tyrosine

[a] must be consumed in the diet
[b] can be made in the body from other amino acid and carbohydrate precursors; not required to be consumed.

Source: Wardlaw, GM and Smith, AM. Contemporary Nutrition: Issues and Insights. 6th Edition. McGraw-Hill Companies, Inc. 2006. p.186

Foods from animal sources of the Meat and Beans Group supply more than an adequate amount of the indispensable amino acids required for protein synthesis. However, vegetarians whose diets do not include foods of animal origin can easily obtain all nine indispensable amino acids needed for optimal health from plant-based foods.[8] The requirement to "complete" proteins at each meal, or combining complementary plant proteins, is not supported by scientific evidence and is no longer considered appropriate dietary guidance for vegetarians. Please see the chapter on Vegetarian Diets in this guide for additional information.

Dietary Recommendations

The Dietary Reference Intakes (DRIs) for protein intake is based upon age and sex (Table 2). DRIs for protein represents the Recommended Dietary Allowances (RDA) and Adequate Intakes (AI). The RDAs were determined to encompass the needs of 97 to 98 percent of the individuals within a population

group, and are not applicable in specific anabolic conditions such as wound healing or recovery from severe burns, or in the case of kidney or liver disease. In addition, the RDA may not be sufficient to meet the needs of older adults in order to maintain skeletal muscle.[9]

Table 2: Dietary Reference Intakes For Protein

		RDA/AI[a] grams/day	AMDR[b]
Infants	0-6 months	9.1*	ND**
	7-12 months	11.0*	ND**
Children	1-3 years old	13	5-20
	4-8 years old	19	10-30
Girls	9-13 years old	34	10-30
	14-18 years old	46	10-30
Boys	9-13 years old	34	10-30
	14-18 years old	52	10-30
Women	19-30 years old	46	10-35
	31-50 years old	46	10-35
	51+ years old	46	10-35
Pregnancy	<18 years old	71	10-35
	19-50 years old	71	10-35
Lactation	<18 years old	71	10-35
	19-50 years old	71	10-35
Men	19-30 years old	56	10-35
	31-50 years old	56	10-35
	51+ years old	56	10-35

*AI is the mean intake for healthy breastfed infants.
**Not determinable due to lack of data of adverse effects in this age group.
[a] Based on 1.5 g/kg/day for infants, 1.1 g/kg/day for 1-3 yrs, 0.95 g/kg/day for 14-18 yrs, 0.8 g/kg/day for adults, and 1.1 g/kg/day for pregnancy (of pre-pregnancy wt) and lactation
[b] Acceptable Macronutrient Distribution Range (AMDR) expressed as percent of energy intake.

Source: Institute of Medicine. *Dietary reference intakes for energy, carbohydrate, fiber, fat, fatty acids, cholesterol, protein, and amino acids.* Washington D.C.: The National Academy Press; 2002.

The protein needs of athletes may be greater than the general population, depending upon the type of exercise performed, the intensity and duration of the exercise, the athlete's training regime and his or her usual nutrient intake. Male body-builders have been advised to consume as much as 1.6-1.7 g/kg of body weight per day to repair muscle fibers damage from strength training and to support gains in lean muscle mass. Inherent in this recommendation is that sufficient calories are ingested to prevent protein being used for energy. Athletes who consume an adequate calorie intake while in training normally have an accompanying proportional increase in protein which more than adequately meets any increased need for protein.[10, 11]

In terms of food choices, the USDA MyPyramid expresses the number of servings needed daily from the Meat and Beans Group in ounce equivalents, based on energy intakes between 1,000 and 3,200 calories per day (Table 3), and per population group (Table 4). Obtaining sufficient protein is not challenging for most Americans, since the standard serving sizes of food in Table 5 are smaller than typical portions found in restaurants and foods served away from home. Excess calories from protein are stored as fat, and do not contribute to increased protein synthesis and lean body mass.

Table 3: Recommended Number of Ounce Equivalents Per Day from the Meat and Beans Group According to Calorie Intake

Calorie Level	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200
oz-eq	2	3	4	5	5	5.5	6	6.5	6.5	7	7	7

Source: Institute of Medicine. *Dietary reference intakes for energy, carbohydrate, fiber, fat, fatty acids, cholesterol, protein and amino acids.* Washington D.C.: The National Academy Press; 2002.

Table 4: Recommended Number of Ounce Equivalent Per Day from the Meat and Beans Group According to Population Group*

Children	2-3 years old	2 ounce equivalents*
	4-8 years old	3 – 4 ounce equivalents*
Girls	9-13 years old	5 ounce equivalents*
	14-18 years old	5 ounce equivalents*
Boys	9-13 years old	5 ounce equivalents*
	14-18 years old	6 ounce equivalents*
Women	19-30 years old	5 ½ ounce equivalents*
	31-50 years old	5 ounce equivalents*
	51+ years old	5 ounce equivalents*
Men	19-30 years old	6 ½ ounce equivalents*
	31-50 years old	6 ounce equivalents*
	51+ years old	5 ½ ounce equivalents*

*These amounts are appropriate for individuals who get less than 30 minutes per day of moderate physical activity, beyond normal daily activities. Those who are more physically active may be able to consume more while staying within calorie needs.
Source: www.MyPyramid.gov

Table 5: Common Foods and Ounce Equivalents from the Meat and Beans Group

	Amount that counts as 1 ounce equivalent in the Meat & Beans group	**Common portions and ounce equivalents**
Meats	1 ounce cooked lean beef	1 small steak (eye of round, filet) = 3 ½ to 4 ounce equivalents
	1 ounce cooked lean pork or ham	1 small lean hamburger = 2 to 3 ounce equivalents
Poultry	1 ounce cooked chicken or turkey, without skin	1 small chicken breast half = 3 ounce equivalents
	1 sandwich slice of turkey (4 ½" x 2 ½" x 1/8")	½ Cornish game hen = 4 ounce equivalents
Fish	1 ounce cooked fish or shell fish	1 can of tuna, drained = 3 to 4 ounce equivalents 1 salmon steak = 4 to 6 ounce equivalents 1 small trout = 3 ounce equivalents
Eggs	1 egg	1 egg
Nuts and seeds	½ ounce of nuts (12 almonds, 24 pistachios, 7 walnut halves) ½ ounce of seeds (pumpkin, sunflower or squash seeds, hulled, roasted) 1 Tablespoon of peanut butter or almond butter	1 ounce of nuts or seeds = 2 oz eq
Dry beans and peas*	¼ cup of cooked dry beans (such as black, kidney, pinto, or white beans) ¼ cup of cooked dry peas (such as chickpeas, cowpeas, lentils, or split peas) ¼ cup of baked beans, refried beans	1 cup split pea soup = 2 oz eq 1 cup lentil soup = 2 oz eq 1 cup bean soup = 2 oz eq
	¼ cup (about 2 ounces) of tofu 1 oz. tempeh, cooked ¼ cup roasted soybeans 1 falafel patty (2 ¼", 4 oz) 2 Tbsp. hummus	
*Dry beans and peas are included in both the Meat and Beans and in the Vegetables group. Source: www.MyPyramid.gov		

In addition to protein, foods from the Meat and Beans group provide many other nutrients required for optimal health including niacin, vitamin B_1 (thiamin), vitamin B_2 (riboflavin), vitamin B_6 (pyridoxine), vitamin E, iron, zinc, and magnesium. Animal sources of protein also provide a significant source of vitamin B_{12} for the diet.

Burden

Diets that are high in cholesterol and saturated fats raise LDL (low density lipoprotein) cholesterol levels in the blood, which increases the risk for coronary heart disease. In 2006, the cost of coronary heart disease in the United States was estimated to be $142.5 billion, in terms of both direct health care costs, combined with lost productivity resulting from mortality and morbidity.[12]

Some food choices in the Meat and Beans group are high in saturated fat such as fatty cuts of beef, pork, and lamb, regular ground beef, sausage, hot dogs, bacon, bologna, salami, and some poultry, such as duck. Foods high in cholesterol include egg yolk and organ meats, such as liver. The MyPyramid food guidance system encourages Americans to vary their choices from the Meat and Beans group, especially fish, nuts, and seeds to increase their intakes of monounsaturated fatty acids (MUFAs), polyunsaturated fatty acids (PUFAs), including the omega-3 fatty acids EPA (eicosapentaenoic acid) and DHA (docosahexaeonoic acid).[13]

Incidence and Prevalence

According to USDA, in 2002 consumption of all meats poultry, and fish was 200 lbs per person, 23 pounds above the level in 1970. Americans consumed, on average, 18 pounds less red meat (mostly less beef) than in 1970, 37 pounds more poultry, and four pounds more fish.[14]

Over the previous century, a shift has occurred in the source of protein in the American diet. In 1909, grain products provided 37 percent of total dietary protein in the American food supply. This contribution fluctuated over the remainder of the century, reaching a low of 18 percent in 1970. Since 1934, the predominant source of protein in the food supply has shifted from grain products to meat, poultry and fish. In 2000, meat, fish, and poultry sources of protein contributed 40 percent of the total protein in the food supply, and grain products provided 22 percent. Historically, red meat provided the largest share of protein from the meat, fish, and poultry foods, but has decreased since 1971. However, poultry's contribution to the available protein in the food supply has increased to 14 percent in 2000 from only three percent in 1909.[15]

Trends/Contributing Factors

High-Protein/Low-Carbohydrate diets. High protein**,** carbohydrate-restricted diets for weight loss regained popularity in the late 1990s and early 2000s. In 2002, a telephone survey of 9,300 households found that 3.4 percent of respondents were currently on such a diet, and 12.5 percent of respondents had ever used a low-carbohydrate, high-protein diet.[16] Favorable metabolic responses have been reported, including lowered blood lipids, and lowered fasting serum glucose. The limited success of eating plans to produce short-term weight loss has been attributed to increased feelings of satiety resulting in decreased caloric intake.[16-19] However, side effects associated with the diet have been reported, including constipation, diarrhea, headache, general fatigue, halitosis, and life-threatening metabolic acidosis.[20] In addition, a high protein and low vegetable diet produces an altered acid-base metabolic response, leading to increasing calcium excretion which negatively affects bone density.[21] High protein, low-carbohydrate diets are typically very restrictive in foods such as grains, fruits and vegetables, and high in saturated fats. Because studies of long-term health effects are not available and the requirement for essential nutrients and fiber are difficult to meet from the food restrictions, these diets are not recommended. Individuals who follow these diets can be at risk for vitamin and mineral deficiencies and potential cardiac, renal, bone, and hepatic abnormalities.[22]

Eating away from home. The increase of overweight and obesity in the United States indicates that more attention needs to be paid to serving size and total calorie content of foods eaten away from home. The proportion of all meals and snacks from away-from-home sources increased by more than two-thirds between 1977–78 and 1995, from 16 percent of all meals and snacks in 1977–78 to 27 percent of all meals and snacks in 1995. Foods prepared outside of the home tend to have higher saturated fat content, and persons tend to consume more calories when eating away from home. In 1995, the average total fat and saturated fat content of away-from-home foods, expressed as a percentage of calories, was 38 percent and 13 percent, respectively, compared with 32 percent and 11 percent for at-home foods.[23]

Barriers to Implementation/Myths

Avian Bird Flu

Avian bird flu does not pose a threat to the United States food supply. Poultry products imported to the United States must meet all safety standards applied to foods produced in the United States. No poultry from countries with confirmed cases of certain strains of the virus can be imported into the United States. Additionally, the USDA has increased its monitoring of domestic commercial markets for illegally smuggled poultry and poultry products.[24]

Common Concerns/Strategies

The Dietary Guidelines for Americans 2005 contain guidance for preventing food-borne illnesses:[1]

To avoid microbial foodborne illness:

- Clean hands, food contact surfaces, and fruits and vegetables. Meat and poultry should not be washed or rinsed.
- Separate raw, cooked, and ready-to-eat foods while shopping, preparing, or storing foods.
- Cook foods to a safe temperature to kill microorganisms.
- Chill (refrigerate) perishable food promptly and defrost foods properly.
- Avoid raw (unpasteurized) milk or any products made from unpasteurized milk, raw or partially cooked eggs or foods containing raw eggs, raw or undercooked meat and poultry, unpasteurized juices, and raw sprouts.

To reduce exposure to environmental contaminants such as mercury:

- Choose canned chunk light tuna, which has less mercury than albacore tuna. Limit consumption of albacore tuna or tuna steaks to six ounces per week.
- Women of childbearing age, pregnant and lactating women, and children should avoid eating shark, swordfish, tilefish, and king mackerel.

For additional information, please see the Environmental Contaminants in Food chapter of this guide and the information posted on websites of the Food and Drug Administration (FDA) (www.cfsan.fda.gov/seafood1.html) and the Environmental Protection Agency (EPA) (www.epa.gov/waterscience/fish/advisory.html).

Opportunities for Improvement

Health professionals and organizations can look for opportunities to:

- Develop strategies to help consumers reduce the amount of cholesterol, saturated fat, and total fat consumed in foods eaten away from home.
- Support consumer education and industry efforts to promote consumer acceptance and availability of vegetable protein-based meals eaten away from home.
- Support educational efforts to assist consumers with choosing lower fat cuts of meat and poultry and healthful cooking methods.
- Support industry efforts to provide lean meats, poultry, and fish to the American consumer.

Resources/Web Sites

The American Dietetic Association (ADA)
www.Eatright.org

Beef Recipes and Nutrition
www.Beefitswhatsfordinner.com

Chicken and Food Safety:
www.fsis.usda.gov/factsheets/chicken_food_safety_focus/index.asp

Dry Bean Recipes and Nutrition
www.Americanbean.org

Environmental Protection Agency, Fish Advisories
www.epa.gov/waterscience/fish/advisory.html

Food and Drug Administration, Center for Food Safety and Applied Nutrition
www.cfsan.fda.gov

Food Safety
www.Fightbac.org

My Pyramid Dietary Guidance
www.MyPyramid.gov

Soy Information Clearinghouse
www.soybean.org

Vegetarian Nutrition Practice Group of ADA
www.Vegetariannutrition.net

Vegetarian Resource Guide
www.vrg.org

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California Food Guide

Fats

By Toni Piechota M.P.H., M.S., R.D., and Aditi Shah M.P.H., R.D.

What's New?

The Dietary Guidelines for Americans were revised in 2005.[1]

The American Heart Association published new dietary guidelines in June of 2006 to include limiting saturated fat to less than 7 percent of calories and *trans* fat to less than 1 percent of calories.[2]

As of January 1, 2006, the Food and Drug Administration (FDA) began requiring food manufactures to list *trans* fat content on the Nutrition Facts Panel and Supplement Facts Panel. Label information about a product's *trans* fat content will help consumers choose more healthy diets.[3]

Introduction

Fats have qualities that make food taste good. They deliver flavor from foods and provide aroma. They also give a smooth, creamy texture to many foods like ice cream, chocolate, and peanut butter and make foods such as meat and baked goods moist and tender or brown and crispy.[4]

One role of fats in the diet is to aid in the absorption of fat-soluble vitamins, which include vitamins A, D, E, and K. In addition, fats are required for maintenance of healthy skin, regulation of cholesterol metabolism, and as a precursor to prostaglandin, a hormone-like substance that regulates many body functions.[5]

However, the negative influence of dietary fat intake - both quantity and composition - on health has been a popular topic of public health education since the 1970s. Over time, our understanding of these effects has become more precise and continues to be refined. While at one time, the recommendation was simply to avoid dietary cholesterol, it has become increasingly clear over time that other dietary lipids are of greater importance. For instance, monounsaturated fats appear to favorably alter blood lipid profiles, and recent studies suggest that *trans* fats are more harmful than saturated fats to certain

blood lipid levels. This chapter presents recent updates and current recommendations about dietary fat and its function in disease causation and prevention.

Dietary Guidelines for Americans 2005 Key recommendations for fats include:[1]	
Adults	**Children & Adolescents**
• Less than 10 percent of calories from saturated fat. • Less than 300 mg/day of cholesterol. • *Trans* fat consumption as low as possible.	• Total Fat intake for children 2-3 years of age should be between 30-35 percent of calories.
• Total Fat intake should be between 20-35 percent of calories, with most fats coming from sources of unsaturated fats such as fish, nuts, and vegetable oils.	• Total Fat intake for children and adolescents between ages 4-18 years should be between 25-35 percent of calories, with most fats coming from sources of unsaturated fats such as fish, nuts, and vegetable oils.

MyPyramid also includes information regarding oil consumption and fats. This information is available at http://www.Mypyramid.gov.

Public Health Implications

- Objectives for Healthy People 2010 Nutrition and Overweight topics include (http://www.healthypeople.gov/Document/HTML/Volume2/19Nutrition.htm):
  - 19-8: Increase the proportion of persons aged 2 years and older who consume less than 10 percent of calories from saturated fat.
  - 19-9: Increase the proportion of persons aged 2 years and older who consume no more than 30 percent of calories from total fat.[5]
- The risk of heart disease and high levels of low density lipoprotein (LDL)-cholesterol can be reduced by decreasing intake of saturated fat.[6]
- LDL-cholesterol can be reduced by decreasing intake of *trans*-fatty acids.[5]
- The risk of developing prostate cancer can be reduced by decreasing intake of saturated fat - especially animal fat from red meat and dairy products.[7]
- The risk of developing type 2 diabetes can be reduced by decreasing intake of total and saturated fat.[8]

Definition

Dietary fats are nutrients, like carbohydrates and proteins, and are needed for an overall healthy lifestyle. Fat is an important source of energy for the body and is the most concentrated source of energy in the diet, providing 9 kcal/g compared to 4 kcal/g from either carbohydrates or protein.[9]

By definition, fats are organic compounds that are made up of carbon, hydrogen, and oxygen; they belong to a group of substances called lipids, and come in either liquid or solid form. All fats are a combination of fatty acids - saturated, monounsaturated, polyunsaturated, and *trans* fatty acids. Whether we consider a food fat to be saturated or unsaturated depends upon the relative amounts of the different categories of fatty acids.

Oils are fats that are liquid at room temperature, like the vegetable oils used in cooking. Oils come from many different plants and nuts. A number of whole foods are naturally high in oils, like: nuts, olives, and avocados.[10] Some common oils are: canola, cottonseed, olive, and peanut oils. Most oils are high in monounsaturated or polyunsaturated fats, and low in saturated fats. Foods from plant sources including vegetable oil and nuts do not contain cholesterol.

Solid fats are fats that are solid at room temperature, like butter and shortening. Solid fats come from many animal foods and can be made from vegetable oils through a process called hydrogenation. Some common solid fats are butter, beef fat (tallow, suet), chicken fat, pork fat (lard), stick margarine, and shortening. Most solid fats are high in saturated fats and/or *trans* fatty acids and have less monounsaturated or polyunsaturated fats. Animal products containing solid fats also contain cholesterol. A few plant oils, such as coconut oil and palm kernel oil, are high in saturated fats and for nutritional purposes should be considered solid fats.[10]

Different Types of Fats

Saturated Fats

Saturated fats are generally found in highest concentrations in animal fats as stated above. They are found in meat, seafood, dairy products (cheese, milk, and ice cream), poultry skin, and egg yolks. Some plant foods are also high in saturated fats, including coconut, palm, and palm kernel oils. Saturated fats raise total blood cholesterol levels more than dietary cholesterol.[11]

Trans Fats

Trans fatty acids are fats produced by heating liquid vegetable oils in the presence of hydrogen. Fast foods such as chips, baked goods, and other commercially prepared foods are high in fat and can contain up to 50 percent

trans fatty acids. *Trans* fatty acids have been shown to increase LDL cholesterol and lower HDL cholesterol, which may increase the risk for heart disease.[11]

Monounsaturated Fats
Monounsaturated fats are liquid at room temperature. They primarily come from plants and include olive oil, canola oil, and peanut oil.[12]

Polyunsaturated Fats
Polyunsaturated fats are liquid at room temperature. Many common vegetable oils, such as corn, soybean, safflower, and sunflower oil, are high in polyunsaturated fats.[12]

Omega-3 fatty acids
Omega-3 fatty acids are one type of polyunsaturated fatty acids. The plant derived omega-3 fatty acid is not synthesized by humans and, therefore, are considered to be essential in the diet. Some of the plant sources include soybean and canola oils, walnuts, and flaxseed. Some of the longer omega-3 fatty acids are found in fatty coldwater fishes, such as salmon, mackerel, and herring. These longer omega-3 fatty acids can also be made in the body by converting the omega-3 fatty acid obtained from plants. This process is however considered inefficient. Diets high in omega-3 fatty acids may help lower LDL- cholesterol and triglyceride levels.[6]

Omega-6 fatty acids*:*
Omega-6 fatty acids are another type of polyunsaturated fatty acid. The primary omega-6 fatty acid is not synthesized in the body and is considered essential in the diet. Good sources are nuts, seeds, and vegetable oils such as soybean, corn, and safflower oils.[6]

Table 1: Percentage of Specific Types of Fat in Common Oils and Fats				
Oils	**Saturated**	**Mono-unsaturated**	**Poly-unsaturated**	**Trans**
Canola	7	58	29	0
Corn	13	24	60	0
Coconut	87	6	2	0
Olive	13	72	8	0
Palm	50	37	10	0
Peanut	17	49	32	0
Safflower	9	12	74	0
Sunflower	10	20	66	0
Soybean	16	44	37	0
Margarine/Spreads				
67% Corn and Soybean Oil Spread, Tub	16	27	44	11
70% Soybean Oil, Stick	18	2	29	23
48% Soybean Oil Spread, Tub	17	24	49	8
60% Sunflower, Soybean, and Canola Oil Spread, Tub	18	22	54	5
Cooking Fats				
Butter	60	26	5	5
Lard	39	44	11	1
Shortening	22	29	29	18
*Values expressed as percent of total fat; data are from analyses at Harvard School of Public Health Lipid Laboratory and USDA publications.				

Table 2: Recommended Daily Amount of Oil in Grams at Each Calorie Level												
Calorie level	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200
Oils (g)	15	17	17	22	24	27	29	31	34	36	44	51

The new USDA MyPyramid gives recommendations for dietary fat intake and includes an allowance for "discretionary calories" based on maintenance calorie needs (see Table 3). Discretionary calories are calories from foods of low nutritional value, such as sugar or butter. Oils are not considered to be part of discretionary calories not defined because they are a major source of vitamin E and polyunsaturated fatty acids, including the essential fatty acids in the diet. In contrast, solid fats are listed separately in the discretionary calorie allowance, because compared with oils; they are higher in saturated fatty acids and lower in vitamin E and unsaturated fatty acids, including essential fatty acids.[11]

Table 3: Discretionary Calories that Remain at Each Calorie Level												
Calorie level	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200
Discretionary calories	165	171	171	132	195	267	290	362	410	426	512	648
Example of division of discretionary calories: Solid fats allowance at various caloric levels are shown in grams (g)												
Solid fats (g)	11	14	14	11	15	18	19	22	24	24	29	34

Burden

The Nurses' Health Study and the Women's Health Initiative trial have found no link between the overall percentage of calories from fat and any important health outcome, including cancer, heart disease, and weight gain. Rather, the impact of dietary fat on health depends extensively on the type of fat consumed. Dietary fats and oils have important functions, but too much dietary cholesterol, *trans*-fat and/or saturated fat (stearic acid may be an exception) negatively impact health and a causal relationship between these three dietary components and coronary artery disease is strongly substantiated. There is a dose-response relationship between increased intakes of either cholesterol, saturated fats, and *trans* fats and the development of unhealthy blood lipid levels, especially for *trans* fats. The Nurses' Health Study found that replacing only 30 calories (7 grams) of carbohydrates

every day with 30 calories (4 grams) of *trans* fats nearly doubled the risk for heart disease.[13, 14, 15, 16]

Conversely, there is strong evidence that high intake of either monounsaturated or polyunsaturated fat lowers the risk for heart disease.[1] Omega-3 fatty acids, found naturally in fatty fish, have inconsistently been shown to reduce heart disease risk or the risk of dying of a heart attack. Three studies, however, found that by getting 1.5 grams per day of omega-3 fatty acids over a two-year period, people who had survived a heart attack could lower their risk of dying from heart disease by 29 percent.[17] Getting a gram a day from fish would mean eating four ounces a day of fatty fish, such as mackerel, salmon, sardines, or swordfish.

Prior research suggesting a correlation between dietary fat intake and risk of certain cancers (breast, colon, and prostate) have not consistently been substantiated.[18, 19, 20, 21]

However, recent research conducted in Europe is suggestive of a protective effect of monounsaturated fats and breast cancer.[22] Preliminary research has also linked the intake of *trans* fat with other non-Hodgkins lymphoma and saturated fat with endometrial cancer, though much more research is needed to confirm these results.

The 2002 recommendations of the Institute of Medicine (IOM) were to minimize consumption of saturated and *trans* fat, as any amount is correlated to an increased risk of coronary artery disease.[23] Because a fat intake of greater than 35 percent of calories typically increases saturated fat intake, and because a low intake of fats and oils (less than 20 percent of calories) increases the risk of inadequate intakes of vitamin E and may contribute to unfavorable changes in high-density lipoprotein (HDL) and triglycerides levels,[1] the IOM also recommended a fat intake range of 20-35 percent of calories. Dietary cholesterol should be restricted to $\leq$ 300 mg/d (200mg/d for those at high risk for coronary artery disease).

Incidence and Prevalence

While mean daily fat intake as a percentage of calories has decreased over the past 30 years, absolute intake has increased. Fat intake as a percentage of calories decreased from 36 percent to 33 percent between 1971 and 2000;[24] however, absolute fat intake increased from 73.4 g/d in 1989-1991 to 76.4 g/d in 1994-1996.[25] Between 1994-1996, average daily intake of *trans* fat was estimated to be 2.6 percent of total energy intake, with processed foods and oils providing approximately 80 percent of dietary *trans* fats. During 1999-2000, mean saturated fat intake was 11.2 percent of calories, down from 13 percent in 1971-1974.[26, 27]

Trends/Contributing Factors

Three key factors that have received attention as potential contributing factors for the trend toward increased fat intake are increased dining outside the home, increased snacking, and reduced price value of fresh fruits and vegetables and low-fat foods. Between 1970 and 1995, calorie intake from food outside the home increased from 18 percent to 34 percent and foods eaten outside of the home tend to be higher in fat and larger portions are served.[28] Intake of chips/crackers/popcorn/pretzels roughly tripled from the mid-1970s to the mid-1990s.[28] Commercially prepared foods are major contributors of fat, especially trans fat, in the American diet. As awareness about trans fats increases, more trans-fat free products are becoming available and intake of trans-fats may decrease. Finally, relative to the consumer price index, the price of fruits and vegetables increased at a higher rate while the cost of high fat and high sugar foods decreased.[28]

Barriers to Implementation/Myths

Below are a variety of myths associated with fat consumption.

- **Myth: Reduced-fat foods are always low in fat.**[29]
  Fact: These foods are lower in fat than their full-fat counterparts, but that does not necessarily mean they are "low-fat." To know the facts, read the nutrition label and compare the fat content of two similar products.

- **Myth: Americans are getting fatter because they are overeating fat-free and low-fat foods.**[29]
  Fact: Obesity occurs when more calories are consumed than used. Lower-fat, lower-calorie foods can help cut total calorie intake when used as part of a well balanced and calorie controlled diet. Increased physical activity also plays an important role in weight maintenance. In addition to burning calories, increased activity benefits overall health in many ways such as disease prevention and stress reduction.

- **Myth: Low-fat means low calorie.**[29]
  Fact: Reducing the amount of fat in food does not necessarily mean the food is low in calories. While a product may be lower in fat, the calorie content may be equal to or even higher than that found in the regular product as they can have a higher carbohydrate and sugar content. Consume low-fat foods in moderation just as you would a full-fat, full-calorie product. The Nutrition Facts panel on the label is the key to finding out the fat and calorie content of foods.

- **Myth: Fat-free means taste-free.**[29]
  Fact: Although many of the first fat-free products on the market did not meet

taste expectations, today's products have greatly improved. If certain fat-free products do not satisfy your taste buds, try low-fat versions. Slight adjustments can add up, and just a little fat can go a long way in adding both flavor and texture to a food. Think of skim milk versus 1 percent milk.

- **Myth: Americans have successfully cut the amount of fat in their diets.**[29]
  Fact: We are not actually eating less fat, but surveys do indicate we have reduced the percent of calories that come from fat in our diets. That is because calorie intake has increased while fat intake has remained the same. To meet dietary goals, we still need to cut back on fat.

- **Myth: Light oils keep your fat intake low**
  Fact: Light or "lite" oils have exactly the same fat and calorie content as regular oils. They are simply light in flavor or lighter in color.

- **Myth: "Cholesterol-free" means a product is heart healthy.**[30]
  Fact: With all the concern about cholesterol and heart disease, numerous companies are promoting their products as cholesterol-free. Blood cholesterol is a contributor to heart disease, but saturated and *trans* fat increase blood cholesterol levels more than dietary cholesterol. Therefore, read labels carefully to see if "cholesterol-free" products contain any saturated or *trans* fat. Foods such as crackers, cookies, chips, sports bars, and other snack foods often contain palm, coconut, or hydrogenated vegetable oils (which are even more saturated than butter). Look for labels that list the grams of fat and type of fat used. Do not be persuaded by misleading advertising.

Common Concerns/Strategies

It is important to emphasize the role of fat consumption in disease prevention. Contributing strategies could include development of positive, practical, and simple educational messages. According to the Continuing Survey of Food Intakes of Individuals (CSFII), the median intake of total fat in the United States ranges from about 32-34 percent of total calories. Major contributors of dietary fats include butter, margarine, vegetable oils, visible fat on meat and poultry, whole milk, egg yolks, nuts, and baked goods.[31] Despite this, it is not clear why this knowledge is not being translated into decreased consumption of fats.

Food manufacturers should continue to develop high quality, low-fat food products that are equally tastier compared to the regular products, so that consumers can frequently choose low-fat food products over regular food products that may be high in saturated fats or *trans* fats. In 2004, the International Food Information Council (IFIC) conducted qualitative research to determine consumers' knowledge and perceptions of dietary recommendations regarding general nutrition, nutrients, dietary fats, dieting, and health.[32, 33] Some

other major findings from the study revealed that the consumers are confused about fats. The following were identified as knowledge gaps among the consumers surveyed about fat:

- Consumers believe that some fats are better for them than other fats but, for the most part, they do not know which fats are which.
- There is significant confusion regarding what types of food contain which fats. Consumers do not know the difference between polyunsaturated fats, monounsaturated fats, *trans* fats, etc., and in what foods these fats can be found.[32, 33]
- Messages about fats are viewed as confusing and inconsistent (e.g., not long ago, the fat in margarine was said to be better than the fat in butter; now it is the reverse). Therefore, consumers are increasingly skeptical about the information provided and their inclination may be to ignore all of it and follow their own advice.
- Many higher fat foods are perceived as good tasting, while many lower fat foods are seen as not meeting taste expectations.
- Consumers participating in this research were ambivalent about adding information about *trans* fats to nutrition labels, since they do not understand what these fats are, where they come from, and how they impact their health.[32, 33]

Common strategies for consumers to decrease consumption of total fats include:

- Eat more fiber rich foods such as oats, barley, whole-grain breads, dried peas and beans, bran, fruits, and vegetables.
- Reduce portion sizes for weight control.
- Trim fat from meat and remove skin from poultry.
- Bake, broil, roast, or grill rather than fry.
- Use nonstick cooking sprays rather than oils, margarine, or butter.
- Choose fat-free (skim) or one percent fat dairy products.
- Try liquid, nonfat, or low-fat soft tub margarine.
- Limit red meat (beef, veal, pork, and lamb) to three times per week or less in 3 ounce portions.

Margarine vs. Butter Controversy

Nutritionists may be asked: "So which is better for me: butter or margarine?" Although they both are sources of fat, to determine which is better for health it is important to look more closely at what kind of fats are found in butter and margarines.[34]

Butter is made from the fat portion of cow's milk, by agitating the milk fat in a churn until coagulation (solidification) occurs. Saturated fats are found in cow's milk, but there is also a small amount of *trans* fat that occurs naturally. Cow's milk normally contains up to 3.7 percent milk fat, but milks with 2 percent and 1

percent fat are common in dairy products. Skim milk contains about 0.2 percent milk fat.[34]

Vegetable oils are the base for margarines. Soybean, olive, corn, and canola are common oils used in the manufacture of margarines, but oils are liquid at room temperature. In order to produce solid margarine, unsaturated fats in the oil are converted to saturated fats by a process called hydrogenation. The level of unsaturated fats goes down in margarines and the level of saturated fats goes up. Even more important is the fact that during the process of hydrogenation to produce margarines, *trans* fatty acids are produced. *Trans* fat like saturated fat raises the level of LDL cholesterol in the blood, and so we should be limiting the amounts of *trans* fat in our diet.[34]

Table 4 illustrates the differences in the amount of fat in butter, stick margarine, and tub margarine. Butter contains less total fat than stick margarine and tub margarine, but the amount of saturated fat found in butter is almost three times the amount in margarine. Butter does contain less *trans* fat than margarines, but when the total of *trans* and saturated fat is compared, traditional vegetable margarines come out ahead of butter. Even better are margarines that are not hydrogenated. These products should be *trans* fat-free.[34]

Table 4: Different Types of Fat in Butter and Margarines
(grams/serving. A serving is defined as 13-14 g, approximately 1 tablespoon)

Product	Total fat	Saturated fat	Trans fat	Trans fat + saturated fat
Butter	10.8	7.2	0.3	7.5
Stick margarine (82% fat)	11.4	2.3	2.4	4.7
Tub margarine (80% fat)	11.2	1.9	1.1	3.0

Sources: United States Food and Drug Administration
Table of Trans Values, 1995;
USFDA Composition DATA, 1995

Did you know?
"A whole stick of butter has almost as much fat and cholesterol and double the amount of saturated fat as three popular quarter-pound burgers with cheese?" This is something to keep in mind when your recipe calls for a whole stick of butter."[35]

Opportunities for Improvement

- Policies aimed at improving the quality of fats and oils can be effective with the collaboration of food industries.
- Consumers should be encouraged to substitute liquid oils and "soft" fats (i.e., those that are soft at room temperature) for "hard fats" (those that are more solid at room temperature) to reduce both saturated fats and trans fat.
- Food manufacturers could reduce the levels of *trans* fats arising from hydrogenation.
- Official agencies should be encouraged to consider monitoring the levels of *trans* fat in the food supply.
- Official agencies should be encouraged to consider limiting the claims concerning the saturated fatty acid content of foods that contain appreciable amounts of *trans* fatty acids, and they should not allow foods that are high in trans fatty acids to be labeled as being low in saturated fatty acids.
- Official agencies should be encouraged to consider making sure that programs such as the National School Lunch and Breakfast Programs meet the guidelines for dietary fats.
- Messages on types of dietary fats could be better conveyed by MyPyramid. Consideration should be given to the design and implementation of a project that will help consumers use MyPyramid to recognize different types of fats and their food sources, and to choose a diet that is low in saturated and trans fat and cholesterol and moderate in total fat in the context of the total diet.
- Programs that teach specific food-choice strategies such as choosing skim milk and lean meats instead of higher fat counterparts, increasing intake of fruits, vegetables, and whole grains, and reducing portion sizes could be implemented by different food programs.
- Collaborations could occur with the media to publicize the need for decreased consumption of saturated and *trans* fats, and to communicate environmental, and consumer-oriented solutions that identify steps of action.

Recommendations

The 2006 recommendations of the American Heart Association (AHA) regarding dietary fat intake are as follows:

- The dietary fat intake for Americans should be between 25-35 percent of total calorie intake, in compliance with the Institute of Medicine (IOM) and the National Cholesterol Education Program recommendations.
  - Less than 7 percent of total calories should be as saturated fats.
  - Less than 1 percent of total calories should be as trans fats (the IOM recommends limiting “as much as possible”).
  - Less than 300 mg cholesterol per day.
  - Eat fish, preferably oily fish, at least twice a week.

The key recommendations for fats and oil consumption in the Dietary Guidelines for Americans are as follows:

- The guidelines for fat intake for healthy Americans, is to consume no more than 30 percent of total calories from fat. The 30 percent guideline means:[36]
  - 7-10 percent of total calories from saturated fats,
  - About 10-15 percent of total calories from monounsaturated fats, and
  - About 10 percent from polyunsaturated fats.
- When selecting and preparing meat, poultry, dry beans, and milk or milk products, make choices that are lean, low-fat, or fat-free.
- Limit intake of fats and oils high in saturated and/or *trans* fatty acids, and choose products low in such fats and oils.

According to a recent study, evidence suggests that consuming approximately two servings of fish per week (8 oz.) may reduce the risk of developing coronary heart disease and that consuming the n-3 polyunsaturated fatty acids, docosahexaenoic acid and eicospentaeoic acid, may reduce cardiovascular disease risk in people who have already experienced a cardiac event.[6] Although concerns have been raised about contamination of fatty fish with mercury and polychlorinated biphenyls (PCBs), it is thought that the benefits outweigh the risks, especially in middle-aged and older men and postmenopausal women. Some concerns for contamination exist for pregnant women, children, and susceptible subgroups, and the Environmental Protection Agency recommends avoiding certain fish (e.g., shark, mackerel, tilefish, and swordfish) and limiting intake to 12 ounces per week of low-mercury fish, such as canned light tuna, salmon, pollock, and catfish. (http://www.epa.gov/ost/fishadvice/advice.html. Accessed on 8/2/06).

AHA currently recommends that people eat at least two servings (8 oz.) of fish a week and choose fats and oils with 2 grams or less saturated fat per tablespoon, such as liquid and tub margarines, canola, corn, safflower, soy bean, and olive oils.[37] If you are a vegetarian, consider more plant-based products that contain omega-3 fatty acid such as flaxseed oil, ground flaxseed meal, canola oil, walnuts, and seeds.[37]

Ways of Reducing Fat and Cholesterol in the diet

For a 2,000 calorie diet, 30 percent of calories as fat corresponds to 67 grams of fat. Some of this fat will be already in foods, such as meat, baked goods, and dairy products (invisible fat). The remainder will be added fats. A serving of added fat generally contains five grams of fat, and the following count as one serving of fat:

- One tsp vegetable oil (canola, safflower, olive, peanut);
- Two tbsp low-fat mayonnaise;

- One tbsp regular salad dressing;
- One tsp soft margarine (zero trans fat); one tsp butter; one tsp stick or hard margarine.[1]

Meal Planning

Planning meals to meet the recommended fat intakes does not have to be complicated. Here are a few suggestions:

- Choose fish, poultry, and lean cuts of meat, and remove the fat and skin before cooking. Eat no more than six ounces per day.
- Substitute vegetarian sources of protein for animal sources several times a week. Good sources include soybeans or soy foods and other high protein plant sources such as many types of beans.[4]
- Broil, bake, roast, or poach foods rather than fry them.[38]
- Cut down on high fat processed meats, including hot dogs, sausage, bacon, spare ribs, and such cold cuts as salami and bologna.
- Season with fat-free broth and herbs and spices instead of fatty meat, fat back, bacon, or butter.[38]
- Limit organ meats such as liver, kidney, or brains.
- Replace a whole egg with two egg whites or use 1/4-cup egg substitute.[38]
- Use skim or low-fat milk, cheeses, and yogurt.
- Use shredded cheese so a little looks like more.[38]
- Use liquid or soft tub margarines or vegetable oils high in monounsaturated fats like canola and olive oil instead of butter.[4]
- Choose margarine containing liquid vegetable oil as the first ingredient.
- Limit intake of obvious sources of saturated fats such as butter, butter/oil blends, cream, sour cream, coconut, and whole milk.
- Use all fats and oils sparingly.
- Use fat-free chicken or vegetable broth for cooking instead of fats or oils.
- Eat plenty of fruits and vegetables, as well as cereals, breads, rice, and pasta made from whole grains.[4]
- Go easy on packaged and processed foods, such as pies, cakes, cookies, doughnuts, croissants, and muffins, which are all high in saturated, *trans*, or hydrogenated fats.[4]

Table 5: Alternatives in Food Selections

Table 5 gives alternatives in food selections to decrease fat content.[39]

Table 5: Alternatives in Food Selection		
Instead of:	Try This:	Save ---- grams of fat
Ice cream bar	Fudgesicle	12 grams per bar
Whole milk	1% (low fat)	5 grams per cup
2% milk	Skim milk (nonfat)	5 grams per cup
Cheddar cheese	Reduced-fat cheddar cheese	8 grams per ounce
Ice cream	Ice milk or frozen yogurt	4.5 grams per 1/2 cup
Sour cream	Non-fat sour cream	2 grams per tablespoon
Potato chips	Baked potato chips	10 grams per ounce
Butter popcorn	Light popcorn	7 grams per serving
Pepperoni pizza	Vegetable pizza	7 grams per slice

Source: American Cancer Society. Cut Calories and Fat, Not Flavor. Available at http://www.cancer.org/docroot/PED/content/PED_3_2X_Cut_The_Fat_Not_The_Flavor.asp?sitearea=PED. Accessed on February 25, 2006.

Read the Label[4]

Use the Nutrition Facts panel on food labels to help balance your food choices. The panel shows how many calories, as well as fat, and other nutrients there are in a particular food product. The ingredient list will name the types of fat and fat replacers used. The terms used on food labels also have strict definitions to help you make choices.

Table 6: Food Label Terms for Fat	
Fat-free	Less then 0.5 grams per serving size listed on the label.
Low-fat	3 grams or less per serving.
Reduced or less fat	At least 25 percent less fat per serving than the reference food.
Saturated fat-free	Less than 0.5 grams saturated fat and less than 0.5 grams trans fatty acids per serving.
Low saturated fat	1 gram or less per serving and not more than 15 percent of the calories from saturated fatty acids.
Reduced or less saturated fat	At least 25 percent less per serving than the reference food.
Cholesterol free	Foods, which contain less than 2 milligrams of cholesterol per serving and 2 grams or less of saturated fat per serving.
Low cholesterol	Foods with less than 20 milligrams of cholesterol per serving and 2 grams or less of saturated fat per serving.
Cholesterol reduced	Foods that have no more than one-quarter (25%) of the cholesterol content of the foods for which they substitute and that they resemble in taste and flavor. These products provide information on how the new product compares with the one it replaces.

Tips for healthful Eating Out[40]

- Choose restaurants that have low-fat, low cholesterol items.
- Select poultry, fish, or meat that is broiled, grilled, or steamed rather than fried.
- Chose lean cuts of deli meats like fresh turkey or lean roast beef instead of higher fat cuts like salami or bologna.
- Order a low fat dessert like sherbet, fruit, or low fat yogurt.
- Control serving size by ordering smaller portions.

- At fast food restaurants, go for grilled chicken sandwiches, salads with low fat --dressing, and pizza topped with vegetables and less cheese, which are all better options.
- Slow down, practice mindful eating!

General Cooking Tips[40]

Meats and Vegetables:

- Use a fat separator to remove liquid fat.
- Remove chicken skin before eating. It may be left on during cooking to help retain moisture and add flavor.
- Cook meats in non-stick pans or use cooking sprays.
- Choose cuts of meat that are lean, with little visible fat and not too much marbling (fat in the lean). Trim off visible fat before cooking.
- Add more vegetables or starches (rice, pasta, potatoes), and cut down on the amount of meat used per serving.
- Try ground turkey for a lower fat alternative to ground beef. After cooking ground beef rinse in a colander. Read the label—some brands contain about the same amount of fat as lean ground beef.
- Try these lower-fat cooking methods:
  - Roasting – Place meat on a rack in the roasting pan so that the fat drips away during cooking.
  - Braising or Stewing – To get rid of the fat that remains in the cooking liquid, refrigerate overnight, and then remove the hardened fat. Longer cooking times helps tenderize tougher cuts of meat.
  - Broiling – For less tender cuts of meat, tenderize by scoring, pounding, grinding or marinating before cooking.
- Sauté onions and garlic in one tablespoon or less olive oil to start and then add water or broth to steam and sauté.
- Steam or microwave vegetables instead of sautéing.

Sauces, Gravies, and Dressings[40]

- To make gravies or sauces with less fat but without lumping, mix the flour or cornstarch with a small amount of cold liquid until smooth. Stir this mixture slowly into the hot liquid you want to thicken and bring to a boil.
- If a sauce made with yogurt is to be heated, add one tablespoon of cornstarch for each cup of yogurt to prevent separation.
- For homemade salad dressings, use less oil in proportion to other ingredients. For creamy dressings, add yogurt to replace some of the oil.
- Try lemon juice or herbed vinegar for fat-free dressings, and reduced calorie or fat-free salad dressings.

Baking Tips[40]

In baked products, try cutting back the fat or oil by one-fourth to one-third. For example:

- If the recipe calls for one cup of oil or margarine, try using 2/3 to 3/4 cup of oil.
- Make one-crust or "no crust" pies rather than two crust pies.
- Nuts are high in fat. Try using only half the nuts called for in your recipe.
- Substitute dried fruits and raisins for chocolate chips.
- Use non-stick sprays to grease pans.
- Use two egg whites instead of one whole egg.
- Make angel food cake in place of other cakes. It uses egg whites and has only a trace amount of fat.
- The minimum amount of fat or oil for cakes and drop cookies is two tablespoons per cup of flour.
- Substitute applesauce or mashed fruit (banana) in place of some fat in cakes and muffins.

Clinical Implications

- Diets low in saturated fats and cholesterol are associated with low risks and rates of coronary heart disease.[6]
- High intake of products high in *trans* fat can increase LDL-cholesterol levels.[6]
- Excessive fat intake has been linked to obesity, heart disease, and cancer.
- High fat diets may promote prostate, colorectal, lung, and endometrial cancers.[41]
- Healthy, low-fat diets may lower the risk of cancer, particularly some gastrointestinal, respiratory, and reproductive system cancers.[42]
- Consumption of foods containing omega-3 fatty acids are associated with decreased risk of coronary heart disease, depression, rheumatoid arthritis, allergies, bipolar disorder, attention deficit hyperactivity disorder, stroke, lupus, and a type of renal disease.[43]
- Diets rich in the plant-based sources of omega-3 fatty acids lower risk of developing heart disease.[37]

Resources/ Web Sites

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5. National Association of Margarine manufacturers. http://www.margarine.org/nutritionallyspeaking.html
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California Food Guide

Lifecycle: Prenatal Nutrition

Catherine Culleton, M.S., R.D.

What's New?

- Decline in neural tube defects.[1]
- Dietary Reference Intakes (DRIs) for pregnant women.
- Exercise guidelines during pregnancy.

Public Health Implications

Healthy People 2010 goals reflect the nation's commitment to nutrition as an essential component of improved pregnancy outcomes. The nutritional status of women prior to conception and during pregnancy is a focus area for several of the evidence-based and developmental Healthy People 2010 objectives:[2]

16-6: Increase the proportion of pregnant women who receive early and adequate prenatal care to 90 percent.

- In 2004, mothers of 85.7 percent of California's live births received prenatal care in their first trimester.[3]

16-10: Reduce the proportion of low-birth-weight infants to 5 percent and very-low- birth-weight infants to 0.9 percent.

- In 2004, 6.6 percent of California's live births were low-birth-weight (<2,500grams) and 1.1 percent were very-low-birth-weight (<1,500 grams).[3]

16-16: Increase the proportion of pregnancies begun with optimal folic acid levels to 80 percent.

- In 2002, 50 percent of women of childbearing age in California reported taking folic acid supplements.[4]

16-17: Increase abstinence from alcohol, cigarettes, and illicit drugs among pregnant women.

- Approximately 9 percent of women who gave birth in California during 2002 reported smoking during the first or last three months of pregnancy.[5] Approximately 19 percent of women who gave birth in California during 2003 reported drinking during the first or last three months of pregnancy.[6]

Public Health Implications continued

19-12, 19-13: Reduce iron deficiency among females of childbearing age to 7 percent and anemia among low-income pregnant women in their third trimester to 20 percent.

Developmental objectives:

- Increase the proportion of mothers who achieve a recommended weight gain during their pregnancies.
- Decrease the proportion of pregnant women with gestational diabetes.
- Reduce the occurrence of fetal alcohol syndrome (FAS).

California Perinatal Characteristics[3]

Tables 1 and 2 depict outcome and demographic statewide perinatal data from 1997 to 2004. In 2004, 545,094 live births took place in California. The percent of low birthweight (LBW) (500 – 2,499 grams) live births increased from 6.0 percent in 1997 to 6.6 percent in 2004 and the percent of very low birthweight (500 – 1,499 grams) live births increased slightly from 1.0 percent in 1997 to 1.1 percent in 2004. Initiation of prenatal care in the first trimester increased from 80.8 percent in 1997 to 85.7 percent in 2004. More than half of the mothers who gave birth to live infants in 2004 were Hispanic while 46.8 percent were foreign born.

Table 1: California Perinatal Characteristics (%) 1997 – 2004[3]

YEAR	Live Births	First Trimester Prenatal Care	Low-Birthweight	Very Low Birthweight	Mothers Under 18 years
1997	524,668	80.8	6.0	1.0	4.6
1999	518,616	82.2	6.0	1.0	4.1
2000	531,943	83.1	6.1	1.0	3.7
2001	528,001	83.9	6.2	1.0	3.4
2002	529,559	84.8	6.3	1.0	3.3
2003	541,185	85.8	6.5	1.1	3.1
2004	545,094	85.7	6.6	1.1	3.1

Data from 1998 are missing due to unavailability of 1998 Vital Statistics.

Table 2: Maternal Race/Ethnicity Composition of 2004 Live Births in California[3]

White	30.2%
Hispanic	51.3%
Black	5.7%
Asian/Pacific Islander	12.4%
Other	0.5%
Foreign Born*	46.8%

*Foreign born refers to mothers who were born outside the United States.

Definition

Prenatal Nutrition

Adequate nutrition during pregnancy is extremely important to both maternal and fetal health. The nutritional requirements in pregnancy, key recommendations from the 2005 Dietary Guidelines for Americans (Dietary Guidelines), current trends in prenatal nutrition, and strategies to optimize nutrient intake will be presented in this chapter.

Dietary intake and gradual continuous weight gain in pregnancy are two of the most critical components of fetal growth and development.[7] Nutritional requirements increase during pregnancy to support fetal growth and development as well as the increase in maternal metabolism and tissue development specific to reproduction.[8] Nutrients supplied to the fetus come from three sources—directly from the mother's diet, from her nutrient stores, and from nutrient synthesis within the placenta.[9] In addition, good nutrition during pregnancy helps prepare women for breastfeeding.[10]

Key components of a healthy pregnancy:[11]

- Appropriate weight gain.
- Consumption of a variety of foods in accordance with the Dietary Guidelines.
- Appropriate and timely vitamin and mineral supplementation.
- Avoidance of alcohol, tobacco, and other harmful substances.
- Safe food handling.

Preconceptional Nutrition

Although the importance of nutrition during the nine months of pregnancy cannot be overstated, maintenance of ideal weight during the childbearing years, and adequate nutrient intake prior to pregnancy contribute to a positive birth outcome. Dietary changes should be started early—preferably before conception—to maximize pregnancy outcomes and support optimal fetal growth and development. Supplementation of 400 mcg of synthetic folic acid is recommended for all women of childbearing age to reduce the risk of birth defects, should a pregnancy occur.

Adolescent Pregnancies

- In 2004, 3.1 percent of live births in California were to mothers under 18 years.[3]

Due to lifestyle and lack of knowledge, many pregnant adolescents fail to meet the recommended intake levels for many nutrients. Obtaining adequate energy and nutrients are paramount to ensure positive outcomes for adolescent pregnancies, especially in younger pregnant teens who are still growing themselves. Health care providers should refer pregnant teens to appropriate nutrition and assistance programs for specialized evaluation and care.

Burden

Consequences of Maternal Malnutrition

Malnutrition during pregnancy negatively affects maternal pregnancy outcome including fetal survival and growth. Malnutrition is caused by eating either too little, too much, or a diet that lacks essential nutrients.[12] Anemia is the most common nutrient-related problem of pregnancy, and is attributable to iron deficiency nearly 90 percent of the time, with the remainder due to folate deficiency.[13]

A malnourished mother is more likely to give birth to a LBW baby susceptible to disease and premature death.[14] Low-income women face substantial barriers to achieving the recommended nutrient intake and weight gain and poverty is a major risk factor for poor pregnancy outcomes.[11]

Adolescent girls and their infants are particularly vulnerable to the effects of malnutrition. Infants born to teens are more likely to be low birthweight and have a higher risk of dying in the first year of life.[15]

In a recent California population-based study, LBW and very low birthweight (VLBW) infants had significantly longer hospital stays, which accounted for a significantly higher proportion of total hospital costs than infants of normal birthweight. The findings revealed that LBW infants accounted for 5.9 percent of the cases and 56.6 percent of total infant hospital costs, whereas VLBW infants accounted for 0.9 percent of the cases and 35.7 percent of total infant hospital costs.[16]

Obesity occurs when excessive calories are consumed relative to energy expenditure. Maternal obesity is a risk factor for maternal and fetal malnutrition. In addition, it increases the risk of gestational diabetes, cesarean deliveries, complications during delivery, macrosomia, congenital defects, and childhood obesity.[17] Uncontrolled diabetes and abnormal birthweight may also contribute to overweight, obesity, and/or diabetes later in life.

Factors Leading to Obesity

A. Diet and Physical Activity

Poor diet and physical inactivity are the most influential factors contributing to the increase in overweight and obesity in the United States.[18] Pregnant women and women

of childbearing age are not immune to these factors. Diet counseling during pregnancy should ensure that energy and nutrient intake is neither excessive nor deficient.[13] Maternal weight gain alone does not mean a woman is consuming foods that meet the nutritional requirements of pregnancy. It is important to balance the risk of maternal overweight due to excessive pregnancy weight with the risk of poor fetal growth associated with low weight gain.[11] Compliance with the 1990 Institute of Medicine (IOM) recommendations for weight gain based on body mass index (BMI)* leads to optimal maternal and neonatal outcomes and no increased risk for postpartum weight retention.[19]

*BMI equals a person's weight in kilograms divided by height in meters squared ($BMI=kg/m^2$).

Eating food away-from-home

Household income spent on away-from-home foods rose from 25 percent of total food spending in 1970 to nearly one half in 1999.[20] A small study of 150 women in Texas suggests that eating food away from home during pregnancy contributes to a higher intake of energy, total fat, and saturated fat.[21]

B. Food Security

Access to enough food at all times defines food security while food insecurity refers to a household with limited or uncertain availability of food. Achieving adequate nutrition is dependent on a number of socioeconomic factors including, age, family income, social status, ethnicity, education, employment, marital status, and availability of healthcare and support systems.[15] Ensuring a nutritious food supply for pregnant women is a primary focus of prenatal care in California.

In a recent study among pregnant women, income level was the characteristic most predictive of food security. The study also found that life stress and coping behaviors may be as important as income in determining an individual's risk for food insecurity.[22] Many food-insecure households reduce the quality, variety, and desirability of their diets because they are worried or unsure whether they will be able to get enough to eat.[23]

California's Women Infants and Children (WIC) Supplemental Nutrition program is available to low-income pregnant, breastfeeding, and postpartum women and children under age five who are at nutritional risk and who are at or below 185 percent of the federal poverty level. The goal of the WIC program is to decrease the risk of poor birth outcomes; and to improve the health of participants during critical times of growth and development. Nutrition education, breastfeeding promotion, medical care referrals, and specific supplemental nutritious foods which are high in protein and/or iron are provided. Many WIC participants are eligible for Food Stamps and vice versa. Food Stamp offices in California are operated by local county welfare departments. Low-income people may apply for food stamps at any office located in the county where they live. Food Stamps can be used to purchase foods for human consumption and seeds and plants to grow food for household use.

Consequences of food insecurity for women of child-bearing age in low-income households:[22]

- Reduced micronutrient intake.[24]

- Overweight.[25]
- Inability to return to pregravid weight postpartum.[26]

C. Media

In the United States, pregnant women are bombarded with warnings, health messages, and advisories about what to eat and drink during pregnancy. Conflicting messages from the media, government, industry, health care professionals, family, and friends can be overwhelming. According to a 2003 Food Marketing Institute survey the top seven sources for consumers seeking information about health and nutrition include: healthcare professionals, books, magazines, family/friends, newspapers, television, and the Internet.[27] In the 2000 California Women's Health Survey, magazines and television combined were the main source of information about folic acid.[4] When planning prenatal nutrition programs, sources of information must be considered.

Dietary Recommendations

Dietary Recommendations During Pregnancy

The Dietary Guidelines recommend that nutrient needs should be met primarily through consuming food.[18] In pregnancy, supplementation with fortified foods and eating a nutrient-dense food-based diet is indicated for most women.[13] The new MyPyramid Food Guidance System[28] Intake Pattern is not specifically applicable for pregnancy or lactation. However, the recommendations in the MyPyramid Education Framework: variety, proportionality, moderation, and activity—are concepts that health professionals can expand upon when counseling about nutrition. Throughout pregnancy, when nutrient needs are very important for mother and baby, women should be addressing nutrition and diet with a health care provider or registered dietitian. Later in this chapter a recommended food guide for pregnant women is provided.

The Dietary Guidelines[18] identifies pregnant women as a special population group. The key recommendations for women of childbearing age that may become pregnant are listed in Table 3.

Table 3: Dietary Guidelines for Pregnant Women and Women of Childbearing Age Adapted for California[18]

Adequate Nutrients Within Calorie Needs
Women of childbearing age who may become pregnant and those in the first trimester of pregnancy should consume adequate synthetic folic acid daily (from fortified foods or supplements) in addition to food forms of folate from a varied diet.
Women of childbearing age who may become pregnant should eat foods high in heme-iron and/or consume iron-rich plant foods or iron-fortified foods with an enhancer of iron absorption, such as vitamin C-rich foods.
Weight Management
Pregnant women should ensure appropriate weight gain as specified by a healthcare provider.
Physical Activity
In the absence of medical or obstetric complications, incorporate 30 minutes or more of moderate-intensity physical activity on most, if not all, days of the week. Avoid activities with a high risk of falling or abdominal trauma.
Alcoholic Beverages
Alcoholic beverages should not be consumed by some individuals, including those who cannot restrict their alcohol intake, women of childbearing age who may become pregnant, pregnant and lactating women, children and adolescents, individuals taking medications that can interact with alcohol, and those with specific medical conditions.
Food Safety
Pregnant women should not eat or drink raw (unpasteurized) milk or any products made from unpasteurized milk: raw or partially cooked eggs or foods containing raw eggs, raw or undercooked meat and poultry, raw or undercooked fish or shellfish, unpasteurized juices, and raw sprouts.
Pregnant women should only eat certain deli meats and frankfurters that have been reheated to steaming hot.

Reducing the Risk of Mercury Toxicity

In 2004, EPA and FDA issued three safety tips to reduce the risk of fetal exposure to methylmercury.[29]

1. Do not eat shark, swordfish, king mackerel, or tile fish because they contain high levels of methylmercury.
2. Eat up to 12 ounces (two average meals) a week of a variety of fish and shellfish that are lower in mercury.*
    a. Five of the most commonly eaten fish that are low in mercury are shrimp, canned light tuna, salmon, pollack, and catfish.
    b. Another commonly eaten fish, albacore (white) tuna has more mercury than canned light tuna. So, individuals may eat up to 6 ounces (one average meal) of albacore tuna per week.
3. Check local advisories about the safety of fish caught by family and friends in local lakes, rivers, and coastal areas.

* One meal is about six ounces of cooked fish or 1/2 pound (eight ounces) of uncooked fish.

If no advice is available, six ounces of fish caught from local waters may be eaten per week, however; no other fish should be consumed during the same week. These guidelines also apply to women who might become pregnant, nursing mothers, and young children.

By following these guidelines, pregnant women can obtain the health benefits that fish and shellfish provide while reducing the risk of neurological damage to the developing fetus. One such health benefit is the addition of omega-3 fatty acids to the diet. Preliminary evidence suggests there is a correlation between maternal omega-3 fatty acid consumption and neonatal functional outcomes.

Reducing the Risk of Listeriosis

Listeriosis, an infection caused by the bacterium Listeria monocytogenes, is particularly dangerous to pregnant women. This bacterium can be found in refrigerated, ready-to-eat foods, (meat, poultry, seafood, unpasteurized milk, and milk products or foods made with unpasteurized milk) and soil. Unlike most food bacteria that have a slow rate of growth in the refrigerator, Listeriosis monocytogenes can grow rapidly at refrigerator temperatures.[30] Risks of listeriosis include preterm delivery, spontaneous abortions, stillbirth, and neonatal death.[30]

Dietary Reference Intakes for Pregnant Women

The Dietary Guidelines and the DRIs apply to average daily diets consumed over several days, not a single day or single meal.[31] DRIs is a generic term for a set of nutrient reference values that include the Recommended Dietary Allowance (RDA)* and Adequate Intake (AI).**

The current DRIs distinguish specific vitamin, mineral, and macronutrient needs for pregnant females between the ages of 14-18 years, 19-30 years, and 31-50 years.[32-36]

Calorie needs increase by about 300 kcal per day starting with the second trimester of pregnancy. This is approximately a 15 to 20 percent increase in the energy needs compared to non-pregnant woman. An increase in the basal metabolic rate (BMR)*** is one of the major components of increased energy requirements during pregnancy.[37] Adolescent, active, or nutritionally deficient women may require more calories. However, the percentage increase in calories is small relative to the estimated need for most other nutrients.[8] Table 4 lists the RDAs and AIs for pregnant and non-pregnant women in three life stage group.

***Recommended Dietary Allowance (RDA)** is the average daily dietary intake level that is sufficient to meet the nutrient requirement of nearly all (97 to 98 percent) healthy individuals in a particular life stage and gender group.[31]

****Adequate Intake (AI)** is the recommended daily intake value based on observed or experimentally determined approximations of nutrient intake by a group (or groups) of healthy people that are assumed to be adequate—used when an RDA cannot be determined.[31] There is much less certainty about the AI value than about the RDA value. Because AIs depend on a greater degree of judgment than is applied in estimating the EAR and subsequently an RDA, the AI might deviate significantly from and be numerically higher than the RDA if it could be determined. For this reason, AIs must be used with greater care than is the case for RDAs.[31]

*****Basal Metabolic Rate (BMR)** is the energy required to sustain basal metabolism and keep the body alive. Basal metabolic energy includes the energy needed to maintain nervous activity, ventilate the lungs, keep the heart pumping to circulate blood, maintain minimal levels of protein synthesis as well as many other biochemical reactions and functions.

Table 4: Recommended Dietary Allowances and Adequate Intakes for Pregnant and Non-Pregnant Women in Three Life Stage Groups[32-36]

		Pregnant Women			Non-Pregnant Women		
Age (years)		**14 - 18**	**19 - 30**	**31 - 50**	**14- 18**	**19 - 30**	**31- 50**
Carbohydrate	g/d	**175**	**175**	**175**	**130**	**130**	**130**
Total Fiber*	g/d	28	28	28	26	25	25
Protein	g/d	**71**	**71**	**71**	**46**	**46**	**46**
Folate	ug/d	**600**	**600**	**600**	**400**	**400**	**400**
Iron	mg/d	**27**	**27**	**27**	**15**	**18**	**18**
Calcium*	mg/d	1,300	1,000	1,000	1,300	1,000	1,000
Thiamin	mg/d	**1.4**	**1.4**	**1.4**	**1.0**	**1.1**	**1.1**
Riboflavin	mg/d	**1.4**	**1.4**	**1.4**	**1.0**	**1.1**	**1.1**
Niacin	mg/d	**18**	**18**	**18**	**14**	**14**	**14**
Vitamain A	ug/d	**750**	**770**	**770**	**700**	**700**	**700**
Vitamin B12	ug/d	2.6	2.6	2.6	2.4	2.4	2.4
Vitamin B6	mg/d	**1.9**	**1.9**	**1.9**	**1.2**	**1.3**	**1.3**
Vitamin C	mg/d	**80**	**85**	**85**	**65**	**75**	**75**
Vitamin D*	ug/d	5	5	5	5	5	5
Vitamin E	mg/d	**15**	**15**	**15**	**15**	**15**	**15**
Vitamin K*	ug/d	75	90	90	75	90	90
Phosphorus	mg/d	**1,250**	**700**	**700**	**1,250**	**700**	**700**
Iodine	ug/d	**220**	**220**	**220**	**150**	**150**	**150**
Magnesium*	mg/d	400	350	360	360	310	320
Zinc	mg/d	**13**	**11**	**11**	**9**	**8**	**8**
Selenium	ug/d	**60**	**60**	**60**	**55**	**55**	**55**
Fluoride*	mg/d	3	3	3	3	3	3
Potassium*	g/d	4.7	4.7	4.7	4.7	4.7	4.7
Sodium*	g/d	1.5	1.5	1.5	1.5	1.5	1.5

Recommended Dietary Allowances are in bold type and Adequate Intakes are in ordinary type followed by a (*).

Daily Food Choices for Pregnant Women

When pregnant women make healthful food choices based on the information provided in Table 5 they are more likely to meet recommended intakes of nutrients. In addition, they are also more likely to have macronutrient intakes that fall within acceptable nutrient distribution ranges of the Dietary Reference Intakes.

Daily Food Choices for Pregnant Women is only a guide and may not be suitable for all pregnant women.

Table 5: Daily Food Choices for Pregnant Women[Ψ]

Food Groups	Recommended Amounts of Food for Pregnant Women	Standard Amounts of Food
Breads, Grains, Cereals	7 to 9 of these choices **or** (7-9) 1 ounce equivalents (Make half of these choices of whole grain)	**1 ounce equivalent is:** 1 slice whole grain bread 1 cup dry cereal ½ cup cooked cereal, rice, noodles 1 roll, pancake, small tortilla ½ bagel, English muffin, pita 4 crackers
Vegetables	3 cups of these choices **or** (6) ½ ounce equivalents	**½ ounce equivalent is**: ½ cup of cut-up raw or cooked vegetables like: carrots, broccoli, sweet potatoes, spinach, pumpkin, squash, peppers, tomatoes, greens, cabbage, snow peas 1 cup leafy raw vegetables like: romaine and green leaf lettuce ½ cup of 100% vegetable juice
Fruits	2 cups of these choices **or** (4) ½ cup equivalents	**½ cup-equivalent is**: 1 medium fruit ½ cup 100% fruit juice with vitamin C ½ cup cut-up fresh, frozen, canned fruit like: oranges, strawberries, melon, kiwi, melon, papaya, apricots, grapefruit ¼ cup dried fruit
Milk Products	3 to 4* of these choices * 4 cups for teens	**1 cup-equivalent is**: 1 cup low-fat or fat-free milk or yogurt 1 ½ ounces cheese 2 ounces low-fat cheese 1 cup pudding or custard made with milk 1 ½ cups frozen yogurt or ice cream 1 cup calcium-fortified lactose free milk or soy milk
Protein Foods	6 of these choices **or** (6) 1 oz equivalents	**1 ounce-equivalent is**: **Animal Protein**: 1 ounce of cooked meat, poultry, or fish 1 egg ½ cup cottage cheese **Vegetable Protein**: ¼ cup cooked, dry beans, peas, lentils ¼ cup tofu 1 Tablespoon peanut butter ½ ounce nuts or seeds
Oils	6 teaspoons	**1 teaspoon equivalent is**: 1 Tablespoon low-fat mayonnaise 2 Tablespoons light salad dressing 1 teaspoon vegetable oil

Ψ This table for was adapted from the 2005 Dietary Guidelines for Americans. Daily Food Choices for Pregnant Women is only a guide and may not be suitable for all pregnant women.

Protein

Protein needs increase by 25 grams per day during pregnancy. This increase—equivalent to about three ounces of meat—supports the synthesis of maternal and fetal tissue. Meat, eggs, chicken, turkey, and fish are good sources of animal protein while beans, lentils, tofu, peanut butter, and other nuts are good sources of vegetable protein. Foods high in protein also provide other important nutrients such as vitamin B_6, iron, and zinc. Animal foods provide vitamin B_{12}, while vegetable foods supply fiber.

Reasons for increased protein during pregnancy:[38]

- Rapid growth of the fetus.
- Development of the placenta.
- Growth of maternal tissues.
- Increased maternal blood volume.
- Amniotic fluid.
- Functional reserve.

Folate

Folate is a B vitamin required for DNA synthesis and cell division, red blood cell formation, and some metabolic reactions. Folate requirements increase during pregnancy to support cell division in maternal and fetal tissue. Folic acid is the synthetic form of folate found in supplements and fortified foods. If a woman has enough folic acid in her body before and during pregnancy, her baby is less likely to develop a neural tube defect (NTD). Folic acid can reduce the risk of NTDs by up to 70 percent.[39] An NTD occurs when the neural tube fails to close properly. Spina bifida and anencephaly are the two most common types of NTDs and occur when the lower and upper end of the neural tube fail to close, respectively. A daily intake of 400 micrograms per day of synthetic folic acid (fortified foods or supplements) in addition to food forms of folate from a varied diet is recommended for women of childbearing age who may become pregnant.[18] It is known that natural folate does not raise blood folate levels as much as equal amounts of synthetic folic acid. In addition, current research does not indicate whether naturally occurring folate from food shows a protective effect against NTDs.[18] The RDA increases to 600 micrograms per day of folate during pregnancy to support fetal growth and rapid cell division. Table 6 lists sources of folate.

The U.S. Food and Drug Administration authorized the addition of folic acid to enriched breads, cereals, flours, corn meals, pastas, rice, and other grain products in March 1996, with compliance mandatory by January 1998.[40] A 19 percent reduction in NTD birth prevalence occurred following folic acid fortification of the US food supply.[39]

In 2005, 33.0 percent of women ages 18-45 reported taking a multi-vitamin containing folic acid in the United States.[41]

Table 6: Sources of Folate/Folic Acid[39]

Sources of Folate/Folic Acid	
Synthetic folic acid supplements	Prenatal vitamins, multivitamins or folic acid supplements
Folic acid fortified enriched foods	Enriched cereals, bread, flour, cornmeal, pasta, rice and others.*
Foods naturally folate rich	Legumes i.e. black beans, navy beans, pinto beans, black-eyed peas, lentils Dark green leafy vegetables, i.e. spinach, collards, turnip greens broccoli, asparagus, okra Citrus fruits and juice, i.e. orange. Nuts and nut butter, i.e. peanuts, almonds, pecans, mixed nuts meat, eggs
*Choose fortified enriched foods with 400 mcg of folic acid per serving.	

Iron

An increase in the maternal blood supply during pregnancy greatly increases the demand for iron.[42] The RDA for iron for pregnant women is 27mg/d.[35] This is significantly higher than a non-pregnant woman's normal need of 18mg/d. Consuming foods high in Vitamin C along with plant (non-heme) sources of dietary iron enhances the body's ability to absorb iron. Iron deficiency anemia in pregnancy increases the risk of preterm birth and low-birth-weight and is also related to lower scores on intelligence, language, gross motor control, and attention tests in children at the age of five years.[43, 44] Generally speaking, anemia is the lack of adequate blood cell size or hemoglobin, causing inadequate transport of oxygen to all the cells in the body.

See the California Food Guide Chapter on Iron Deficiency for more information.

Calcium

Calcium absorption in women increases two-fold during pregnancy.[9] Consequently, the calcium requirements of pregnant women are similar to those of non-pregnant women. However, requirements for teenagers, increase by 300 mg for accumulation of optimal bone mineral. An extra 8 ounce glass of milk would provide the added calcium needed by a 14-18 year-old women. In addition, women with pregnancy-induced hypertension may also benefit from higher calcium intakes.[13] Good sources of calcium include, milk, cheese, and yogurt. Women diagnosed with lactose intolerance may benefit from dairy products with less lactose, such as cheese, yogurt, or milk with added lactase enzyme. Additional non-dairy based sources of calcium include fortified ready-to-eat cereals; fortified soy-based beverages with added calcium; calcium fortified juices, green leafy vegetables like kale; tofu processed with calcium; corn tortillas processed with lye; and canned salmon with bones or other small fish eaten with whole bones (i.e., sardines). Calcium supplementation may be necessary for some women.

Planning diets for pregnant women:[31]

1) Plan a diet that the pregnant woman will consume—one that is palatable, economical, culturally appropriate and safe.
2) Set nutrient goals that are appropriate. Consider pre-pregnancy weight, prenatal weight gain, nutrition status, social and psychological status.

Prenatal Vitamins

For women who do not ordinarily consume a balanced diet and for those at nutrition risk, a daily multiple-vitamin-mineral supplement beginning in the second trimester may be recommended by some physicians. The supplement should include the nutrients listed in Table 7. Supplementation of other nutrients may be needed for some pregnant women.

Table 7: Recommended Contents of a Prenatal Supplement[45]

Iron	30 mg	Vitamin B_6	2 mg
Zinc	15 mg	Folate*	300 mcg
Copper	2 mg	Vitamin C	50 mg
Calcium	250 mg	Vitamin D	5 mcg

*Most prenatal supplements have 400 mcg of folic acid, an amount that will assist pregnant women in reaching the DRI recommendation of 600 mcg folate.

Weight Gain During Pregnancy

- **Women should begin their pregnancy at a healthy weight.**
- **Goals for weight gain should be based on pre-pregnancy BMI, which is determined by an individual's weight and height.**

The 1990 Institute of Medicine (IOM) guidelines for weight gain during pregnancy recommend weight gain based on pre-pregnancy body mass index (BMI).[45] The guidelines have been validated by numerous studies indicating that weight gain in accordance with these guidelines is associated with optimal birth weight and obstetrical outcomes.[19, 46] However, most pregnant women do not gain weight in accordance with the guidelines.[19] In fact, according to the 2003 National Pregnancy Nutrition Surveillance Study (PNSS), 44.2 percent of women gained more and 25.2 percent gained less than the IOM recommendations.[47] Weight status at the beginning of pregnancy is also of concern. The 2003 PNSS revealed that 43.0 percent of women were overweight and 12.1 percent were underweight at the beginning of their pregnancy.[47] Excess weight gain during pregnancy and failure to lose weight after pregnancy have been shown to be predictors of long-term weight changes and higher BMI many years after pregnancy.[48] It is important to remember that weight gain alone should not be considered a perfect diagnostic or screening tool for good perinatal outcomes.[19] Table 8 lists the 1990 IOM recommendations for total weight gain during

pregnancy. Table 9 lists the approximate weekly weight gain guidelines for the second and third trimesters of pregnancy. In 2006, IOM organized a committee of experts to prepare a summary report about recent trends in maternal weight gain (prior to, during, and after pregnancy) and the impact of maternal weight during pregnancy on the health of mothers and their children (up to 12 months). Once this report is released, the1990 recommendations for weight gain during pregnancy may be revised.

Table 8: 1990 Institute of Medicine Recommendations for Weight Gain During Pregnancy[45, *]

Body Mass Index (BMI)	Wt. Gain (kgs)	Wt. Gain (lbs)	Wt. Gain per 2 weeks
<19.8	12.5 - 18.5 kgs	28 - 40 lbs.	0.5 kg
19.8 - 26	11.5 - 16 kg	25 – 35 lbs.	0.4 kg
>26 - 29	7 – 11.5 kg	15 – 25 lbs.	0.3 kg
BMI > 29	At least 7.0 kg	At least 15 lbs.	
Twin Pregnancy	15.9 – 20.4 kg	34 – 45 lbs.	0.7 kg
Triplet Pregnancy		(50 lbs.)	

BMI = wt/ht^2 = body weight in kilograms/height in meters^2 **1 kilogram = 2.2 pounds**

*Adolescents less than two years post-menarche should be advised to stay within the IOM-recommended BMI-specific weight range—without either restricting weight gain or encouraging weight gain at the upper end of the range.

Table 9: Institute of Medicine Approximate Weekly Weight Gain Guidelines for the Second and Third Trimesters[45, **]

Low Body Mass Index (BMI) (BMI <19.8)	Slightly more than 1lb/week
Normal BMI (19 – 26)	1 lb/week
High BMI (BMI 26-29)	2/3 lb/week

**In addition, the data support a weight gain of 1.5 pounds per week for normal-weight women during the second half of a twin pregnancy. Suitor CW. 1997. *Maternal Weight Gain: A Report of an Expert Work Group.* Arlington, VA: National Center for Education in Maternal and Child Health.

Exercise During Pregnancy

The American College of Obstetricians and Gynecologists (ACOG) and the 2005 Dietary Guidelines for Americans recommend **30 minutes or more of moderate-intensity physical activity per day for most days of the week during pregnancy** in the absence of medical or obstetric complications.[18, 49] The ACOG guidelines also promote exercise for previously sedentary pregnant women and for those with medical or obstetric complications, but only after they have undergone medical evaluation and clearance. The health benefits from exercise during pregnancy include: reducing the risk of gestational diabetes, excessive weight gain, pregnancy induced hypertension, thrombosis, and lower back pain.[50] Other possible benefits include reduced stress,

enhanced ability to cope with postpartum depression, shorter labors, and enhanced feelings of physical and emotional wellbeing.[49]

Perhaps the greatest benefit for women who exercise during pregnancy is the increased likelihood of continued exercise beyond the nine months of pregnancy. Establishing a pattern of regular exercise will provide health benefits well beyond the reproductive years.[50]

Examples of moderate-intensity physical activity:[18]

- brisk walking
- swimming
- dancing
- hiking
- resistance training
- light gardening/yard work
- stretching
- stationary cycling

Pregnant women should avoid activities that increase the risk of falls, result in excessive joint stress or have a high risk for trauma such as downhill skiing, gymnastics, ice hockey, horseback riding, kickboxing, soccer and vigorous racquet sports.

Pregnant women should stop exercising and call their doctor if they get any of these symptoms:[49]

- vaginal bleeding
- shortness of breath before exercising
- dizziness
- headache
- chest pain
- muscle weakness
- calf pain or swelling
- preterm contractions
- decreased fetal movement
- amniotic fluid leakage

Special Dietary Considerations During Pregnancy

Vegetarian Diets

"Well-planned total vegetarian (vegan), lacto-vegetarian, and lacto-ovo-vegetarian diets are appropriate for all stages of the life cycle, including pregnancy and lactation."[51] Special attention should be given to the intake of protein, vitamin B_{12}, vitamin D, iron, calcium, and folic acid to insure nutrient needs are being met. The Dietary Guidelines recommend nuts and legumes as alternative food choices (for meat, poultry, and/or fish) for vegetarians in the general population. These substitutions are also appropriate for pregnant women.

Multiple Gestation, Including Twins

Multiple births accounted for 3.3 percent of all births in the United States in 2003.[52] The results are similar in California, with multiple births accounting for 2.9 percent and 3.0 percent of live births in 2003 and 2004, respectively.[3] Infants of multiple births have a much greater risk of premature birth and low-birthweight. Adequate prenatal nutrition and appropriate weight gain improves the chance that infants of multiple gestation will be born close to term and achieve a healthier birth outcome.[53] (See Table 8)

Common Concerns/Strategies

Gestational Diabetes

Pregnant women who have never had diabetes before but who have high blood glucose levels during pregnancy have gestational diabetes (GDM). GDM complicates approximately 7 percent of all U.S. pregnancies annually, resulting in about 200,000 cases per year.[54] Of these women, 20 – 50 percent have a chance of developing type 2 diabetes in the five to ten years following their pregnancy.[54] Treatment of GDM may include special meal plans, physical activity, oral hypoglycemic therapy, insulin therapy, and blood glucose monitoring. The most common prenatal risk of gestational diabetes is fetal macrosomia.

Women with GDM should receive nutritional counseling that is consistent with the recommendations by the American Diabetes Association. In California, many physicians, nurses, registered dietitians, social workers, and other health care professionals follow the Guidelines for Care for GDM through the California Diabetes and Pregnancy Program. This program is also known as Sweet Success. The goal of Sweet Success is to improve pregnancy outcomes, such as reducing fetal deaths and neonatal complications.

Gestational Diabetes is more common in women who:[55]

- Have a first degree relative with diabetes.
- Are obese.
- Are from one of the following ethnic groups: American Indian, African American, Hispanic, Asian/Pacific Islander.
- Have had a previous baby weighing more than nine pounds.
- Had a previous baby that died before birth (stillbirth).
- Have polycystic ovarian syndrome.
- Have chronic use of medications that increase the risk of diabetes (e.g. steroids).

Smoking

Approximately 9 percent of women who gave birth in California during 2002 reported smoking during the first or last three months of pregnancy. Smoking during pregnancy is linked with poor pregnancy outcomes including low-birth-weight (small for gestational age or preterm delivery), sudden infant death syndrome (SIDS), and stillbirths. In addition to contributing to infant illness and death, these problems are associated with

serious child and adult health problems such as asthma.[5] Health risks can be reduced if a woman quits smoking by the fourth month of pregnancy.[10]

The California Smokers' Helpline is a telephone program funded by the California Department of Health Services. This free service provides referrals and one-on-one counseling over the phone. Pregnant women who smoke may call 1-800-No-Butts for more information.

Alcohol

Approximately 19 percent of all pregnant women in California reported drinking alcohol during the first or third trimester of pregnancy in 2003.[6] The Dietary Guidelines state that even moderate drinking during pregnancy may have behavioral or developmental consequences for the baby. The adverse effects of alcohol on the developing fetus represent a spectrum of structural anomalies and behavioral and neurocognitive disabilities, commonly referred to as fetal alcohol syndrome (FAS). FAS is characterized by abnormal facial features, growth retardation, and central nervous system disorders. FAS is one of the leading preventable birth defects associated with mental and behavioral impairment. Many children have some, but not all, of the clinical signs of FAS. This is referred to as Fetal Alcohol Spectrum Disorder (FASD) and may include: fetal alcohol effects (FAE), alcohol-related neurodevelopmental disorder (ARND), and alcohol-related birth defects (ARBD).

Illicit Drug Use

Drug use by pregnant women can increase the risk of a small for gestational age infant.[56] According to the 2003-2004 National Survey on Drug Use and Health report, an estimated 4.6 percent of pregnant women aged 15 to 44 years reported using illicit drugs in the past month.[57] Marijuana was the most common illegal drug used by pregnant women. The March of Dimes encourages pregnant women who use illicit drugs (with the exception of heroin) to stop using drugs immediately. Women who use heroin should consult their health care provider or a drug treatment center about methadone treatment.[58]

Caffeine

Available evidence suggests that a caffeine intake of up to 300 mg per day is not harmful to the fetus.[13] Eight ounces of brewed coffee contains about 125 mg of caffeine. Other sources of caffeine include: black tea, regular and diet soda and unsweetened cocoa and chocolate. Some of the health concerns associated with excessive caffeine consumption during pregnancy include delayed conception, shorter gestation and lower birth weight.[59, 60]

Morning sickness/hyperemesis gravidarum

Nausea and vomiting or morning sickness is a common problem during pregnancy—particularly during the first trimester. It rarely continues throughout the entire pregnancy. Hyperemesis gravidarium is a serious medical condition of pregnancy that

involves repeated episodes of vomiting. It can cause rapid weight loss, dehydration and other dangerous changes in the levels of blood components.[10]

General guidelines for the treatment and prevention of morning sickness:

- Eat six to eight small meals per day.
- Avoid being without food for long periods of time.
- Drink fluids between meals (so as not to overfill the stomach).
- Avoid foods that are greasy, fried, or highly spiced.
- Avoid foul or unpleasant orders.
- Rest when tired.

Heartburn

Pregnant women may experience heartburn (burning pain in the lower esophagus) caused by the reflux of food and acid from the stomach.[15] Heartburn tends to worsen throughout pregnancy as the growing uterus exerts pressure on the abdominal cavity.

Dietary recommendations for the prevention and treatment of heartburn:[10]

- Eat six to eight small meals per day
- Drink less while eating, drink fluids between meals
- Avoid foods that tend to make heartburn worse (varies for individuals)
- Avoid lying down with a full stomach
- Wear loose clothing
- Elevate shoulders and head when lying down to prevent the flow of stomach contents into the esophagus.

Medical intervention may be necessary if the woman is spitting up blood, has difficulty swallowing, has black stools or weight loss or heartburn persists for extended periods of time.

Constipation

Constipation is a common concern during pregnancy. Constipation may result from increased relaxation of the intestines, increased water retention by the body, and pressure placed on the intestines from the growing uterus.

Recommendations for problems with constipation:

- Eat more foods with fiber.
- Eat regular meals and snacks.
- Drink plenty of liquids.
- Try a natural laxative like prunes, prune juice, or dried apricots.

Opportunities for Improvement

- Assure pregnant women access to culturally competent medical care, medical nutrition therapy, and nutrition education.
- Support changes in communities that make it easier and safer for women of childbearing age and pregnant women to be physically active and have access to healthy foods.
- Support an environment that reduces exposure of tobacco, alcohol, and other drugs in women of childbearing age and pregnant women.

Resources/Web Sites

California Department of Health Services
Maternal Child and Adolescent Health Branch
1615 Capitol Avenue
Sacramento, California 95899-7420
1-866-241-0395
http://www.mch.dhs.ca.gov/

California Department of Health Services
WIC Supplemental Nutrition Branch
3901 Lennane Drive
Sacramento, California 95834
1-800-852-5770
http://www.wicworks.ca.gov/

California Diabetes and Pregnancy Program
Sweet Success Program-Resource Center
9170 Camino Santa Fe
San Diego, California 92121
858-536-5090
Fax: (858) 536-5099
http://www.llu.edu/llumc/sweetsuccess/

March of Dimes California Chapter
1050 Sansome Street, 4th Floor
San Francisco, California 94111
415-788-2202
http://www.marchofdimes.com

MyPyramid for Pregnancy and Breast feeding:
http://www.mypyramid.gov/mypyramidmoms/index.html

The National Women's Health Information Center
U.S. Department of Health and Human Services
Office of Women's Health
8270 Willow Oaks Corporate Drive,
Fairfax, Virginia 22031
1-800-994-9662
http://www.4woman.gov

Office of Dietary Supplements
National Institutes of Health
Bethesda, Maryland 20892 USA
http://ods.od.nih.gov/
ods@nih.gov

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California Food Guide

Maternal Nutrition During Lactation

By Paula Benedict Griffin, M.P.H., R.D.

What's New?

Exercise during lactation will not only improve the mother's cardio respiratory fitness but may increase the amount of essential fatty acids in her breast milk.[1]

Public Health Implications

Healthy People 2010 Objective 16-19: Increase the proportion of mothers who breastfeed their babies. In the United States, by 2010, 75 percent of mothers will breastfeed their newborns in the early postpartum period, 50 percent will continue to breastfeed through their infants' first six months and 25 percent will breastfeed their babies throughout their first year of life.[2]

Target and baseline:[3]

Objective	Increase in Mothers Who Breastfeed	1998 Baseline (unless noted)	2010 Target
		Percent of Mothers	
16-19a.	In early postpartum period	64%	75%
16-19b.	At 6 months	29%	50%
16-19c.	At 1 year	16%	25%
16-19d.	Exclusively through 3 months	43% (2002)	60%
16-19e.	Exclusively through 6 months	13% (2002)	25%

In 2004, 83.9 percent of women in California intended to provide "any breastfeeding," to their newborn infants upon discharge from the hospital, exceeding the Healthy People 2010 target of 75 percent of mothers breastfeeding in the early postpartum period. However, only 40.5 percent intended to exclusively breastfeed, thus, the Healthy People 2010 Objective 16-19 d. target of 60 percent was not met in California (see Figure 1).

Definition

Lactation, the process of milk secretion, is sometimes referred to as the physiological completion of the female reproductive cycle. During pregnancy, hormonal action prepares the female mammary glands to produce milk, which will continue to be produced in the postpartum period in response to the infant suckling at the breast.[4]

Also during pregnancy a woman's body prepares to breastfeed by storing additional nutrients and energy needed for milk production. Breast milk provides sufficient calories and nutritive factors to allow an infant to double its birth weight by six months of age. Breast milk is a bioactive, complex fluid containing more than 200 recognized substances varying in composition between women, and from the same woman, depending upon her stage of lactation.[5] Breast milk of women who deliver a premature infant is higher in calories, fats, protein, immune factors, and anti-inflammatory agents compared to full-term breast milk, therefore, adaptive to the additional nutritional needs of the premature infant.

Maternal nutritional requirements during lactation have been studied in women from many cultures, and while much has been learned, some information is conflicting because of differences in sampling techniques and laboratory analysis methods. However, many studies have documented that lactation and infant growth are not compromised when maternal intakes fall below recommended levels for vitamins, minerals, and energy. The nutritional quality of breast milk remains fairly constant, even when the mother's supply of nutrients is limited on a short-term basis.[6, 7]

Benefits of Breastfeeding

The American Academy of Pediatrics (AAP) recommends that infants be breastfed without supplemental foods or liquids for their first six months of life, and that breastfeeding should be continued for the first year of life and beyond, as mutually desired by the mother and child.[8] Additional discussion of the nutritional benefits of breastfeeding for the infant is contained in the Normal Infant Feeding (0-12 months) chapter.

In addition to being the optimal method to nourish an infant, breastfeeding provides many health benefits for the mother. These benefits include more rapid

recovery from childbirth; decreased postpartum bleeding; delayed return to fertility; reduced risk for breast and ovarian cancers; less bladder and other infections; possibly less post-menopausal hip and spinal fractures; and reduced risk for developing type 2 diabetes.[8, 9, 10, 11] Many lactating women return to their pre-pregnancy weight more quickly than bottle-feeding mothers.[12] Additional health benefits cited by Riordan are lower serum levels of cholesterol and triglycerides in breastfeeding women compared to women who gave their babies manufactured infant milk (formula).[12]

Nearly every woman is physically capable of breastfeeding. According to the CDC, women who are infected with the hepatitis C virus (HCV) can breastfeed, but should temporarily discontinue breastfeeding if the nipples or surrounding areola become cracked and bleeding. The breast milk can be expressed and discarded while the nipples heal. [13]

However, in some cases a woman should not breastfeed because doing so would place the mother or the infant at risk for an adverse health outcome, surpassing the benefits of breastfeeding.[4] A mother with a new diagnosis of breast cancer or women who are unable to consume less than two alcoholic drinks per day, who currently use street drugs such as heroin or cocaine, and women who have tested positive for the human immunodeficiency virus (HIV) should not breastfeed, and should discuss their infant feeding plans with their health care provider.[14] However, in developing countries, breastfed infants may be better protected from HIV transmission from their mothers compared to infants given manufactured baby formula. One large study found exclusively breastfed infants of HIV-positive mothers had a significantly lower risk of HIV transmission compared to partially-breastfed or formula-fed babies. It was speculated that the exclusively breastfed infant's superior intestinal mucosal barrier prevented HIV transmission.[12] In developing countries, the health risks of not breastfeeding outweigh the possible risk of HIV transmission, due to increased infant mortality from infectious diseases and nutritional deficiencies.[15]

Incidence and Prevalence

Breastfeeding rates are lower in the United States compared to other countries. Only 17 percent to 20 percent of infants in the Unites States are breastfed for 12 months, compared to 79 percent worldwide. Since the 1970s, breastfeeding initiation rates have increased from a low of about 24 percent to a high of 70 percent in 2002.[9]

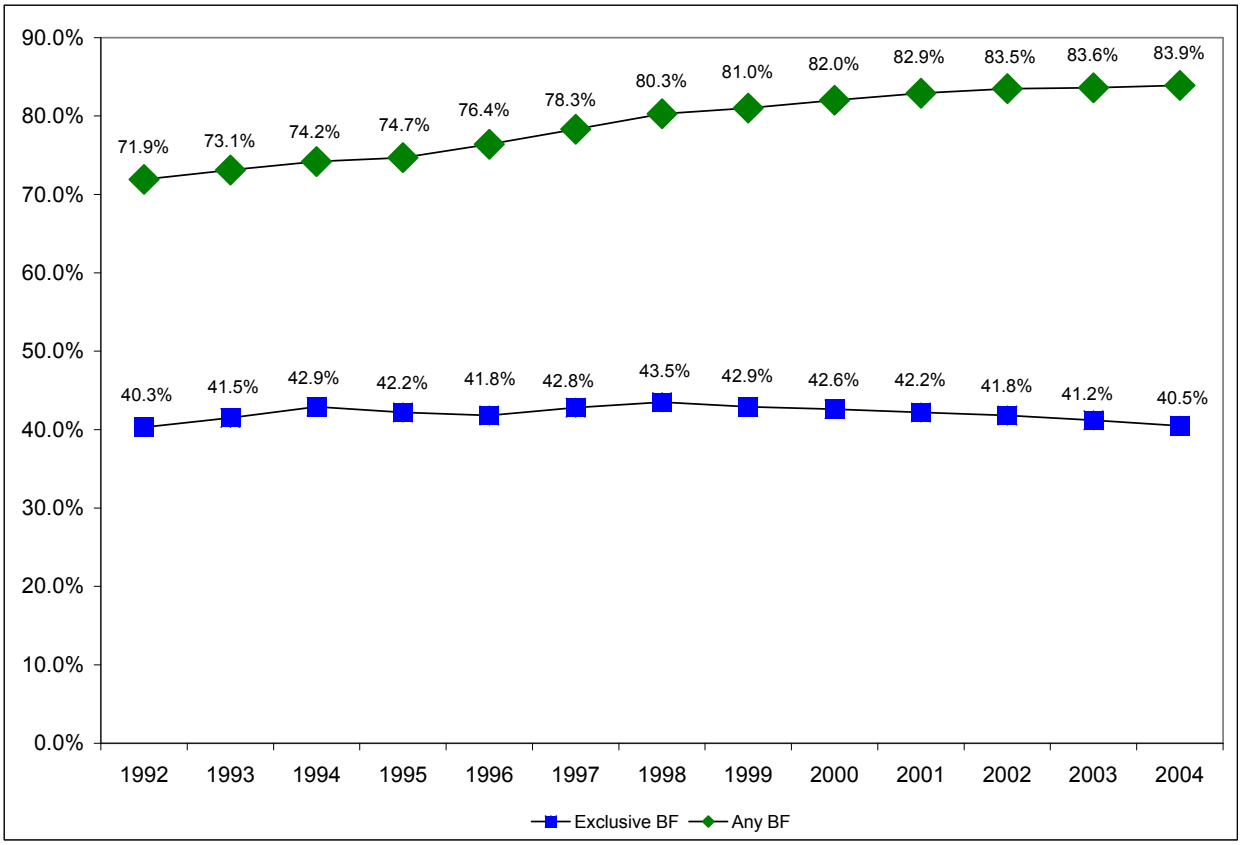
Trends/Nutrient Patterns

As shown in Figure 1, California's rates for "any breastfeeding," a measure of mothers who are "exclusively breastfeeding" and those who give both breast milk and manufactured baby formula to their infants, increased from 71.9 percent to

83.9 percent, between 1992 and 2004, while "exclusive" breastfeeding rates remained relatively stable, with a slight decline since the late 1990s.

Breastfeeding rates differ between ethnic groups, as illustrated in Figure 2. Between 1992 and 2004, Whites, American Indians, and women of "multiple race/other" had higher in-hospital "exclusive breastfeeding" rates, while African-American, Pacific-Islander, and Latina rates were lower. Additional information regarding the incidence and duration of breastfeeding in different ethnic groups in California can be found in the Normal Infant Feeding (0-12 months) and the Health and Dietary Issues Affecting Latinos chapters of this guide.

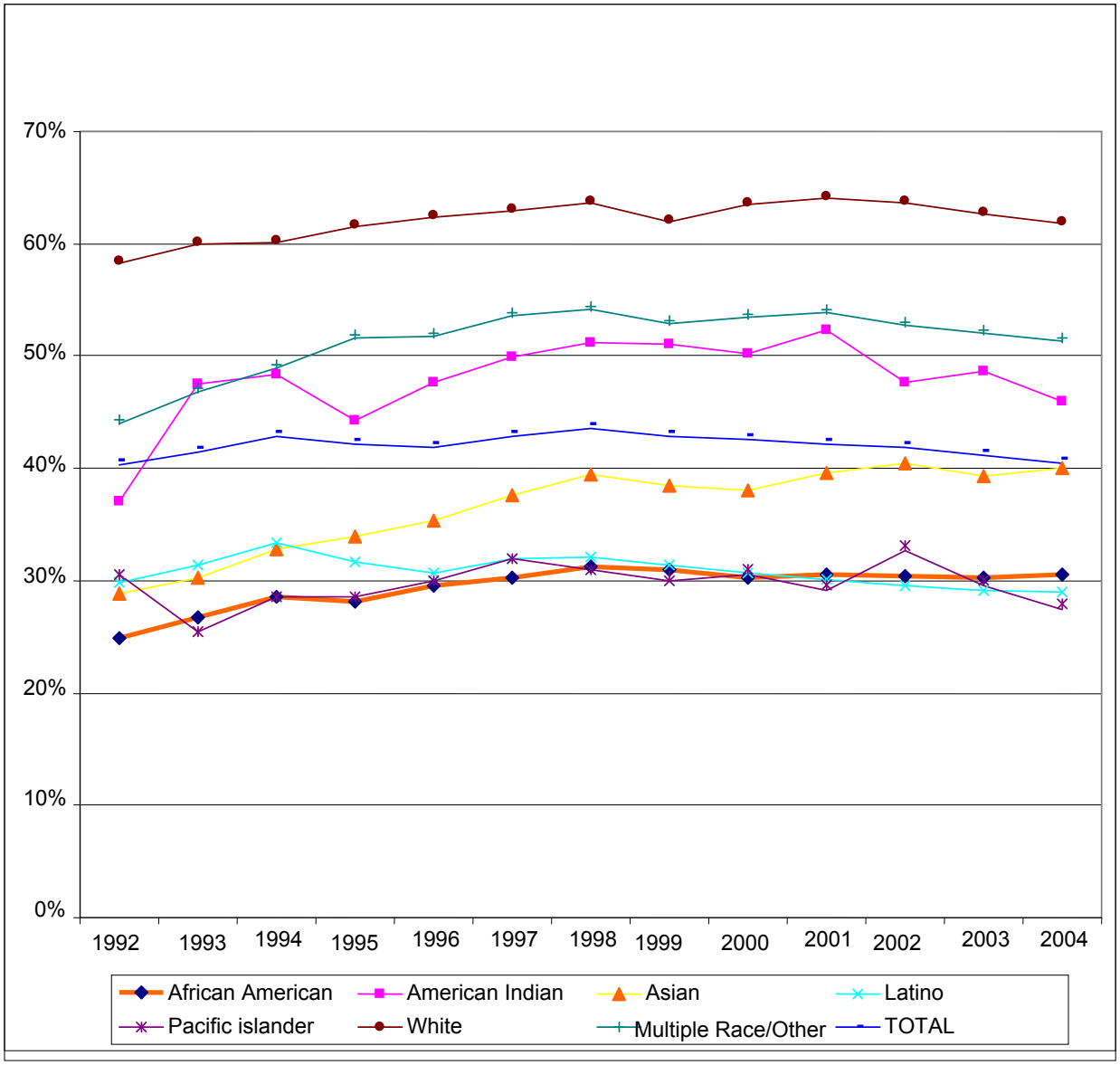
Figure 1: Breastfeeding Rates in California as Reported on the Newborn Screening Test Form (1992-2004)[16] *



* "Any breastfeeding" includes women exclusively breastfeeding and women who are both breastfeeding and giving manufactured infant formula.

**Data Source: Newborn Screening Data Base, Genetic Disease Branch, California Department of Health Services, 1992-2004.

Figure 2: Exclusive Breastfeeding Rates by Ethnicity 1992-2004[16]



Data Source: Newborn Screening Data Base, Genetic Disease Branch, California Department of Health Services, 1992-2004.

Dietary Recommendations

Women who are breastfeeding do not need to consume special foods or excessive amounts of fluid to successfully lactate or to increase their milk production.[12] Dietary restrictions are unnecessary, unless certain foods are suspected allergens to the baby. The belief that a woman's diet must be "perfect" during lactation is not accurate; women with a wide range of dietary habits and customs worldwide are consistently able to nourish their infants to grow and develop properly. Guidance given to lactating women should be carefully weighed in consideration of the misconception that the maternal diet must be perfect in order to produce quality breast milk.[17] Lactating women

should be encouraged to obtain their nutrients though a well-balanced diet, rather than vitamin and mineral supplements,[5] and consume a variety of foods using MyPyramid[18] as a guide to food choices.

Four overarching themes within the MyPyramid Education Framework provide a basis for dietary guidance for healthy individuals:[18]

(1) Variety—Eat foods from all food groups and subgroups.
(2) Proportionality—Eat more of some foods (fruits, vegetables, whole grains, fat-free or low-fat milk products), and less of others (foods high in saturated or *trans* fats, added sugars, cholesterol salt, and alcohol).
(3) Moderation—Choose forms of foods that limit intake of saturated or *trans* fats, added sugars, cholesterol, salt, and alcohol.
(4) Activity—Be physically active every day.

The 2005 Dietary Guidelines identifies breastfeeding women with different nutritional requirements than other population groups. Key recommendations for lactating women are listed below in Table 1, and a comprehensive list of nutrient recommendations during lactation is included in Appendix 1.

Table 1: Key Recommendations for Breastfeeding Women from the Dietary Guidelines for Americans 2005[19]

Weight Reduction	Moderate weight reduction is safe and does not compromise weight gain of the nursing infant.
Physical Activity	Neither acute nor regular exercise adversely affects the mother's ability to successfully breastfeed.
Alcoholic Beverages	Alcoholic beverages should not be consumed by some individuals, including those who cannot restrict their alcohol intake, women of childbearing age who may become pregnant, pregnant and **lactating women**, children and adolescents, individuals taking medications that can interact with alcohol, and those with specific medical conditions.

The nutritional profile of breast milk stays remarkably uniform over a wide range of dietary intakes. When the maternal diet is limited, levels of protein, carbohydrate, fat, folate, and most minerals are maintained at consistent levels in her breast milk at the expense of nutrient stores.[5] In women with adequate vitamin and mineral status, fluctuations in micronutrient intakes are not reflected in milk composition.

Nutrient needs during lactation are a function of the woman's nutrient needs and status, and her output of breast milk. Her needs will be greater if she is feeding twins or triplets, and less if she is only partially breastfeeding an infant who is also receiving formula or complementary solid foods.[5]

Daily Food Choices for Lactating Women

The Dietary Guidelines for Americans 2005 (Dietary Guidelines) does not provide detailed recommendations for lactating women; however, MyPyramid for Moms provides guidance for the daily servings of foods and calories based upon information entered at its website: www.mypyramid.gov/mypyramidmoms/breastfeeding_nutrition_needs.html, including age of the baby, amount of breastmilk and formula being given to the baby, and age and physical activity level of the mother. Table 2, Daily Food Choices for Lactating Women, is an adaptation of recommendations made in the Dietary Guidelines and MyPyramid, and can serve as a guide to meal planning. While this is only a guide and may not be suitable for all breastfeeding women, it can assist women in obtaining their recommended intakes of nutrients from the food groups.

Energy Needs During Lactation

Energy or caloric needs during lactation are based upon the woman's basal metabolic rate, age, activity level, how much breast milk is being produced, and other factors. While calories are needed for milk production, the mother does not need to eat substantially more than she did in her pre-pregnancy state to sustain milk production.[12]

In most cases, a woman who consumes 500 calories (kcal) per day above her pre-pregnancy intake will be able to maintain her body weight during the first six months postpartum and will have sufficient calories for milk production. After six months postpartum, an extra 400 kcals/day is normally sufficient. These recommendations are based on the average energy expenditure of moderately active women, the estimated caloric cost of lactation, and take into account some fat mobilization from maternal stores, equal to approximately 170 kcal/day.[20, 21, 22] It is recognized that these guidelines allow for wide variance in energy expenditure and represent the upper limit within the recommended range for additional calories, and many women will require fewer calories to avoid weight gain.[12]

A significant maternal energy deficit appears to reduce the quantity, but not the quality of breast milk. Energy intakes less than recommended levels are seen in women attempting to lose weight, those who are inactive or otherwise have low energy needs, or are food insecure.

Calorie intakes of 1,800 per day or above are recommended for lactating women, and should not consistently fall below 1,500 per day during lactation or milk supply could be compromised.[5, 20] However, due to differences in tissues stores and metabolic and activity needs between women, it is unrealistic to determine a critical energy level necessary for adequate milk production for all women.[22]

While the milk supply of well nourished women does not appear to be negatively affected by short-term energy intakes below current recommendations,[23, 24] undernourished women may benefit from supplemental food. A study of undernourished Guatemalan women supplemented with approximately 280 kcal per day resulted in improved milk production and the duration of exclusive breastfeeding.[25]

Table 2: Daily Food Choices for Lactating Women[18, 19] (2200-2800 calories)*

Food Groups	Recommended # of Servings	Serving Sizes and Food Choices
Grains	7-10 choices of these 1 ounce equivalents	**A 1 ounce equivalent is:** 1 slice whole grain bread 1 cup dry cereal ½ cup cooked cereal, rice, pasta 1 roll, pancake, small tortilla ½ bagel or English muffin 4 crackers
Vegetables	3½ cups	Raw or cooked vegetables such as carrots, broccoli, sweet potatoes, spinach, pumpkin, squash, peppers, tomatoes, greens, cabbage, snow peas, leafy greens, 100% vegetable juice, corn, potatoes, legumes. *Aim for these amounts each week*: 3 cups dark green veggies, 2½ cups orange veggies, 3½ cups legumes, 7 cups starchy veggies, and 8½ cups of other veggies.
Fruits	2 cups	Choose fresh, frozen, canned fruit or 100% juice. Medium whole fruit= ½ cup ½ cup dried fruit= 1 cup fresh fruit
Milk	3-4* of these choices *4 for teens	1 cup low-fat or fat-free milk or yogurt 1 ½ ounces cheese 2 ounces of low-fat cheese 1 cup pudding or custard made with milk 1 ½ cups frozen yogurt or ice cream 1 cup calcium- fortified, lactose-free milk or soy milk
Meat & Beans	6-7 choices of these 1 ounce equivalents	**A 1 ounce equivalent is:** 1 ounce of cooked lean meat, poultry, or fish 1 egg ½ cup cottage cheese ¼ cup cooked dry beans, peas, lentils ¼ cup tofu 1 Tablespoon of peanut butter ½ ounce nuts or seeds
Oils	6-8 teaspoons	Vegetable oil, soft margarine, mayonnaise, salad dressing
Discretionary Calories	290-426	**Discretionary Calorie Allowance** is the remaining amount of calories in a food intake pattern, after accounting for the calories needed for all food groups using forms of foods that are fat-free or low-fat, and with no added sugars.

***Source**: Adapted from the 2005 Dietary Guidelines for Americans and MyPyramid. Based on recommendations that lactating women, in the normal weight range, need an additional 500 calories per day.

Key Nutrients for Women during Lactation

Nutrients are mobilized from maternal stores to produce breast milk, and the lactating woman is vulnerable to depletion of her nutrient stores. She should be encouraged to consume foods high in calcium, vitamins A, B_1 (thiamin), B_2 (riboflavin), vitamin B_6, B_{12}, folate, and iodine to minimize losses and to maintain her health and well-being.[5, 19]

Calcium

Calcium's role in the body is to assist with blood clotting, muscle contraction, nerve transmission, and the formation of bone and teeth.[26] Calcium is mobilized from the bone during lactation and then replenished later. The calcium content of breast milk is maintained at the expense of maternal stores, and does not appear to be affected by the woman's serum calcium levels or dietary intake and supplementation. Women experience temporary acute bone mineral loss during lactation, only to have bone density restored to normal or above baseline after weaning.[4, 17] During lactation, alterations in metabolism, absorption, and excretion appear to help preserve maternal calcium stores.[4]

The Food and Nutrition Board of the Institute of Medicine recommends that women 19-50 years of age consume 1,000 milligrams (mgs) of calcium per day, and teens aged 14-18 years consume 1,300 mgs.[26] Milk and milk products are excellent sources of calcium, and non-dairy sources include calcium-fortified breakfast cereals, juices, and soy milk, calcium-set tofu, Chinese cabbage, kale, broccoli, and canned fish with bones, such as sardines and salmon.

Calcium supplements should be considered for women who do not consume milk or milk products or a regular source of dietary calcium. In the case of lactose intolerance, Lactaid® milk, yogurt, or hard cheeses may be acceptable sources of calcium. Please refer to the Milk and Milk Products chapter of this guide for additional information.

Vitamin A

Vitamin A is required for vision, immune system function, and maintenance of epithelial tissue.[26] The vitamin A content of breast milk is influenced to a greater extent by maternal dietary intake than by the woman's vitamin A status.[4, 17] Infants are born with relatively small amounts of stored Vitamin A in the liver and rely heavily on intake from breast milk or other dietary sources. However, vitamin A deficiency in breastfed infants is quite rare, as breast milk is a good source of the vitamin.[12] Lactating women should consume an extra 600 µg of vitamin A per day, according to the DRIs.[26] Fortified milk, liver, and dark green and orange colored fruits and vegetables are good sources of vitamin A or its precursor, beta carotene.

Vitamin B_1 (Thiamin)
Thiamin plays an important role as a coenzyme in the metabolism of carbohydrates and branched-chain amino acids.[26] Breastfed infants of women with beriberi, the thiamin deficiency disease, consequently develop infantile beriberi by three to four weeks of age.[27] In thiamin-deficient women, supplementation will increase levels in breast milk to a certain limit, while excess is excreted in the urine.[4]

An additional 0.3 mg of thiamin per day is recommended during lactation,[26] easily obtained from a slice of enriched bread. Due to the enrichment of grains, thiamin deficiency in the United States has become rare.

Vitamin B_2 (Riboflavin)
Riboflavin also functions as a coenzyme involved in many reactions in the body. As with all the B vitamins, except folate, maternal intake of riboflavin is reflected in breast milk.[4] Women who are deficient in riboflavin produce breast milk that is low in riboflavin, but is responsive to supplementation.

During lactation, the recommended extra 0.5 mg per day[26] can be obtained from a glass of milk and enriched grains. Since grains in the United States have been enriched with riboflavin, deficiencies are rare.

B_6 (Pyridoxine, pyridoxal, and pyridoxamine)
Vitamin B_6 functions as a coenzyme in the metabolism of amino acids and glycogen.[26] The B_6 content of breast milk is directly related to maternal intake and has been known to drop to critically low levels in mothers with a long-term history of oral contraceptive use.[4] However, modern formulations of oral contraception contain lower levels of estrogens than those previously studied, and the effect on B_6 status in breast milk is not clear.[5]

Very high doses of vitamin B_6 have been shown to suppress lactation by reducing prolactin levels, thus lactating women taking supplements should not take more than 25 mg of B_6 per day.[28]

An extra 0.7 mg of pyridoxine per day is recommended during lactation,[26] which can be easily consumed in a bowl of fortified breakfast cereal.

Vitamin B_{12} (Cobalamin)
Vitamin B_{12} functions as a coenzyme in nucleic acid metabolism. Deficiency of this vitamin has been seen in infants breastfed by mothers who were very strict vegetarians. Maternal supplementation should be considered for women who may have very low B_{12} stores, such as total vegetarians (vegans) who consume no animal-based foods or beverages, or those with Crohn's Disease, a history of gastrectomy or parasitic or gastrointestinal bacterial infection. Long-term

neurological problems can result from vitamin B_{12} deficiency during infancy. [27, 29, 30, 31]

An extra .04 µg of Vitamin B_{12} is recommended daily during lactation, and is easily obtained from milk, eggs, meat, fish, poultry, or enriched cereals or grains.

Folate (Folic Acid, Folacin)

Folic acid has been recognized for its role in the prevention of neural tube defects. In 1992, the U.S. Public Health Service recommended that all women of childbearing age consume 0.4 mg (400 micrograms) of folic acid daily to prevent two common and serious birth defects, spina bifida, and anencephaly.

While severe maternal folate deficiency can influence the folate content of breast milk, milk production appears to take priority in folate utilization. This was illustrated in a study involving overtly folate deficient women with megaloblastic anemia. The women were supplemented with folate and the researchers observed an increase in the folate content of the women's breast milk, however, no change was seen in their plasma folate levels.[32, 33]

In 1998, all grain products manufactured in the United States were required to be fortified with folic acid. Orange juice, fortified breakfast cereals, and dark green vegetables are good sources of folic acid.

Iodine

Iodine is a component of the thyroid hormones and is essential to prevent goiter and cretinism.[26] Iodine levels in breast milk vary based upon maternal intake and are strongly influenced by maternal intake. Pregnant and lactating women in geographic areas where iodine deficiencies are prevalent should be supplemented with iodine to prevent brain damage and mental retardation in their children.[32, 34] In the United States, iodized table salt is a good source of this mineral.

Protein

Protein needs are greater for women during lactation compared to non-pregnancy. The Food and Nutrition Board of the Institute of Medicine has set the Recommended Dietary Allowance (RDA) for lactating women of all ages at 71 grams of protein, using 1.1 grams of protein per 1 kilogram reference body weight, with an acceptable range of intake between 10 and 35 percent of total calories.[35] Consumption of a variety of six 1- ounce equivalents from the Meat and Beans Group and three servings from the Milk Group helps to meet this need.

The protein content in breast milk appears to be influenced very little by maternal diet and is more affected by the age of the infant.[17] Proteins are synthesized in the breast based on gene expression, which is influenced by changing hormone

levels in the weeks and months after delivery.[36] While the protein content of human breast milk is low in comparison to other mammalian species, breast milk proteins provide appropriate amounts of amino acids vital for the proper growth of the infant. Breast milk proteins also provide antiviral, antimicrobial, and anti-inflammatory factors to protect the infant's system.[35]

Carbohydrate

Carbohydrates provide a readily available source of energy to the body and are present in nearly all foods that have calories, except fats and oils. A woman's RDA for carbohydrates increases to 210 grams during lactation.[22] Lactose is the major carbohydrate in breast milk and is second only to water as a major constituent of breast milk. Lactose content in breast milk is similar between women, and does not appear to be affected by maternal diet.[5]

Fat

The total fat content of breast milk remains consistent independently of the mother's diet. However, the types of fatty acids present in breast milk are influenced by maternal diet and energy balance.[37, 38] A woman with a diet high in monounsaturated fatty acids would have a large amount of this type of fatty acid reflected in her breast milk. This is also true for DHA (docosahexaenoic acid), recognized for its important role in retinal development. When a woman loses weight while lactating, the breast milk contains the types of fatty acids found in her adipose tissue.

The breast milk of women who deliver prematurely is higher in long chain polyunsaturated fatty acids, consistent with the premature infant's greater need for these fatty acids necessary for growth and brain development.[32]

Although a mother's dietary fat intake may vary on a daily basis, hormonal changes during lactation allow for the production of breast milk with a fatty acid content appropriate for the baby.[32] RDAs for fat intake have not been established, however, an acceptable range for adults is 20-35 percent of total calories, with the recommendation that saturated fat and trans fatty acid consumption be kept as low as possible with a nutritionally adequate diet.[22]

Fluid intake

Breast milk production and volume is not affected by short-term increases or decreases in fluid intake. However, excessive fluid intake has been shown to negatively affect milk production in a study by Dusdieker, as cited in Lawrence & Lawrence.[4] Women can be advised to have a beverage nearby while they are breastfeeding their baby, but only need to drink in response to thirst. Adequate hydration is best indicated by passing urine with a pale yellow color,[17] however, women taking certain medications or multivitamins may find their urine color to be altered and should not depend solely on urine color as a guide to hydration status.

Vitamin and Mineral Supplements

A lactating woman should not routinely depend upon a multivitamin supplement to meet her nutritional needs. However, women with very restricted diets, such as vegans, or who regularly consume less than 1,800 calories per day could benefit from calcium and multivitamin supplements.[5] A nutritional assessment from a health care provider can reveal if a woman could benefit from a multivitamin supplement.

In 1992, the U.S. Public Health Service recommended that women of childbearing age consume 400 micrograms of folic acid per day to reduce their risk of having a pregnancy affected by a neural tube defect (NTD). Since lactating women are of childbearing age, a daily folic acid supplement or multivitamin with folic acid is advised. Supplementation with folic acid in women before conception and during early pregnancy has been shown to reduce the occurrence of NTDs by at least 50-70 percent.[39]

Other Vitamins and Minerals during Lactation

Vitamin D

The vitamin D content of breast milk is influenced by maternal vitamin D status, and breast milk does not typically provide enough to meet infant needs. Infants rely on stored vitamin D as well as adequate exposure to sunshine, equivalent to two hours per week while fully clothed. Infants breastfed by mothers who restrict their intake of vitamin D-rich foods, or have severely limited exposure to sunlight can develop rickets due to a vitamin D deficiency.[32] See the Normal Infant Feeding (0-12 months) chapter of this guide for additional information.

Iron

In contrast to pregnancy, the recommended intake for iron during lactation is not increased, and is actually lower than that of a non-pregnant female. The RDA for iron during lactation is nine grams for women 19-30 years of age, versus 18 grams for the non-pregnant female and 27 grams for pregnant women of the same age. These recommendations for intake are based on menstruation resuming at six months postpartum and iron losses in breast milk and normal metabolic processes, but does not take into account the high prevalence of iron-deficiency anemia in women of childbearing age and the need to recover iron stores after pregnancy.[23]

The iron content of breast milk does not appear to be related to maternal dietary intake. Iron supplements taken by the mother will not increase iron levels in breast milk, even if the mother is anemic. In women, iron-deficiency anemia has been associated with postpartum depression.[40]

Barriers to Implementations/Myths

Postpartum Weight Loss

Although the caloric cost of breastfeeding has been estimated at 670 calories per day, and the hormonal environment favors the mobilization of fat stores, most lactating women lose weight at a relatively slow rate during the first six months postpartum, ~0.8 kg/mo in affluent populations and ~0.1 kg/mo in disadvantaged populations. Differences in mean weight changes are likely due to differences in gestational weight gains, cultural practices, physical activity level, and seasonal food availability.[41]

Weight loss in the first six months postpartum is normally 0.5-1.0 kg (~1-2 pounds) per month; however, not all lactating women lose weight. Overweight women can lose up to 2.0 kg (~4.5 pounds) per month without adverse effects on milk production.[5]

Intentional weight loss should not be attempted until two months postpartum, and then at a rate of no more than 2 kg (~4.5 pounds) per month, consuming a diet of at least 1,800 calories per day.[5] This loss should be managed with a combination of changes in food intake and increased physical activity.

For women motivated to lose weight at a somewhat increased rate, a modest reduction in caloric intake does not appear to influence breast milk composition or volume.[20] A study involving well-nourished women, found that milk production was not compromised during a ten week weight loss program that included a 23 percent reduction in energy intake and resulted in a weekly weight loss of one pound.[42]

A recent study with overweight lactating women who decreased their energy intake by 500 calories per day, primarily by restricting chips, soft drinks, and other fats and sweets, had nutrient intakes comparable to a group of overweight lactating women who did not restrict their intake. However, the restricted group consumed one less serving of milk and had lower vitamin D and calcium intakes than the control group. Both groups had low intakes of vitamin C and E.[43]

Colic and Maternal Diet

It is commonly believed that eating certain foods, such as onions, garlic, and broccoli can cause a colicky baby. However, few studies have shown any association between these foods and infant distress. Women should presume that all foods will be tolerated well by the infant and only eliminate specific foods after they have been demonstrated as problematic for the baby. If a mother is concerned that her infant is reacting to her diet, she should keep a record of the food she eats and information about her baby's response, including symptoms and/or behaviors and discuss any concerns with her health care provider.[4, 17]

Maternal Intake of Food Allergens

Breastfeeding offers protection from both respiratory and food allergies throughout childhood and adolescence. However, if a breastfed baby shows allergic symptoms, the mother should consider avoiding the major food allergens--wheat, peanuts, soybeans, tree nuts, eggs, cow's milk --for ten to14 days. If the infant shows a reduction in symptoms, the foods can be reintroduced one at a time to help identify the cause. The most common food allergen for infants is cow milk's protein, which can be ingested from whole milk, manufactured baby formula, or passed through the breast milk from the mother.[12]

Vegetarianism and Lactation

Vegetarian mothers should be encouraged to breastfeed as they produce breast milk with a similar composition to that of non-vegetarian women. However, vegetarian diets must include regular sources of vitamin B_{12}, calcium, and vitamin D. Vitamin B_{12} is found naturally in foods of animal origin, and sometimes added as a supplement to plant-based food products. Vegetarians who do not use milk and milk products need good alternate sources of calcium, protein, and vitamins B_2, B_{12}, and D.[19]

Docosahexaenoic acid (DHA) is an essential fatty acid that plays a role in infant brain and eye development. Vegans and other vegetarians who not do regularly eat eggs should be encouraged to include sources of linolenic acid, a DHA precursor. DHA has been measured in breast milk of vegetarian women at lower levels than in non-vegetarians. These women should also be encouraged to limit their intake of foods containing linoleic acid, such as corn, safflower and sunflower oil, and limit foods with hydrogenated fats, such as stick margarine, as they hinder the conversion of linolenic acid to DHA. [44]

Additional information about vegetarianism can be found in the *Vegetarian Diets* chapter in this guide.

Physical Activity and Lactation

Milk production appears to be protected when lactating women participate in exercise and increase their energy expenditure. Several factors may be involved including an increase in energy intake and an increase in prolactin levels. Several studies suggest that lactating women will increase energy intake to compensate for any increase in energy expenditure due to a physical activity program, with no apparent effect on milk production or infant growth.[45, 46] Additionally, in response to aerobic activity, there is an increase in fatty acid mobilization to meet the needs of milk production.[32]

Caffeine and Lactation

Caffeine is a stimulant found in many foods, beverages, and over-the-counter medications. Products such as energy beverages, weight loss aids, and herbal supplements may also contain caffeine. Caffeine concentration peaks in breast milk one to two hours after consumption. While adults can metabolize a large

amount of caffeine within five hours, this process can take nearly 20 times longer in a newborn. Irritability and sleeplessness in the breastfed infant after maternal caffeine consumption has been described. [28]

Chronic coffee drinking may also reduce the amount of iron in breast milk. Chronic and persistent ingestion of caffeine during lactation should be avoided, especially during the first few months of the infant's life; however, occasional use of caffeine is not contraindicated during lactation.[28, 47] If a baby appears to be responding to the caffeine in the mother's diet, all caffeine-containing products should be avoided for two to three weeks.[48]

Alcohol and Lactation

Although wine and beer have been recommended to improve lactation, this has proven untrue. Studies suggest that alcohol can impair milk ejection and cause a reduction in milk volume.[49]

Peak breast milk levels are seen 30-60 minutes after alcohol consumption and at 60-90 minutes when accompanied by food. As alcohol is metabolized by the woman's liver, her plasma and milk levels decline. Clearing the equivalent of one serving of beer or wine from a 120-pound woman's body has been estimated to take two to three hours.[4, 50]

Studies show that maternal ingestion of alcohol changes the odor of the breast milk and can reduce the volume consumed by the infant by as much as 20 percent. Even short-term exposure to small amounts of alcohol in breast milk has been shown to result in a decrease in the total sleep time for the infant.[50]

Smoking, Nicotine, and Lactation

Maternal smoking is associated with reduced milk volume, impaired milk ejection reflex, and early weaning. However, breastfed infants of mothers who smoke receive better protection than bottle-fed babies with less acute respiratory illness[8] and risk for Sudden Infant Death Syndrome (SIDS). Women who are unable to quit should be advised to not smoke while nursing or in the presence of the infant.[4, 51, 52, 53]

Studies have shown that using a 14-mg or seven-mg nicotine patch offers a sustained and lower nicotine level than smoking and appears to not affect the milk intake of the breastfed infant. However, nicotine gum may cause significant peaks in plasma nicotine levels and it is recommended that mothers wait two to three hours after using the gum product to breastfeed.[28]

Herbal Products, Over the Counter Medications, and Prescription Drugs during Lactation

Several herbal preparations are marketed with the promise to either increase or decrease milk supply. However, some herbal supplements are incompatible with successful lactation while others can be dangerous to the woman's health. Since

herbal preparations and dietary supplements are not regulated as medications, their active ingredients, safety, efficacy, potency, and purity are unknown.[54, 55]

Fenugreek is an herbal substance with a widespread reputation as a galactagogue, a substance which increases milk production; yet its efficacy is not supported by scientific evidence. While this product has limited toxicity when consumed in moderation, a few cases of adverse side effects have been reported.[28]

Most non-prescription, over-the-counter medications pose little or no risk of harm to a breastfed infant. However, aspirin, implicated in Reye's syndrome, and pseudoephedrine, which can dramatically reduce milk production, should be avoided during lactation, and better alternatives such as ibuprofen and acetaminophen could be used under the guidance of a health care provider.[28] The recommendation to reduce or discontinue breastfeeding due to maternal medication should only be made when no alternative drug can be given and the risk to the baby significantly outweighs the benefits of breastfeeding.[17] Breastfeeding women should discuss their use of herbal products or medication with their health care provider in order to select the best option during lactation.[14]

Illicit Drugs and Lactation

Most drugs pass to some extent into breast milk. The active ingredient in marijuana, delta-9-tetrahydrocannabinol (THC), concentrates in breast milk prior to entering the infant's circulatory system and can result in impaired infant motor development at twelve months of age.[56] Other drugs of abuse, such as heroin, cocaine, the hallucinogens, and methamphetamines pass into breast milk and can have detrimental effects on the infant.[12]

Women who are currently using illegal, recreational drugs should be advised of the effect of these substances on their infants, and that their infants will be drug-screen positive for as long as a few weeks after ingestion. The lactating woman who is unable to remain drug-free should discuss her infant feeding plans with her health care provider, and should probably be advised to bottle-feed.[12]

Opportunities for Improvement

(1) Assure lactating women are assessed for nutritional adequacy and the use of tobacco, alcohol, drugs, herbal products, and over-the-counter medications, and have access to appropriate counseling and referral sources.

(2) Support measures to provide pre-conception nutrition and healthy lifestyle education and counseling, including the importance of a daily 400 mcg. folic acid supplement, and appropriate child spacing to allow recovery of maternal nutritional status.

(3) Support an environment where lactating women can comfortably breastfeed their babies, without fear of ridicule or unwarranted reprisal.

(4) Support communities that provide reduced exposure to tobacco, alcohol, and drugs to all women of childbearing age.

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Appendix 1: Nutrient Recommendations for Lactating Women [19, 22, 26]

Nutrient	Dietary Reference Intake (DRI) for non-pregnant, non- lactating women (per day) 19-50 yrs	Additional amount above DRI recommended for Lactating Women (per day) 19-50 yrs	Tolerable Upper Intake Level (UL) (per day)	Food Sources
Protein	50 g	+15 g (0-6 mo postpartum) +12 g (6-12 mo postpartum)	Not determined	Meat, fish, poultry, dry beans, eggs, tofu, cheese, nuts, seeds
Carbohydrates-- total digestible	130 g	+80 g	Not determined	Grains, pasta, starchy vegetables, fruit and fruit juices
Total Fiber	25 g	+4 g	Not determined. Excessive intake can cause gastrointestinal distress and is usually self-limiting.	Whole grains, vegetables, whole fruit, dry beans, nuts
Total Fat	Not determined	Not determined	No defined excessive intake level for potential adverse effects	Whole milk, meats, vegetable oils, butter
Linoleic acid (n-6 polyunsaturated fatty acids)	12 g	+1 g	No defined excessive intake level for potential adverse effects	Nuts, seeds, vegetable oils
Linolenic (n-3 polyunsaturated fatty acids)	1.1 g	+.2 g	No defined excessive intake level for potential adverse effects	Vegetable oils, flax seed, fatty fish, fish oils, eggs
Fat-Soluble Vitamins				
Vitamin A	700 µg	+600 µg	3,000 µg	Liver, fish, dairy products, darkly-colored fruits and leafy vegetables
Vitamin D	5 µg	-----	50 µg	Fortified dairy products
Vitamin E	15 mg	+ 4mg	1000 mg	Nuts, vegetable oils
Vitamin K	90 µg	----	Not determined	Leafy green vegetables, Brussels sprouts, broccoli, vegetable oils.
Water-Soluble Vitamins				
Vitamin B_1 Thiamin	1.1 mg	+0.3 mg	Not determined	Enriched, fortified, or whole-grain products
Vitamin B_2 (Riboflavin)	1.1 mg	+0.5 mg	Not determined	Organ meats, milk, bread products and fortified cereals
Vitamin B_3 (Niacin)	14 mg	+3 mg	35 mg	Meat, fish, poultry,

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				whole grain breads and bread products, fortified cereals
Vitamin B_6 (Pyridoxine, Pyridoxal, and Pyridoxamine)	1.3 mg	+0.7 mg	25 mg	Fortified cereals, organ meats, fortified soy-based meat substitutes
Vitamin B_{12} (Cobalamin)	2.4 µg	+.04 µg	Not determined	Meat, fish, poultry, fortified cereals
Folate	400 µg	+100 µg	800 µg	Enriched cereal grains, fortified ready-to-eat cereals, dark green leafy vegetables
Vitamin C	75 mg	+45 mg	2,000 mg	Citrus fruit, strawberries, bell pepper, broccoli, cabbage, spinach, tomatoes
Pantothenic Acid	5 mg	+2 mg	Not determined	Whole grains, poultry, yeast, potatoes, broccoli
Biotin	30 µg	+5 µg	Not determined	Liver, some meats and fruit
Choline	425 mg	+ 125 mg	3,500 mg	Eggs, liver, milk, peanuts
Minerals				
Calcium	1,000 mg 1,300 mg (14-18 yrs)	---	2,500 mg	Milk and milk products, Chinese cabbage, kale, broccoli, calcium-set tofu
Potassium	4.7 g	+0.4 g	Not determined	Fruits, vegetables. dried peas, dairy products, meats, nuts
Phosphorus	700 mg	---	4000 mg	Milk and milk products, eggs, peas, meat
Magnesium	310 mg (19-30 yrs) 320 mg (31-50 yrs)	---	350 mg *only when consumed in supplemental for. No UL established for Mg*	Green leafy vegetables, unpolished grains, nuts, meat, milk

Appendix 1: Nutrient Recommendations for Lactating Women [19, 22, 26]

Nutrient	Dietary Reference Intake (DRI) for non-pregnant, non- lactating women (per day) 19-50 yrs	Additional amount above DRI recommended for Lactating Women (per day) 19-50 yrs	Tolerable Upper Intake Level (UL) (per day)	Food Sources
			consumed from foods.	
Manganese	1.8 mg	+.8 g	11 g	Nuts, legumes, tea, whole grains
Chloride	2.3 g	---	3.6 g	Processed foods with added sodium chloride, salted meats, nuts, cold cuts
Chromium	25 µg	+ 20 µg	Not determined	Some cereals, meats, poultry, fish, beer
Copper	900 µg	+400 µg	10,000 µg	Organ meats, seafood, nuts, seeds, whole grains
Fluoride	3 mg	----	10 mg	Fluoridated water, teas, marine fish
Iodine	150 µg	+140 µg	1,100 µg	Iodized salt, foods of marine origin
Iron	18 mg	less 9 mg	45 mg	Meat, poultry, for- tified breads and grains, dry beans
Selenium	55 µg;	+15 µg	400 µg	Organ meats, seafood, plants (depending upon soil selenium content)
Sodium	1.5 g	--	2.3 g	Processed foods with added sodium chloride, salted meats, nuts, cold cuts
Zinc	11 mg	+2 mg (≤ 18 yrs) +1 mg (19-30 yrs) +1 mg (31-50 yrs)	34 mg (≤ 18 yrs) 40 mg (19-30 yrs) 40 mg (31-50 yrs)	Fortified cereals, red meat

Sources: See reference citations listed above in the table title.

Resources/Web Sites

The Academy of Breastfeeding Medicine (ABM)
http://www.bfmed.org/index.asp

The American Academy of Pediatrics
141 Northwest Point Blvd., Elk Grove Village, IL, 60007
1-847- 434-4000
http://www.aap.org/

Breastfeeding Policy
http://www.aap.org/policy/re9729.html

Breastfeeding Promotion in Pediatric Office Practices Program
1-847-228-5005, extension 4779
http://www.aap.org/breastfeeding/new%20resources.cfm#AAP

Baby-Friendly USA Hospital Initiative
1-508- 888-8092
http://www.babyfriendlyusa.org

Best Start Social Marketing
Web site: www.beststartinc.org/trainings.asp

Breastfeeding Online (Jack Newman, M.D.)
http://www.breastfeedingonline.com/newman.shtml

The Breastfeeding Task Force of Greater Los Angeles
http://www.BreastfeedLA.org

California Department of Public Health
Maternal Child and Adolescent Health Branch
1615 Capitol Avenue
Sacramento, California 95899-7420
1-866-241-0395
http://www.cdph.ca.gov/programs/MCAH/Pages/default.aspx

California Department of Public Health
WIC Supplemental Nutrition Branch
3901 Lennane Drive
Sacramento, California 95834
1-800-852-5770
http://www.wicworks.ca.gov

UC Davis Human Lactation Center
Department of Nutrition
University of California
One Shields Avenue
Davis, California 95616
Phone: (530) 754-5364
http://lactation.ucdavis.edu

Human Milk Banking Association of North America
1500 Sunday Drive, Suite 102, Raleigh, NC 27607
1-919-787-5181
http://www.hmbana.org

International Lactation Consultants Association
ILCA · 1500 Sunday Drive · Suite 102 · Raleigh, NC 27607
1-919-861-5577
http://www.ilca.org

Lactation Education Resources
3621 Lido Place
Fairfax, VA 22031
1-703-691-2069
http://www.LERon-line.com

La Leche League International
1400 N. Meacham Rd., Schaumburg, IL 60173-4808
1- 847-519-7730
TTY: 1-847-592-7570
http://www.lalecheleague.org

MyPyramid for Pregnancy and Breastfeeding
http://www.mypyramid.gov/mypyramidmoms/index.html

Wellstart International
P.O. Box 80877
San Diego, CA 92138-0877
Phone: 619-295-5192
http://www.wellstart.org

World Alliance for Breastfeeding Action (WABA)
P.O. Box 1200, 10850 Penang, Malaysia
http://www.waba.org.my/

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California Food Guide

Life Cycle: Normal Infant Feeding (0-12 months)

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What's New?

- Breastfeeding may protect against childhood obesity.
- The American Academy of Pediatrics targets prevention of vitamin D deficiency and sets new guidelines for vitamin D intake for breastfed babies.
- Though infant formula is now widely supplemented with docosahexaenoic acid (DHA) and arachidonic acid (ARA), these supplemental long-chain polyunsaturated fatty acids (LCPUFAs) may not be associated with sustained long-term developmental effects for term and preterm infants.[1, 2, 3]
- The American Academy of Pediatrics recommends no introduction of juice for infants less than six months of age and to limit juice to no more than 2oz./day by cup after six months of age.[4]

Public Health Implications

Healthy People 2010 Objective16-19:[5] The United States 2010 target for increasing the proportion of mothers who breastfeed their babies is 75 percent during the early postpartum period, 50 percent at six months, and 25 percent at one year.

- In 2004, 40.5 percent of women in California reported the intent to exclusively breastfeed their infants when discharged from the hospital after delivery.[6] In 2004, 83.9 percent of women in California reported the intent to provide any breastfeeding to their infants when discharged from the hospital after delivery.[6]

Healthy People 2010 Objective 19-4:[5] The 2010 target of reducing growth retardation among low-income children under age five years is 5 percent.

- In 2004, the prevalence of short stature among low-income children under the age of 5 years living in California was 5.1 percent.[7]

Healthy People 2010 Objective 19-12:[5] The 2010 target for reducing iron deficiency among young children and females of childbearing age is 5 percent for ages 1-2 years of age.

- In 2004, the California anemia prevalence for low-income children under the age of 5 years was 14.0 percent.[7]

Healthy People 2010 Objective 19-3a:[5] The 2010 target for reducing the proportion of children who are overweight or obese is 5 percent for ages 6-11.

- In 2004, the California prevalence for overweight for ages 5-11 years was 22.3 percent.[7]

Definition

Definition of Infant Feeding

Infant feeding is the feeding of a child from birth to one year of age. This section promotes "normal" infant feeding, which is defined as breastfeeding for at least the first year of life and introduction of iron-rich complementary foods around six months of life. For this reason, breastfeeding is the focus of infant feeding and the recommendations that follow.

There is overwhelming scientific evidence that human breast milk is the optimal food for human infants. Numerous professional organizations actively promote breastfeeding including the American Academy of Pediatrics,[8, 9] the American College of Obstetrics and Gynecologists,[10] the American Academy of Family Physicians,[11] Obstetrics and Neonatal Nurses,[12] the American Dietetic Association,[13] the U.S. Department of Health and Human Services,[14] and the American Public Health Association.[15]

Benefits of Breastfeeding

Exclusive breastfeeding during the first six months of life is the most important nutrition intervention a mother can do to improve the immediate and long-term health of her infant (see Tables 1 and 2).

Table 1: Quality of Human Milk[16]

- Human milk is nutritionally complete and provides the nutrients that infants need in the first six months of life.
- Human milk contains a variety of enzymes, proteins, hormones, and hormone-like substances that are not found in infant formula. These bioactive factors support necessary functions in the newborn infant, such as gastrointestinal maturation and immunity to infections.
- Fatty acids found in human milk benefit infant cognitive and neurological development, including a possible increase in intelligence quotient (IQ).

Breast milk contains bioactive substances that optimize the immune system, decrease infections, promote growth of optimal gut flora, and changes over time to meet the specific biological needs of the human infant. Because there is no measuring or preparation of breast milk, issues of over or under dilution, hygienic preparation, and overfeeding are eliminated. There is growing evidence that some of the major chronic diseases, such as obesity, cancer, diabetes, and heart disease faced by Americans as adults can be positively impacted by exclusively breastfeeding in the first six months of life.[15] As more research is being completed on the positive impacts of breastfeeding, the role of professionals and families encouraging and sustaining breastfeeding is clearly an essential support.

Extended breastfeeding reduces the risk of overweight among preschool children.[17] Since obese children are at risk for becoming obese adults, breastfeeding may play a critical role in reducing the prevalence of cardiovascular disease and other adult diseases related to obesity.[9, 18, 19, 20]

Health care plans save money, as well as provide improved care, by supporting and promoting breastfeeding.[21] In a 1995 study to determine the excess cost of health care services for three illnesses (lower respiratory tract illnesses, otitis media, and gastrointestinal illness) in formula-fed infants in the first year of life, adjusting for potential confounders, it was determined that additional health care services cost the managed care health system between $331 and $475 per never-breastfed infant.

Lastly but as important, the act of breastfeeding promotes maternal-infant bonding, which enhances maternal attentiveness and overall parenting.

Table 2: Benefits of Breastfeeding[9, 16, 18, 19, 20, 21, 22]

Benefits of breastfeeding for the infant include:

- Lowered incidence of diarrhea, lower respiratory illnesses, ear infections, and bacterial infections including bacteremia, meningitis, and urinary tract infections
- Lowered incidence of some allergies and infant botulism
- Lowered incidence of Sudden Infant Death syndrome
- No alteration of gut flora
- Shorter gut transit time
- Decreased incidence of “baby-bottle tooth decay” or dental caries in infants.
- Possible decreased incidence of obesity
- Better maternal-infant harmony
- Decreased incidence of some chronic diseases such as diabetes, inflammatory bowel diseases and cancer
- Optimal nutritional composition for central nervous system development

Burden

Consequences of inappropriate infant nutrition in California’s children under the age of five include short stature, iron deficiency anemia, and overweight. These consequences may continue beyond childhood and in particular affect females of childbearing age. Poor nutrition in infancy is one of the primary causes of infant growth retardation and paradoxically excessive infant weight acceleration. Early and persistent iron deficiency anemia is associated with negative developmental impacts in cognitive and motor areas. If it becomes medically necessary to feed an infant formula, the formula should be fortified with iron.[8] See the chapter on Iron Deficiency Anemia for iron-rich food for infants.

Incidence and Prevalence

In California, the 2004 initiation rate of "any" breastfeeding, as reported on the Newborn Screening Test Form, exceeds the Healthy People 2010 Objective16-19[5] of 75 percent. For exclusive breastfeeding initiation rates, the goal of 75 percent is not met by any race or ethnicity (see Table 3). 2004 breastfeeding rates for Asian ethnicity vary substantially when analyzed by ethnic subgroup.[23] Within Asian ethnicity 'any' in-hospital breastfeeding rates range from 54.5 percent (Laotian) to 93.1 percent (Japanese) and 'exclusive' breastfeeding rates range from 17.7 percent (Cambodian) to 61.2 percent (Japanese). Of the nine Asian ethnicity subgroups analyzed, six exceeded the HP2010 goal of 75 percent for 'any' breastfeeding. Japanese and Asian Indian groups have the highest rates of 'any' (93.1 and 92.4) and 'exclusive' (61.2, 57.9) breastfeeding rates, respectively. Southeast Asian ethnic subgroups (Cambodian, Laotian and Vietnamese) have the lowest rates of 'any' and 'exclusive' breastfeeding (any= 59.9 percent, 54.5 percent, 71.2 percent) (exclusive= 17.7 percent, 21.9 percent, 18.2 percent), respectively.

Table 3: California In-Hospital "Any" Breastfeeding Initiation Trend as Reported on the Newborn Screening Test Form: 1992-2004[a, b]

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
African American	50.4%	52%	54.1%	55.2%	58.2%	59.5%	62.5%	63.7%	64.6%	67.1%	67.4%	68.6%	70.1%
American Indian	62.9%	67.2%	66.9%	65.8%	66.9%	72.6%	73.4%	77.5%	73.5%	77.2%	76.4%	77.2%	76.6%
Asian	58.5%	59.9%	63.3%	65.2%	67.9%	71.8%	75.7%	78.5%	78.8%	80.6%	82.3%	82.8%	83.9%
Latino	71.8%	73.5%	74.9%	75.1%	76.6%	78.6%	80.4%	80.8%	81.9%	82.7%	83.6%	83.3%	83.6%
Pacific Islander	53.9%	52.6%	58.5%	59.3%	61.4%	63.8%	66.1%	65.5%	65.6%	68.5%	70.8%	69.5%	68.3%
White	79.2%	79.8%	80%	80.6%	82%	83.3%	84.9%	85.3%	86.6%	87%	86.9%	87.2%	87.2%
Multiple Race/Other	69.4%	70.5%	72.6%	74.4%	75.6%	78%	80.9%	81.2%	82.9%	83.5%	83.7%	83.6%	83.8%
TOTAL	71.9%	73.1%	74.2%	74.7%	76.4%	78.3%	80.3%	81%	82%	82.9%	83.5%	83.6%	83.9%

[a] Data Source: Newborn Screening Database, Genetic Disease Branch, California Department of Health Services, 1992-2004.
[b] There were 536,446 births in 2004 (Feeding type was known in 521,559 births, Unknown: 2.8 percent).

Breastfeeding rates reported in the Maternal and Infant Health Assessment are generally lower at two months duration as indicated in Table 4.

Table 4: Breastfeeding at Two Months Duration as reported in the Maternal Infant Health Assessment by Race: 2004 [a, b, c]

Race/Ethnicity	% Any Breastfeeding	% Exclusive Breastfeeding
African American	56.9%	31.6%
Asian/Pacific Islander	76.6%	42.3%
Latina	66.4%	36.6%
White, non-Hispanic	72.8%	52.9%
TOTAL	**69.1%**	**42.2%**

[a] Data Source: Maternal Infant Health Assessment, Maternal and Child Health Branch, California Department of Health Services.
[b] All percents were weighted to represent all California women.
[c] 3544 respondents

Feeding Trends/Nutrient Patterns

A 2004 national report, Feeding Infants and Toddler Study (FITS), which addresses the nutrient intakes of infants and children between 4-24 months of age indicates some positive feeding patterns and some negative feeding trends.[24, 25]

Positive patterns:

- Infants who are infant formula fed were primarily fed iron-fortified formulas, hence ensuring positive iron status.
- Most infants were introduced to complementary foods at 4-6 months.
- It is now rare to see the inappropriate early introduction of unmodified whole cow's milk to infants less than six months of age.
- Most infants receive adequate nutrients and are at negligible risk for nutrient deficiency.

Negative patterns:

- Breastfeeding rates still do not meet the Healthy People 2010 goals.
- Twenty-three percent of the infants exceeded mean energy intakes in the second half of infancy.
- About half of 7-8 month olds consume some type of dessert, sweet or sweetened beverage and this percentage increases as their age increases.
- French fries are one of the three most common vegetables consumed by infants 9-11 months of age and by 15-18 months, French fries are the most common vegetable.

The California initiation rate of "any" breastfeeding as reported on the Newborn Screening Test Form has increased from 71.9 percent to 83.9 percent between 1992 and 2004. African Americans, who went from 50.4 percent to 70.1 percent, and Asian, who went from 58.5 percent to 83.9 percent, saw the largest increases (see Table 3). The California initiation rate of "exclusive" breastfeeding remained fairly constant

between 1992 and 2004, though there were fluctuations by race or ethnicity (see Table 5).

Table 5: California In-Hospital "Exclusive" Breastfeeding Initiation Trend as Reported on the Newborn Screening Test Form: 1992-2004[a, b]

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
African American	24.9%	26.7%	28.6%	28.1%	29.5%	30.3%	31.3%	30.9%	30.3%	30.6%	30.4%	30.2%	30.5%
American Indian	37.1%	47.5%	48.4%	44.2%	47.6%	49.9%	51.2%	51.1%	50.2%	52.3%	47.7%	48.7%	45.9%
Asian	28.8%	30.3%	32.8%	34%	35.3%	37.6%	39.4%	38.5%	38.1%	39.6%	40.4%	39.3%	40%
Latino	29.8%	31.4%	33.4%	31.7%	30.7%	31.9%	32.1%	31.4%	30.7%	30.1%	29.6%	29.1%	29%
Pacific islander	30.5%	25.5%	28.6%	28.6%	30%	31.9%	30.9%	30%	30.5%	29.1%	32.6%	29.6%	27.4%
White	58.3%	60%	60.1%	61.5%	62.3%	62.9%	63.7%	61.9%	63.5%	64.1%	63.7%	62.7%	61.8%
Multiple Race/Other	44%	46.8%	49%	51.6%	51.8%	53.6%	54.2%	52.9%	53.4%	53.9%	52.7%	52.1%	51.3%
TOTAL	40.3%	41.5%	42.9%	42.2%	41.8%	42.8%	43.5%	42.9%	42.6%	42.2%	41.8%	41.2%	40.5%

[a] Data Source: Newborn Screening Database, Genetic Disease Branch, California Department of Health Services, 1992-2004.
[b] There were 536,446 births in 2004 (Feeding type was known in 521,559 Births, Unknown: 2.8%).

Dietary Recommendations

Breastfeeding

The 2005 policy statement from the American Academy of Pediatrics, "Breastfeeding and the Use of Human Milk," strongly recommends breastfeeding for all infants. The policy includes the following: "Human milk is species-specific, and all substitute feeding preparations differ markedly from it, making human milk uniquely superior for infant feeding." "In addition, human milk fed premature infants receive significant benefits with respect to host protection and improved developmental outcomes compared with formula-fed premature infants." Note that fortification of breast milk is typically recommended for premature infants who weigh less than 1,800 gms at birth.[3] Exclusive breastfeeding is complete and appropriate nutrition, sufficient to support optimal growth and development for approximately the first six months after birth, except for vitamin D, which is needed in early infancy.[8] See Table 11 for recommendations on vitamin and mineral supplementation. Health care professionals need to provide consistent and appropriate support to assist mothers in initiating and maintaining breastfeeding. They can assist mothers by:

- Encouraging early initiation;
- Encouraging frequent breastfeeding to ensure an adequate milk production and appropriate infant growth;
- Avoiding supplementation during the first six months; and,
- Timely introduction of appropriate complementary foods at around six months of age.

Mothers need support to avoid early weaning to formula or complementary foods. Infants weaned before 12 months of age should not receive cow's milk feedings but should receive iron-fortified infant formula. Gradual introduction of iron-enriched complementary foods in the second half of the first year should complement the breast milk diet.[7, 8] It is recommended that breastfeeding begin within the first hour after birth, continue exclusively for around six months then continue for at least 12 months, and thereafter for as long as mutually desired by mother and child.[26] The California Breastfeeding Promotion Committee's vision is that breastfeeding will be the norm in California for at least the first year of life and preferably longer.[16]

Infant Formula

Table 6 identifies five indications for nourishing infants with formula. Infant formula should be iron-fortified and given in the first 12 months. After 12 months, whole cow's milk is appropriate.

Table 6: Five Indications for the Use of Infant Formula[9]

1) As a substitute for human milk in infants when breast milk is medically contraindicated, such as classic galactosemia, maternal active untreated tuberculosis, and when contraindicated medication or metabolites are in the breast milk.
2) When breastfeeding is medically contraindicated for the mother.
3) As a supplement to support the infant's nutrition while the mother seeks consultation with a lactation specialist to correct problems of low milk supply, inadequate or inappropriate suck and milk transfer or while other medical or non-medical concerns are being corrected. (The occasions for long-term supplementation of the breastfed baby should be rare and include a medical exam for the mother and infant. Most infants who are allowed to self regulate feedings will thrive on human milk.)
4) When the caregiver does not include the biological mother, such as adoption and foster care.
5) As a substitute or supplement for human milk in infants whose mothers, after receiving breastfeeding education and support, choose not to breastfeed or who do not breastfeed exclusively.

When providing infant formula, the American Academy of Pediatrics does not recommend the use of soy-based formulas for:[27]

1. Preterm infants with birth weight less than 1,800 grams or infants born with intrauterine growth restriction. Because these infants are high-risk nutritionally due to depressed growth and organ function, there are three primary reasons for not using soy-based formulas with preterm infants: decreased achievement of growth rates with lower albumin levels, reduced bone mineralization with increased osteopenia, and aluminum toxic effects as a result of reduced renal function.

2. Preventing infantile colic or food allergies. The routine use of isolated soy protein-based formula has no proven value in the prevention or management of infantile colic or in the prevention of atopic disease in healthy or high-risk infants.
3. Infants with cow's milk protein-induced enterocolitis or enteropathy.

However, soy-based infant formula may be an appropriate choice for an infant of a mother who is on a vegetarian diet and is not exclusively breastfeeding.

Commercial infant formulas are available in three forms: ready-to-feed, concentrated liquid, and powder. Directions for the correct preparation of infant formula are included on the label and should be followed. If concerned about the safety of the water supply, refer to **Other Fluids in Infant Feeding** section.

Infant formula manufacturers now supplement the vast majority of infant formula with long chain polyunsaturated fatty acids (LCPUFAs), because of differences in visual acuity and IQ seen between breastfed infants and formula fed infants. The essential fatty acids, alpha linolenic acid (ALA) and linoleic acid (LA) are precursors of LCPUFAs: docosahexaenoic acid (DHA) and arachidonic acid (ARA). These essential or precursor fatty acids historically were contained in infant formula but levels of LCPUFAs were low in infant formula. Conversely, breast milk contains higher amounts of LCPUFAs as well as essential fatty acids. Babies fed breast milk have demonstrated positive visual improvements and higher IQ when compared to infants fed formula.

Two questions have been raised: 1) Are LCPUFAs essential in infancy and 2) are infant formulas supplemented with LCPUFAs improving visual acuity and IQ more than unsupplemented infant formula? Current study results differ and are inconclusive regarding the questions of essential nutrient need and the effects on visual acuity and intellectual development for both term and preterm infants fed LCPUFA supplemented infant formula. The Cochrane Review recently concluded there is not enough evidence to show a long-term benefit of LCPUFA supplementation, but that supplementation is safe for both preterm and term infants. Additionally, for preterm infants, LCPUFA supplementation does not significantly influence their growth.[1, 2]

The type of infant formula used will affect stool frequency, color, and consistency. If infant formula is indicated, parents should be educated on the wide range of normal infant stooling patterns, as well as the increased incidence of feeding intolerance such as crying, spitting up, and gas.[28]

When bottle feeding, it is important to replicate the act of breastfeeding by providing skin-to-skin contact, frequent caregiver-infant contact, and attending to infant hunger cues. Below are some do's and don'ts that promote caregiver-infant bonding when an infant is bottle-fed (see Table 7).

Table 7: Watchfulness when Bottle Feeding

• **DO** hold and cuddle the infant comfortably and securely during feeding. Make sure the head and neck are supported. Hold the head slightly higher than the body. • **DO** alternate sides so the baby looks towards the caregiver in both directions. • **DO** provide skin-to-skin contact between caregiver and baby. Allow the infant to hear the caregiver's heartbeat by holding infant close to chest. • **DO** feed according to an infant's hunger and satiety cues such as lip smacking, slowed sucking, turning away and increased distractibility. • **DO NOT** prop the bottle in the infant's mouth or put the infant to bed with a bottle.

Introducing Complementary Foods

The exact timing for introducing complementary foods should be individually determined. According to the American Academy of Pediatrics, water, juice, and other foods are unnecessary for infants in the first six months.[8] The introduction of complementary foods should take into account the developmental stage and nutritional status of the infant,[9] coexisting medical conditions, social factors, cultural, ethnic, and religious food preferences of the family, financial considerations, and/or any other environmental factors. The optimal timing for the introduction of complementary foods is not well defined. Contrary to many mother's beliefs that early introduction of complementary foods is necessary, most infants do not need any foods other than breast milk or iron-fortified infant formula prior to six months. Mothers may mistakenly associate early introduction of complementary foods with increased satiety, improved sleep patterns or developmental advancement.

At six months of age, iron-fortified complementary foods should be introduced to meet the increased nutrient needs of the infant, which are no longer completely met by breast milk or infant formula.[8, 9]

Feeding guidance should be family-based and adhere to the AAP infant feeding recommendations.[9] The first year of life is the time when habits and preferences are beginning to be formed, and it is important to foster healthy eating habits early. Parental and caregiver feeding beliefs and practices directly affect the quality and quantity of their infant's nutrition intake. When parents and caregivers respond to infant cues, they will tend to feed their infant appropriately. Parents and caregivers frequently need education to:

1) Understand the normal feeding progression of the developing child.
2) Building trust by establishing a healthy feeding relationship.
3) Meet the nutritional needs of growth and prevent future chronic diseases.

Some effective parental and caregiver practices include:

- Having nutritious foods readily available.
- Establishing regular mealtimes and eat together.
- Feeding according to age appropriate level.
- Feeding when infant wants to eat; ending the feeding when the infant is ready.
- Creating a supportive atmosphere for enjoyable eating.[29]

For detailed information on developmental stages and feeding recommendations for healthy full-term infants, refer to Table 8. Developmental delays in infant feeding skills due to medical conditions, prematurity, multiple hospitalizations, low birth weight, depression, failure to thrive, neuromuscular delay, physical and emotional abuse, and/or not having oral feeding for extended periods of time, might necessitate a delay in the introduction of complementary foods (see Table 9) and/or modifications in food texture and nutritional density. In these situations, medical management is indicated.

The introduction of complementary foods and liquids other than breast milk, infant formula or water should be determined by the infant's development and nutrient needs. Infants who are introduced to complementary foods too early or before they are developmentally ready may choke on the food, consume excessive calories, develop a feeding aversion, and/or consume less than the appropriate amount of breast milk or infant formula thereby compromising their nutrient intake.

Infants who are fed complementary foods too late or after they are developmentally ready, may not consume an adequate variety and/or amount of complementary food to meet their caloric and other nutritional needs and thereby compromise growth and nutrient status, particularly iron status. Furthermore, infants may develop negative feeding behaviors, such as, rejecting age appropriate foods and textures, delaying independent eating skills, and resisting a mealtime routine.

Table 8 identifies appropriate feeding recommendations according to developmental stages of healthy infants. By matching an infant's development with an appropriate feeding approach, infants and caregivers experience feeding in a positive way and equally enjoy the feeding experience. Mealtime should be a social and pleasant family activity, not a solitary "shovel food quickly into the baby" experience. Parents can avoid food battles by offering new interesting options. At the same time, food, especially desserts, should not be used as a "reward."

Table 8 also lists specific foods, which are based on an infant's nutritional needs and developmental readiness, as well as, health and safety concerns. For instance, infants should not be given foods that can precipitate choking, such as raw carrots and whole grapes.

Table 8: Feeding Recommendations for Healthy Full Term Infants According to Developmental Stage and Nutrient Needs[29-34]

Developmental Stage	Approximate Age	Feeding Recommendations to Meet Nutrient Needs
• Rooting reflex will gradually diminish • Sucks and swallows liquids • May push food out with tongue	Birth to 6 months	• Exclusive breastfeeding until about 6 months of age. • If not breastfeeding, use iron fortified infant formula. Watch for infant's cues of satiety. • Feed when the infant shows early signs of hunger, note: crying is a late sign of hunger. • Breastfeed about 10-12 times in 24 hours, including some cluster feedings (on-demand feeding). • No complementary foods at this time. • No other fluids such as water, tea, and juice.
• Sits with support • Holds head steady • Keeps food in mouth and swallows it	6 months	• Continue to breastfeed or provide iron-fortified infant formula on demand. Breast milk or infant formula is still the primary source of nutrients. • Introduce complementary foods. New foods can be introduced every 2-4 days. The order of foods is not critical, although high iron foods are recommended. Introduce a small amount (1 to 2 tsp.) of a new food once or twice per day. (Remember to be patient and pleasantly offer new foods; you are creating a positive new experience). • 2-3 small meals per day, with snacks optional. • Feed with a spoon in a seated position • Plain iron fortified infant cereal. Cereal can be mixed with breast milk or infant formula. • A strainer, blender, or baby food grinder can be used to make baby food. • Cooked vegetables and soft fruits should be strained or pureed. • Meat, chicken, eggs, or cooked beans should be strained or pureed; tofu should be mashed. • **DO NOT** feed large predatory fish, such as shark and swordfish. • **DO NOT** put cereal or other foods in the bottle. • **DO NOT** force feed or extend feeding time beyond a half hour. • **DO NOT** feed too much complementary foods, for instance no more than one half cup of complementary food at a sitting.
• Grasps and holds onto things • Sits with ease and without support • Begins to chew • Uses a cup with help •May self feed finger foods.	7 to 8 months foods	• Continue to breastfeed or provide iron-fortified infant formula by cup. • Continue to offer a variety of new soft foods. • Start teaching how to drink water from a small cup. • If desired, offer 100% fruit juice **in a cup**. Limit to 2 ounces of diluted fruit juice (dilute with equal parts of water) per day. • Encourage and explore self-feeding by using soft foods for finger feeding. • **Limit** adding sugar, salt or spices to food. • **DO NOT** force feed or extend feeding time beyond a half hour.

		• **DO NOT** leave child alone during feeding. • Avoid foods in a form that may cause choking (i.e., items that have a shape and/or consistency that may cause them to become lodged in the trachea, such as whole nuts, whole grapes, pieces of hot dog, popcorn, raw vegetables, whole or in pieces).
• Takes a bite of food • Self feeds finger foods • Uses a cup without help or with minimal help	8 to 10 Months	• Continue to breastfeed or provide iron-fortified infant formula. • Continue to offer a variety of new foods. • Provide soft, baby size pieces of complementary foods for self-feeding. • Finger foods such as soft cheese, unsalted crackers or small pieces of tortilla, tofu, or toasted whole grain or white breads. Avoid breads with nuts or large seeds. • Avoid foods in a form that may cause choking (i.e., items that have a shape and/or consistency that may cause them to become lodged in the trachea, such as whole nuts, whole grapes, and raw carrots, whole or in pieces). • For families with a history of atopic disease, because of concern for allergies, **NO** eggs until 2 years of age; and no peanuts, nuts, and fish until 3 years of age.
• Starts to use a spoon to self feed	10 to 12 Months	• Continue to breastfeed or provide iron-fortified infant formula. Start giving fluids in a cup. • Provide 3-4 meals per day, with snacks to meet nutritional needs. • Provide small pieces of cooked or soft table foods. • Begin to structure feeding times with family members to create mealtime socialization. • **Avoid** excessive use of sweets, salty, and fatty foods.
• Uses a spoon without help • Begins to use a fork	1 year old	• Continue to breastfeed. Offer all other liquids in a cup. • If bottle feeding, complete transition from bottle to cup. • Provide 3-4 meals per day, with snacks. • Provide whole milk, offer 2-4 ounces in a cup. When accustomed to whole milk, offer 4 ounces in a cup, 4 times a day with meals or snacks. Do not exceed 24 ounces per day.

Sources: See reference citations as listed in the table title above.

Food Sensitivity

Major types of adverse reactions to food include food hypersensitivity (allergy) and food intolerance. A food hypersensitivity is an immunologic reaction resulting from the ingestion of a food or food additive. Food intolerance is an abnormal physiologic response to an ingested food or food additive.[8]

Food hypersensitivity or intolerance may cause any of the following symptoms: diarrhea, vomiting, coughing and wheezing, respiratory symptoms, ear infections, abdominal pain, gas, hives, skin rashes and less commonly systemic reactions (anaphylactic shock, failure to thrive). Food allergies are most commonly associated

with consumption of cow's milk, whole eggs (or egg white), wheat, tree nuts, finfish and shellfish, legumes, and peanuts.[8]

The following prevention guidelines for at risk infants are: (1) no maternal dietary restrictions during pregnancy; (2) exclusive breastfeeding for approximately six months of life or use of a hypoallergenic infant formula if breastfeeding is not possible or supplementation is required; (3) delay introduction of complementary foods until after approximately six months of age; and (4) delay introduction of cow's milk products until one year of age; eggs until two years; and peanuts, nuts, and fish until three years of age.[35, 36] Caregivers should stop feeding any food that causes an adverse reaction and should consult their health care provider immediately.

Other Fluids in Infant Feeding

Supplementary fluids are not needed in healthy exclusively breastfed infants or infant formula fed infants[9] (see Table 9). Young breastfed infants who receive supplementary fluids have a lower intake of breast milk than if they are exclusively breastfed and are also more likely to be breastfed for shorter periods. In addition, supplementary fluids, such as fruit juice may be linked to excessive bottle use and increased risk of dental caries. Cup use, which can be started around six months of age, is the preferred feeding method if supplementary fluids are provided.

Fluoride supplementation to prevent dental caries should be based on the amount of fluoride in the drinking water consumed by the breastfeeding mother or in the preparation of infant formula. Supplementary fluoride should not be provided during the first 6 months of life to reduce the risk of enamel fluorosis. Supplementation is needed when the fluoride concentration in drinking water is <0.3-0.6 ppm.[9] To check the status of local water fluoridation refer to the CDHS Division of Drinking Water and Environmental Management website: http://www.dhs.ca.gov/ps/ddwem/Fluoridation/Fluoridetable2002.PDF.

Water safety should be taken into consideration when choosing to use powdered or concentrated infant formula, which requires water in its preparation. Contaminants such as harmful microorganisms, lead, nitrates and copper are potential health hazards.[8] If water is boiled to kill microorganisms, it should be boiled for at least one minute. A covered top should be used to avoid concentrating contaminants and minerals. If the safety of the water supply is questionable, caregivers should contact their local health department or the U.S. Environmental Protection Agency (EPA) Safe Drinking Water Hotline at 1-800-426-4791.

Table 9: Fluids During Infant Feeding[4, 8, 37, 38]

Fluids	Cautions during Infant Feeding
Water	• Healthy infants do not require plain water added to their diet in the first 6 months of life. Infants in hot climates lose water by perspiring. Exclusively breastfed infants can meet their water requirements from breast milk alone even in hot, dry, or humid climates. • Water and electrolyte needs may be increased during some medical circumstances such as vomiting or diarrhea. In this case, a medical provider should medically manage the infant. Breast milk helps prevent dehydration through periods of vomiting and diarrhea and should not be considered "milk" when an infant is to stop taking "milk products" (i.e. infant formula, cow's milk, cheese, etc.) **Water intoxication as well as malnutrition may occur if infants are fed excessive amounts of water or if infant formula is prepared improperly by over diluting.**
Teas	Caregivers in some cultures may offer water and/or herbal teas to young infants, frequently from the first week of life, in the belief that these fluids will relieve pain associated with colic and earache, prevent and treat colds and constipation, soothe fretfulness, and quench thirst. Teas (herbal or others) are not recommended for any infants because certain herbs may be dangerous and they replace nutritious foods. The March of Dimes does not recommend the use of herbal supplements by pregnant women, infants, and children because the safety and effectiveness of many herbs have not been demonstrated. Herbal and other tea use may point to parental concerns about underlying conditions that need to be addressed by the health care practitioner.
Fruit Juice	Fruit juice is not a necessary component of infant feeding; however, diluted 100% fruit juice may be introduced between 6 and 7 months, when the infant can drink from a cup. If fruit juices are given to infants after six months, limit the volume to 2 ounces/day of juice. Dilute fruit juice with an equal amount of water. Macronutrient imbalances are associated with excessive fruit juice or other excessive simple carbohydrate consumption and may lead to overweight, diarrhea, poor weight gain, failure to thrive, and early childhood caries.
Cow or goat milk, chocolate milk, cocoa, coffee, Gatorade®, Kool-Aid®, soft drinks, or sweetened fruit drinks	These are NOT appropriate beverages to offer to infants.

Sources: See reference citations as listed in the table title above.

Micronutrient Recommendations

Table 10 provides micronutrient recommendations for selected nutrients for infants in two age categories: 0-6 months and 7-12 months of age. Nutrient needs generally increase as the infant gets older because their nutrient needs increase with accelerated growth. Note the difference between nutrient needs of the 0-6 month vs. the 7-12 month infant. The specific values below are obtained from the most current scientific publication from the Food and Nutrition Board, Institute of Medicine, National Academy of Sciences (NAS). The NAS has updated and expanded the Recommended Dietary Allowances (RDA), which are now referred to as Dietary Reference Intakes (DRIs). When sufficient evidence is not available to determine an RDA or DRI, a reference intake, Adequate Intake (AI) is provided as a recommended intake for individuals. For infants this is based on adequate intakes of healthy breast fed infants. This level of intake should reduce the risk of developing a negative functional outcome. The AI may not meet requirements for clinical conditions or medical diseases.

Table 10: Selected Vitamin and Mineral Adequate Intakes[a] for Infants[b,39]

Age (mo.)	Calcium (mg/d)	Phosphorous (mg/d)	Magnesium (mg/d)	Vitamin D (μg/d)	Fluoride (mg/d)	Thiamin (mg/d)	Riboflavin (mg/d)
0-6	210	100	30	5	0.01	0.2	0.3
7-12	270	275	75	5	0.5	0.3	0.4

Age (mo.)	Niacin (mg/d)	Vitamin B_6 (mg/d)	Folate (μg/d)	Vitamin K (μg/d)	Vitamin B_{12} (mcg/d)	Pantothenic Acid (mg/d)	Biotin (μg/d)	Choline (mg/d)
0-6	2	0.1	65	2	0.4	1.7	5	125
7-12	4	0.3	80	2.5	0.5	1.8	6	150

[a] For healthy breastfeed infants, the Adequate Intakes (AI) is the mean intake and is a goal for individual intake. The AI is believed to cover the needs of all individuals in an age group, but lack of data or uncertainty in the data prevent being able to specify with confidence the percentage of infants covered by this intake.

[b] Healthy infants do not normally require supplements, with the exceptions listed in Table 12. Infants with special health care needs, which include chronic medical conditions, may require additional supplements.

Source: Food and Nutrition Board, Institute of Medicine, National Academy of Sciences *Dietary Reference Intakes: Recommended Levels for Individual Intake*. Revised 1998.

Table 11: Vitamin and Mineral Supplement Recommendations for Healthy Full-Term Infants from Birth through One Year of Age[8, 9]

The following nutrients require routine supplementation of all infants.

Nutrient	Age	Dosage	Special Instructions
Vitamin K	Birth	0.5 to 1.0 mg	Vitamin K is usually given as a single intramuscular dose after the first feeding is completed and within the first 6 hours of life for prophylaxis against hemorrhagic disease of the newborn.
Vitamin D		5 μg/d	Diets of breastfed infants should be supplemented with vitamin D, unless consuming 500 mL per day of vitamin D-fortified infant formula.[37] It is recommended by the American Academy of

			Pediatrics that: • All infants, including those who are exclusively breastfed, have a minimum intake of 200 IU of vitamin D per day beginning during the first 2 months of life. • Premature infants receive a multivitamin supplement that includes vitamin D. Iron supplementation may also be indicated. • Exclusively breastfed, full-term infants living in climates with reduced sunlight, especially in winter, or who are not taken outside, and darker skinned infants have been noted to be at a higher risk for rickets.
Fluoride	+6 mo.	0.25 mg/d	Fluoride supplementation is recommended after 6 months of age where the water supply is not adequately fluoridated (0.3 ppm fluoride). Please note the dosage of fluoride can vary with the concentration of fluoride in the drinking water and the age of the child. The AAP states that where the water is adequately treated with fluoride, the breastfed infant should not be supplemented with fluoride. The AAP endorses and accepts as its policy the Recommendations for Using Fluoride to Prevent and Control Dental Caries in the US.
Vitamin B_{12}		0.3 to 0.5 μg/d	Vitamin B_{12} supplementation is recommended for infants whose breastfeeding mothers eat a vegan diet and do not take vitamin B_{12} supplements.

Sources: See reference citations as listed in the table title above.

Infants Breastfed by Mothers Who Are Vegetarian:

The following recommendations pertain to feeding an infant of a mother on a vegetarian diet:

- Breastfeed infants for at least 12 months.
- According to the American Academy of Pediatrics, the diets of all breastfed infants should be supplemented with 200 International Units (IU) per day of vitamin D during the first two months of life, unless consuming 500 mL per day of vitamin D-fortified infant formula.[40]
- Mothers who are total vegetarians (vegan) and breastfeed should consult with their health care providers about consuming a vitamin B_{12} supplement in a food or pill form.
- Complementary foods should be introduced with special attention to providing calorically dense foods so the increased bulk of a vegetarian diet does not interfere with adequate consumption of energy, protein, and other essential nutrients. Adding additional fat sources may be needed in order to provide sufficient energy and to create satiation.

Total vegetarian (vegan) and other vegetarian practices, such as lacto-ovo vegetarianism, are not the same. Total vegetarian dietary practice is less common and more restrictive. Without proper dietary planning, there is increased potential for significant nutritional deficiencies during accelerated growth, such as infancy. Both the vegan and vegetarian infant should be evaluated by their health care providers for adequacy of nutrients associated with growth such as protein, B12, vitamin D, iron, zinc,

and calcium intake in order to prevent childhood nutrition disorders such as anemia, growth delays, and poor bone mineralization.[41]

Honey
Honey, including that used in cooked or baked products, should never be fed to infants. Honey may be contaminated with Clostridium botulinum spores. **When consumed by an infant, these bacterial spores can grow in the intestinal tract and produce a toxin, resulting in the life-threatening paralytic illness, infant botulism**.[42]

Food Insecure Households
Food insecure households especially benefit from ready access to breast milk, no need for preparation, no refrigeration or equipment, and the low cost of breast milk. For caregivers who are not breastfeeding and who experience difficulty in purchasing adequate amounts of infant formula, referrals should be made to community food assistance resources, such as WIC, food banks, the public health department, or a pediatric dietitian.

Barriers to Implementation/Myths

Barriers to Breastfeeding[16]

- Lack of basic knowledge about breastfeeding coupled with the lack of role models or access to mother-to-mother support groups leave many new mothers with no one to turn to for advice and support during an important transitional time.
- Hospital policies such as separation of mother and baby, gifts of free infant formula, early discharge, inadequate follow-up and support in the early days of breastfeeding have been shown to shorten the duration of breastfeeding.
- Lack of workplace and community friendly breastfeeding environments, in spite of California Lactation Accommodation Law (Assembly Bill 1025).
- Very few health care professionals have received the training (knowledge or clinical skills) needed to support and assist women and their infants with breastfeeding basics.
- Limited maternity leave and lack of workplace feeding or pumping facilities are common barriers faced by working mothers.
- Lack of support from one's peers and family members has an even greater impact on the decision to breastfeed than advice from health care providers, with one of the greatest influences often being a woman's partner.
- Embarrassment, lack of confidence, lack of desire, poor previous breastfeeding experience, fear of change in lifestyle, or concerns about their physical appearance, dietary or other health practices, such as smoking and drinking inhibit some women from breastfeeding.

Opportunities for Improvement

Breastfeeding is encouraged and supported for all infants in California.

- Support breastfeeding as the norm in California.
- Counsel women during their pregnancy, along with family members, on appropriate infant feeding practices including the risks of infant formula. Before discharge from hospitals, postpartum women and their families should be provided the following: culturally appropriate information and referrals that operate round the clock, such as mother-to-mother support; lactation consultants; WIC agencies and appropriate referrals for providers that prescribe durable medical equipment for overcoming any problems that may arise. In addition, there should be access to after-hours and weekend support, when necessary.
- All California perinatal and pediatric health care providers should be trained with current information about policies, procedures, and clinical skills that support lactation success as well as other appropriate infant feeding practices.
- Worksites in California should be encouraged to be supportive of breastfeeding by providing employee time and a safe, clean place to pump and store breast milk.

Resources/Web Sites

Academy of Breastfeeding Medicine
ABM Executive Office
191 Clarksville Road
Princeton Junction, NJ 08550
Toll free: 1-877-836-9947 ext. 25
Local/International: (609) 799-6327
Fax: (609) 799-7032
Email: abm@bfmed.org
http://www.bfmed.org/

American Academy of Pediatrics (AAP)
National Headquarters
141 Northwest Point Boulevard
Elk Grove Village, IL 60007-1098
(847) 434-4000
http://www.aap.org/

Best Start
4809 E. Busch Blvd., Suite 104
Tampa, FL 33617
Toll free: (800) 277-4975
Fax: (813) 971-2280
Email: beststart@beststartinc.org
http://www.beststartinc.org

Breastfeeding and Human Lactation Study Center
University of Rochester School of Medicine and Dentistry
Department of Pediatrics, Box 777
Rochester, NY 14642
Telephone: (585) 275-0088
Fax: (585) 461-3614

Centers for Disease Control and Prevention (CDC)
(800) 311-3435
http://www.cdc.gov/

Ellyn Satter Associates
4226 Mandan Crescent, Madison, WI 53715
Phone: 608-271-7976, 800-808-7976
Fax: 866-724-1631
Email: info@ellynsatter.com

Food and Nutrition Information Center, Agricultural Research Service, USDA
National Agriculture Library, Room 105
10301 Baltimore Ave.
Beltsville, MD 20705
Phone: (301) 504-5719
Fax: (301) 504-6409
Email: fnic@nal.usda.gov
http://www.nal.usda.gov/fnic

Healthy Mothers, Healthy Babies Coalition (HMHB)
121 North Washington Street Suite 300
Alexandria, VA 22314
Phone: (703) 836-6110
Fax: (703) 836-3470
http://www.hmhb.org/

Human Milk Banking Association of North America, Inc
1500 Sunday Drive, Suite 102
Raleigh, NC 27607
http://www.hmbana.org/

Institute of Medicine (IOM)
500 Fifth Street, NW
Washington, D.C. 20001
Phone: (202) 334-2352
Fax: (202) 334-1412
http://www.iom.edu/

International Food Information Council
1100 Connecticut Avenue, NW Suite 430
Washington, D.C. 20036
Phone: (202) 296-6540
Fax: (202) 296-6547
http://www.ific.org/

International Lactation Consultant Association
1500 Sunday Drive, Suite 102
Raleigh, NC 27607
Phone: (919) 861-5577
Fax (919) 787-4916
E-mail: info@ilca.org
http://www.ilca.org/

Lactation Institute
16430 Ventura Boulevard Suite 303
Encino, CA 91436
Phone: (818) 995-1913
Fax: (818) 995-0634
http://www.lactationinstitute.org

Lactation Training Program, UCLA Extension
UCLA Extension
Department of Humanities, Sciences, Social Sciences, and Health Sciences
10995 Le Conte Avenue, Room 711
Los Angeles, CA 90024
Phone: (310) 825-8423
Email: hlthsci@uclaextension.edu
http://www.uclaextension.edu/

Lactation Training Program
UCSD Extension- Health Care and Behavioral Sciences
9500 Gilman Drive, Dept. 0170E
La Jolla, Ca 92093-0170
Phone: (858) 964-1010
www.extension.ucsd.edu/programs

La Leche League International
1400 N. Meacham Road
Schaumburg, IL 60173-4808
Phone: (847) 519-7730
http://www.lalecheleague.org

National Network for Child Care
Iowa State University Extension

1094 LeBaron Hall
Ames, IA 50001
http://www.nncc.org/homepage.html

HRSA Information Center
Health Resources and Services Administration
U.S. Department of Health and Human Services
Parklawn Building
5600 Fishers Lane
Rockville, Maryland 20857
http://www.ask.hrsa.gov/

Promotion for Mother's Milk, Inc.
1133 Broadway, Suite 706
New York, NY 10010
http://www.promom.org/

San Diego Breastfeeding Coalition
c/o Children's Hospital and Health Center
3020 Children's Way, MC 5073
San Diego, CA 92123-4282
Toll free: 1-800-371-MILK
Email: sdcbc@breastfeeding.org
http://www.breastfeeding.org

U.S. Breastfeeding Committee (USBC)
2025 M Street, NW, Suite 800,
Washington, D.C. 20036
Phone: (202) 367-1132
Email:info@usbreastfeeding.org
http://www.usbreastfeeding.org/

Wellstart International
P.O. Box 80877
San Diego, CA 92138-0877
Phone: (619) 295-5192
Email: info@wellstart.org

World Health Organization (WHO)
Department of Child and Adolescent Health and Development (CAH)
Avenue Appia 20, CH-1211 Geneva 27, Switzerland
Phone: (+00 41 22) 791 21 11
Fax: (+00 41 22) 791 48 53
Email: cah@who.int
http://www.who.int/child-adolescent-health/NUTRITION/complementary.htm
http://www.who.int/child-adolescent-health/New_Publications/NUTRITION/guiding_principles.pdf

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California Food Guide

Life Cycle: 1 to 3 Year Olds

by Poppy Strode M.P.H., M.S., R.D., Kelley Knapp M.S., R.D, and Josephine Ngai M.S., R.D.

What's New?

- Childhood obesity is at record levels.
- Updated dietary guidance has been released (Dietary Guidelines for Americans 2005 and MyPyramid).
- Dietary Reference Intakes (DRIs) have been established for ages one to three.
- The Feeding Infants and Toddlers Study (FITS) has compared actual intakes to the DRIs.

Public Health Implications

Recent research highlights several major areas of concern for children in this age group:

- High intake of fat and sugar
- Low intake of fruits and vegetables
- Limited exposure to a variety of foods
- Increase in fast food consumption
- Decrease in physical activity
- Increased prevalence of overweight
- Increased risk of diabetes and other chronic diseases

Trends/Nutrient Patterns

Overweight, Poor Nutrition, and Physical Inactivity

Overweight (defined as Body Mass Index [BMI] above the 95th percentile for age, see www.cdc.gov/nccdphp/dnpa/bmi/childrens_BMI) is a major health concern in children and adolescents. Since the 1970s, the prevalence of overweight has more than doubled for preschool children aged 2-5 years.[1] Childhood overweight is an important indicator of children's nutrition and health status. The trend toward increased childhood overweight is of concern, because overweight children are at increased risk for serious physical and psychosocial problems, including type 2 diabetes, metabolic syndrome, cardiovascular disease, lowered self-esteem, and increased depression.[2] In 2000, it was estimated that 30 percent of boys and 40 percent of girls born in the United States are at risk for developing type 2 diabetes at some point in their lives.[1] Approximately one-third of overweight preschool children, one-half of overweight school-age children, and three-quarters of overweight teenagers grow up to be obese as adults.[2]

Studies of young children suggest that both poor nutrition and physical inactivity are primary factors contributing to excessive fat accumulation. The increase in overweight has been linked to increased sedentary activities such as watching television and computer and video games.[3] According to a recent national survey and a series of focus groups with parents of young children, 83 percent of children under age six use some form of screen media every day, averaging about two hours per day, and more than 60 percent of babies one year old and younger watch screen media in a typical day.[4, 5] This decreases time for more vigorous motor activities. Children who do not participate in adequate physical activity are much more likely to be sedentary as adults than children who are active.

Some of the current societal trends that are resulting in poor nutrition and overweight in young children include:

- Busy lifestyles, leading to over-consumption of fast foods and convenience foods with high-fat and sugar content, and low-nutrient density.[6, 7]
- Decrease in meal planning, cooking, and eating home-prepared meals together as a family.
- Excessive consumption of liquids such as soft drinks and other sweetened beverages, juices, and milk.[7]
- Low intake of fruits and vegetables.
- Lack of variety and availability of more nutritious foods in low-income areas.
- Immigrants and other ethnic groups losing traditional food habits, sometimes losing more nutritious foods.
- Delayed weaning from the bottle.
- Inadequate nutrition education for many parents and child care providers.
- Widening gap between rich and poor, with many families struggling to provide adequate nutritious food with minimum-wage jobs.

- Exposure to media, advertising, and television watching from an early age.
- Inactivity due to increased use of cars, television, computers, and labor-saving devices; unsafe neighborhoods; and a built environment that discourages physical activity in daily life.

Prevention of overweight in young children involves changes in the whole family's lifestyle that promote healthy eating, more physical activity, and less sedentary behavior. Promoting positive behaviors early in childhood may help these behaviors continue into adulthood.

Common Concerns/Strategies

Nutrition and Learning

Proper nutrition is important to a child's readiness to learn. Young children who are well nourished are able to play and work with other children, are alert and eager to learn, and are less likely to be absent from childcare or preschool. Children who are hungry or poorly nourished are not able to take full advantage of the variety of enriching and educational experiences provided in the preschool setting. Specific nutrients, particularly iron, affect cognitive development. Iron deficiency can result in cognitive and motor deficits, some of which may not be reversible; thus, preventing iron deficiency is extremely important[8] (see section on "Weaning from the Bottle"). Another health consequence of iron deficiency is enhanced lead absorption.[8] Because childhood lead poisoning is a well-documented cause of neurological and developmental deficits, iron deficiency contributes to this problem both directly and indirectly.

Toddler Development

Children in the toddler age group go through major developmental and psychosocial transitions which influence their eating behaviors and nutritional status. Only nutrition-related developmental issues are addressed in this chapter.

Because children's growth rates decrease during the toddler years, their energy needs decrease as well.[9] Parents often become concerned that their toddler is not eating enough, and they need reassurance that this is normal. When offered a variety of healthy foods, children usually eat enough to meet their nutritional needs.

Toddlers are also cautious about new foods and often refuse to try them. They need to look, smell, feel, and taste new foods, up to 15 to 20 times before they accept them.[9] Toddlers are unpredictable in the amounts and types of foods they eat, from meal to meal and from day to day.

In spite of all these changes, toddlers will eat a variety of foods if their parents and caregivers serve appropriate meals and snacks, and keep exposing their children to new tastes and textures. If parents and other caregivers model eating a variety of food, their children are more likely to do so.[10]

Dietary Recommendations

Nutrition goals for ages one to three

The nutrition goals for early childhood are: to provide adequate nutrition to support normal growth and development, activity and learning; and, help children learn food preferences and dietary habits that prevent disease and support a lifetime of good health.

Specific nutrient recommendations (from DRIs for ages 1-3 years)[11]

Protein

13 g per day (RDA)
5-20 percent of energy intake (Acceptable Macronutrient Distribution Range)

Fat

30-40 percent of energy intake (Acceptable Macronutrient Distribution Range)

Children under two years of age need calories from fat for proper growth and brain development. Fat intake should not be restricted during this time. Whole milk and whole milk products should be included in very young children's diets.

Children age two and older should gradually adopt a diet that by the age of five reflects the following pattern of nutrient intake:

- 20-35 percent of total energy from total fat, over several days
- Less than 10 percent of total energy from saturated fat
- Less than 300 mg cholesterol per day

After age two, children should drink low-fat or reduced-fat milk, and the amount of other fat in the diet should be gradually decreased.

Carbohydrates

130 g per day (RDA)
45-65 percent of energy intake (Acceptable Macronutrient Distribution Range)

No more than 25 percent of total energy from added sugars

Total fiber: 19 g per day (RDA) (14 g per 1,000 calories total energy intake)

Vitamins and minerals

Vitamin A: 300 mcg per day
Vitamin C: 15 mg per day
Vitamin D: 5 mcg per day
Folic Acid: 150 mcg per day
Iron: 7 mg per day
Calcium: 500 mg per day
Fluoride: 0.7 mg per day

***General* dietary recommendations (from the Dietary Guidelines for Americans 2005)**[12]

Children age two and older should follow the Dietary Guidelines for Americans 2005:

- To maintain body weight in a healthy range, balance calories from foods and beverages with calories expended.
- Overweight children: reduce the rate of weight gain while allowing growth and development; consult health care provider before putting child on a weight loss diet.
- Eat a variety of fruits and vegetables each day; choose from all five vegetable subgroups (dark green, orange, legumes, starchy, and other) several times each week.
- At least half of all grain products should come from whole grains, with the rest coming from enriched grain products.
- Consume two cups per day of fat-free or low-fat milk or equivalent milk products (for children age 2-8).
- Keep saturated fat intake less than 10 percent of calories, cholesterol intake less than 300 mg per day, and trans fat intake as low as possible.
- Keep total fat intake between 30 and 35 percent of calories for children age 2-3 (25 to 35 percent for children age 4-18, and 20 to 35 percent for adults), with most fats coming from sources of polyunsaturated and monounsaturated fatty acids, such as fish, nuts, and vegetable oils.
- When choosing and preparing foods, make choices that are lean, low-fat, or fat-free.
- Limit intake of fats and oils high in saturated and/or trans fatty acids.
- Choose fiber-rich fruits, vegetables, and whole grains often.
- Choose and prepare foods and beverages with little added sugars.
- Choose and prepare foods with little salt, and eat potassium-rich foods such as fruits and vegetables.

Food group recommendations for ages 2-3 (from MyPyramid)[13]

Foods served to young children should follow the recommended eating patterns for healthy Americans as suggested by MyPyramid. The recommended calorie

range for children age 2-3 is from 1,000 to 1,400, depending on activity level. This corresponds to the following food intake patterns for children age 2-3:

- **Fruits**: 1 to 1.5 cups (1 cup = 1 cup fresh fruit or juice, or ½ cup dried fruit) – limit fruit juice to one 4-ounce serving a day.
- **Vegetables**: 1 to 1.5 cups (1 cup = 1 cup raw or cooked vegetables, or 2 cups raw leafy greens).
- **Grains**: 3 to 5 ounce equivalents (1 ounce equivalent = 1 slice bread, 1 cup cereal, ½ cup rice, pasta, or cooked cereal).
- **Meat and beans**: 2 to 4 ounce equivalents (1 ounce equivalent = 1 ounce meat/poultry/fish, 1 egg, 1 tablespoon peanut butter, ¼ cup cooked dry beans, ½ ounce nuts).
- **Milk**: 2 cups (1 cup = 1 cup milk or yogurt, 1 ½ ounces cheese).
- **Oils**: 3 to 4 teaspoons.

Offer child-size portions. Start with one tablespoon of each food for each year of the child's age. For example, give a two-year-old two tablespoons of rice and two tablespoons of vegetables. Let her ask for more.

Other nutrition issues for age one to three

Weaning from the bottle

Children should be weaned from the bottle between 12 and 14 months of age to reduce the risk of baby bottle tooth decay, anemia, ear infections, and overweight. Children who continue using the bottle often drink excessive amounts of milk, juice, and sweetened drinks. This excessive intake of liquid calories can displace the intake of solid foods, and can diminish the child's interest in trying new foods.[8] Caregivers should offer children water to drink when they are thirsty.[14]

Oral health[15]

Recommendations:

- Children should:
  - Be weaned from the bottle between 12 and 14 months.
  - See a dentist by their first birthday.
  - Have a dental exam at least twice a year.
- To prevent dental caries: drink fluoridated water, use a tiny amount of fluoridated toothpaste, brush and floss regularly, have dental sealants applied to pits/fissures of teeth, and limit sweetened beverages and added sugars.
- Community water fluoridation is a safe and effective way to significantly reduce the risk of early childhood caries in infants. If bottled water is used, it is recommended to have 0.8 to 1.0 mg/L (ppm) of fluoride. Optimal concentration of fluoride in water for maximal dental caries prevention is 0.7

ppm to 1.2 ppm. If you use tap water and it is low in fluoride, ask your child's doctor about fluoride drops or tablets.

Consumption of milk and sweetened liquids

Excessive consumption of liquids such as milk, juices, soft drinks, and other sweetened liquids reduces children's appetites and prevents them from getting the nutrients they need from solid food. In FITS,[16] beverages provided 36 percent of energy intake for children aged 19-24 months. Juices, fruit drinks, and carbonated beverages appeared to displace milk in some toddlers' diets. Milk consumption should be limited to 16 ounces per day, juice consumption limited to one four-ounce serving per day,[17] and soft drinks and other sweetened liquids should be given very rarely if at all. Milk and juice should be served in a small, child-size cup.

Fiber

The DRI for fiber is 14 grams per 1,000 calories total energy intake, based on evidence for reduced cardiovascular disease risk at that level. In addition, fiber protects against constipation and has been shown to have many other health benefits, including decreased risk of some cancers, obesity, and diabetes. Several cross-sectional surveys on U.S. children and adolescents have found inadequate dietary fiber intakes, which could be improved by increasing consumption of whole fruits, vegetables, and whole-grain products.[12]

The Feeding Relationship

Eating challenges are especially noticeable during the toddler years when young children are becoming more mobile, exploring their environment, developing personalities, and acquiring new skills. All these factors impact feeding and eating. The transition to table foods presents many challenges for young children and their caregivers. In helping young children develop healthful attitudes toward food and eating, caregivers will benefit from understanding this developmental stage and adjusting parenting approaches accordingly.

Caregivers need to provide healthy meals and snacks at regular times in appropriate forms and textures, and respect the child's limits. They should offer nutritious meals and snacks without pressuring or restricting, and let the child eat what he or she wants from what is offered. The adult's responsibility is to offer suitable foods at appropriate times; the child determines what and how much to eat from those foods.[9] Food should be offered every two to three hours (three meals and two to three snacks per day).

Caregivers should offer food that is easy for the child to eat: easy to chew, bite size or easy to hold, mild and simple. Something familiar that the child likes should always be offered along with new foods. Children should never be forced

to eat or even to taste foods; this practice is likely to make them more resistant. Children are usually more willing to try a new food if others, including older children, are eating the food.

Meal and snack times should be pleasant and relaxed. Meals and snacks can be important social times for children. Children eat better when an adult is nearby, especially when the adult shares the meal or snack with them. The family should eat meals together whenever possible, at least for one meal a day. Parents should turn off the television, sit and eat and talk with children.

Children need the opportunity to feed themselves at the family table. Young children often are messy eaters while they learn to feed themselves; caregivers need to be patient and understanding. Children should sit in a highchair or booster seat at this age. They should use forks and spoons that are designed for them (smaller and easier to use).

This is a good age to start teaching children where foods come from and how foods are grown. Parents and children can plant a vegetable garden together or visit a farm. Parents can also involve the child in food shopping and preparation. Young children can help to choose produce at the grocery store or farmers market. At home, they can start learning to help with food preparation; scrubbing produce, washing and tearing lettuce and other salad greens, carrying non-breakable items to the table. Often children are more interested in trying foods when they have helped to prepare them.[18]

Breastfeeding

Breastfeeding can be continued and should be encouraged as long as mother and child both desire. Breastfeeding after meals helps to ensure that breast milk does not take the place of solid foods that provide needed nutrients. Breastfeeding may even enhance the acceptability of new foods given to children during the transition to table foods, because of the early exposure to different flavors through breast milk.[19]

Choking prevention

- Do not serve foods that can cause choking, such as hot dogs, popcorn, nuts, raw carrots, grapes, dried fruit, chips, chunks of meat, and hard candy.
- Children should sit down to eat, and an adult should be nearby.

Food safety[20]

- Wash hands, food contact surfaces, fruits and vegetables; do not wash or rinse meat or poultry.
- Separate raw, cooked, and ready-to-eat foods while shopping, storing, and preparing foods.

- Avoid cross-contamination. If possible, designate one cutting board for raw meats and another for fruits and vegetables.
- Cook foods to a safe temperature to kill microorganisms.
- Refrigerate perishable foods promptly.
- Defrost frozen foods properly, such as by placing them in the refrigerator or microwave to thaw or placing them, sealed, under cold running water.
- Avoid raw (unpasteurized) milk and any products made from raw milk, raw or partially cooked eggs, raw or undercooked meat and poultry, unpasteurized juices, and raw sprouts (infants and young children and pregnant women should not eat or drink these foods at all).

What You Need to Know About Mercury in Fish and Shellfish[21]

2004 EPA and FDA Advice for:
Women Who Might Become Pregnant
Women Who are Pregnant
Nursing Mothers
Young Children

Fish and shellfish are an important part of a healthy diet. Fish and shellfish contain high-quality protein and other essential nutrients, are low in saturated fat, and contain omega-3 fatty acids. A well-balanced diet that includes a variety of fish and shellfish can contribute to heart health and children's proper growth and development. So, women and young children in particular should include fish or shellfish in their diets due to the many nutritional benefits.

However, nearly all fish and shellfish contain trace amounts of mercury. For most people, the risk from mercury, by eating fish and shellfish, is not a health concern. Yet, some fish and shellfish contain higher levels of mercury that may harm an unborn baby or a young child's developing nervous system. The risks from mercury in fish and shellfish depend on the amount of fish and shellfish eaten and the levels of mercury in the fish and shellfish. Therefore, the Food and Drug Administration (FDA) and the Environmental Protection Agency (EPA) are advising women who may become pregnant, pregnant women, nursing mothers, and young children to avoid some types of fish and eat fish and shellfish that are lower in mercury.

By following these three recommendations for selecting and eating fish or shellfish, women and young children will receive the benefits of eating fish and shellfish while reducing their exposure to the harmful effects of mercury:

1. Do not eat shark, swordfish, king mackerel, or tilefish because they contain high levels of mercury.

2. Eat up to 12 ounces (two average meals, smaller portions for young children) a week of a variety of fish and shellfish that are lower in mercury.
   a. Five of the most commonly eaten fish that are low in mercury are shrimp, canned light tuna, salmon, pollock, and catfish.
   b. Another commonly eaten fish, albacore ("white") tuna has more mercury than canned light tuna. So, when choosing your two meals of fish and shellfish, you may eat up to six ounces (one average meal) of albacore tuna per week.
3. Check local advisories about the safety of fish caught by family and friends in your local lakes, rivers, and coastal areas. If no advice is available, eat up to six ounces (one average meal) per week of fish you catch from local waters, but do not consume any other fish during that week.

Follow these same recommendations when feeding fish and shellfish to your young child, but serve smaller portions.

See the Environmental Health Investigations Branch website at http://www.ehib.org/cma/topic.jsp?topic_key=8 for more information about recommended serving sizes.

For further information about the safety of locally caught fish and shellfish, visit the California Office of Environmental Health Hazard Assessment (OEHHA) website at: http://www.oehha.ca.gov/fish.html.

Physical Activity

Active play is important for young children and their families. When families are active, children learn to make physical activity a regular part of their lives.

Recommendations from the Dietary Guidelines for Americans:[12]
- Engage in regular physical activity; reduce sedentary activities.
- Children and adolescents should get at least 60 minutes of activity on most, preferably all, days.

Recommendations from the National Association for Sports and Physical Education:[22]
- Toddlers should accumulate at least 30 minutes daily of structured physical activity; preschoolers at least 60 minutes.

- Toddlers and preschoolers should engage in at least 60 minutes and up to several hours per day of unstructured physical activity and should not be sedentary for more than 60 minutes at a time except when sleeping.
- Parent involvement plays a major role in helping children develop motor skills and enjoy physical activity.

Recommendations from Bright Futures in Practice: Physical Activity:[23]
- Children need at least 60 minutes of moderate physical activity per day (tag, bike, walk, run, jump rope, etc.).
- Adults should set an example for children. They should be encouraged to join children in physical activity, and encourage them to be active.
- Decrease TV and computer time.
- Organized sports are inappropriate for children under age six, because they lack the motor skills, and the mental and emotional capabilities, to participate in organized sports.

According to the American Academy of Pediatrics, children under age two should not watch television; children age two and up should watch no more than one to two hours per day.[5]

Socioeconomic barriers to physical activity need to be addressed. Unsafe neighborhoods; lack of access to parks and other recreational facilities and programs; unavailability of quality, affordable childcare for young children; shortage of time especially in low-income households; and lack of understanding of the importance of movement for child development and health are all barriers to adequate physical activity for young children.

Barriers to Implementation/Myths

Food Insecurity

Food insecurity is the limited or uncertain availability of nutritionally adequate and safe foods, or limited or uncertain ability to acquire acceptable foods in socially acceptable ways.

In 2004, 38.2 million people in the United States lived in food-insecure households, including 13.9 million children.[24] Of these individuals, 7.4 million adults and 3.3 million children lived in households where someone experienced hunger during the year. However, even in households with hunger, most of the children were not hungry. In most households, children (especially younger children) are usually protected from hunger unless hunger among adults in the household becomes quite severe. The number of children living in households classified as “food insecure with hunger among children” was 545,000 (0.7 percent of children in the nation). The prevalence of food insecurity varied considerably among household types. Some groups had rates of food insecurity

much higher than the national average (which was 11.9 percent of United States households in 2004):

- Households with incomes below the official poverty line for a family of four in 2004 – 36.8 percent food-insecure.
- Households with children headed by a single woman – 33 percent food-insecure.
- Black households – 23.7 percent food-insecure.
- Hispanic households – 21.7 percent food-insecure.

In California, more than 2.9 million low-income adults live with hunger or make daily decisions about whether to eat or to pay for other essential needs.[25] Among low-income adults in households with children, 38 percent are insecure about their next meal, and hunger affects 11 percent. Rates are higher in single-parent households with children.[26]

Before reducing the quantity of food eaten, food-insecure households reduce food spending by changing the quality or variety of food consumed.[27] As a result, while families may get enough food to avoid feeling hungry, they may not get the nutrients needed to be properly nourished.

Overweight can also be an adaptive response to periods when people are unable to get enough to eat. Research indicates that chronic ups and downs in food availability can cause individuals to eat more when food is available than they normally would. Over time, this cycle can result in weight gain.[27]

Generally, children with overweight mothers and low family income also tend to be overweight compared with higher-income households that are secure about food.[28] However, when parents were asked to report on whether their child was overweight, food insecurity by itself did not seem to play a role.[27] Other studies, too, have been unable to show a clear relationship between childhood overweight and food insecurity.[29, 30]

Federal poverty guidelines are established by the Office of Management and Budget, and are updated annually by the Department of Health and Human Services (DHHS). These guidelines are used in setting eligibility criteria for a number of federal programs. The Food Action and Research Center (FRAC) reports that in 2004 nearly 19 percent of California's children were living in poverty compared to the national average of 18.4 percent.[31]

Federal, state, and community nutrition programs do more than reduce hunger and boost nutrition, as important as those effects are. They produce a range of other crucial economic, educational, and health outcomes. By picking up most food costs, they play a critical role in helping families pay for rent, child care, health care, energy, and other essentials. They strengthen community-based service providers. They increase access to a range of supportive services, including child care, and help improve the quality of care.[31]

Resources/Web Sites

U.S. Department of Agriculture (USDA) Programs:

Child and Adult Care Food Program (CACFP) provides nutritious meals and snacks to children in child care programs. Established meal pattern requirements and regulations ensure that the foods served through CACFP meet children's daily energy and nutrient needs. Research shows that children who receive CACFP meals and snacks have higher dietary nutrient levels, and consume more servings of milk and vegetables, and fewer servings of fats and sweets, than children in child care programs that do not participate in the program. The California Department of Education (CDE) administers this program. For more information, contact: 1-800-952-5609 or www.cde.ca.gov/ls/nu.

Commodity Supplemental Food Program (CSFP) provides nutritious food supplements for low-income pregnant, postpartum, and breast feeding women, their infants and children up to age six, and the elderly. The foods are chosen to help prevent infant mortality and low birth weight and to support normal child development. CSFP is currently operated in California by the San Diego Food Bank, San Francisco Food Bank, Community Action Partnership of Orange County, Redwood Empire Food Bank, Los Angeles Regional Food Bank, and The Modesto Love Center. CDE administers this program. For more information, contact: 1-800-952-5609 or www.cde.ca.gov/ls/nu.

Food Stamp Program provides low-income families with electronic benefits they can use like cash at most grocery stores to obtain a more adequate diet. The program increases food security and enhances household nutrition. Many recipients run out of food stamps and money to buy food before the end of each month. Studies show that this shortfall leads to food shortages at some point each month. These families face cycles of food availability and restriction, or forego a balanced diet and depend on a few inexpensive staples to meet their families' nutrition needs on a monthly basis. The California Department of Social Services administers this program. For more information, contact: www.dss.cahwnet.gov/foodstamps/.

National School Lunch and Breakfast Programs are federally assisted meal programs operating in public and nonprofit private schools and residential child care institutions (RCCI). Children who participate in these programs, compared with children who participate in neither program, consume more than twice as many servings of milk and of fruits and vegetables combined; and one-quarter the number of servings of soda and fruit-flavored drinks. The school lunch and breakfast programs are required to serve meals that are in compliance with the U.S. Dietary Guidelines for fat and saturated fat. CDE administers this program. For more information, contact: 1-800-952-5609 or www.cde.ca.gov/ls/nu.

Summer Food Service Program ensures that children in lower-income areas receive nutritious meals during long school vacations, when they do not have access to school lunch or breakfast. Eligible sponsors of the program receive supplemental reimbursement for serving healthful meals to children less than eighteen years of age. CDE administers this program. For more information, contact: 1-800-952-5609 or www.cde.ca.gov/ls/nu.

WIC – The Special Supplemental Nutrition Program for Women, Infants, and Children serves low-income pregnant, postpartum, and breastfeeding women, infants, and children up to age five who are at nutritional risk by providing checks for nutritious foods to supplement their diets, nutrition education, and referrals to health care. WIC has been shown to improve the dietary intake of pregnant and post-partum women and young children. The WIC program raises birth weights and reduces infant mortality and early childhood obesity.[31] The California Department of Health Services, WIC Branch, administers this program. For more information, contact: 1-888-WIC-WORKS (1-888-942-9675) or www.wicworks.ca.gov.

Department of Health and Human Services (DHHS) Programs:

Head Start and Early Head Start are comprehensive child development programs that serve children from birth to age five, pregnant women, and their families. They are child-focused programs and have the overall goal of increasing school readiness of young children in low-income families. Wellness is recognized as a significant contributor to each child's ability to thrive and develop. Accordingly, health screenings evaluate the child's overall health status, and regular health check-ups and good practices in oral health, hygiene, nutrition, personal care, and safety are incorporated into the program. California Head Start agencies participate in CACFP to ensure that children receive nutritious meals and snacks while in child care. For more information, contact: 1-916-444-7760 or http://caheadstart.org/index.html.

Other Programs:

The California Association of Food Banks (CAFB) was founded in 1995 to promote collaboration in response to emerging social, economic, and legislative challenges impacting hungry people throughout California. The mission of CAFB is to provide a unified voice among food banks to maximize their ability to ensure that the people of California are well-nourished. The major focus of food banks is not to provide food directly to low-income individuals and families. Instead, food banks provide food to other community-based agencies that, in turn, provide food to low-income families. However, the term *food bank* is often used for agencies that primarily provide food directly to individuals. Many of these agencies may have very limited warehouse space, and may focus on a smaller service area. For more information, contact: 1-916-321-4435 or http://www.cafoodbanks.org.

Expanded Food and Nutrition Education Program (EFNEP) provides nutrition education for low-income families with young children. The program has been proven effective in improving food intake and food safety practices of families. Classes include information on parenting practices, meal planning and food shopping, food selection and preparation, food safety, and physical activity. The program is administered by the University of California at the county level. For more information, see http://efnep.ucdavis.edu/.

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California Food Guide

Life Cycle: 4 to 8 Year Olds

By Cindy Schneider M.P.A., R.D.

What's New?

- Childhood overweight is at epidemic levels in California and the United States with the percentage of overweight children having tripled since 1968.
- Studies confirm the link between good nutrition and children's cognitive development and performance in school.
- Dietary guidelines, referred to as Dietary Reference Intakes (DRIs), have been established for the 4-8 year old age group.

Public Health Implications

Current research results indicate three major areas of concern for children:

- Increased incidence of at risk for overweight and overweight.*
- Increased risk and occurrence of type 2 diabetes.
- Decrease in physical activity.

Definition

Healthy People 2010 outlines a national strategy for improving the health of Americans during the decade of 2001 to 2010. It is recommended that children eat a wide variety of foods; with an emphasis on fruits, vegetables, and whole grains; and consume enough calories to support growth and development so that they reach and maintain suggested body weight. The adoption of a low-fat diet (of not more than 30 percent of total calories from fat) is encouraged in the prevention of chronic disease.

* CDC recommends using the terms "at risk for overweight" (body mass index [BMI] $\geq$ 85th percentile and < 95th percentile, using CDC 2000 Growth Charts) and "overweight" (BMI $\geq$ 95th percentile) for pediatric overweight.

Four- to eight-year-olds are a “teachable” group and at a developmental age when food habits are still being formed and peer pressure is minimal. Television advertising can counteract nutrition education efforts so it is recommended to minimize exposure and promote physical activity in addition to healthy eating.

The most recent DRIs have an age category for 4-8 year olds. However, other reports and studies group children into different age categories, e.g., 2-5 year olds and 6-11 year olds. Because of this, some of the data from various studies overlap into more than one DRI age group.

Food Pattern and Nutrient Intakes

National studies indicate that most children in the 4-8 year old group are not meeting the Dietary Guidelines for Americans. Although intakes of fat and saturated fat are declining, overall diet quality showed little or no improvement between 1994 and 1996.

The United States Department of Agriculture (USDA) 1989-91 Continuing Surveys of Food Intakes by Individuals (CSFII) examined food patterns of 3,307 youth in relation to the USDA Food Guide Pyramid recommendations. The mean number of servings per day was below recommended levels for all food groups, except dairy. Percentages of youth meeting recommendations for fruit, grain, meat, and dairy averaged 30 percent. The percentage of those meeting the recommendation for vegetables was 36 percent. Sixteen percent of youth did not meet any recommendations. None of the 2-5 year olds and less than one percent of the 6-11 year olds met the recommendations for all five Food Guide Pyramid groups.[1]

The 1994 CSFII found that more children were meeting the dietary guidelines for fat and saturated fat than in 1989.[2] In particular, only two percent of the low-income children (low income is defined as households with a gross income greater than 130 percent of the federally established poverty threshold) drank low-fat milk, compared to 57 percent of the children in the highest income group (high income defined as above 350 percent of the federally established poverty threshold).[3] Furthermore, the average fat intake as a percentage of energy intake was 35 percent and did not vary among age, sex, racial/ethnic, or income groups.[4] Results also found that relatively more calories and nutrients in the child's diet were coming from snacks in 1994 compared to 1989.

In the 2001 California Health Interview Survey (CHIS), parents of 12,592 children ages 2-11 reported the number of servings of fruits and vegetables consumed in a 24-hour period. No differences were found between males and females ages 2-4; but as children got older (ages 5-11) fewer servings of fruits and vegetables were consumed. Less than half (47.2 percent) met the five a day recommendations of greater to or equal to five servings a day, including fried potatoes.[4] A higher proportion of children from households with incomes below 200 percent of the federal poverty level consumed five or more servings than do children in the income groups above 300 percent of the poverty level.[4]

The recommended number of grams of dietary fiber per day for children over the age of two is the age of the child plus five. This is often referred to as the *age + 5* rule. The 2001 CHIS found that only 45 percent of 4-6 year olds consumed adequate dietary fiber to meet the *age + 5* rule. Those who met this guideline did so by consuming significantly more breads and cereals, fruits and vegetables, legumes, nuts, and seeds. Those who met the *age + 5* rule had significantly higher adjusted intakes of dietary fiber, vitamins A and E, folic acid, magnesium, and iron.[5] Children with low dietary fiber intakes had significantly higher energy-adjusted intakes of fat and cholesterol.[5]

According to the Healthy Eating Index (HEI) in 1998, 83 percent of the 4-6 year olds and 88 percent of the 7-9 year olds had diets classified as "needs improvement" or "poor." HEI, which examines the diet quality of Americans, found that much of the decline in diet quality occurs between the age groups 2-3 and 4-6. Moreover, the overall HEI scores have not changed significantly from 1989 to 1998.[6]

Table 1: Percent of Children Not Meeting the Dietary Guidelines in the United States, 1989-2001[1-6]

Food Inadequacies	1989-91 (CSFII)*	1989-98 (HEI)	1994 (CSFII)	2001 (CHIS)*
Vegetable servings	64%			43-57%
Fruit servings	70%			43-57%
Grain servings	70%			
Milk, lowfat			43-98%	
Meat servings	70%			
Fiber servings				55%
No Food Pyramid recommendations met	100% (2-5 yr.) 16% (youth)			
Needs improvement or poor diet		83-88%		
Calories from snacks			Increased	

* Percentages are approximations only.
Sources: See reference citations as listed in the table title above.

Ethnic Differences

Research indicates that there are disparities by sex and between racial and ethnic groups in the prevalence of at-risk for overweight and overweight.[7] In the 1999-2000 National Health and Nutrition Examination Survey (NHANES), the percent of Mexican-American children ages 6-11 were more likely to be overweight (24 percent) than non-Hispanic black children (20 percent) and non-Hispanic white children (12 percent).[8] As a result of at-risk for overweight and overweight, type 2 diabetes is on the rise in American children, especially African Americans, Latinos, and Native Americans.[9]

In the 2001 CHIS, Asian children consumed the least number of fruit and vegetable servings compared to other racial and ethnic groups. Latino children were found to be more likely than white children (51.7 percent vs. 45.8 percent) to eat five or more servings.

In San Diego, the Study of Children's Activity and Nutrition (SCAN) examined dietary differences among 351 Anglo- and Mexican-American preschoolers (mean age 4.4 years).[10] In both groups, nutrients most likely to be inadequate were iron, zinc, vitamin D, vitamin C, and niacin. However, the Mexican-American children tended to consume a more nutrient-dense diet than the Anglo children. Compared to Anglos, the Mexican-American children consumed more corn tortillas, beef, chicken, turkey, hot dogs, and less milk, bread, and fruit. Although food choices may vary across ethnic groups, other California data indicate that vegetable and, to some extent, meat intake is low among 2-5 year-olds regardless of socioeconomic or ethnic background.[11-12]

Incidence and Prevalence

There has been a significant increase in the number of children who are overweight in the United States over the last 40 years. Results from the 1999-2000 NHANES indicate that an estimated 15 percent of children and adolescents 6-11 years of age are now overweight while in the 1960s there were four percent.[10] Children are considered overweight if their body mass index (BMI) is at or above the 95th percentile for their age and gender.

Similarly, prevalence of overweight has increased among low-income preschoolers, tracked through the Pediatric Nutrition Surveillance System (boys: from 6.6 percent in 1983 to 8.3 percent in 1995 and girls: from 7.2 percent in 1983 to 9.0 percent in 1995). Across a number of studies, the prevalence of overweight is relatively high in African-American, Hispanic, and Native-American children and may be related to the effects of poverty on early development.[13] The trends toward increased childhood overweight are of concern, as obesity persists into adulthood in approximately 50 percent of the overweight children and adolescents.[14]

Both at-risk of overweight and overweight in children have been increasing while fitness has been decreasing. Of children aged 5-10 who are overweight, 61 percent have one

or more cardiovascular disease risk factors, and 27 percent have two or more. With the increase in at-risk of overweight and overweight among children, type 2 diabetes, previously referred to as "adult-onset" diabetes, has also risen in numbers among children and adolescents.[14]

In conclusion, the percent of children who are overweight continues to increase. This is of concern because it has been found that children who are overweight often grow up to be overweight and obese adults and, as a result, are at greater risk of chronic disease such as heart disease, diabetes, and cancer.[10]

Trends/Contributing Factors

There is a growing trend to increase the use of dietary supplements by children as well as the general population. Parents and caretakers need to be informed that children need a variety of nutritious foods that cannot be replaced by supplements.

The nutrient density of children's diets has decreased as energy intakes have increased. Much of the decrease in the nutrient density appears to be attributable to beverage choices. While the consumption of milk and milk products has decreased, the increase of beverages low in nutrients has increased.[6] Children have also reduced their fat intake since 1977, but they still consume too much fat and saturated fat.[15]

Children are snacking more frequently and many of the snacks are being obtained away from home. In 1977-78, children ate 1.1 snacks per day, compared with 1.8 snacks in 1994-96.[15]

Overweight children and adolescents have a 70 percent chance of becoming overweight or obese adults.[16] This increases to 80 percent if one or more parent is overweight or obese. Both children and adults who are overweight and obese are at risk for health problems including heart disease, type 2 diabetes, high blood pressure, and some forms of cancer. Because of societal pressures, poor self-esteem, and depression sometimes accompany overweight and obesity.

Overweight in children is caused by many factors. Environmental factors and healthy lifestyles such as lack of physical activity and unhealthy eating patterns allow for the genetic expression of overweight. Most overweight children who are still growing should not need to lose weight, but can maintain their weight or reduce their rate of weight gain by limiting food portions and increasing activity levels so they can "grow into" their weight. Calorie restriction of any kind can result in stunting of growth in height and should be carefully supervised by a physician. Weight loss, if initiated and supervised by a physician, should be gradual. A healthy lifestyle to promote weight control should be considered a life-long endeavor.[17]

The proportion of energy consumed away from home continues to increase among children and adolescents. The CSFII data suggest that almost one-third of total energy

intake is consumed outside of home. Foods consumed away from home tend to be lower in fiber and calcium, and higher in total and saturated fat.[15] Fast food consumption is extremely prevalent in American society, and a steady diet of burgers, fries, and soda may significantly increase the calories, fat, and sugar intake of children. CSFII data indicates that children who ate fast food, compared with those who did not, consumed more total energy, more energy per gram of food, more total fat, more total carbohydrate, more added sugars, more sugar-sweetened beverages, less fiber, less milk, and fewer fruits and non-starchy vegetables.[18]

Common Concerns/Strategies

Nutrition and Learning

Nutrition plays a powerful role in the physical, emotional, and intellectual development of children and their ability to learn. Research supports this by providing compelling evidence on how inadequate nutrition and hunger influences children's behavior, their school performance, and their overall cognitive development.[19] Additionally, students who eat breakfast at school have lower rates of absenteeism and tardiness and are less likely to have behavior problems.[20] Another study by the University of California at Davis shows that school breakfast participation is linked to higher test scores, particularly among poor children.[21]

As children begin school, they can participate in the National School Lunch Program (NSLP) and School Breakfast Program (SBP). NSLP provides one-third of the Recommended Dietary Allowance (RDA) for age while SBP provides one-fourth of the RDA over the school week. Meals must meet nutrition standards established by USDA as well as the Dietary Guidelines for Americans.

Physical Activity

Changes in the eating habits and physical activity of children appear to be major factors in the rising rates of at risk for overweight and overweight. The Surgeon General's report Call to Action to Prevent and Decrease Overweight and Obesity outlined the need for a comprehensive nutrition education and physical activity program to assist in preventing continued increase in childhood overweight and to promote health.[17] The American Academy of Pediatrics suggests including daily physical activity and limiting the amount of television per day to one to two hours.

Physical activity can help combat the increase in overweight; however, it is important to monitor the eating habits of young athletes. A balanced diet is essential with adequate calories and fluids to support energy and optimize performance. It is recommended that children drink plenty of water before and during exercise. Water is the preferred beverage. Sodas and other high sugar beverages are not suggested because they can cause cramping, nausea, and diarrhea as well as provide many empty calories.

Eating Disorders

Eating disorders can be of concern, especially as children head into adolescence. Even girls as young as first grade have expressed interest in wanting to be thinner and are sometimes dieting or otherwise trying to lose weight by skipping meals.[22] Girls seem to be particularly at risk for developing a poor body image. They see society's obsession with thinness and then starve themselves (anorexia nervosa) or binge and purge (bulimia).

Although eating disorders are generally not a problem until after puberty begins, parents should be aware of danger signs a child may exhibit. Preoccupation by adults or the child with weight and size, a drastic reduction in food intake, or a lack of weight gain despite a large appetite can mean a child may have an eating disorder. Eating disorders can lead to serious health problems and even death; however, counseling can successfully guide these children through this precarious time.

Dietary Supplements

Only limited scientific data is available on the use of vitamin requirements and supplements in children because of ethical, cost, and time concerns. Additionally, it is believed by some that meeting recommended intakes for nutrients would not necessarily provide enough for individuals already malnourished, nor is it believed that they would be adequate for some diseases marked by increased nutritional requirements. Supplemental vitamins can be expensive and unnecessary for healthy children older than one year who consume a varied diet.[23]

Opportunities for Improvement

1) Most children do not meet the dietary recommendations and those who do tend to consume too much fat and sugar. Meanwhile, there is a growing trend for children to eat more meals away from home and to consume more of their calories from snacks. Parents need to be encouraged to provide lower fat and sugar choices with emphasis on variety and portion control.
2) Parents and caregivers should model healthy patterns of eating and exercise. Necessary assistance should be provided to help them adopt a healthy lifestyle that includes more physical activity and regular meals for good health and development.
3) Children should receive education about the importance of good nutrition.
4) Parents, caretakers, and health care providers need help in understanding and addressing the impact of environmental, psychological, and social factors on childhood at risk for overweight and overweight.

Listed below are the Dietary Guidelines for Americans 2005 (Dietary Guidelines) specific for ages 4-8 years old. These Dietary Guidelines provide science-based recommendations to promote health and reduce the risk of chronic disease through diet and physical activity.[24]

Table 2: Daily Recommendations[24]

Calories	Gender	Sedentary	Moderately Active	Active
	Girls	1,200	1,400-1,600	1,400-1,800
	Boys	1,400	1,400-1,600	1,600-2,000
Grains/Breads* (1 ounce = 1 serving)	Girls	4	5	5-6
	Boys	5	5	5-6
Fruits (1/2 cup = 1 serving)	Girls	2	3	3
	Boys	3	3	3-4
Vegetables** (1/2 cup = 1 serving)	Girls	3	3-4	3-5
	Boys	3	3-4	3-5
Milk/Milk Products***	Girls	2	2-3	2-3
	Boys	2	2-3	3
Meat (lean)/Meat Alternates (beans)	Girls	3 ounces	4-5 ounces	4-5 ounces
	Boys	4 ounces	4-5 ounces	5-5.5 ounces
Discretionary calorie allowance****	Girls	171	171-132	171-195
	Boys	171	171-132	132-267
Fiber	Child's age + 5 rule equals the number of grams of fiber			
Oils/Fats*****	It is recommend that children, two years old and up, gradually begin to adopt a lower fat diet so that by age five their diets contain no more than 25-35% of calories as fat. While some have argued that lower-fat diets in early childhood may be necessary to prevent obesity and chronic disease later in life, others are concerned that lower-fat diets may be too restrictive for young children and result in poor growth and mineral deficiencies.			
Physical Activity	Engage in at least 60 minutes on most days of the week.			

Source: See reference citation listed by Table 2 title.

*Low-fat and low-sugar forms were used. Discretionary calories are to be used if products higher in fat and sugar are consumed. At least half the grains should be whole grains.

**Only vegetables with no added fats or sugars were used. Discretionary calories are to be used if products higher in fat and sugar are consumed. A variety of dark green vegetables, orange vegetables, legumes, starchy vegetables, and other vegetables should be consumed over a week's time.

***Most milk, yogurt, and cheese products consumed should be fat-free or low-fat. Calcium-fortified soy beverages are an option for those who want a non-dairy calcium source.

****The discretionary calorie allowance is the remaining amount of calories in each calorie level after nutrient-dense forms of foods in each food group are selected. For individuals needing to lose weight, discretionary calories may be disregarded.

*****Emphasis should be placed on polyunsaturated and monounsaturated fatty acids, such as fish, nuts, and vegetable oils, while limiting saturated and trans fats to less than ten percent of total calories. Other examples of unsaturated and polyunsaturated fats include oils and soft margarines without trans fats. Examples of saturated and trans fats include those solid at room temperature. Trans fats are fats added to foods during processing, cooking, or at the table.

Additional information and a more in-depth discussion on the Dietary Guidelines and subsequent dietary recommendations are available and can be downloaded at: http://www.health.gov/dietaryguidelines/dga2005/document/.

Resources/Web Sites

- American Dietetic Association (ADA) – Information on locating a nutrition professional, nutrition tips, and a monthly feature on a variety of nutrition-related topics. www.eatright.org/Public

- Feeding Kids Newsletter by Connie Evers, MS, RD – Promotes nutritional health and provides nutrition information and related activities to assist in teaching children and adolescents. www.nutritionforkids.com

- Healthy Schools, Healthy People School Network for Absenteeism Prevention (SNAP) – Food safety information for school-age children with emphasis on hand hygiene. http://www.itsasnap.org/index.asp

- MyPyramid - 2005 IOM Report on Preventing Childhood Obesity http://www.iom.edu/project.asp?id=25044

- Centers for Disease Control and Prevention (CDC) – Information provided on a variety of health-related topics, e.g., nutrition, physical activity, food safety, etc., and on coordinated school health programs.
  www.cdc.gov/
  www.cdc.gov/HealthyYouth
  www.cdc.gov/nccdphp/dnpa/physical/recommendations/young.htm

- United States Department of Agriculture (USDA) Child Nutrition Programs – Information on the USDA Child Nutrition Programs including the National School Lunch and School Breakfast Programs, Child and Adult Care Food Program, Summer Food Service Program, and After School Snack Program. http://schoolmeals.nal.usda.gov/

- United States Food and Drug Administration (FDA) – Information on dietary supplements, foodborne illness, mad cow disease, West Nile virus, product recalls, in addition to several other food and drug-related topics. www.fda.gov/

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California Food Guide

Life Cycle: 9-18 Year Olds

by Alyssa Ghirardelli, M.P.H., R.D.

What's New

Nationally, estimated rates for overweight (BMI ≥ 95th percentile) in 2004-2005 for youth ages 6-11 are nearly five times what they were in 1966 (from four percent to 19 percent).[1] Estimates of teen rates for overweight show rates for adolescents ages 12-19 more than tripling (five to 17 percent).[1]

In California, self-reported rates of overweight vary with adolescents aged 12-17 reporting overweight (BMI ≥ 95th percentile) at 12 percent on the 2003 California Health Interview Survey (CHIS) and 9 percent on the 2002 California Teen Eating, Exercise and Nutrition Survey (CalTEENS). Measurements of low income youth from the Pediatric Nutrition Surveillance System (PedNSS) in California from 2004 report 26 percent of 9-11 year olds as overweight (BMI ≥ 95th percentile), 24 percent of 12-14 year olds, and 20 percent of 15-19 year olds.

California Department of Education gears up to implement and monitor stricter standards for foods sold in schools (e.g. a la carte, foods sold outside the cafeteria) other than the National School Lunch and Breakfast Programs.

The Institute of Medicine releases the landmark report “Food Marketing to Children and Youth: Threat or Opportunity?” in December of 2005 which documents the imbalance in the marketing of unhealthy products to youth and issues a call to action for integrated efforts with industry to modify marketing practices that influence the diets and health of youth.

Public Health Implications

Selected Healthy People 2010 Objectives Include:

- Reduce the proportion of children and adolescents (youth ages 6-19 years) who are overweight or obese.
  Target: 5 percent, Baseline from 1988-1994: 11 percent
- Increase the proportion of persons aged 2 years and older who consume at least three daily servings of vegetables, with at least one-third being dark green or orange vegetables.
  Target: 50 percent, Baseline: 3 percent
- Increase the proportion of persons aged 2 years and older who consume at least two daily servings of fruit.
  Target: 75 percent, Baseline: 28 percent
- Increase the proportion of children and adolescents aged 6 to 19 years whose intake of meals and snacks at school contributes to good overall dietary quality.

Definition/Background

Adolescence is one of the most dynamic stages of human development characterized by dramatic physical, cognitive, social, and emotional changes. These changes make nutrition particularly important during this period of life. Increasing autonomy, need for peer acceptance, concern with appearance, and changes in lifestyles influence eating behaviors. Adolescents begin to spend more time away from home and are increasingly faced with making dietary choices. As teen attitudes are shaped, dietary habits are formed which can impact life-long behaviors. For many reasons, teens tend to consume an overabundance of fast foods which are typically high calorie and lacking in nutrient content. Additionally, the school environment often offers fast food and other foods of poor nutritional quality, sometimes along with unhealthy food marketing which influence student choices.

Adequate caloric and nutrient intake are critical to adolescent growth peaks and sexual maturation. Adolescents often skip meals and snack frequently on junk foods which can compromise nutrition status and impact school performance.[2] Other nutrition-related concerns include low intakes of fruits, vegetables, and calcium-rich foods; high soft drink consumption; unsafe weight loss methods; low iron intake; eating disorders; and low levels of physical activity. Additionally, poor nutrition or inappropriate dietary habits may increase the risk of chronic disease for adolescents.[3] Of greatest concern is the increasing rate of obesity and obesity-related health risks, such as diabetes and cardiovascular disease.[1, 4]

Physical Changes

The dramatic changes in physical growth and development over a short period of time increases the demand for energy, protein, and many vitamins and minerals. As individuals grow at independent rates, their needs can vary widely based on their stage of growth and their activity level. Physical changes during adolescence include increases in height and weight, completion of skeletal growth with an increase in skeletal mass, changes in body composition, and sexual maturation. However, variation among individuals exists for age of onset, duration, and tempo of these events. Linear growth spurts generally coincide with onset of puberty and therefore the stage of sexual maturation should be used when available in assessment of individual nutritional needs instead of chronological age.[2] Ethnic and racial differences for onset of puberty appear to be present for females with African American girls entering puberty earlier.[5] Differences among individuals in timing and duration of changes in growth should be considered for assessment and nutrition education approaches.

Changes in Height

Approximately 15 to 25 percent of final adult height is attained during the pubertal growth spurt.[6] In girls the linear growth spurt begins between ages 9.5 and 14.5 years of age, with the peak velocity occurring 6 to 12 months prior to menarche. Peak velocity of linear growth for boys occurs much later, on average at 14.4 years of age with four to 12 inch increases in height during puberty.[6, 7]

Close to half of maximum adult bone mass is accumulated during adolescence with more than one-third of adult bone mass accruing during and immediately following puberty, and more than 90 percent of adult skeletal mass accrued by 18 years of age.[8, 9, 10] Several factors contribute to the accrual of bone mass, such as hormonal fluctuations, weight bearing exercise, cigarette smoking, alcohol consumption, and intakes for vitamins and minerals including vitamin D, calcium, phosphorous, boron, and iron.[2]

Changes in Body Weight and Composition

During adolescence, approximately half of adult ideal body weight is gained.[2] Peak weight gain occurs after the linear growth spurt by approximately three months for boys and 3 to 6 months for girls.[2] Weight gain for girls during puberty ranges from 15 to 55 lb (7 to25 kg), with a mean gain of 38.5 lb (17.5 kg).[6, 7] Boys gain between 15 to 65 lb (7 to 30 kg) with a mean gain of 52.2 lb (23.7 kg).[6, 7] By the end of adolescence, body fat levels for boys end up at around 12 percent, however body fat levels for girls range from 16 to 27 percent, approximately a 120 percent increase in body fat for girls.[11] The dramatic increase in body fat for girls is normal, but can lead to nutrition compromising behaviors such as caloric restriction, dieting, eating disorders or the use of diet pills or laxatives that can result from body image distortions.

California Demographics

Youth ages 9-18 are generally separated into different groups as their changes in growth and nutritional need can vary greatly. Youth ages 9-11 usually are defined as "tweens" and youth ages 12-17 are known as "teens." California is home to over 4 million youth ages 9-17, the majority being of Hispanic or Latino origin.[12] Over 40 percent of California youth aged 9-17 are of Hispanic or Latino origin, 37 percent are white only, ten percent are of Asian origin, and 7 percent are African American.[12] The ethnic diversity of youth impacts social and societal approaches to nutrition education for this unique group.

Burden

In 2001 the Surgeon General's report stated that overweight children are at greater risk for other health problems including type 2 diabetes, high blood pressure, high blood lipids, asthma, sleep apnea, chronic hypoxemia (not enough oxygen in the blood), early maturation, and orthopedic problems.[13] Strong correlations exist between childhood and adult overweight, with adult obesity associated with several chronic diseases such as, diabetes, heart disease, hypertension and some cancers.[14] It is of great concern that several chronic diseases which have been considered "adult onset" are now appearing at younger ages, including type 2 diabetes, elevated blood pressure, and hyperlipidemia.[14] Additionally, youth that become overweight often suffer psychosocial problems, such as low-self esteem, poor body image, and symptoms of depression.[15] Poor self-image among girls who are identified as obese can extend into adulthood, resulting in fewer years of education completed, lower family incomes, and higher rates of poverty, regardless of their early socioeconomic history.[16] Overweight has risen

more dramatically nationally and in California for low income youth and for those among certain ethnic groups.[17, 18, 19]

Incidence/Prevalence

The California Teen Eating, Exercise and Nutrition Survey (CalTEENS) obtains a modified food recall, questions related dietary behaviors, and physical activity from 1,200 adolescents aged 12-17 through a random digit dial telephone survey. Reported findings covered in this section from CalTEENS provide bi-annual survey data that can be looked at comparatively, but trend analysis to examine significant differences have not yet been conducted. Other survey data sources cited include the California Health Interview Survey (CHIS) that conducts random digit dial telephone surveys with anywhere from 4,000 to over 5,000 adolescents aged 12-17, gathering some focused dietary recall and physical activity reporting. CHIS data for youth aged 9-11 is collected from parents and samples range from 8,000 to over 12,000. Caution should be exercised when interpreting CHIS BMI data for youth, as parental reporting may not be accurate. Additionally, a recent literature review conducted by CDC found that self-reporting of weight and height from adolescents is often under-reported, especially for girls and those already overweight.[20] Height is also often over-reported.[20] As CHIS and CalTEENS collect self-reported weight and height, they should be interpreted with some caution.

The Pediatric Nutrition Surveillance System (PedNSS) offers data from Child Health and Disability Prevention (CHDP) Program well-child physical exams for low-income high-risk children and teens participating in publicly funded health programs. BMI data are highly accurate with samples for youth ages 9-19 of over 250,000. PedNSS collects data nationally, but also has state specific data.

The California Department of Education (CDE) physical fitness test (FITNESSGRAM) additionally collects actual weight and height measurements, but calculates them as "in the healthy fitness zone" defined by Cooper Institute standards using usually BMI, but in some cases skin fold measurements. CDE FITNESSGRAM sample sizes are approximately 450,000 for each grade level with testing in grades five, seven, and nine, however no dietary data or usual physical activity measures are collected. National data reporting provided as a comparison is through the *CDC's* Youth Behavior Risk Surveillance System (YRBSS), a survey conducted in the school setting collecting nutrition and physical activity behaviors with self-reported weight and height and through the U.S. National Health and Nutrition Examination Surveys (NHANES) through the National Center for Health Statistics which gathers actual height and weight measurements and conducts in person dietary data collection.

Weight Status

Nationally, 2002 data from NHANES for the prevalence of overweight among youth aged 6-11 is four times higher than in 1966 and overweight among adolescents more than tripled as seen in Table 1.[17] NHANES reports the estimated prevalence of

overweight (body mass index (BMI) ≥ 95th percentile) in 2003-2004 for youth aged 6-11 as 19 percent and for teens 12-19 as 17 percent.[1]

Table 1: National Prevalence of Overweight among children and adolescents ages 6-19 years, for selected years 1963-65 through 1999-2002.

Age (years)[1]	NHANES 1963-65 1966-70[2]	NHANES I 1971-74	NHANES II 1976-80	NHANES III 1988-94	NHANES 1999-2002[3]
6-11*	4	4	7	11	16
12-19*	5	6	5	11	17
15-17 (in poverty)**		5	6	17	23[3]
15-17 (not in poverty)**		5	4	8	14[3]

*Adapted from CDC-National Center for Health Statistics, http://www.cdc.gov/nchs/products/pubs/pubd/hestats/overwght99.htm
[1]Excludes pregnant women starting with 1971-74. Pregnant status not available for 1963-65 and 1966-70.
[2]Data for 1963-65 are for children 6-11 years of age; data for 1966-70 are for adolescents 12-17 years of age, not 12-19 years.
**Source: Miech, 2006
[3] NHANES 1999-2002
Note: Some numbers may be rounded to the nearest whole number.

Recent analysis of NHANES data revealed differences nationally in BMI trends among adolescents from families meeting the U.S. Census poverty threshold. As seen in Table 1, there are remarkable differences for teens aged 15 -17 in poverty and overweight (BMI ≥ 95th percentile) compared to those not in poverty.[18] What is additionally noteworthy is how the difference developed over time, with those in poverty and not in poverty at the same rate in 1971-1974, changing to a stark difference of 23 percent for those in poverty compared to 14 percent for those not in poverty in 1999-2002.[18] These differences in poverty rates may also be seen among California teens as disparities are present statewide. Data from the California Health Interview Survey shows a difference, however not significant, in percent of teens aged 15-17 who are overweight and obese and living at less than 200 percent Federal Poverty Level (FPL) at 15 percent and teens above 200 percent FPL at nine percent.[21]

The YBRSS reports overweight (BMI ≥ 95th percentile) in 2005 for teens 9th -12th grade as 13 percent, and those who described themselves as overweight as 31 percent.[22] The 2005 YRBSS showed results of 29 percent of students nationally overweight or at risk for overweight (BMI ≥ 85th percentile).[22]

Table 2 shows that statewide findings for self-reported overweight among youth aged 12-17 as documented by CalTEENS and CHIS are fairly consistent, with CHIS rates slightly higher.[21, 23] In 2002, CalTEENS results showed almost one in four teens (24 percent) were overweight or at-risk for overweight (BMI ≥ 85th Percentile) close to the rate in 2000 of 25 percent, but an increase from 21 percent in 1998.[23] In 2001 and 2003 *CHIS* found that 12 percent of teenagers were overweight (BMI ≥ 95th percentile). CalTEENS found in 2000 and 2002 rates of overweight (BMI ≥ 95th percentile) at 11 and nine percent respectively.[23] Of particular interest, the percent of African Americans who were overweight or at-risk for overweight (BMI ≥ 85th percentile) decreased from 39 percent in 1998 to 29 percent in 2002.[23] However, disparities are still evident between ethnic groups in 2002 with 16 percent of African Americans reporting overweight (BMI ≥ 95th percentile) compared to 9 percent for Latinos, eight percent for Whites, and 6 percent for Asian/Other.[23] Still yet, when combining at risk for overweight with overweight in 2002, Latinos and African Americans have the similar rates (30 percent and 29 percent respectively) compared to Whites with 20 percent and Asians with 13 percent.[23]

Table 2: Prevalence of Overweight among California Adolescents, 12-17 years

	CalTEENS[1], Age 12-17 years						**CHIS[2], Age 12-17 years**	
	At Risk for Overweight (85th Percentile)			Overweight (95th percentile)			Overweight or obese (BMI≥95th percentile)	
	1998	2000	2002	1998	2000	2002	2001	2003
Total	13	14	15	8	11	9	12	12
Gender								
Males	16	14	15	9	12	12	16	16
Females	10	13	14	7	9	5	8	9
Ethnicity								
White	11	10	12	5	7	8	10	9
African American	20	12	13	19	17	16	17	13
Latino	15	19	21	10	15	9	15	18
Asian/Other	13	12	7	6	9	6	8	4*

*Statistically unstable
[1]Body Mass Index (BMI) was calculated using the equation: weight (kg)/height (m^2)
[2]Source: 2001, 2003 California Health Interview Survey. For adolescents, "Overweight or obese" includes the respondents who have a BMI in the highest 95 percentile with respect to their age and gender.

Results from the California Department of Education Physical Fitness Test *(FITNESSGRAM)* are reported for grades five, seven, and nine (approximately ages ten, 12, and 14 respectively). Standards tested include aerobic capacity, body composition, abdominal strength, trunk extension strength, upper body strength, and flexibility. In 2004-2005, 25 percent of California tweens in fifth grade met all six fitness standards and 29 percent of California teens in seventh grade and 27 percent of ninth graders meeting all six standards.[24] One third (33 percent) of California fifth, seventh and ninth graders are not in the healthy fitness zone for body composition.[24] Adolescents of Hispanic/Latino, American Indian/Alaskan Native, Pacific Islander, and African American origin have higher percentages of students not meeting the healthy fitness zone standards with Pacific Islanders in ninth grade reaching 40 percent not meeting standards for body composition, compared to 25 percent for Non-Hispanic Whites and 20 percent for Asians/Asian Americans.[24] Thirty-nine percent of seventh grade boys are not in the healthy fitness zone for body composition compared to 27 percent of seventh grade girls.[24]

Table 3 provides results from the 2004 Pediatric Nutrition Surveillance System (PedNSS) *for California* which indicate that 26 percent of 9-11 year olds are overweight (BMI ≥ 95th percentile) with a combined total of 45 percent overweight or at risk for overweight (BMI ≥ 85th percentile).[25] Twenty-four percent of 12-14 year olds are overweight (BMI ≥ 95th percentile) and 44 percent overweight or at risk (BMI ≥ 85th percentile).[25] Fifteen to nineteen year olds have lower rates comparatively with 20 percent overweight (BMI ≥ 95th percentile) and 39 percent overweight or at risk for overweight (BMI ≥ 85th percentile).[25] 2004 PedNSS results additionally show differences between groups for race/ethnicity with the highest rates seen among American Indian/Alaskan Natives and Hispanic youth aged 9-11 (31 percent and 28 percent respectively) for overweight (BMI ≥ 95th percentile) compared to the lowest rates of overweight at 12 percent among Asian/Pacific Islanders aged 15-19.[25]

Table 3: Prevalence of Overweight among California Children Aged 9 to <20 years

2004 Pediatric Nutrition Surveillance, California data						
	9-11 years		12-14 years		15-19 years	
	At Risk for overweight (85th-<95th percentile)	Overweight (≥ 95th percentile)	At Risk for overweight (85th-<95th percentile)	Overweight (≥ 95th percentile)	At Risk for overweight (85th-<95th percentile)	Overweight (≥ 95th percentile)
Total	19	26	20	24	18	20
Ethnicity						
White	17	20	18	22	20	20
African American	18	22	19	23	18	22
Latino	20	28	20	25	19	21
American Indian/ Alaskan Native	20	31	21	28	23	25
Asian/Pacific Islanders	16	18	14	15	13	12

2004 Pediatric Nutrition Surveillance, California. Table 16C: Growth Indicators by Race/Ethnicity and Age.
Note: Some numbers may have been rounded to the nearest whole number.

Iron Deficiency/Anemia
Iron deficiency anemia data, as measured by low hemoglobin or hematocrit are also reported by PedNSS. Findings indicate that 13 percent of youth from ages 5-19 showing positive results.[26] Boys actually show higher rates than girls, with boys aged 15-19 having the highest rates at 16 percent, and boys 12-14 at 15 percent.[26] Girls aged 12-14 have the lowest rates at nine percent and girls aged 15-19 are still lower than boys in the same age group with 14 percent showing signs of anemia.[26]

Fruit and Vegetable Consumption
2005 YRBSS found that 20 percent of teenagers nationwide ate five servings of fruits and vegetables on the preceding seven days of the survey.[22] CalTEENS data, which is based on a 24 hour recall, found that 44 percent of teens ate five servings of fruits and vegetables the previous day.[23] CalTEENS findings show little change in fruit and vegetable consumption for teens in recent years, increasing from 4.3 to 4.5 in 1998 and 2000, and then decreasing to 4.3 in 2002.[23] While 44 percent of teens reported eating five servings of fruits and vegetables a day in 2002 CalTEENS, only 31 percent met the recommended amount for that time (seven servings a day for boys and five servings a day for girls.[23] The proportion of teens reporting less than one serving of fruits and vegetables has slowly increased in recent years from six percent in 1998 to ten percent in 2002(23). In 2001, CHIS found that 40 percent of teens ate five or more servings of fruits and vegetables; compared to the CalTEENS which found that 44 percent of teens ate five servings in 2002.[21, 23]

Intake of Other Healthy Foods
Only 16 percent of teenagers reported eating four or more servings of whole grain breads the previous day according to CalTEENS 2002.[23] Seventy percent of teenagers reported consuming three or more servings of dairy products in 1998 and has slowly decreased since then, down to 65 percent in 2000 and 62 percent in 2002, with 37 percent not meeting the recommended amounts for dairy intake.[23] Consumption of beans has also decreased; from 45 percent of teens in 1998 reporting consumption of one or more servings, down to 25 percent in 2002.[23] Consumption of meat has increased from 81 percent of teens reporting intake of at least one serving of meat, poultry, fish or eggs the previous day in 2000, up to 85 percent in 2002.[23]

Indicators of a Less Healthy Diet
Consumption of unhealthy foods has remained high in recent years. According to the CalTEENS, teens who reported eating two or more high calorie, low nutrient foods (any of the following: pastries (such as doughnuts or muffins), deep-fried foods (such as French fries or fried chicken), potato chips, sweet snacks (such as cake or cookies, candy, and soda) increased slightly from 68 percent in 1998, to 73 percent in 2000, and 69 percent in 2002.[23] Additionally in 2002 CalTEENS, 70 percent of teens reported drinking soda the previous day.[23] The 2003 CHIS found that 36 percent of teens drank two or more sodas the previous day, a one percent difference from the CalTEENS finding (35 percent, 2002).[21, 23] Both 2003 CHIS and 2002 CalTEENS reported a mean soda consumption of 1.4 cans of soda on a daily basis.[21, 23] African American teens consume soda significantly more than other race/ethnicities with 83 percent reporting

consumption of soda yesterday compared to 65 percent of White teens and 71 percent of Latinos and 73 percent of Asians and others.[23]

Physical Activity/Inactivity

Nationwide only 36 percent of teens met the 60 minutes of physical activity per day recommendation in 2005, compared to 62 percent of California teens in 2002.[22, 23] In 2001 according to CHIS data 73 percent of teens got enough physical activity in the past week, whereas 2002 CalTEENS found that 62 percent met the requirement of 60 minutes of physical activity per day.[21, 23] This rate is up from 41 percent in 1998 and 40 percent 2000.[23] A disparity in physical activity levels between genders was found with two-thirds (66 percent) of teen boys achieving at least one hour of activity compared to 56 percent of teen girls.[23] In 2002, the 12-13 year old teen girls were significantly less likely to report at least an hour of activity than were the older girls, with less than half (47 percent) reporting one hour compared to 55 percent and 70 percent for 14-15 and 16-17 year olds respectively.[23]

The amount of time spent watching television and playing video games did not change considerably from 1998 to 2002. In 1998 teens averaged 131 minutes a day, in 2002 the average was 129 minutes; just over two hours a day.[23] African American teens reported significantly more viewing time than White and Latino teens (185 minutes, 124 minutes, and 119 minutes respectively).[23] Teens who engaged regularly in physical activity reported watching almost 40 minutes/day less TV than did others who did not.[23] Contributing to the accessibility of TV viewing, 57 percent of teens reported having a television in their bedroom in 2002.[23]

Socioeconomic differences are evident for teens related to physical activity rates as well. According to national data from NHANES, adolescents from poor families have almost twice the level of physical inactivity.[18] Teens in poverty at 17 years of age have rates of inactivity at 24 percent compared to 13 percent among those not in poverty.[18] The 2002 CalTEENS additionally shows differences in activity among teens in poverty, with those at risk for food insecurity significantly less likely to exercise for an hour compared to teens who were not at risk (54 percent and 64 percent respectively).[23]

School Environment

Nineteen percent of the teens surveyed through the CalTEENS in 2002 reported eating lunch from the cafeteria and 24 percent reported eating school breakfast.[23] Ninety-five percent of those who reported eating school breakfast ate no fruits, vegetables, or juice at breakfast.[23] Twenty-three percent of males ate lunch in the cafeteria compared to 15 percent of females.[23] In 2002, 20 percent of teens reported receiving free or reduced price meals.[23]

In 2002, almost all (96 percent) of California teens age 16-17 have soda vending at school and 64 percent of 16-17 year olds have access to snack vending at school.[23] Of all teens age 12-17, 81 percent have soda vending at school.[23] Fast food is available at school for 47 percent of California teens age 16-17 in the year 2002.[23] Eighty-one percent of teenagers reported having two or more unhealthy food options available at

school (this includes fast food, soda, and high calorie/low nutrient snack food vending) in 2000 and 2002.[23] In 2002 CalTEENS, forty-one percent of students reported having a fast food restaurant on the school campus, the percent increasing among older teens with close to half of teens over age 14 reporting fast food restaurants in their school.[23]

Three out of four teens (75 percent) reported taking physical education at school in 2002 and of those taking physical education, teens have class an average 4.4 days per week.[23] Those having a class discussing the benefits of exercise were physically active almost a full day more each week (4.9 days) than those who didn't have class (4.1 days).[23] Teens who had a class on healthy eating in the past year reporting eating significantly more fruits and vegetables than teens that did not receive education on healthy eating (4.6 servings vs. 3.9).[23]

Trends/Nutrient Patterns

There are many factors that influence adolescent eating behaviors including peer influences; parental modeling; food preferences and availability; cost; convenience; personal and cultural beliefs; media and body image.[27] These factors interact to varying levels that can be depicted in conceptual models, however it is critical to keep in mind that all levels of influences should be targeted to efficiently impact behavior change among youth.

Knowledge/Cognitive Development

Cognitive and psychosocial changes can directly influence food choices and behaviors. Abstract reasoning and problem solving abilities are not very well developed among young teens therefore the capacity to understand nutrition and health relationships and to overcome barriers to make behavior changes may not be evident at younger ages. Desire to fit in with peers can make it difficult for young teens to connect current health behaviors with future health status. However, these skills develop over the teen years with older teens having strong personal identity, ability to manage impulsive behaviors, less influence from peer pressure and an increase in abstract reasoning and problem solving skills.[2]

Attitudes

As teens become more independent and have increased control over their eating, attitudes and beliefs regarding food begin to play a significant role in nutrition behaviors. Teens tend to make choices for foods based on several factors including hunger and food cravings, appeal of food, time considerations of adolescents and parents, convenience of food, food availability, parental influence on eating behaviors (including culture/religion), benefits of foods, situation-specific factors, mood, body image, habit, cost, media, and vegetarian beliefs.[28] Barriers to consumption of healthy foods including fruits and vegetables and eating less high-fat foods include a lack of sense of urgency about personal health and taste preferences for other foods.[28] Thirteen and fourteen year-olds report mainly learning about healthy eating from their parents and school health classes, however food packaging sometimes influences their selection of healthy foods.[29] Teens tend to imitate what their friends eat and eating with peers

affects their choices.[29] The types of benefits most likely to impact healthy eating choices for adolescents include increased physical performance when preparing for playing a sport, increased energy levels, bolstered self-esteem and self-image, and avoiding future health problems such as heart disease, and diabetes.[29] Teens may also separate junk foods from healthy foods, associating junk foods with fun and friends and healthy foods with family and home life and thus the desire to associate with peers and exert independence from parents could contribute to poor eating behaviors.[30]

Meal Patterns

Meal skipping is a common occurrence among adolescents, especially older teens, which can contribute to lower total daily energy, protein and other nutrient intakes.[2] Breakfast is most commonly skipped which can be attributed to lack of time, lack of appetite, wanting to sleep longer, and dieting behaviors.[2] Breakfast skippers may experience difficulty concentrating which impacts school performance and learning.[31]

Snacking

Snacks usually comprise 25-33 percent of daily energy intakes among teens.[2] Snack choices tend to be high in sugar, sodium and fat with low nutrient values for vitamins and minerals. Close to half of California teens aged 12-17 (42 percent) reported on CalTEENS 2002 eating snack chips or other fried snacks (includes potato chips, tortilla chips, cheese puffs, pork rinds, or other fried snacks) on the previous day.[23] The 2002 CalTEENS reveals that boys are significantly more likely to consume fried snacks and chips than girls (45 percent compared to 38 percent).[23] Teens who report eating school lunch were more likely to consume chips and fried snacks on the previous day (47 percent compared to 39 percent).[23] A third of teens (34 percent) in 2002 reported eating candy on the previous day and 39 percent reported eating bakery desserts.[23]

Fast Foods

In 2002, California teens aged 12-17 reporting consumption of fast food on the previous day was near one-third (28 percent) with significantly more boys eating fast food than girls (31 percent compared to 25).[23] The proportion of teens that ate at fast food restaurants also increased from 28 percent in 2000 to 31 percent in 2002.[23] Typical weekly frequency of fast food consumption reported by most teens in 2002 was two or more times per week (44 percent) with 24 percent reporting two times per week and 20 percent, three or more.[23] African American and Latino adolescents report consuming fast foods significantly more often than Whites or Asians (38 and 30 percent compared to 24 and 25 percent reporting fast food consumption yesterday).[23] Teens who smoke are also more likely to eat fast foods with 42 percent reporting intake of fast food yesterday compared to 27 percent of non-smokers.[23]

Family meals

Youth eating meals with family tend to have better dietary intake than those who do not, including consumption of more fruits and vegetables, less soft drinks and fried foods, lower intake of saturated and trans fats, and higher intakes of fiber and micronutrients.[32] As youth get older, the number of meals with family decrease for reasons such as teen schedules, desire by teens for autonomy, and dissatisfaction with family relations.[33]

However, youth who eat more often with family, at least five days a week or more, are more likely to get better grades and are less likely to smoke, use drugs, become sexually active at a young age, or get into fights.[34]

Marketing

Marketing has significant impact on adolescent food and beverage choices.[35] In television advertisements directed toward youth, 83 percent of foods are sweets, convenience and fast foods.[36] In-school marketing seizes a captive audience with product sales through vending machines, soft drink "pouring rights" agreements, branded fast food, and fundraisers; direct advertising, such as food and beverage ads in schools; and indirect advertising, such as corporate-sponsored educational programs, sports sponsorships, and incentive programs using contests and coupons.[36] New approaches to marketing continue to expand the numerous exposures to marketing through Internet-based interactive marketing strategies that are then delivered by youth to other youth through "word of mouth" and additionally through text messaging.[36] The report disseminated by the Institute of Medicine (IOM) "Food Marketing to Children and Youth: Threat or Opportunity?" in December of 2005 provides a comprehensive review of what is known about current food and beverage marketing practices and what their influence is on the diets and health of youth. The report reveals how media in multiple forms and through broad reach plays a significant role in choices that youth make. Major conclusions provided in the IOM report are as follows:

- Along with many other intersecting factors, food and beverage marketing influences the diets and health prospects of children and youth.
- Food and beverage marketing practices geared to children and youth are out of balance with recommended healthful diets and contribute to an environment that puts their health at risk.
- Food and beverage companies, restaurants, and marketers have underutilized the potential to devote creativity and resources in promoting food, beverages, and meals that support healthful diets for children and youth.
- Achieving healthful diets for children and youth will require continued, multi-sectoral, and integrated efforts that include industry leadership and initiative.
- Public policy programs and incentives do not currently have the support or authority to address many of the current and emerging marketing practices that influence the diets of children and youth.

New areas for marketing to youth are emerging through the Internet with advergaming and other approaches to obtain brand loyalty. "Advergaming," defined as a cross between advertisement and video game is a particular form of "branded entertainment" in which a brand is inserted into an entertainment medium.[37] With approximately 64 percent of children aged 5-14 accessing the Internet to play games[38] and estimates that visitors spend an average of 25 minutes on a gaming site[39, 40, 41] it's not surprising that in a study of sites sponsored by food manufacturers that 85 percent of the brands had a website directly targeting youth.[42] What is of concern however is the extent of the types of approaches used on the websites, such as promotions, viral marketing, membership opportunities, movie and television tie-ins, and as mentioned previously, advergaming.[42]

Weight Control Behaviors

Adolescence is a time when body image and self-esteem begin to play a significant role in the lives of youth. At eight years-old, girls believe that weight control is strongly associated with self-worth and view dieting as a means of improving self-worth.[43] As girls mature, poor body image often leads to dieting, which can lead to unhealthy weight control behaviors, disordered eating, and ultimately eating disorders.[43] Poor body image is also strongly associated with low self-esteem and low self-worth, both of which can severely limit the potential for youth to succeed.[43] Views of a "healthy weight" are often skewed by teens and heavily influenced by the media, specifically television talk shows and other images.[29] Perceptions of a "healthy weight" varies among ethnicities, specifically African American and Mexican American teens believe that being a few pounds overweight is healthy and acceptable compared to white teens who believe that a "healthy weight" is defined as being thin or fit.[29] According to the 2005 YRBSS, 31 percent of teens describe themselves as slightly or very overweight, however the rates for males are much lower (25 percent) compared to girls (38 percent).[44] The 2002 CalTEENS shows 50 percent of girls reporting trying to lose weight in the past 30 days and 35 percent of boys.[23] Many adolescents engage in health compromising behaviors such as frequent dieting, meal skipping, and frequent consumption of foods high in total and saturated fats, sodium, and sugar.[2]

Vegetarian Diets

Adolescents who attempt to practice a total vegetarian or vegan (no animal protein from any source) diet are at greater risk for nutrient deficiencies. Several nutrients, such as vitamin B12, vitamin D, calcium, iron, zinc, and some essential fatty acids can be limited in a strictly plant-based diet.[2] Adolescents completely restricting animal products should add vitamin B12 to their diet by eating fortified foods or by taking a vitamin supplement. Those who practice a more liberal and balanced vegetarian diet that includes some animal products, such as dairy products and eggs, can meet their nutrient needs. More information regarding vegetarian diets is available in the Vegetarian Chapter.

Dietary Recommendations

The United States Department of Agriculture (USDA) Dietary Guidelines for Americans (Dietary Guidelines) 2005 provide recommendations by food groups for all ages with selected specific recommendations for children and adolescents. Based on the Dietary Guidelines, the USDA's MyPyramid designates recommended amounts for each food group by age, gender, and level of physical activity. Based on dietary intake data or evidence of public health problems, nutrients of particular concern in the Dietary Guidelines for adolescents, include calcium, potassium, fiber, magnesium, and vitamin E. The Dietary Guidelines also recommend that children and adolescents engage in at least 60 minutes of physical activity on most, preferably all, days of the week. Table 4 provides the calorie levels calculated at break points based on age, gender, and activity level.

Table 4: MyPyramid- Daily Amount of Food from Each Group and Food Intake Pattern Calorie Levels by Age

	Males			Females		
Activity Level	Sedentary	Mod. Active	Active	Sedentary	Mod. Active	Active
AGE						
9	1600	1800	2000	1400	1600	1800
11	1800	2000	2200	1600	1800	2000
14	2000	2400	2800	1800	2000	2400
17	2400	2800	3200	1800	2000	2400

Food Groups: USDA Dietary Guidelines for Americans 2005

Once individual calorie level is established based on age, gender, and activity level, amounts needed for each food group can be discerned as shown in Table 5.

Table 5: Food Group Needs by Calorie Levels for Males and Females *

Calorie level	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000*
Fruits	1.5 cups	1.5 cups	2 cups	2 cups	2 cups	2 cups	2.5 cups	2.5 cups
Vegetables	2 cups	2.5 cups	2.5 cups	3 cups	3 cups	3.5 cups	3.5 cups	4 cups
Grains	5 oz-eq	6 oz-eq	6 oz-eq	7 oz-eq	8 oz-eq	9 oz-eq	10 oz-eq	10 oz-eq
Meat & Beans	5 oz-eq	5 oz-eq	5.5 oz-eq	6 oz-eq	6.5 oz-eq	6.5 oz-eq	7 oz-eq	7 oz-eq
Milk	3 cups	3 cups	3 cups	3 cups	3 cups	3 cups	3 cups	3 cups
Oils	5 tsp	5 tsp	6 tsp	6 tsp	7 tsp	8 tsp	8 tsp	10 tsp
Discretionary calorie allowance	132	195	267	290	362	410	426	512

* For 3,200 calories, the additional calories come from 1 additional tsp of oil—11 total tsp--and 648 discretionary calories.

Source: MyPyramid: Steps to a Healthier You. Public domain. US Department of Agriculture and the US Department of Health and Human Services. Available online: http://www.mypyramid.gov

Fruits and Vegetables

Eating a wide variety of fruits and vegetables can provide many vitamins and minerals, fiber, and phytochemicals required by the body for maintaining good health and reducing the risk of cancer and chronic disease.[45] Simple changes such as eating five or more daily servings of fruits and vegetables are key for cancer prevention. Comparatively, eating two or fewer servings, was found to be associated with half the risk of a dozen different cancers.[45]

Grains

Many grains offer quality sources of energy, fiber and select vitamins. The Dietary Guidelines recommend that adolescents consume whole-grain products often and at least half the grains consumed should be whole grains.

Fats
The Dietary Guidelines specify that adolescents should keep total fat intake between 25 to 35 percent of total calories for children and adolescents 4-18 years of age, with most fats coming from sources of polyunsaturated and monounsaturated fatty acids, such as fish, nuts, and vegetable oils. Trans fats should be avoided.

Dairy
The Dietary Guidelines for Children nine years of age and older should consume a minimum of three cups per day of fat-free or low-fat milk or equivalent milk products. Alternatives to dairy products that can provide adequate amounts of calcium for healthy bone growth would include calcium fortified 100 percent fruit juice or soy milk.

Other Recommendations
For overweight children and adolescents, the goal is to slow the rate of weight gain while achieving normal growth and development. Adolescents and their families should consult a healthcare provider before placing a child on a weight reduction diet.

Institute of Medicine Food and Nutrition Board: Nutrient Requirements

The Food and Nutrition Board at the Institute of Medicine (IOM) has developed Dietary Reference Intakes (DRIs) specific to age and gender for assessing and planning diets for healthy individuals. The DRIs have replaced the use of the RDAs (Recommended Dietary Allowances). Adequate Intake (AI) provides a recommended intake value based on approximations or estimates from observed or experimental methods. AIs are used when it is not possible to determine the RDA. Also provided in some cases are the Estimated Average Requirements (EAR) and for macronutrients, the Acceptable Macronutrient Distribution Range (AMDR) is provided to note a particular energy source that is associated with reduced risk of chronic disease. DRIs also include Tolerable Upper Intake Levels, the maximum level of daily nutrient intake which is not likely to create risk for adverse health effects. Table 6 provides recommended intakes for adolescents by age and gender. The DRIs are based on chronological age, not on individual growth status, therefore professionals should use appropriate considerations when planning adequate nutrition recommendations for individuals.

Table 6: DRIs and AIs- Recommended intakes for Adolescents by Age and Gender; Macronutrients, Vitamins and Minerals*

	Females		Males	
	9-13 yrs	**14-18 yrs**	**9-13 yrs**	**14-18 yrs**
Macronutrients				
Energy (kcals/day)	2,071	2,368	2,279	3,152
Carbohydrate (g/day)	**130**	**130**	**130**	**130**
Total Fiber (g/day)	26	28	31	38
n-6 Polyunsaturated Fat (g/day)	10	11	12	16
n-3 Polyunsaturated Fat (g/day)	1	1.1	1.2	1.6
Protein (g/day)	**34**	**46**	**34**	**52**
Vitamins				
Vitamin A (µg/d)	**600**	**700**	**600**	**900**
Vitamin C (mg/d)	**45**	**65**	**45**	**75**
Vitamin D (µg/d)	5	5	5	5
Vitamin E (mg/d)	**11**	**15**	**11**	**15**
Vitamin K (µg/d)	**60**	**75**	**60**	**75**
Thiamin (mg/d)	**0.9**	**1**	**0.9**	**1.2**
Riboflavin (mg/d)	**0.9**	**1**	**0.9**	**1.3**
Niacin (mg/d)f	**12**	**14**	**12**	**16**
Vitamin B6 (mg/d)	**1**	**1.2**	**1**	**1.3**
Folate (µg/d)g	**300**	**400**	**300**	**400**
Vitamin B12 (µg/d)	**1.8**	**2.4**	**1.8**	**2.4**
Pantothenic acid (mg/d)	4	5	4	5
Biotin (µg/d)	20	25	20	25
Choline (mg/d)	375	400	375	550
Elements				
Calcium (mg/d)	1,300	1,300	1,300	1,300
Chromium (µg/d)	21	24	25	35
Copper (µg/d)	**700**	**890**	**700**	**890**
Fluoride (mg/d)	2	3	2	3
Iodine (µg/d)	**120**	**150**	**120**	**150**
Iron (mg/d)	**8**	**15**	**8**	**11**
Magnesium (mg/d)	**240**	**360**	**240**	**410**
Manganese (mg/d)	1.6	1.6	1.9	2.2
Molybdenum (µg/d)	**34**	**43**	**34**	**43**
Phosphorus (mg/d)	**1,250**	**1,250**	**1,250**	**1,250**
Selenium (µg/d)	**40**	**55**	**40**	**55**
Zinc (mg/d)	**8**	**9**	**8**	**11**

Note: This table presents RDAs in bold type and AI's in ordinary type. RDAs and AIs may both be used as goals for individual intake. RDA's are set to meet the needs of almost all (97%-98%) individuals in a group. The AI is believed to cover needs of all adolescents in the group, but lack of data or uncertainty in the data prevent being able to specify with confidence the percentage of individuals covered by this intake.

*Source: Data from reports from the Institute of Medicine, Food and Nutrition Board, Standing Committee on the Scientific Evaluation of Dietary Reference Intakes,3-7 © by the National Academy of Sciences, courtesy of the National Academies Press, Washington.

Energy and Protein

Energy needs for adolescents are affected by activity level, basal metabolic rate, and the increased need to support growth and development. The calculation of energy needs based on height usually provide a more accurate estimate of needs than a typical daily recommendation.[9] However, caloric needs for adolescent girls range from approximately 2,000 to 2,400 kcal per day and 2,200 to 3,200 kcal for boys using the IOM's DRIs. DRIs are based on light to moderate activity levels.[2] An additional 600-1,000 kcal per day are usually needed if the adolescent is involved in vigorous physical activity.[2] Low energy intake can occur among adolescents due to restrictive dieting, lack of resources to purchase food, or other factors such as substance abuse or chronic illness and continued insufficient intake can lead to delayed puberty or growth retardation.[2]

Protein requirements are influenced by adolescent needs for maintenance of existing lean body mass, but also for the additional accrual of lean body mass during a growth spurt. Most adolescents meet or exceed recommended levels of protein.[2, 46] Adolescents at risk for protein deficiency include strict or total vegetarians and those using extreme measures to restrict their food intake to lose weight. Consistently inadequate protein intake can result in linear growth reduction, delays in sexual maturation, and a reduction of additions to lean body mass.[2]

Table 6 provides recommended intakes for energy and protein based on age and gender. Additional estimates to increase accuracy of needs assessment can be made based on stage of sexual maturation.

Carbohydrates

The primary source of energy for youth is usually from carbohydrates.[2] Foods that typically make up carbohydrate sources for teens are yeast breads, soft drinks, milk, ready-to-eat cereal, and other foods such as cakes, cookies, quick breads, donuts, sugars, syrups, and jams.[47] Whole grains should be encouraged as quality carbohydrate sources over white breads or other foods with added sweeteners.

Fat

Dietary fat and essential fatty acids are required by the body for normal growth and development. The DRIs do not provide AI requirements for total fat intake. Acceptable Macronutrient Distribution Range (AMDR) are provided for total fat of 25 - 35 g/day for males and females over age four. Polyunsaturated fatty acids (n-6) (linoleic acid) is recommend at 10-11 g/day for girls and at 12-16 g/day for boys depending on age and polyunsaturated fatty acids (n-3) (α-linolenic acid) is recommended at 1.0-1.1 g/day for girls and 1.2-1.6 for boys depending on age.

Fiber
The recommended daily intake of fiber for adolescents is calculated by using the following formula: (adolescent's age in years) + 5-10 grams. However, the average fiber intake for adolescents is approximately 12 grams per day.[48] In 2002, a mere 16 percent of teens reported eating four or more servings of whole grains yesterday, down from 19 percent in 1998.[23] Fruit and vegetable intake also contribute to total dietary fiber. In 2002, only 42 percent of adolescents in California met the then current recommendation to eat five or more servings per day.[23]

Calcium
Adolescence is a critical time for optimal calcium intake as bones grow and incorporate calcium most rapidly during the teen years. With 45 percent of peak bone mass attained during adolescence, it is a particularly important time to assure adequate intake of calcium to reduce the risk of fractures and osteoporosis in future years[49].

The Institutes of Health Consensus Development Conference Statement on Optimal Calcium Intake recommends for adolescents aged 11-24 an intake of 1,200 to 1,500 milligrams per day.[50] This committee agreed that there seems to be a threshold of dietary calcium intake needed by growing adolescents to achieve their genetically predetermined bone mass.[50] For individuals 9-18 years of age, DRIs indicate optimal dietary calcium intake is 1,300 milligrams per day (DRIs). Four or more servings of milk or other calcium-rich foods would meet this recommended amount.

Increased consumption of sodas by adolescents is potentially contributing to low calcium status, not only due to the substitution of soda for milk, but additionally through interference with bone mineralization.[50] With caffeine increasing the excretion of calcium in the urine and possible reduction in calcium absorption due to phosphorous levels in sodas, there may be substantial effects on bone mineralization with high soda consumption.[50]

Iron
Iron plays an essential role in transporting oxygen through the blood stream. Inadequate intake of iron leads to iron deficiency or anemia. Iron needs increase during puberty due to expanding blood volume and muscle mass.[2] Menarche also increases iron requirements for adolescent girls. The RDA (Recommended Dietary Allowance) provided by the Food and Nutrition Board of the Institute of Medicine for iron increases for girls from 8 milligrams per day during ages 9-13 to 15 milligrams per day for 14-18 year olds (RDAs). The RDA for boys also increases, but not as dramatically, from 8 milligrams per day during ages 9-13 to 11 milligrams per day for boys aged 14-18 (RDAs).

The ability for the body to absorb iron depends on the form that it takes in the food source. Heme iron found in meat, fish, and poultry is more bioavailable than non-heme iron, mainly found in grains. The bioavailability can be enhanced if the iron form is consumed in the presence of vitamin C. Adolescent vegetarians are at risk for low iron intake due to the omission of meat products and the lower bioavailability of iron from

plant sources. Intake of iron for vegetarian teens should be double that of other teens.[51] Common dietary sources of iron for teens include ready-to-eat cereal, bread, and beef.[2] Iron deficiency is more prevalent among older adolescent girls and in lower socioeconomic groups.[2]

Zinc
Zinc is required during puberty for normal growth and sexual maturation. The RDA for adolescents aged 9-13 is 8 milligrams per day (RDA). Once teens reach ages 14-18, the RDA for girls is 11 milligrams per day and for boys is 9 milligrams per day (RDA). Dietary sources include lean meats, seafood, whole grains, and fortified breakfast cereals.[2] Elevated intake of iron may affect zinc status as zinc and iron compete for absorption.[2] Vegetarian teens, especially vegans, are at highest risk for insufficient intake of zinc.[2]

Vitamin A
Not only important for normal vision, vitamin A is particularly important during adolescence for its role in reproduction, growth and immune function.[51] Boys and girls aged nine to 13 should obtain 600 µg/day, girls aged 14-18, 700 µg/day and boys ages 14-18, 900 µg/day to ensure adequate body stores.

Vitamin C
Due to its involvement in the synthesis of collagen and other connective tissues, vitamin C is additionally important during adolescent growth and development. The RDA for vitamin C is 45 mg/day for youth ages 9-13, 75 mg/day for boys aged 14-18 and 65 mg/day for girls aged 14-18. Approximately 90 percent of vitamin C is obtained through the diet from fruits and vegetables, with citrus fruits and tomatoes as major contributors. Due to oxidative stress and metabolic turnover in smokers, the requirement for vitamin C is increased by 35 mg/day.[2]

Folate
Adolescents need more folate due to rapid growth and sexual maturation. The RDA for adolescents between the ages of 9-13 is 300 micrograms (or 0.3 mg) per day and increases to 400 micrograms (0.4 mg) per day for adolescents aged 14 to18 (RDA's). Adequate intake of folate is essential for sexually active and pregnant teens at any age to prevent congenital abnormalities such as neural tube defects that may occur before the knowledge of a pregnancy. Intakes are recommended for any females capable of becoming pregnant at 400 micrograms (0.4 mg) per day (RDAs). Major dietary sources of folate are dried beans or lentils, dark-green, leafy vegetables, as well as enriched, whole grains, however for girls with the possibility of becoming pregnant, a multi-vitamin with adequate amounts of folate is recommended.

Barriers/Common Concerns

Adolescents deal with many barriers to eating healthy and being active. These include making healthier choices in their home, school and community environments;

developmental stages and personal choices; developing taste preferences; and limited time.

Home Environment

In the home environment, families increasingly have busy lives with both parents working and a plethora of convenience products available in the food supply. Low cost, convenient foods are typically of lesser nutrition and are often heavily marketed to parents and youth. Teens increasingly have foods available in the home that are high in fat, sodium, sugar and are highly processed. Families consume fewer meals at home and more than ever, eat take out foods. Without quality parental role modeling, teens have limited exposure to approaches to healthy living. Additionally within the home, there are often multiple opportunities for media and leisure activities that foster physical inactivity. Many teens (57 percent as of 2002) have televisions in their rooms[23] with many channels advertising unhealthy food products providing cues to consume foods of low nutrient value and occupying their time when they could be playing with friends or being physically active in other ways. The Internet additionally contains marketing of unhealthy foods and gaming (video or internet) again draws from time to otherwise be physically active.

School Environment

Until schools implement new statewide standards for foods and beverages sold, the school environment may contain limited opportunities for healthy choices. Fast food restaurants or food service contractors have in many cases replaced traditional school food service and once new standards are implemented, these vendors must comply, however there may be schools that require additional monitoring. Currently, student stores and vending throughout school campuses continue to offer products high in fat, sugar, and sodium. Even with upcoming policy changes, replacement products that are marketed as “healthy” are not always quality choices. Marketing of unhealthy foods is beginning to be addressed though recent statewide legislation. Unless schools voluntarily remove marketing practices, they will continue to condone foods of lesser value, provide strong cues to action for unhealthy eating practices, and encourage brand loyalty from students. Some schools have an “open campus” for lunch, however, local choices for students may include fast food or convenience market establishments. In the future there are plans to update health education standards and curriculum, but currently, schools have minimal classes that include nutrition and food science. Physical education in schools had continued to diminish nationally and there are needs for improved curriculum that move away from competitive activities.

Community Environment

Community environments additionally provide challenges to teens to make healthy choices. When students are away from school or home which increasingly occurs for this age group, an entire host of other factors come into play. Studies have shown that in the United States, community environments and the area around schools are more often than not saturated with fast food restaurants and convenience or liquor stores, especially in low-income and minority communities[52, 53, 54]. Because time, appeal, and

convenience play a significant role in decision making for teens, these types of outlets offer a particularly easy opportunity for food, but since they typically don't have many healthy foods available, unhealthy choices are the norm.[2,55] Community environments are also increasingly unsafe due to crime and traffic hazards and in many cases due to poor planning and zoning, have limited opportunities for safe outdoor physical Activity.[56, 57] Perceived dangers due to enhanced media coverage in relation to national and local crimes may also hinder neighborhood activity.

Personal Choices/Development of Preferences
Taste preferences and marketing play an important role for teens in decision making involved with food. Teens, like anyone, will eat food that tastes good and is marketed well. With minimal opportunities for teens to experience foods that are healthy and taste good, they are unable to learn how to make healthy choices on their own, and therefore will continue to make poor choices if they are easy, low cost options that are highly marketed.

Particularly unique to teens, is their inability to feel a sense of urgency when it comes to the importance of healthy eating. Teens are not likely to feel compelled to eat healthy foods because they prevent chronic disease. They also usually have minimal self-discipline and tend to have preferences for junk foods. Healthy eating is not seen as a priority to teens, simply because it is not the norm and there are other social issues that dominate their emotional and physical landscape.

Opportunities for Improvement

Statewide Youth Board on Obesity Prevention/California Center for Civic Participation and Youth Development: The Statewide Youth Board on Obesity Prevention (SYBOP) with the California Center for Civic Participation and Youth Development surveyed youth on strategies to improve eating and physical activity among youth in California. Results from the survey reflected appropriate and realistic approaches in several areas including school-based strategies that promote healthy eating and physical activity. Additionally, the HEAC (Healthy Eating Active Communities) Youth Leadership Project has recently worked with the SYBOP on a strategic effort to reduce disparities in diabetes and obesity rates through improving food and physical activity environments in low-income areas for California youth and results following this project should encourage further discussion about youth-involved community-based approaches.

Youth Activities
If youth are involved in making changes to their own environment, they not only learn as individuals through the process, but often strengthen efforts as they collaborate and share ideas. Young people can educate, mobilize, and act as a group on behalf of their interests.[58] Youth should be seen as resources, assets and community-builders who are capable of making changes based on their own initiative.[58] Youth can do the following to encourage changes in eating and physical activity:

- Educate other youth including younger children and their peers.
- Organize after school activities.
- Educate parents and the community.
- Develop new programs and policies that incorporate youth ideas.
- Use media and technology to create messages and campaigns to youth audiences.
- Create reward programs to honor schools, businesses, government agencies, and individuals.
- Help in decision making and planning for funding allocation.
- Organize volunteers.
- Conduct research such as surveys, interviews, and mapping to find out about youth issues and ideas.
- Advocate for good government policies by making informed arguments to school boards, city councils, and state legislators.
- Evaluate existing laws and programs.
- Serve with adults on boards, commissions, and committees.
- Organize protests and boycotts to draw attention to schools, businesses, and government agencies that do not promote healthy eating or physical activity.

School-Based Strategies

As youth spend a significant amount of time at school, quality eating and active environments, accompanied by responsible marketing practices and supportive staff who model healthy lifestyles are critical to positive trends in teen nutrition. As designated by the Federal Child Nutrition and WIC Reauthorization Act of 2004, every school district participating in the National School Lunch and/or School Breakfast Program must establish a school wellness policy by the beginning of the 2006-2007 school year in which schools must set goals for nutrition standards of foods available in schools, nutrition education, physical activity, and other school-based activities designed to promote student wellness. These mandatory school wellness policies are opportunities to create well defined nutrition and physical activity policies that can implement quality standards at the school level to improve the school environment. Wellness policies will inevitably vary from school to school, with schools that have exemplary leadership along with parent and student involvement more likely to develop higher standards. Therefore, model wellness policies are important for schools to use when entering into the development process.

The California Department of Education Advisory Committee on Nutrition Implementation Strategies has developed guidelines and approaches along with resources in "School Nutrition... By Design" of which the intent is to assist schools through nine design principles to improve the school nutrition environment. Design principles include governance and policy, stakeholder involvement, student involvement, nutrition education, access and participation, healthy school environment, funding, professional development, and continuous monitoring and accountability. Each design principle is defined by quality indicators and implementation strategies along with resources and exemplars. Additionally, in 2003, the California School Boards Association and California Project LEAN (Leaders Encouraging Activity and Nutrition)

developed a resource guide "Successful Students Through Healthy Food Policies" which outlines what districts and school boards can do to develop healthy nutrition policies and provides case studies along with sample board policies.

In 2005, the Superintendent of Public Instruction released a White Paper on Health, Nutrition, and Physical Education entitled *"Healthy Children Ready to Learn"* (http://www.cde.ca.gov/eo/in/se/yr05healthychildrenwp.asp). It addresses issues surrounding student nutrition, physical activity and fitness, and the recommendations from The Superintendent's Task Force on Childhood Obesity, Type 2 Diabetes, and Cardiovascular Disease. Additionally, the Department of Health Services has released the "California Obesity Prevention Plan: A Vision for Tomorrow, Strategic Actions for Today" which includes goals for school nutrition and physical activity. Nationally, the USDA Food and Nutrition Service (FNS) has established The School Meals Initiative, a legislated system to review and monitor the implementation of targeted nutrition goals for school lunch menus.

Public Health Law Program Approaches: The Public Health Law program at the Public Health Institute has produced fact sheets with strategies for regulating junk food marketing on public school property with guidance as to which approaches are more or less likely to withstand a legal challenge if crafted with appropriate language. Below are the examples provided as the most feasible approaches specifically to limit marketing practices of unhealthy foods in the public school environment.

- Negotiate specific contract terms with vendors to limit commercial advertising for foods and beverages.
- Refuse vending contracts that require or permit the marketing or promotion of non-nutritious foods.
- Refuse to display advertising for any food and beverage on public school property.
- Refuse to advertise any foods or beverages that are not to be sold on campus.

California Project Lean: California Project LEAN (CPL) has also developed a tool kit "Captive Kids: Selling Obesity at Schools, An Action Guide to stop the marketing of unhealthy foods and beverages in schools" through the California Endowment and the California Department of Justice, Antitrust Law Section. CPL cites the recommendation from the IOM through the National Academies of Science report "Food Marketing to Children and Youth: Threat or Opportunity" for school districts through support of parents, health authorities, and other stakeholders to limit commercial influences throughout the school environment which includes curriculum, commercial sponsorships, activities and events, and school meals and snacks (CPL - Captive Kids and IOM- Threat or Opportunity Report). CPL notes that due to the intensity and pervasiveness of marketing to youth, parents alone cannot protect their children from the potentially harmful effects of a billion dollar food industry (CPL- Captive Kids).

School gardens
School gardens offer a unique opportunity for youth to learn about growing food and nutrition, and California Department of Education standards have been linked to several curricula developed for school gardens. The California School Garden Network (CSGN) was established by Western Growers and the California Department of Food and Agriculture (CDFA) to promote school gardens, develop a school garden guidebook, and improve coordination between public, private, and governmental agencies including CDHS, CDFA, the California Department of Education, and other key organizations, including the agricultural and food industry, community advocates, and local school districts. The CSGN guidebook, "Gardens for Learning: Creating and Sustaining Your School Garden" released in 2006 and provides extensive information for California schools to establish and maintain gardens that teach.

Community-Based Strategies
Locally targeted initiatives have the potential to create significant changes to improve healthy eating and physical activity opportunities for youth. As mentioned previously, if youth are able to get involved in identifying, planning, and implementing change in their community to improve the nutrition and physical activity environment, they are more likely to make changes in their own life and be champions for change which can then change social norms.

Community based strategies assembled by the California SYBOP.

- Use advertising and media to create campaigns promoting healthy eating and physical activity.
- Establish community gardens so youth and families have greater access to healthy, inexpensive food.
- Establish supermarkets in low-income areas whose people can't afford to drive for better food.
- Encourage markets and restaurants to promote healthy eating by voluntarily increasing options, reducing prices, and improving labeling.
- Ask big organizations, such as the YMCA, churches, and Scouts, to help promote healthy eating and physical activities throughout their chapters.
- Create healthy lifestyle classes and programs in community centers for youth and families to connect about healthy eating (e.g. cooking classes) and physical education (e.g. yoga class).
- Form biking and walking groups with volunteer adults leading youth and youth leading youth.
- Organize talented volunteers who want to teach others how to cook healthy food, do fun physical activities, create gardens.
- Create a website and library with ideas (best practices) from around the world to promote healthy lifestyles.
- Improve neighborhood safety so children and families can take walks and go to parks free from crime.
- Encourage employers to promote health by providing healthier foods and exercise options.

- Design communities that promote health by reducing our use of cars, promoting local food production, and encouraging physical activity.
- Raise funds for creating mini-grants for youth, families, and community organizations who work to promote healthy eating and physical activity.
- Conduct a community mapping project to find out your area's healthy lifestyle pluses and minuses.
- Form a community health council to organize people, businesses, and government to promote change.
- Improve equipment and access to facilities so it's easier and safer to exercise and play.
- Connect farmers directly to customers to provide healthy inexpensive food to hospitals, workshops, schools, and homes.
- Promote prevention healthcare by encouraging healthcare providers (doctors and hospitals) to expand access to services.
- Advocate for better government polices by organizing citizens and organizations in communities to promote school, city, county, and state laws that support healthy eating and physical activity.
- Conduct research such as surveys, discussions, and interviews to find out what the community wants to do.

Government-Based Initiatives

Initiatives and policies developed through government whether on a local, state, or national level can have powerful implications, specifically for youth. Through tracking of legislation, bills aimed at decreasing rates of obesity and improving statewide nutrition and physical activity have increased. Additional legislation, programs, and initiatives related to nutrition and physical activity that affect youth should continue to be sponsored while monitoring, evaluation, and enforcement should continue to be addressed in regulatory language.

Recent enacted legislation in California that changes foods available in the food environment for adolescents in middle, junior, or high schools include:

Beverages: Ed. Code 49431.5, Effective July 1, 2004 - Limits the types of drinks sold regardless of the time of day to the following:

- fruit-based drinks with no less than 50 percent fruit juice and have no added sweetener,
- vegetable-based drinks composed of no less than 50 percent vegetable juice(s) with no added sweetener,
- drinking water with no added sweetener,
- two-percent fat milk, one-percent fat milk, nonfat milk, soy milk, rice milk, and other similar nondairy drink and
- electrolyte replacement beverages with no more than 42 grams of added sweetener per 20 ounce serving

Food: Ed. Code 49431.2, Effective July 1, 2007- Limits the types of foods that may be sold during the school day in addition to USDA reimbursable meals for snacks to those that contain no more than

- 35 percent of total calories from fat (excluding nuts, nut butters, seeds, eggs, cheese, fruit, vegetables, legumes),
- 10 percent of total calories from saturated fat (excluding eggs and cheese),
- 35 percent of total weight from sugar (excluding fruits or vegetables) and
- 250 calories.

Entrees many contain no more than four grams of fat per 100 calories, and no more than 400 total calories.

Competitive Foods: Ed. Code 38085, Effective July 1, 2007 - requires that a minimum of 50 percent of any food items, offered for sale each school day at any school site by any entity or organization during regular school hours, are selected from the following list (this is referred to as the list of nutritious foods):

- Milk and dairy products, including cheese, yogurt, frozen yogurt, and ice cream.
- Full-strength fruit and vegetable juices and fruit drinks containing 50 percent or more full-strength fruit juice, and fruit nectars containing 35 percent of more full-strength fruit juice.
- Fresh, frozen, canned, and dried fruits and vegetables.
- Nuts, seeds, and nut butters.
- Non-confection grain products, as defined by regulation of the United States Food and Drug Administration, including crackers, breadsticks, tortillas, pizza, pretzels, bagels, muffins, and popcorn.
- Meat, poultry, and fish, and their products, including beef jerky, tacos, meat turnovers, pizza, chili, and sandwiches.
- Legumes and legume products, including bean burritos, chili beans, bean dip, roasted soy beans, and soups.

Additional policy changes through government entities can continue to improve the nutrition and physical activity environments for youth in California and nationally.

Public Health Law program at the Public Health Institute strategies for regulating junk food marketing aimed at children and youth: The following ideas are examples of the most feasible policy approaches specifically to limit marketing practices of unhealthy foods and are more likely to withstand a legal challenge if crafted with appropriate language.

- Prohibiting or regulating the location of *all* billboards, regardless of content.
- Limiting or eliminating specific uses of land, such as fast food sales.
- Imposing fees on businesses that sell non-nutritious foods/beverages.
- Levying state or federal taxes on certain foods/beverages or ingredients.
- Requiring restaurants to include nutritional information for menu items.
- Implementing ad campaigns that counter or parody food industry messages.

- Banning the sale of non-nutritious foods/beverages at public facilities and other specified locations.
- Restricting the sale of non-nutritious foods/beverages to children.
- Prohibiting "toy-with-purchase" giveaways with non-nutritious foods/beverages.
- Brokering voluntary restrictions on advertising for non-nutritious foods/beverages.
- Implementing V-chip ratings for TV commercials (FEDERAL- LEVEL ACTION).
- Requiring warnings on all non-nutritious food/beverage ads (FEDERAL- LEVEL ACTION).
- Expanding existing labeling requirements to include easy-to-understand information (such as pie charts) indicating non-nutritious food/beverage content (FEDERAL- LEVEL ACTION).

Types of Messaging

Overcoming barriers in adolescent nutrition will involve multiple partnerships: clinical adolescent healthcare providers, academic entities, professional organizations, as well as policy advocates and government leaders through mutually benefiting, but ethically non-compromising relationships with industry to achieve the following:[59]

- Define healthy eating and fitness for adolescents realistically.
- Simplify and clarify the healthy eating message.
- Reframe the message to fit adolescent audiences.
- Promote skills-based interventions to accompany the message.
- Strengthen environmental support for youth fitness and nutrition.

Messaging must resonate with the unique audience of youth and teens for it to engender healthy behavior changes in California and nationally. Media must appeal to the concerns of adolescents, such as having lots of energy, achieving and maintaining healthy weight, physical appearance, doing well in school.[2] Types of messaging that can work encourage teens to eat well to help in all that they do and what you want to be.[2] Youth want real-life teenagers, not actors to be spokespersons for campaign efforts.[29] They prefer that advertisements show active, racially diverse, average-looking groups of young people.[29] Youth can be positive role models for other youth to encourage changes in social norms.

Resources/Web Sites

Department of Health and Human Services Center for Disease Control and Prevention (CDC)- National Center for Chronic Disease Prevention and Promotion- Healthy Schools Healthy Youth http://www.cdc.gov/HealthyYouth

Youth Behavior Risk Factor Surveillance System (YRBSSS)- http://www.cdc.gov/HealthyYouth/YRBSS/index.htm

National Center for Health Statistics- National Health and Nutrition Examination Survey NHANES- http://www.cdc.gov/nchs/about/major/nhanes/nhanes2003-2004/nhanes03_04.htm

USDA 2005 Dietary Guidelines- http://www.health.gov/DietaryGuidelines
USDA MyPyramid- http://www.mypyramid.gov
USDA Food and Nutrition Service (FNS) Child Nutrition Programs- http://www.fns.usda.gov/cnd/
School Meals Initiative- http://www.cde.ca.gov/ls/nu/he/smi.asp

California Department of Health Services, Cancer Prevention and Nutrition Section
California Teen Eating, Exercise and Nutrition Survey (CalTEENS)- http://www.dhs.ca.gov/ps/cdic/CPNS/research/rea_surveys.htm
http://www.ca5aday.com

California Department of Education (CDE)
FITNESSGRAM- http://www.cde.ca.gov/ta/tg/pf
Guidelines for Wellness Policies- http://www.cde.ca.gov/ls/nu/he/wellness.asp
School Nutrition… By Design!- http://www.cde.ca.gov/re/pn/fd/documents/schnutrtn071206.pdf
Healthy Children Ready to Learn- http://www.cde.ca.gov/eo/in/se/yr05healthychildrenwp.asp

California Project LEAN (Leaders Encouraging Activity and Nutrition) - http://www.californiaprojectlean.org

The Center for Ecoliteracy- http://www.ecoliteracy.org/
Thinking outside the school lunchbox

California School Garden Network- http://www.csgn.org

Healthy Kids Resource Center- http://www.californiahealthykids.org

California Center for Civic Participation and Youth Development, Statewide Youth Board on Obesity Prevention- http://www.californiacenter.org/programs_plp_sybop.htm

California Food Policy Advocates- http://www.cfpa.net

California School Nutrition Association- http://www.calsna.org

UC Berkeley Center for Weight and Health- http://www.cnr.berkeley.edu/cwh

National Alliance for Nutrition and Activity- http://www.cspinet.org/nutritionpolicy/nana.html

School Health Connections- http://www.dhs.ca.gov/ps/cdeic/shc/

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California Food Guide

Life Cycle: 19-50 Year Olds

By Cindy Schneider M.P.A., R.D. and Tammie Voss M.A., R.D.

What's New

The federal government has begun meeting with representatives from the food and beverage industry to discuss how these industries can help Americans combat overweight and obesity. The goal is to have these industries offer healthier food choices, provide easy to understand nutrition information, and to integrate health into mass marketing strategies. Progress is being made slowly.

Public Health Implications

Healthy People 2010 (HP) is a national initiative of the U.S. Department of Health and Human Services (DHHS) to improve the health of all Americans through prevention. The overall goals of this national initiative are to increase the span of healthy life, reduce health disparities among Americans, and achieve access to preventive services. Below are some of the HP objectives related to the nutrition status of Americans:

- Objective(Obj.) 19-1:Increase the proportion of adults who are at a healthy weight.
- Obj. 19-2: Reduce the proportion of adults who are obese.
- Obj. 19-5: Increase the proportion of persons aged 2 years and older who consume at least two daily servings of fruit.
- Obj. 19-6: Increase the proportion of persons aged 2 years and older who consume at least three daily servings of vegetables, with at least one-third being dark green or orange vegetables.
- Obj. 19-7: Increase the proportion of persons aged 2 years and older who consume at least six servings of grain products, with at least three being whole grains.
- Obj. 19-8: Increase the proportion of persons aged 2 years and older who consume less than 10 percent of calories from saturated fat.
- Obj. 19-9: Increase the proportion of persons aged 2 years and older who consume no more than 30 percent of calories from total fat.
- Obj. 19-10: Increase the proportion of persons aged 2 years and older who consume 2,400 mg or less of sodium daily.
- Obj. 19-11: Increase the proportion of persons aged 2 years and older who meet dietary recommendations for calcium.
- Obj. 19-12: Reduce iron deficiency among females of childbearing age.

Definition

This chapter focuses on recommendations for adults between the ages of 19 and 50 years of age, which encompasses a broad age range with varying nutrient needs. Some information is included on pregnancy, childbirth, and lactation for women as well; however, there are other chapters within the California Food Guide specifically devoted to the special nutrient needs for women.

Burden

As a large number of Californians age over the next several decades, the prevalence of chronic diseases and their impact on the health system and health care costs will likely continue to increase. A small number of chronic disorders, such as diabetes and cardiovascular diseases, account for the majority of deaths each year, and the medical costs for people with chronic diseases account for more than 75 percent of the nation's medical care costs.[1] Fortunately, small changes in diet and activity can greatly impact these costs. Modeling techniques estimate that if Americans reduced their intake of saturated fat by approximately 8 grams per day, the health care system could save as much as $12.7 billion in medical costs and lost earnings annually.[2]

Overweight and Obesity

Overweight is the state between normal weight and obesity. Overweight is defined as having a body mass index (BMI) of greater than or equal to 25 but less than 30. (BMI is an index that relates a person's body weight to their height by dividing their weight in kilograms by their height in meters squared.) Obesity is defined as a BMI of 30 or above which is usually indicative of an excessive accumulation of adipose tissue to an extent that health is impaired. Public health officials currently refer to overweight and obesity as an epidemic. The prevalence of overweight and obesity has increased dramatically in recent years, doubling since 1980, and now is seen by the Centers for Disease Prevention and Control (CDC) as one of the top threats to the health of the nation.[2] Approximately two-thirds of the adult population is either overweight or obese, and slightly less than one-third is obese according to data from the 1999-2000 National Health and Nutrition Examination Survey (NHANES).[3]

Weight gain results from an imbalance between the amount of calories consumed and amount expended by an individual. Currently, many individuals' diets reflect pre-packaged foods; low-cost, big portion restaurant meals; and soft drinks, all of which may be high in sugar, calories, and/or fat. These changes in our food supply along with decreasing opportunities for physical activity are influencing this epidemic.

As previously stated, overweight and obesity significantly affect health, quality of life, and life expectancy since they raise the risk for a wide variety of medical conditions (e.g. type 2 diabetes, hypertension, coronary heart disease, stroke, etc). The prevalence of overweight and obesity in adults has steadily increased among both genders, all racial/ethnic groups, and all educational levels. Additionally, incidence

increases with advancing age through age 60.[4] Obesity is believed to be associated with more chronic disorders and worse physical health than smoking or problem drinking.[5] However, studies show that an overweight individual can reduce the risk for some chronic disorders by losing as little as five to 15 percent of their weight.[6] Estimates of the deaths of U.S. adults due to obesity related causes range from 280,000 to 325,000 each year.[5, 7, 8] Research shows that as body mass increases so do health care costs.[9]

Diabetes

Research suggests that overweight and obesity, as well as lack of physical activity, are associated with an increased risk for diabetes. In 2000, it was estimated that 17 million people -- 6.2 percent of the U.S. population -- had diabetes. One million new cases of diabetes in people aged 20 years or older are diagnosed each year, and diabetes was the sixth leading cause of death in 1999.[10]

Untreated or poorly treated diabetes can result in death or significant disability, including heart disease and stroke, kidney failure, blindness, and lower limb amputations. Studies find that people with diabetes have medical expenditures that are 2.4 times higher than those without diabetes.[11] Research also finds that lifestyle changes, such as altering diet, increasing physical activity moderately, and lowering body weight by five to seven percent can prevent or delay the onset of type 2 diabetes.[12]

Cardiovascular Disease

Cardiovascular disease (CVD) is predominantly caused by atherosclerosis which results in inadequate blood flow to tissues in the body leading to damage or death of those tissues. In heart disease and stroke (the principal components of CVD), atherosclerosis affects the arteries of the heart and brain. The CDC identified five key risk factors for CVD: tobacco use, high cholesterol levels, lack of physical activity, poor nutrition, and high blood pressure.

Heart disease and stroke are the first and third leading causes of death in the United States, respectively. CVD accounts for 40 percent of the mortality in the United States, killing about 950,000 Americans annually.[13] Taken as a whole, CVD is the cause of more deaths than the next five causes of death combined.[13, 14] The 2000 age-adjusted death rate from CVD among the U.S. population was 343.1 per 100,000 people, with half of all of these deaths occurring among women.[15]

Hypertension

Hypertension, also known as high blood pressure, is one of the key risk factors for CVD. About 90 percent of middle-aged Americans will develop high blood pressure in their lifetime, and nearly 70 percent of people with high blood pressure do not have it under control. Of the estimated 50 million Americans with high blood pressure, 31.6 percent are unaware of their condition.[15] Hypertension can be controlled by maintaining a healthy weight; being physically active; following a healthy eating plan (which includes foods lower in salt and sodium); and drinking alcohol in moderation, if at all. Research shows that blood pressure was reduced with the DASH (Dietary Approaches to Stop

Hypertension) diet.[16] This eating plan is low in saturated fat, cholesterol, and total fat, and emphasizes fruits, vegetables, and low-fat dairy foods. It also contains whole grains, fish, poultry, and nuts, while limiting red meat, sweets, and sugar-containing beverages. It is rich in magnesium, potassium, and calcium, as well as protein and fiber.[17]

Cancer

Death rates from the four most common cancers; lung, breast, prostate, and colorectal, continued to decline in the late 1990s according to new data from the "Annual Report to the Nation on the Status of Cancer, 1975-2000." For all cancers combined, the death rate began to stabilize in the late 1990s, showing neither an increase nor a decrease, while the incidence rate (newly diagnosed cases) began to stabilize in the middle of the decade.[18] It is estimated that about one-third of all cancer deaths may be related to what we eat.[19] Making positive choices in dietary intake, e.g., following the Dietary Guidelines for Americans (see below), promotes good nutrition and good health and may reduce the risk of some types of cancer. Other behaviors that can decrease the risk of cancer include limiting time in the sun or wearing a sunscreen when outdoors, not smoking, being active, and maintaining a healthy weight.

Trends/Nutrient Patterns

Individual behaviors and lifestyle choices influence the development and course of many chronic conditions. Unhealthy behaviors, such as poor diet, lack of physical activity, and tobacco use are risk factors for overweight and obesity, type 2 diabetes, congestive heart failure, stroke, hypertension, and some cancers. Encouraging individuals to adopt healthy habits and practices through education and social marketing may reduce the burden of chronic disease in California while concurrently maintaining and/or improving overall quality of life. Also of importance are the advocacy and promotion for changes in policy and the environment to support these behaviors.

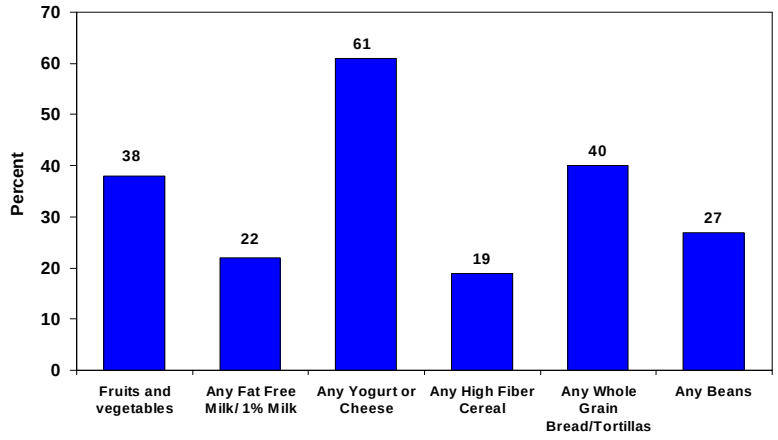
As our society has become more affluent since post World War II, nutritional concerns have changed from apprehension about the effects of too little food and/or nutrients to an overabundance of food. Epidemiological and laboratory studies demonstrate a link between dietary excess and chronic diseases such as coronary heart disease and cancer. These findings have led to the development of dietary guidance intended to reduce Americans' risk of chronic disease. Current dietary recommendations focus on ensuring an adequate intake of nutrients such as carbohydrates and fiber, while moderating others such as dietary fat which may be linked to the development of chronic disease.

Data from the 2003 California Dietary Practices Survey (CDPS) showed that few California adults, 18 years of age and older, had met the then dietary recommendations to promote good health and reduce the risk of many chronic diseases (See Table 1). Thirty-eight percent of California adults ate a minimum of five serving of fruits and vegetables daily. There were disparities in consumption of fruits and vegetables among Californians of varying ethnic backgrounds. African American Californians were less likely to eat five or more servings of fruits and vegetables than their White, Hispanic, and Asian/Pacific Islander counterparts (See Table 2). Though more than half (55 percent) of California adults drank milk, only 22 percent drank fat-free or 1 percent milk. Consumption of foods high in dietary fiber was low among California adults, with only 19 percent of them eating high fiber cereals, 40 percent consuming whole grain bread or tortillas, and 27 percent consuming beans.

CDPS tracked healthy eating behaviors practices of California adults. The health eating practices (HEP) score was calculated based upon one point each for: having fruit and a vegetable; eating five or more servings of fruits and vegetables; having any milk, yogurt or cheese; having any one percent or fat-free milk or yogurt; having whole grain breads/ corn tortillas; having any high fiber cereal; and having any beans; with a maximum possible score of seven. The average HEP score for California adults was 2.8.

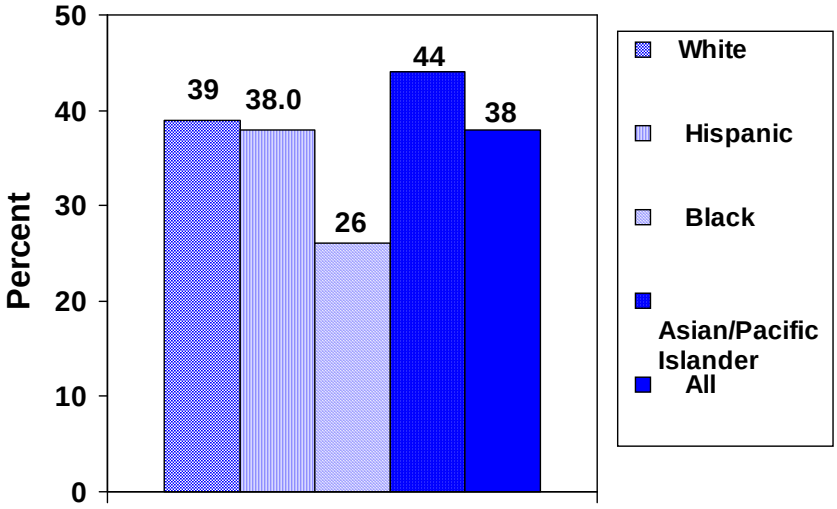
One possible explanation for these undesirable dietary practices is high consumption of food high in calories and low in nutrients (HCLN), which have been shown to replace the more nutrient-dense foods, such as fruits and vegetables and whole grains. Consistent with other studies, data shows that consumption of HCLN foods was negatively related to healthy eating behaviors.[1,2] Californians who did not eat any HCLN food items were also more likely to meet the then recommended five servings of fruits and vegetables, compared to those who consumed two to four HCLN food items (see Table 3).

Table 1: Proportion of California Adults (>18 yrs) Who Ate Foods Recommended for Good Health on the Previous Day, 2003



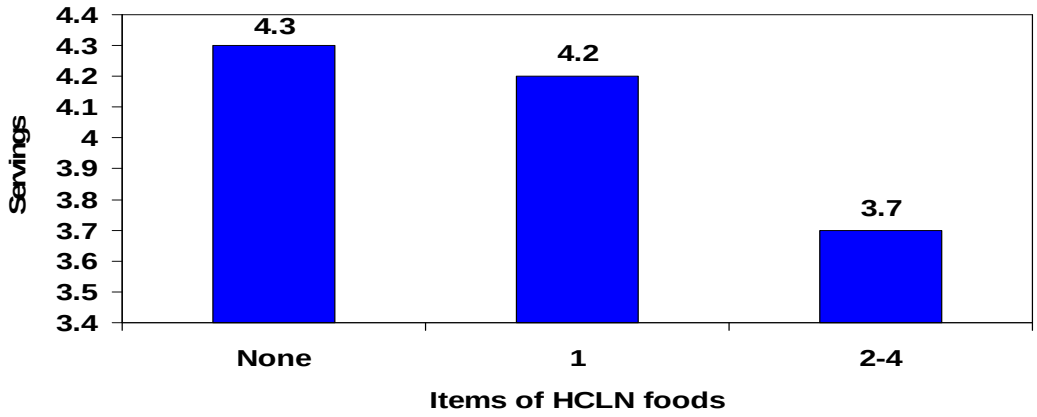
Data source: California Department of Health Services. (2006) California Dietary Practices Survey Data Tables. Unpublished 2003 Data, Cancer Prevention and Nutrition Services.

Table 2: Disparities in Percent Eating 5+ Servings of Fruits and Vegetables on the Previous Day by Race/Ethnicity, 2003



Data source: California Department of Health Services. (2006) California Dietary Practices Survey Data Tables. Unpublished 2003 Data, Cancer Prevention and Nutrition Services.

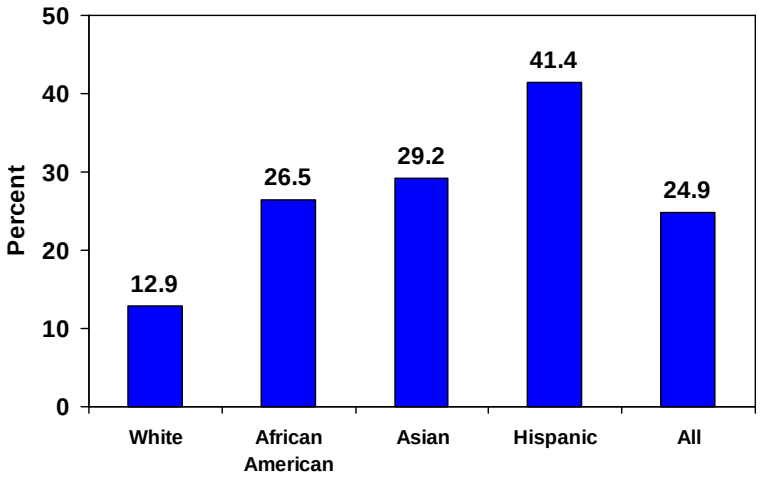
Table 3: Consumption of High Calorie, Low Nutrient (HCLN) by Servings of Fruits and Vegetables Consumed on the Previous Day, 2003



Data source: California Department of Health Services. (2006) California Dietary Practices Survey Data Tables. Unpublished 2003 Data, Cancer Prevention and Nutrition Services.

Research has shown that regular physical activity is important for enhancing health and reducing the risk of death from all causes.[1] The Dietary Guidelines for Americans 2005 recommends that adults get at least 30 minutes of physical activity, seven days a week for good health.[2] However, according to the 2005 Behavioral Risk Factor Surveillance System data, only 30 percent of California adults, 18 years of age and older, were close to meeting the recommendations for physical activity on an average day (were physically active six days a week, 30 minutes a day). Data from the 2001 California Health Interview Survey on adults between the ages of 19-50 revealed that almost a quarter (24.9 percent) of this population did not get any moderate or vigorous physical activity at all on an average day. Hispanic adults were more likely to have not participated in any moderate of vigorous physical activity compared to other ethnicities (see Table 4).

Table 4: Percent of California Adults, 19-50 yrs, Reporting No Moderate or Vigorous Physical Activity on and Average Day, CHIS 2001



Data Source: California Health Interview Survey (CHIS)—Ask CHIS 2001. Retrieved June 30, 2004, from http://www.chis.ucla.edu

Food Insecurity

Food insecurity remains a serious public health concern in the United States. A report by the United States Department of Agriculture in 2002 revealed that there was an increase from 10.7 percent in 2001 to 11.1percent in 2002 alone.[1] In addition, the 2003 California Health Interview Survey found that over one third (37 percent) of California adults between the ages of 19 and 50 were food insecure.[2]

Fast Foods

According to the 2003 CDPS data, on average, 16 percent of California adults ate at least one meal or snack a day from a fast food establishment such as McDonalds, Carl's Jr., Taco Bell, Burger King, KFC, Pizza Hut, or a food court. Ethnicity was significantly related to fast food consumption ($p<.01$). African American Californians were more likely to report eating fast food compared to their Hispanic, Asian, and White counterparts (26 vs. 19, 16, and 14 percent, respectively). These statistics pose a serious concern because data from the 2003 CDPS also show that the average consumption of fruits and vegetables was significantly lower in those who ate any meals from fast food establishments compared to those who had not eaten any meals outside of the home (3.3 servings vs. 4.3 servings, respectively; $p<0.001$).*

* California Department of Health Services. (2006) California Dietary Practices Survey Data Tables. Unpublished 2003 Data, Cancer Prevention and Nutrition Services.

Dietary Recommendations

In the United States, the leading determinants of morbidity and mortality are rooted in behavioral choices related to eating habits, exercise, tobacco use, alcohol consumption, and stress reduction. Scientific data consistently provide evidence that diet plays an important role in health promotion and disease prevention. Healthy eating habits, coupled with other healthful lifestyle behaviors including physical activity, have the potential to reduce the risk of chronic disease.

Health promotion and disease prevention endeavors are the best population-based strategies for reducing the current burden of chronic disease. Health professionals should be actively involved in promoting optimal nutrition in community settings and should advocate for the inclusion of healthy eating, in addition to other health-promoting behaviors, in programs and policy initiatives at local, state, and federal levels.

Dietary Guidelines for Americans

The Dietary Guidelines for Americans 2005 (Dietary Guidelines) provide recommendations based on updated scientific information about individual nutrients and food components that are important for promoting health and lowering the risk of chronic disease. Specifically, the intent is of the Dietary Guidelines is to summarize and synthesize knowledge gained through an analysis of evidence-based research. An Advisory Committee appointed by the U.S. Department of Health and Human Services and the U.S. Department of Agriculture reviews the Dietary Guidelines every five years and only recently completed their update in 2005. A basic premise is that nutrient needs should be met primarily through consuming food versus supplements. Foods provide a wide variety of nutrients and other compounds believed to have beneficial effects on health. In some cases dietary supplements and fortified foods can be beneficial; however, it is recommended that they not replace a well-balanced, healthy diet.[20]

Of key importance in the Dietary Guidelines is the need to obtain adequate nutrients within calorie needs while limiting the intake of saturated and *trans* fats, cholesterol, added sugars, salt, and alcohol.[20] To prevent gradual weight gain over time, it is suggested that small decreases in food and beverage calories be made and physical activity increased. A growing body of research suggests that regular physical activity can reduce the risks of heart disease, cancer, hypertension, type 2 diabetes, osteoporosis, and many other health problems traditionally linked to diet. The American College of Sports Medicine, the CDC, and the U.S. Surgeon General recommend accumulating 30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week to gain physical activity's health benefits. As the proportion of the U.S. population ages, physical activity will become even more

important to maintain the function and independence of older adults and enhance their quality of life.

In addition to eating a healthful diet, participation in regular physical activity can have one of the most important influences on health. Regular physical activity and physical fitness make important contributions to one's health, sense of well-being, and maintenance of a healthy body weight. For those who need to lose weight, decreasing calorie intake, increasing physical activity, and maintaining adequate nutrient intake is encouraged to promote a slow, steady weight loss. People with higher levels of physical fitness are at lower risk of developing chronic disease, and conversely, a sedentary lifestyle increases risk for over weight and obesity and many chronic diseases. Mortality rates from all causes of death are lower in physically active people compared to sedentary people. Physical activity can also aid in managing mild to moderate depression and anxiety.[20] Recommendations by the U.S. Department of Health and Human Services include:

- Thirty minutes of moderate-intensity physical activity beyond the usual daily activity throughout the week to reduce the risk of chronic disease.
- Sixty to ninety minutes of daily moderate-intensity physical activity in addition to not exceeding calorie requirements is encouraged to sustain weight loss.
- Cardiovascular conditioning and stretching for flexibility to promote muscle strength and endurance and achieve physical fitness.

The Dietary Guidelines encourage the intake of sufficient amounts of fruits and vegetables while staying within calorie needs. Several studies in addition to literature reviews indicate that diets rich in fruits and vegetables are associated with reduced risks for chronic disease and many types of cancer. Additional research is still needed in this area, but current evidence demonstrates a correlation between fruit and vegetable intake and improved health.

Total fat intake is suggested to account for between 20 to 35 percent of calories, primarily from polyunsaturated and monounsaturated fats such as fish, nuts, and vegetable oils. Additionally, less than 10 percent of calories should be from saturated fat, and less than 300 mg/day of cholesterol. *Trans* fat acids, which are defined as unsaturated fats that contain at least one non-conjugated double bond in the trans configuration, include hydrogenated or partially hydrogenated vegetable oils that are used to make shortening and many commercially prepared baked goods, snack foods, fried foods, and margarines. Intake from trans fats should be as low as possible.

Carbohydrates in the form of fiber-rich fruits, vegetables, and whole grains are recommended. Choosing and preparing foods with little added sugars and salt is recommended. Individuals with hypertension, blacks, and middle-aged adults should aim to consume no more than 1,500 mg (less than 1 tsp of salt) of sodium per day. The potassium requirement of 4,700 mg/day should be met with food rather than a supplement.

If alcoholic beverages are consumed intake should be moderate, which is defined as up to one drink per day for women and up to two drinks per day for men. While moderate consumption may help reduce the risk of heart disease, some studies find a link between alcohol intake and breast cancer. It is not advisable to drink alcohol for health reasons.

My Pyramid

U.S. Department of Agriculture's MyPyramid represents a personalized approach to healthy eating and physical activity. It is a visual depiction of what to eat each day based on the Dietary Guidelines.

Listed below are the estimated calorie requirements specific for ages 19-50 years old. Fewer calories are needed the older one gets; however, sufficient nutrients continue to be required by the body for good health. To optimize the beneficial impact of the Dietary Guidelines, the key recommendations previously discussed should be implemented in their entirety as well as adequate physical activity to maintain a healthy weight.[21]

Table 5: Estimated Calorie Requirements for Ages 19-50 Years Old, U.S. Department of Agriculture MyPyramid

Gender	Age (years)	Activity Level [a,b,c]		
		Sedentary	Moderately Active	Active
Female	19 – 20	2,000	2,200	2,400
	21 – 25	2,000	2,200	2,400
	26 – 30	1,800	2,000	2,400
	31 – 35	1,800	2,000	2,200
	36 – 40	1,800	2,000	2,200
	41 – 45	1,800	2,000	2,200
	46 - 50	1,800	2,000	2,200
Male	19 – 20	2,600	2,800	3,000
	21 – 25	2,400	2,800	3,000
	26 – 30	2,400	2,600	3,000
	31 – 35	2,400	2,600	3,000
	36 – 40	2,400	2,600	2,800
	41 - 45	2,200	2,600	2,800
	46 - 50	2,200	2,400	2,800

Source: MyPyramid.gov. 2005

These activity levels are based on Estimated Energy Requirement from the Institute of Medicine Dietary Reference Intakes macronutrients report, 2002, calculated by gender, age, and activity level.[21]

[a] Sedentary means a lifestyle that includes only light physical activity associated with typical day-to-day life; less than 30 minutes/day of moderate physical activity in addition to daily activities.

[b] Moderately activity means a lifestyle that includes physical activity equivalent to walking 1.5 to 3.0 miles/day at 3 to 4 miles/hour for at least 30 minutes and up to 60 minutes/day, in addition to light physical activity associated with typical day-to-day life.
[c] Active means a lifestyle that includes physical activity equivalent to walking more than 3 miles/day at 3-4 miles/hour for 60 or more minutes a day, in addition to the light physical activity associated with typical day-to-day life.

In the Table 6, MyPyramid's daily food intake patterns identify amounts to consume from each food group at a variety of energy levels. New nutrition standards have been published by the National Academy of Sciences' Institute of Medicine and these are now titled Dietary Reference Intakes (DRIs). They expand and replace previously published values in the Recommended Dietary Allowances (RDAs). The Dietary Guidelines, the foundation of federal nutrition policy, were also reviewed and updated. In addition, U.S. Department of Agriculture's Agricultural Research Service released new data on the nutritional content of foods and on food consumption patterns. The updated food intake patterns were published in the Dietary Guidelines. These food intake patterns form the technical basis for the new food guidance system, which replaces the original Pyramid and is entitled MyPyramid.[21]

The suggested amount of food to consume from the basic food groups, subgroups, and oils to meet the recommended nutrient intakes, per the U.S. Department of Agriculture, varies depending on calorie needs. For ages 19-50 consuming between 1,800 – 3,000 calories a day is recommended.[22] The daily amount of food from each group is as follows:

Table 6: Daily Food Intake Patterns Identifying Amounts to Consume at Varying Energy Levels. U.S. Department of Agriculture MyPyramid

Daily Amount of Food From Each Group							
Calorie Level	**1,800**	**2,000**	**2,200**	**2,400**	**2,600**	**2,800**	**3,000**
Food Groups							
Fruits	1.5 cups (3 svgs)	2 cups (4 svgs)	2 cups (4 svgs)	2 cups (4 svgs)	2 cups (2 svgs)	2.5 cups (5 svgs)	2.5 cups (5 svgs)
Vegetables	2.5 cups (5 svgs)	2.5 cups (5 svgs)	3 cups (6 svgs)	3 cups (6 svgs)	3.5 cups 7 svgs)	3.5 cups (7 svgs)	4 cups (8 svgs)
Grains	6 ounce equivalent	6 ounce equivalent	7 ounce equivalent	8 ounce equivalent	9 ounce equivalent	10 ounce equivalent	10 ounce equivalent
Lean meat and beans	5 ounce equivalent	5.5 ounce equivalent	6 ounce equivalent	6.5 ounce equivalent	6.5 ounce equivalent	7 ounce equivalent	7 ounce equivalent
Milk	3 cups	3 cups	3 cups	3 cups	3 cups	3 cups	3 cups
Oils [a]	5 teaspoons	6 teaspoons	6 teaspoons	7 teaspoons	8 teaspoons	8 teaspoons	10 teaspoons
Discretionary calorie allowance [b]	195	267	290	362	410	426	512

Source: Dietary Guidelines for Americans, 2005

[a] Oils shown in this table represent the amounts that are added to foods during processing, cooking, or at the table. The amounts listed are not considered to be part of discretionary calories because they are a major source of vitamin E and polyunsaturated fatty acids, including the essential fatty acids, in the food patterns.

[b] Discretionary calories are the remaining number of calories in each food pattern after selecting the specified number of nutrient-dense forms of foods in each food group. The number of discretionary calories assumes that food items in each food group are selected in nutrition-dense forms, (e.g., forms that are fat-free or low-fat and that contain no added sugars). Solid fat and sugar calories always need to be counted as discretionary calories. Examples include sugars added to fruits or fruits canned in syrup, vegetables prepared with added fat and/or sugars, added fats and/or sugars added to grain products such as pastries, cookies, and cakes.

Barriers to Implementation/Myths

The government recognizes the strong link between nutrition and health. This awareness is leading consumers towards taking greater responsibility for self-care and

an increased interest in food and nutrition information. However, this is also creating opportunities for nutrition misinformation, health fraud, and quackery to thrive. The media is most consumers' leading source of nutrition information, but news reports rarely provide complete and accurate information in order for consumers to correctly understand and implement the suggestions provided. Single, inconclusive studies are sometimes cited. The emergence of the Internet provides another major source of health and nutrition information, but consumers must be reminded that the accuracy of information appearing on web sites is not governed by any regulatory agency.

Misinformation about nutrition can be harmful to an individual's health or be used to fuel food faddism, quackery, or health fraud. The health consequences may include delay or failure to seek legitimate medical care or continue essential treatment, undesirable drug nutrient interactions, the effects of nutrient toxicity or toxic components in products, and interference with sound nutrition education information and practices. In particular information on dietary supplements, and complimentary and alternative medicine may be unreliable and inaccurate. A web site that may be useful in researching the accuracy of nutrition-related information found on the Internet is Quackwatch, Inc. (http://www.quackwatch.org). Quackwatch, Inc. is a nonprofit corporation whose purpose is to combat health-related frauds, myths, fads, fallacies, and misconduct.

Common Concerns/Strategies

Consistent and accurate nutrition guidance and messages reduce confusion and reinforce the credibility of science-based nutrition information and research. When looking at research findings the following questions help determine whether a study is valid:[21]

- Was the research done by a credible institution? A qualified researcher?
- Is this a preliminary study? Have other studies reached the same conclusions?
- Was the study done with animals or humans?
- Was the research population large enough? Was the study long enough?
- Who paid for the study? Might that affect the findings? Is the science valid despite the funding source?
- Was the report reviewed by peers?
- Does the report avoid absolutes, such as "proves" or "causes"?
- Does the report reflect appropriate context: for example, how the research fits into a broader picture of scientific evidence and consumer lifestyles?
- Do the results apply to a certain group of people? Do they apply to someone your age, gender, and health condition?
- What do follow-up reports from qualified nutrition experts say?

Credible scientific study is evidenced-based; whereas, other research may not be which results in doubt as to the validity of the information provided. For this reason, allied health professionals are urged to collaborate with qualified dietetics experts to provide consumer-focused health education, training for medical and health personnel, and implementation of community nutrition education outreach. Strategic partnerships

between allied health professionals and related scientific and professional organizations and the nutrition community can help ensure the delivery of consistent nutrition and health-related messages to consumers.[23]

Opportunities for Improvement

Food and nutrition are the foundation of the health of our population. Some considerations for ensuring that Californians reach and maintain optimum health include:

- A safe and nutritionally adequate diet should be available to all individuals.
- The use of sound science and its application in technology can contribute to effective food, nutrition, and health policy.
- Finding successful strategies to reduce the prevalence of obesity and overweight.
- Nutrition and health education and promotion are essential for disease prevention and treatment.
- Evidence-based medical nutrition therapy is an integral part of disease treatment, management, and rehabilitation.
- The spectrum of health care programs should include nutrition services delivered by dietetics professionals.
- Research in food and nutrition, including nutrition education, needs to be scientifically based and adequately supported.
- Monitoring and surveillance of the nutrition and health status of the population needs to continue on an on-going basis.
- Food and nutrition information needs to be based on reliable scientific evidence and disseminated in such a way as to promote public understanding with the goal of adopting a healthful lifestyle as a result of behavior change.
- Priorities should be established for evidence-based research related to public policy and convey the significance of the outcomes to policy makers.

Nutrition is one of the most cost-effective preventive treatments available to the American public but remains a minor priority in federal research funding, with only approximately four cents of every $100 spent on health care in the United States directed toward nutrition research.[22] Nutrition services directed toward prevention can help reduce health care costs that are rising by more than ten percent per year. Although funding related to disease prevention is limited, health professionals need to actively pursue funds for prevention programs and research.

Resources/Web Sites

American Diabetes Association	www.diabetes.org
CDC website	www.cdc.gov/nccdphp
American Dietetic Association	www.eatright.org
American Cancer Association	www.cancer.org
American Heart Association	www.americanheart.org
American Obesity Association	www.obesity.org
California Center for Public Health Advocacy	www.publichealthadvocacy.org
California Diabetes Prevention and Control Program	www.caldiabetes.org
California Project LEAN (Leaders Encouraging Activity and Nutrition)	www.californiaprojectlean.org
California Nutrition Network and the California 5 A Day	www.ca5aday.com
Centers for Disease Control and Prevention	www.cdc.gov
Center for Food Safety and Applied Nutrition	www.foodsafety.gov
Center for Weight and Health, UC Berkeley	www.cnr.berkeley.edu/cwh
Dairy Council of California	www.dairycouncilofca.org
Healthfinder	www.healthfinder.gov
Healthy People 2010	www.healthypeople.gov
National Center for Health Statistics	www.cdc.gov/nchs
National Heart, Lung, and Blood Institute, National Institutes of Health	www.nhlbi.nih.gov
National Institutes of Health	www.nih.org
North American Association for the Study of Obesity	www.naaso.org
Nutrition Gov	www.nutrition.gov
Partnership for Food Safety Education	www.fightbac.org
Prevention Institute	www.preventioninstitute.org
Shape Up America	www.shapeup.org
Strategic Alliance	www.eatbettermovemore.org
Tufts Nutrition	www.navigator.tufts.edu
USDA Center for Nutrition Policy and Promotion	www.mypyramid.gov
USDA Food and Nutrition Information Center	www.nal.usda.gov/fnic
USDA Dietary Guidelines	www.health.gov/dietaryguidelines
Web MD	www.webmd.com

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California Food Guide

Life Cycle: 51+ Year Olds

By Carol Hance R.D.

What's New?

- The CDC report on the State of Aging and Health in America 2004, states that older Americans, at that time, were not reaching the previous Healthy People 2000's target goal of eating at least four servings of fruits and vegetables each day. It also reports that one-third of adults 65+ did not engage in leisure time physical activities.[1]
- The 85+ age group is increasing more than any other age group in the United States.
- Moderate physical activity has proved to be beneficial for both mental and physical well being.
- Older consumers are taking more responsibility for their own health care, self treating with over the counter drugs, vitamins, herbal remedies, and food supplements. Furthermore, seniors are at risk for fraud due to profiteers pushing "anti-aging" remedies that are unfounded.

Public Health Implications

- The U.S. population that is 65 years and older is growing.[1] It is estimated that the elderly age group in California will increase 112 percent during 1990-2020.[2] This potentially could lead to increased healthcare costs.
- Older consumers are becoming interested in the dietary supplement market.[3]
- Early disease detection and treatment along with the promotion of healthy lifestyles, including programs supporting healthy eating habits and daily physical activity, are essential to healthy aging.
- Nearly 80 percent of people who need long-term care live at home or in community settings rather than institutions. Elders compromised by disabilities or dementia require care that impacts their families. Fifty-nine percent of the adult U.S. population either is or expects to be a family caregiver. Many caregivers have health concerns themselves.[1] Caregiver support is needed to control rates of stress and poor health (i.e. through respite services, support groups, and health maintenance programs).
- Dental care is often costly for seniors on fixed incomes and thus neglected. Oral health is essential to good health.
- CDC's Behavioral Risk Factor Surveillance System (BRFSS) data show that the prevalence of obesity among adults 65+ increased from 12 percent in 1990 to 19 percent in 2002.[1]

Public Health Implications continued

- Obesity is associated with an increased risk of chronic diseases such as cardiovascular disease and diabetes and may worsen conditions such as arthritis.[4]
- Diabetes affects one in five Americans over 65, and the aging of the U.S. population, in conjunction with the obesity epidemic will only intensify its impact.[4]
- Heart disease is the leading cause of death among those 65+ and accounted for 32.4 percent of deaths in 2001.[4]

Definition

The definitions of "senior," "elderly," and "aged" vary according to the source of documents studied. Information in this chapter will be cited according to the terminology used in the reference source. The information in this chapter focuses on the community dwelling (non-institutionalized) elderly.

While we can all anticipate a slowing down of bodily functions as we age, the rate of decline varies greatly from one individual to another. Genetics plays a role in dictating the rate of decline but controllable factors such as lifestyle and early disease detection and management are highly important in maintaining optimal health.

The older U.S. population (65+) increased to almost 36 million (one in eight Americans) in 2003.[5] California is the state with the largest number of residents in the 60+ age group (3.6 million or 14 percent of the state population). However, Florida has the highest percentage of the population (17 percent) in the 60+ age group. Nationally, in 2002, the 75-84 age group (12.7 million) was 16 times greater than in 1900. The 85+ group was 38 times larger than in 1900. The 85+ group is projected to increase from 4.7 million in 2003 to 9.6 million in 2030. There were over 50,000 persons aged 100+ living in the U.S. in 2002, a 35 percent increase from 1990. "Baby Boomers" born in 1946 to 1964 are now in their fifties. The Census Bureau projects that the older population will grow from 35 million in 2000 to 71.5 million in 2030 or 20 percent of the total U.S. population.[5]

The majority of individuals 51+ years of age live alone or with a family member(s) in the community. Women make up 69 percent of the 85+ population. Older women are twice as likely as older men to live alone. The percentage of Americans living in institutions in 2000 ranged from 4.5 percent (65+) to 18.2 percent for those 85+.[6] According to CDC, nursing homes have an estimated 900,000 fewer residents today than they would have had if the rates of nursing home use had remained steady over the last two decades.[6]

Results of the 2000 long-form census (received by one in six housing units) showed that 50 percent of the 50-59 group living with grandchildren were responsible for the children, 31 percent of the 60-69 age group were responsible

for the children, with 34 percent of the grandparent caregivers residing with grandchildren but not the children's parents.[7]

Trends/Nutrient Patterns

The Dietary Guidelines for Americans 2005 (Dietary Guidelines) includes key recommendations for specific populations including the 51+ age group. The guidelines recommend daily calorie intakes, for 51+ years of age, based on physical activity levels as indicated in Table 1 below:

Table 1: Daily Calorie Intakes Based on Gender, Age, and Physical Activity Levels[8]

Gender	Age	Sedentary	Moderately Active	Active
Female	51+	1,600	1,800	2,000-2,800
Male	51+	2,000	2,200	2,400-2,800

(Reference: Dietary Guidelines for Americans 2005, Table 3, page 12)

Dietary Guidelines for Americans 2005 Key Recommendations[8]

In addition to following the general recommendations for eating from all five food groups, controlling fat, sodium, and calorie intake, individuals 51+ are advised to:

- Consume vitamin B_{12} in its crystalline form (i.e., fortified foods or supplements).
- Be sure to get at least 15 minutes of ultraviolet band radiation (sunlight) each day or take extra vitamin D from vitamin D fortified foods and/or supplements to ensure an intake of 400 I.U.s daily.
- Consume less than 2,300 mg sodium (approximately one teaspoon of salt) per day. Individuals with hypertension and older adults aim to consume no more than 1,500 mg of sodium per day, and meet the potassium recommendation (4,700 mg/day) with food.
- Choose fiber-rich fruits, vegetables, and whole grains often.
- Reduce the incidence of dental caries by practicing good oral hygiene and consuming sugar and starch containing foods and beverages less frequently.
- Participate in regular physical activity to reduce functional declines associated with aging and to achieve other benefits of physical activity identified for all adults.

Consumers and professionals can access a wealth of information through the USDA's MyPyramid which was designed to complement the Dietary Guidelines.

The MyPyramid Plan provides information about the personal nutrition and physical activity needs of a consumer based on age, sex, and current physical activity levels. The MyPyramid Worksheet provides a checklist of the amount and types of food needed to meet daily requirements. An online dietary and physical activity assessment tool is available at http://www.mypyramidtracker.gov/. "Inside the Pyramid" at http://www.mypyramid.gov/pyramid/ has illustrations of the food groups and daily physical activity recommendations. Detailed information about food groups may be found in the Food Groups section.

Vitamins and Minerals

Adults do not consume enough vitamins A, C, and E; calcium; magnesium; potassium; and fiber. In addition to following the recommendations for these nutrients of concern, people over age 50 should follow the recommendations for B_{12} and Vitamin D as stated in the Key Recommendations of the Dietary Guidelines.[8]

Blood Pressure

Keeping blood pressure in the normal range reduces the risk of coronary heart disease, stroke, and congestive heart failure.[8] Nearly all Americans consume more salt than they need. Key recommendations advise older adults or those with elevated blood pressure to consume no more than 1,500 mg of sodium per day and to meet the Adequate Intake (AI) recommendation for 4,700 mg/day of potassium, a difficult goal to achieve. Approximately 75 percent of sodium found in processed foods in the U.S. is from substances added by the manufacturers. The range of sodium content of processed foods available in the retail market may vary widely so labels must be compared. Foods listed as containing more than 140 mg or more than 5 percent of the Daily Value (DV) for sodium per serving are high in sodium. Understanding nutrition labels of processed foods is essential.[9] Restaurant food is also frequently high in sodium and must be selected carefully to minimize sodium intake.[8]

Fresh vegetables, whole grains, dry mature beans, and many fresh meats are examples of unprocessed foods which, on the average account for only ten percent of the total sodium intake. Most fresh and frozen fruits contain little or no sodium and are high in potassium. Table salt added in cooking or at the table accounts for five to ten percent of sodium in the diet.[8]

Reducing salt intake is one of several ways that people may lower their blood pressure. A potassium rich diet blunts the effects of salt on blood pressure in some individuals. Potassium is found in a wide variety of foods. Potassium rich fruits and vegetables include leafy green vegetables, root vegetables, and fruit from vines.[8] Dietary sources of potassium are listed in the Dietary Guidelines for Americans, 2005 Appendix B-1:[8] http://www.healthierus.gov/dietaryguidelines/.

The amount of potassium found in common foods is listed in the USDA National Nutrient Database for Standard Reference:[10] http://www.nal.usda.gov/fnic/foodcomp/search/.

In addition to providing potassium, fresh fruit and vegetables also provide an array of other nutrients. Often, the brighter the color, the higher the content of vitamins, minerals, antioxidants, and phytochemicals in fruits and vegetables. Research points to the health promoting power of phytochemicals found in fruit, vegetables, and whole grains. Many of these disease fighters are found in the plant pigments so the more colorful the fruit or vegetable the better. Red and blue/purple fruits and vegetables may be beneficial to maintaining memory function (because of the antioxidants they contain) and should be included in the "other fruits" to be consumed weekly.[11]

Fiber Rich Foods

The Nutritional Goal for total fiber intake listed in Table D1-1 USDA Daily Food Intake Patterns[8] for women 51+ is 22 grams per day and 28 grams per day for 51+ men. Mature cooked beans such as navy, kidney, pinto, and split peas are rich in fiber, with over 15 grams fiber per cup. Frozen peas, mixed frozen vegetables, pumpkin, dates, dried plums (prunes), raw raspberries and black berries, sweet potatoes, and winter squash each provide six grams or more of dietary fiber per cup. Asian pears, raw raspberries, raw black berries, sweet potatoes, and winter squash each provide six grams or more of dietary fiber per cup.[10] A complete ranking of fiber in foods may be found on the USDA National Nutrient Database for Standard Reference http://www.ars.usda.gov/main/site_main.htm?modecode=12-35-45-00.[10] Please note that the ranking is not always for the same amount by weight or measure.

Recommendations for Electrolytes and Water[8]

The Adequate Intake (AI) level for water was established at 3.7 liters/day for adult men and 2.7 L/day for adult women in a temperate climate. Total water intake includes drinking water, water in beverages, and water contained in food (including about 80 percent from fluids and 20 percent from foods). Individual water requirements can vary widely due to differences in physical activity, environment, and diet. The primary indicator of hydration status is plasma or serum osmolality. Appendix G-1 from the recent 2004 Institute of Medicine (IOM) report provides the serum osmolality by decile of total water intake in the third *National Health and Nutrition Examination Survey* (NHANES III).[12] Serum osmolality concentrations were essentially identical (the maximum range between the lowest and highest decile was only three mOsmol/kg). These data indicate that persons in the lowest and highest deciles of total water intake were neither systematically dehydrated nor hyperhydrated. Importantly, this pattern of findings also was evident in men and women age 71 and older.[8] www.health.gov.dietaryguidelines/dga2005/report

Recommendations for Reducing Dental Caries: Practice Good Oral Hygiene and Consume Sugar and Starch Containing Foods and Beverages Less Frequently

According to The State of Aging in America, California ranked number one in meeting the Healthy People 2000 Oral Health (65+) target of complete tooth loss of no more than 20 percent.[1] Individuals over the age of 50 frequently have one or more chronic diseases or conditions that can affect their dental health. Among the elderly wearing defective dentures and the edentulous, poor oral health is thought to contribute to the development of involuntary weight loss associated with protein-energy malnutrition.

An American Dietetic Association position paper states that "Oral health and nutrition have a synergistic relationship."[13] The Surgeon General's report in 2000 stated that 23 percent of 65- to 74-year-olds have severe periodontal disease. Periodontal disease (PD) is an oral infectious disease involving inflammation and loss of bone and the supporting tissue of the teeth. Systemic influences on the disease include diabetes mellitus, smoking, stress, immune status of the host, and presence of pathogens associated with PD in the subgingival flora. Malnutrition can elicit adverse alterations in the volume, antibacterial and physiochemical properties of saliva. Good dietary practices combined with the removal of the stimuli of the inflammatory periodontal response are important in diminishing the severity of PD.[13] About 30 percent of adults 65 years and older are edentulous, compared to 46 percent 20 years ago. These figures are higher for those living in poverty.[14]

Most older Americans take both prescription and over-the-counter drugs. In all probability, at least one of the medications used will have an oral side effect--usually dry mouth. Many medications used to treat chronic diseases common in aging have the side effect of diminished salivary flow, depriving teeth of the many protective factors in saliva.[15] The inhibition of salivary flow increases the risk for oral disease because saliva contains antimicrobial components as well as minerals that can help rebuild tooth enamel after attack by acid-producing, decay-causing bacteria.[14]

Use of herbs and dietary supplements can also impact nutrition and oral health. Moreover, elderly with reduced chewing ability take more drugs (including laxatives and anti-reflux agents) for gastrointestinal disorders than those with normal chewing ability.[14] Difficulty with chewing, swallowing, and with mouth pain are identified as indicators of nutritional risk in older adults.[13] Helping seniors access affordable and geriatric-friendly dental services is vital.

Fluoridated drinking water has also been shown to effectively reduce both crown and root decay in middle-aged and older adults. This benefit is important because seniors frequently experience gum recession which results in root exposure. This area of the tooth is highly sensitive and susceptible to dental

decay. Also, as previously stated, tooth retention in older U.S. residents has increased in recent years, which means that the number of teeth at risk for tooth decay in seniors has increased as well. It is important to note that restoring decay on the tooth roots is difficult and often comes with a poor prognosis for tooth longevity. Fluoridated drinking water has been shown to reduce the incidence of root decay up to 60 percent in seniors.[15]

Aging Adult Physical Activity

In addition to eating a healthful diet, regular physical activity is an important means for achieving good health. Regular physical activity can lower the risk of cardiovascular disease, type 2 diabetes, colon and breast cancer, depression, and osteoporosis, as well as help to maintain healthy weight and functional independence.[16] A synergistic relationship may occur in health promotion programs that incorporate both healthy eating and physical activity.

CDC, the National Institutes of Health (NIH), the American Heart Association, and the American College of Sports Medicine all recommend that American adults accumulate at least 30 minutes of moderate-intensity physical activity on most days of the week.[17] According to a report in the Journal of the American Medical Association, women aged 70-81 years old involved in the Nurses Health Study who regularly walked at an easy pace 1.5 hours/week (long term physical activity) had better cognitive function and less decline than those in the same age group who did not participate in regular physical activity.[18]

"The new *Blueprint* on physical activity and health sends a strong message that regular physical activity is important to promote health and reduce chronic diseases among individuals 50 years of age and older. There are many things that individuals can do to be physically active, but most of all it is important to choose activities that one enjoys, such as walking, gardening, bicycling or swimming and doing them regularly, several days a week." — Jeffrey P. Koplan, M.D., M.P.H., Director, CDC.[19]

An interactive exercise instruction can be found at “Exercise for Older Adults” website: http://nihseniorhealth.gov/exercise/toc.html. An illustrated exercise book is also located on the NIH Senior Health web site. More details about physical activity can be found in the Physical Activity chapter on this California Food Guide web site.

Recommendation for Alcoholic beverages[8]

The Dietary Guidelines for Americans 2005 defines moderate alcohol consumption as the consumption of up to one drink per day for women and up to two drinks per day for men.[8] One drink is defined as 12 oz of regular beer, 5 oz of wine (12 percent alcohol), or 1.5 oz of 80-proof distilled spirits. Alcoholic beverages supply calories but provide few essential nutrients. If used, the

calories are to be counted as discretionary calories. The 51+ age groups have few discretionary calories so wise calorie choices are necessary. Please refer to Table 2 for caloric intake for specific alcoholic beverages.

People Who Should Not Drink Even in Moderation:[8]

- Individuals who cannot restrict drinking to a moderate level.
- Individuals who are taking prescription or over the counter drugs which can interact with alcohol.
- Individuals with specific medical conditions, have balance problems, or a history of falls.

Table 2: Calories in Selected Alcoholic Beverages[8]

Beverage	Approximate Calories 1 fluid ounce	Example Serving Volume	Approximate Total Calories
Beer (regular)	12	12 ounce	144
Beer (light)	9	12 ounce	108
White wine	20	5 ounce	100
Red wine	21	5 ounce	105
Sweet dessert wine	47	3 ounce	141
80 proof, distilled spirits (gin, rum, vodka, whiskey)	64	1.5 ounce	96

Recommendation for Food Safety

Food safety must under gird all dietary guidelines. Foodborne illness strikes over 76 million Americans each year. Older adults may have weakened immune systems making it difficult to fight foodborne pathogens. This makes the elderly vulnerable to severe complications including gastroenteritis-induced deaths.

Individuals aged 51+ should avoid:[8]

- raw (unpasteurized) milk, or products made from unpasteurized milk such as soft cheese (feta, brie, blue veined, Mexican style). Hard cheeses, processed cheese, cream cheese, cottage cheese and yogurt need not be avoided.
- raw or partially cooked eggs or foods containing raw eggs.
- raw or undercooked fin fish, shellfish, meat, and poultry.
- unpasteurized or untreated juices and raw sprouts.

In the U.S., 98 percent of the juice is pasteurized or otherwise treated to kill harmful bacteria. The Food and Drug Administration requires a warning label on the untreated juice products.[8]

Downloadable information about food safety for seniors is on the U.S. Food and Drug Administration Center for Food Safety and Applied Nutrition Website. Eight different topics are available at FDA/CFSAN Seniors and Food Safety. Information about keeping food safe to eat can be accessed at http://www.fsis.usda.gov/Food_Safety_Education/. The Food Marketing Institute for Consumers has information about safe food storage.

Common Concerns/Strategies

Cognitive Decline and Dementia

Over 40 percent of the 85+ population has cognitive impairment which results in an increase in demand for long-term care services. Nearly 80 percent of individuals needing long-term care live at home. Perhaps more than any other disabling conditions, Alzheimer's disease and dementia impinge on the quality of life of family caregivers. The stress of family care giving has been shown to impact a care giver's immune system for up to three years after care giving ends, thus increasing their chances of developing a chronic illness themselves.[20]

Forgetfulness

Some memory problems are serious, and others are not. People who have serious changes in their memory, personality, and behavior may suffer from dementia. Dementia seriously affects a person's ability to carry out daily activities. The term dementia describes a group of symptoms that are caused by changes in brain function. Dementia symptoms may include asking the same questions repeatedly; becoming lost in familiar places; being unable to follow directions; getting disoriented about time, people, and places; and neglecting personal safety, hygiene, and nutrition. Dementia is caused by many conditions.

Some conditions that cause dementia can be reversed, and others cannot. Furthermore, many different medical conditions may cause symptoms that seem like Alzheimer's disease, but are not. Some of these medical conditions may be treatable. Reversible conditions can be caused by a high fever, dehydration, vitamin deficiency and poor nutrition, bad reactions to medicines, problems with the thyroid gland, or a minor head injury. Medical conditions like these can be serious and should be treated by a doctor as soon as possible.[21]

Chronic Disease Prevention

NIH directly relates 30 percent of deaths from cardiovascular disease to diet and sedentary life style.[22] The cost of providing health care for one person age 65+ is three to five times greater than the cost of someone younger than 65.[22] Please refer to Table 3 below for the percentage of the senior population that suffers from specific chronic conditions.

Table 3: Selected Chronic Conditions Among Adults 65 and Older
(Expressed in percent of 65+ Population)[22]

Chronic Conditions	
Stroke	8.6
Diabetes	15.2
Cancer	19.9
Heart Disease	20.4
Hypertension	35.9
Arthritis	49.2

Source: CDC, National Center for Health Statistics National Health Interview Survey 2000-2001. Respondent was considered to have "arthritic symptoms" if s/he answered "yes" to "During the past 12 months, have you had pain, aching, stiffness or swelling around a joint? And have the symptoms been present on most days for at least one month?"

Barriers to Implementation/Myths

Myth 1. Health inevitably declines as we get older. Reality: CDC states that people of any age can improve their health by adopting healthy behaviors.

Myth 2. If one takes a multivitamin, all nutrient needs are covered and it doesn't matter what one eats. Reality: There is more to a healthy diet than vitamins and minerals. The phytochemicals, as well as the fiber, found in plant foods are important to "defensive eating."

Barrier 1. TV watchers confuse infomercials with factual nutrition advice. Many of these advertising programs promote "anti-aging" food supplements and target older audiences.

Barrier 2. TV, magazines, and newspapers are the top three sources of older consumer's nutrition information. The volume and misinformation received causes the consumer to be confused about who or what to believe.[18]

Barrier 3. The sources of potassium are not clear to consumers as potassium is not uniformly listed on food labels. Example: Potassium is not listed on bags of dry beans or many canned sweet or other potatoes or baked, kidney or other ready-to-eat dry beans but is listed on frozen French fries.

Barrier 4. Fast foods are not served with nutritional labels. Many seniors frequent fast food establishments to find low-cost meals and to socialize without having to cook.

Barrier 5. Health disparities related to nutrition and disease are seen among African American, Latino, and other ethnic groups. Refer to the ethnicity chapters on the California Food Guide website for details.

Opportunities for Improvement

One goal of Healthy People 2010 is to increase the quality and years of healthy life. Quality, to many individuals, means "aging in place"- remaining independent in one's own home.[23]

Opportunities:

1. Assist the elderly in remaining independent by referring individuals to the proper community agencies already in place.

2. Promote community resources and advocate for increased access to needed services.

3. Promote services providing dietary assessments, health screens, education and referrals to needed services.

4. Promote food programs that increase access to healthy food (i.e. Senior Gleaners, Food Stamps, Meals on Wheels, Senior Nutrition Programs). Potentially effective could be transportation programs that take seniors to grocery stores and farmer's markets.

5. Emphasize the concept that nutrients should come primarily from wholesome foods. These contain not only vitamins and minerals found in supplements but also hundreds of natural substances which may protect against chronic health conditions.

6. Provide education for family members and other "in-home caregivers" about caring for the elderly with dementia and other chronic diseases and also caring for themselves and reducing stress. Work with disease-related support groups (such as Alzheimers, arthritis, heart disease) and promote them.

7. Provide evidence-based health information for the public through media including the internet, radio, television, and newsprint to minimize misinformation about food and diet.

Resources/Web Sites

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    Select from index "Seniors and Food Safety" choice of topics
    Fight bac – http://www.fightbac.org/main.cfm. Accessed 4/11/06.
    http://www.homefoodsafety.org (video, down loadable brochures, fact sheets) Accessed 4/11/06.

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    - Exercise for Older Adults: http://nihseniorhealth.gov/exercise/toc.html Accessed 4/11/06.
    - Not Too Late Tips: http://www.ndep.nih.gov/ Accessed 4/11/06.
    - Office of Dietary Supplements: http://ods.od.nih.gov/index.aspx Accessed 4/11/06.
    - Chart for Sharing Information (about supplement use) with Health Care Team http://www.cfsan.fda.gov/ Accessed 4/11/06.

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*Photo source: *Health Canada web site and Media Photo Gallery*, Health Canada. http://www.hc-sc.gc.ca Reproduced with the permission of the Minister of Public Works and Government Services Canada, 2005.

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California Food Guide

Physical Activity: California's Approaches to Promoting Physical Activity and Health

By Steven P. Hooker, Ph.D. and Jim Carman, M.S.

What's New

- Federal and state Safe Routes to School legislation is an example of environmental and policy approaches that hold important promise for increasing physical activity levels and decreasing the risk of chronic diseases among large populations over the long-term.
- The United States Department of Agriculture (USDA) in 2005 revised the Dietary Guidelines for Americans.[1]

Public Health Implications

Healthy People (HP) 2010 objectives recommend that Americans should aim to reduce the proportion of adults who engage in no leisure-time physical activity from a baseline of 40 percent to a target objective of 20 percent.[2] Over half of California adults are not engaging in sufficient physical activity, which is leading to primarily sedentary lifestyles. Thus the California baseline does not meet the HP 2010 target.[3] Recently, it has been estimated that the annual cost of physical inactivity cost the state of California approximately $13.3 billion dollars in the year of 2000.[4]

Definition

Physical activity is defined as, "bodily movement produced by the contraction of skeletal muscles that increases energy expenditure above the basal level."[5] Physical activity can occur in the context of occupational, household, leisure time, or transportation activities. Many people mistakenly use exercise and physical activity synonymously. **Exercise**, is physical activity that is planned, structured, repetitive, and purposeful for improving or maintaining one of more components of physical fitness.[5] **Physical fitness** components include, cardio-respiratory (aerobic) endurance, muscular endurance and strength, speed, flexibility, agility, balance, reaction time and body composition.[5] A person is considered **physically inactive** when they indicate that they have not engaged in any leisure time physical activity during the previous 30 days.[3]

Burden

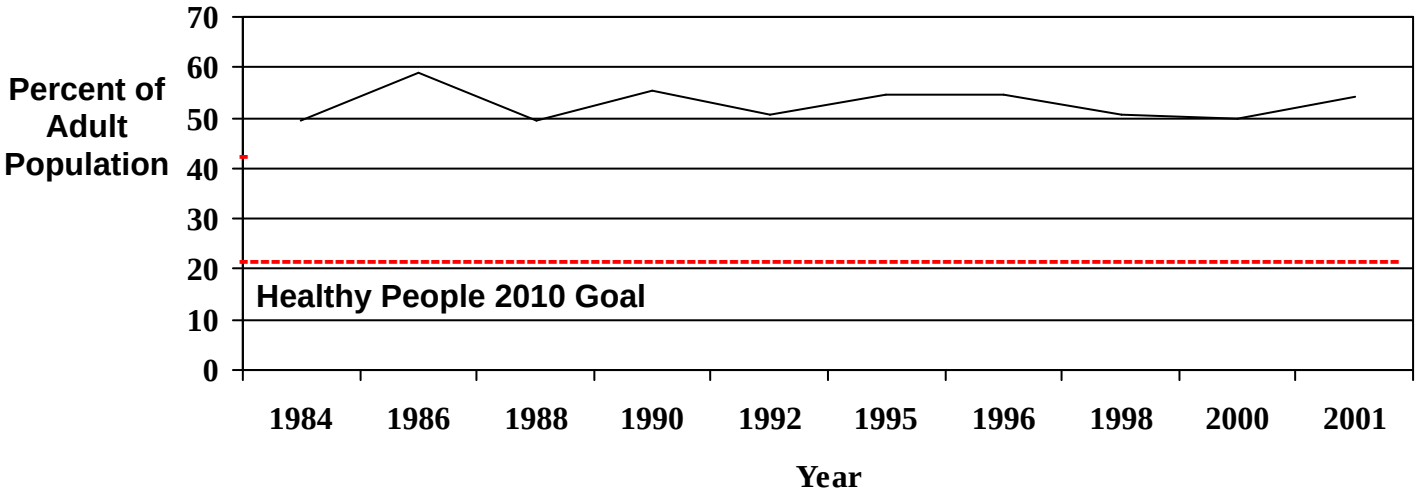
In California, physical inactivity is by a large margin the most prevalent chronic disease risk factor with more than one of every two adults reporting a sedentary lifestyle.[3] This is unfortunate since years of irrefutable research evidence indicates that low levels of physical activity are strongly linked to high rates of mortality and morbidity from chronic diseases such as coronary heart disease, non-insulin dependent diabetes, obesity, hypertension, colon and breast cancer, osteoporosis, and depression.[5] Sedentary lifestyle is also associated with decreased mental alertness, higher levels of stress, poor sleep quality, low self-worth, higher rates of disability, and diminished quality of life.[5]

Indeed, the public health and economic burdens of physical inactivity are significant. In California, it is estimated that physical inactivity may be responsible for nearly $13 billion annually in direct and indirect medical care, lost employee productivity, and worker's compensation costs.[4] These costs will continue to rise due to increases in California's aging population, growth in the general population, monetary inflation and the continued high prevalence of physical inactivity. The greatest burden will be borne by those with the highest rates of physical inactivity: low income, less educated, racial/ethnic minorities, immigrants, and older adults. As such, physical inactivity will continue to contribute to the health disparities observed in many California communities and populations.

Incidence and Prevalence

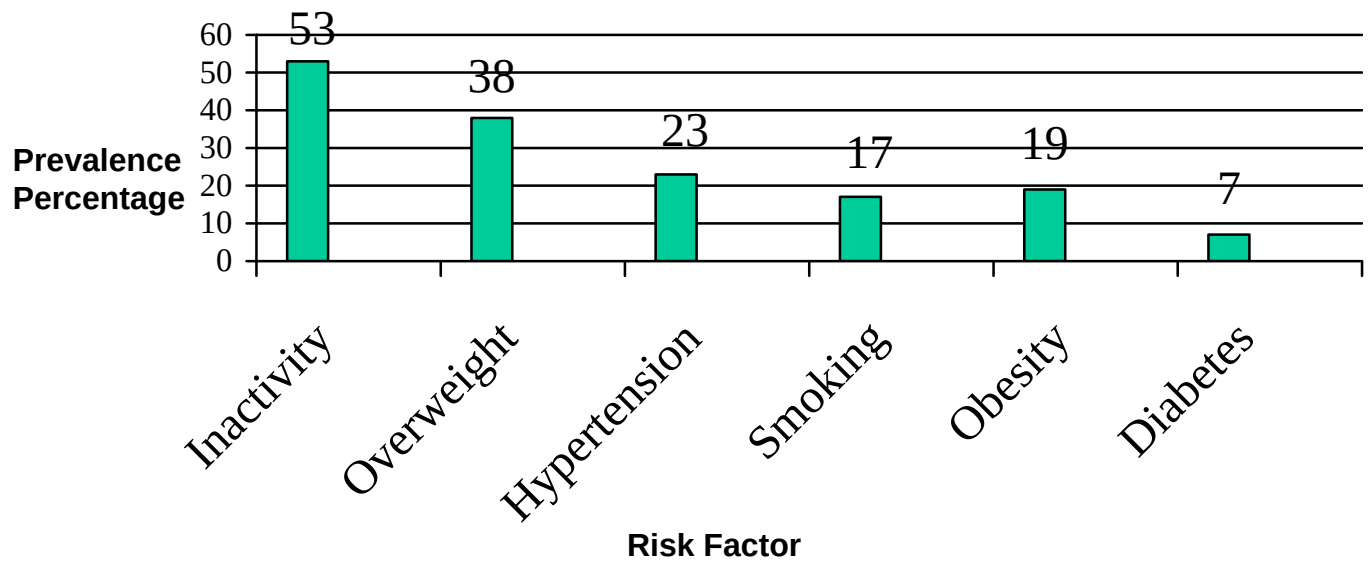
The rates of physical inactivity in California adults have remained relatively unchanged over the past 15-20 years (see Figure 1).[3] Combining persons who report absolutely no leisure time physical activity over the past month with those who report being irregularly active (e.g., one to four physical activity bouts per month), over one-half of California adults are not engaging in sufficient levels of physical activity to reap health benefits. These persons lead essentially sedentary lifestyles. This rate of physical inactivity is well above the Healthy People 2010 goal of 20 percent of the population reporting a sedentary lifestyle, indicating more work needs to be done to combat this unhealthy behavior.

Figure 1: Prevalence of Physical Inactivity Among California Adults, 1984-01[3]



The prevalence of physical inactivity among Californians is much greater than the prevalence of other risk factors for chronic disease (figure 2).[6] These data further demonstrate the need to focus resources on encouraging and enabling persons to become and remain physically active.

Figure 2: Prevalence of CVD Risk Factors Among California Adults, 2003[6]



Can increasing our levels of physical activity prevent chronic disease?
Yes. There is an increasing recognition and consensus among epidemiologists, experts in exercise science, and public health professionals on the value of regular moderate intensity physical activity in improving the health of Americans. For example, according to Physical Activity and Health: A Report of the Surgeon General, regular physical activity significantly reduces the risk of:[5]

- Coronary heart disease
- Non-insulin dependent diabetes
- Obesity
- Osteoporosis
- Colon cancer
- High blood pressure

See Table 1 located at the end of the chapter for the potential impact regular physical activity has on several common chronic diseases.

According to the most recent California data, African American women, Hispanic men and women, and persons with less than a high school education are least likely to engage in regular leisure time physical activity.[3] However, data indicates that nearly one out of every two Californian adults is physically inactive regardless of gender, age, race, ethnicity, or geographical location. Unfortunately the majority of adult Californians are not engaging in sufficient physical activity to achieve significant health benefits.[5] A key challenge for public health is to help improve the detrimental behaviors of those who are at high risk for physical inactivity and chronic disease.[1]

Common Concerns/Strategies

If the current percentage of Californian adults who are physically inactive could be reduced, the statewide financial toll from this modifiable risk factor could be substantially decreased. A five percent increase in the percentage of physically active adults could produce cost savings of about $1 billion per year.[4]

What other benefits accrue from physical activity?

Physical activity also helps:

- Increase mental alertness
- Manage stress
- Reduce anxiety
- Manage depression
- Improve sleep quality
- Control or reduce weight
- Improve mood (psychological well-being)
- Enhance quality of life
- Increase self-confidence and self-worth

How much physical activity does it take to reap the benefits? Physical Activity and Health: A Report of the Surgeon General recommends that for health-related benefits all adults should accumulate at least 30 minutes of at least moderate-intensity physical activity on most, if not all, days of the week.[5] The report also states that persons already achieving this level could gain even greater health and fitness benefits by performing physical activity for a longer duration and/or at a higher intensity.

The recommended level of physical activity can be achieved with a 30-minute brisk walk five days per week.[5] Nearly every Californian can integrate physical activity into his or her life with slight modifications in daily routine. This is termed **incidental physical activity**. The integration of incidental physical activity is useful when considering that an estimated daily imbalance of only 100 kilocalories is linked to the rising rates of overweight and obesity among adults.[4] Lifestyle modifications to help offset this daily energy imbalance might include taking stairs instead of elevators, parking further away from a destination, walking or biking rather than using the car for short (less than one-half mile) trips, getting off the bus a stop or two before the usual stop, or doing yard work and household chores. Promoting incidental physical activity does not overlook the role of structured, planned physical activity or exercise, but assists in making individual behavior change realistic and possible. Table 2 (on page 13) presents the potential energy expenditure of replacing common sedentary activities with regular physical activity.

Reports subsequent to the Surgeon General's recommend that children and youth should be physically active for at least 60 minutes per day for a variety of physical and mental health and social benefits.[7] Children and youth can attain physical activity recommendations in the context of free play, games, transportation, physical education, intra- and inter-mural programs, organized sports, recreation, structured exercise, and work. In addition, extended periods of sedentary activity, such as non-academic television watching and computer use, should be discouraged and limited. Children and youth should be limited to a maximum of two hours a day for television and video time.[8]

See Table 3 for current physical activity guidelines for various age groups developed by the California Department of Health Services.

The United States Department of Agriculture (USDA) recently released the revised Dietary Guidelines for Americans 2005 (Dietary Guidelines). Revisions include specific recommendations related to physical activity throughout the life span. These recommendations include the following:

Dietary Guidelines for Americans 2005: Recommendations for Physical Activity[1]

The Dietary Guidelines state that most adults do not need to see their healthcare provider before starting a moderate-intensity physical activity program. However, men older than 40 and women older than 50 years who plan a vigorous program or who have either chronic disease or risk factors for chronic disease should consult their physician to design a safe, effective program. Key recommendations include the following:

- Engage in regular physical activity and reduce sedentary activities to promote health, psychological well-being, and a healthy body weight.
- To reduce the risk of chronic disease in adulthood: Engage in at least 30 minutes of moderate intensity physical activity, above usual activity, at work or home on most days of the week.
- For most people, greater health benefits can be obtained by engaging in physical activity of more vigorous intensity or longer duration.
- To help manage body weight and prevent gradual, unhealthy body weight gain in adulthood: Engage in approximately 60 minutes of moderate to vigorous intensity activity on most days of the week while not exceeding caloric intake requirements.
- To sustain weight loss in adulthood: Participate in at least 60 to 90 minutes of daily moderate intensity physical activity while not exceeding caloric intake requirements. Some people may need to consult with a healthcare provider before participating in this level of activity.
- Achieve physical fitness by including cardiovascular conditioning, stretching exercises for flexibility, and resistance exercises or calisthenics for muscle strength and endurance.

Key Recommendations for Specific Population Groups[1]

- **Children and adolescents**: Engage in at least 60 minutes of physical activity on most, preferably all, days of the week.
- **Pregnant women**: In the absence of medical or obstetric complications, incorporate 30 minutes or more of moderate intensity physical activity on most, if not all, days of the week. Avoid activities with a high risk of falling or abdominal trauma.
- **Breastfeeding women**: Be aware that neither acute nor regular exercise adversely affects the mother's ability to successfully breastfeed.
- **Older adults**: Participate in regular physical activity to reduce functional declines associated with aging and to achieve the other benefits of physical activity identified for all adults.

Opportunities for Improvement

Partnership, collaboration, and greater understanding among public and private sectors will be the keys to successfully increasing physical activity levels in

California. Public health professionals, legislators, policy makers, city planners, transportation engineers, commercial advertisers, private industry, school boards and superintendents, architects, employers, and others need to recognize that they each play a role in either encouraging or discouraging physical activity among Californians. Effective solutions to the physical inactivity epidemic cannot be implemented without their cooperation and involvement.

The California Center for Physical Activity (CCPA), formerly known as the Physical Activity and Health Initiative (PAHI), was created by the former California Department of Health Services to lead the statewide effort to combat the rising tide of physical inactivity and reduce the risk of preventable chronic disease in California. The mission of CCPA is to get more Californians more active, more often, thereby reducing the personal, societal, and economic costs associated with sedentary living. To achieve this end, CCPA and willing partners are working to implement a broad spectrum of intervention strategies including policy and environmental change approaches. A long term effort will need to be sustained to overcome the social norms, myths, physical environments, and policies that currently dissuade regular physical activity.

Also, it is critical to link physical activity promotion to other statewide and local health initiatives for the prevention and/or control of unintentional injury, cancer, diabetes, obesity, cardiovascular disease, and osteoporosis, as well as those focused on traffic safety, violence prevention, environmental health, and nutrition. In this regard, partnerships with non-governmental and nonprofit organizations are essential to attain the goal of improving the health of higher risk populations.

CCPA instituted a rigorous programmatic planning process that included reviewing the literature, consulting with national and international experts, and convening potential partners to develop various approaches to the promotion of physical activity. Three potential solutions emerged from this planning process:

A. Change our community environments to make them more walking and biking friendly.
B. Promote physical activity among those who are at greatest risk for being sedentary and having chronic conditions, such as persons over the age of 50 years.
C. Promote physical activity where over half of our population can be reached, such as the work place.

Listed below is a summary of potential intervention approaches for each of these areas.

A. California's Approaches to Active Community Environments

The environment in which we live has a profound impact on our behavior, including whether we choose healthy foods or are physically active. When environments are supportive of physical activity, individuals can more

successfully integrate physical activity into their existing routines. All communities have definable features that can contribute to individual and community health. A primary feature is an inter-connected network of safe and well maintained sidewalks, streets, trails, paths, and parks. This network permits residents to reach routine destinations by walking, or bicycling, perhaps in conjunction with taking transit. The availability of this supportive infrastructure where people live, work, and play is essential to make the healthy choice the easy choice. However, changes are needed to create activity friendly environments, and some of them are substantial. Since World War II, most communities have been physically designed to support automobile use and tend to discourage routine physical activity such as walking or cycling.

Opportunities:
California's approaches to active community environments encourage communities to:

- Support local and regional coalitions.
- Influence community and facility design.
- Increase public awareness and support.
- Prepare professionals to support their establishment and maintenance.
- Increase facility utilization.
- Nurture youth leadership.
- Influence legislation governing liability and taxes.
- Develop informal and formal community networks among gatekeepers and stakeholders.

B. California's Approaches to Active Aging

Inactive and irregularly active older adults comprise at least 60 percent of the 5.8 million older Californians.[9] These individuals are not sufficiently active to gain positive physical health, mental health, and fitness benefits. Persons over age 50 exhibit losses in fitness, health, and function which begin to: 1) render them more dependent on care, 2) put them at higher risk for several chronic diseases, and 3) make them less likely to pursue leisure time physical activity and more likely to consume health care.[10] Community dwelling, functionally independent persons over 50 years comprise by far the largest (70-80 percent of 4.1 to 4.6 million) of the older population.[11] Effective interventions can help restore or maintain physical function and functional independence, prevent chronic diseases, as well as retard progression towards stages of frailty. A physically active lifestyle can help these persons remain vital contributors to families, communities, employers, and society in general.

Opportunities:
California's Active Aging Project proposes to:

- Foster increased levels of physical activity by changing the perception of physical activity and exercise among older adults so that it is seen as easy to do, common place, and natural for their stage in life; increase the

understanding of health and other benefits (enjoyment, independence, and quality of life).
- Increase accessibility, affordability, and availability of various opportunities for older adults to be physically active.
- Disseminate widely and at minimal cost community-based and rigorously evaluated personal physical activity programs that are proven effective for older adults.
- Implement direct mail interventions for physical activity proven effective by partnering with stockholders that have extensive existing channels for dissemination.
- Modify existing or develop new physical environments that promote physical activity for older adults.
- Initiate policy within health care plans for routine physical activity assessment and counseling for older adults to promote increased levels of physical activity.

C. California's Approaches to Active Worksites

California has one of the fastest rates of increase in obesity among working age adults in the nation. Over half of California adults are overweight or obese.[12] Physical inactivity, obesity, and overweight costs California more than $21.7 billion a year in lost productivity, workers' compensation, and medical costs. The majority of these costs are shouldered by California's public and private employers.[4] Worksites are a viable place to promote healthy behaviors, because 70 percent of working ages Californians are currently employed, and adults spend more than one-third of their day at work.[13]

Opportunities:
California's strategies to promote active worksites include:
- Increasing the prevalence of workplace environments and cultures that support healthy active lifestyles for all workers including small employers and those that employ low wage workers.
- Improving the reach and quality of existing efforts to encourage and support healthy active lifestyles among workers.
- Developing and disseminating effective tools to foster and encourage healthy active workplace environments and cultures.
- Developing policy and legislation to encourage workplace environments and cultures that support active healthy lifestyles throughout California.
- Recognizing healthy workplace champions and best practices.
- Educating worksite gatekeepers, management, and employers.
- Partnering with associations to promote the development of a network of professionals committed to encouraging healthy active workplace environments and cultures statewide.

How Can We Get California's Children More Active?

Several California Department of Health Services programs and external partners are focused on increasing physical activity among California's children. Listed below are several recommendations that, if implemented, will promote and encourage regular physical activity among California's youth.

School-based Physical Education (PE)

- Ensure that certified teachers teach all PE courses.
- Require schools to provide daily physical activity breaks (recess) for all elementary school students.
- Provide sufficient oversight to ensure that schools meet all of the mandated PE requirements.

After School Programs

- Implement programs, including school sponsored competitive and noncompetitive extracurricular sports and recreation, that meet the needs and interests of all students.
- Support federal and state sponsored youth development and early education programs to include opportunities for quality physical activity.

Community Programs

- Support federal and state programs, including summer programs, for under served kids to incorporate quality physical activity.
- Require that daily physical activity breaks be incorporated into licensed preschool programs.
- Support access to community-based physical activity programs by offering transportation options, increased adult supervision, low program fees, and clean facilities.
- Develop legislation to protect from liability claims those that provide facilities, equipment, open space and programs that encourage physical activity. Such providers may include employers, schools, and park and recreation departments.

Community Design and Transportation Choice

- Allocate school transportation expenses to transportation budgets rather than school budgets.
- Promote more flexible street designs that slow traffic speeds and improve safety for both drivers and pedestrians.
- Implement programs and incentives to create, improve, and promote access to and use of transportation options that enhance physical activity, such as walking and biking.
- Support zoning regulations that support the creation and maintenance of green space and public parks.
- Provide student, staff, and community access to schools and school owned facilities during non-school hours.

Table 1: Costs of Illness and Lost Earnings in California: Reductions Possible with Physical Activity[4, 14]

Occurrence of Disorder in California	Population at Risk, percentage	Estimated Costs in California	Relationship to Physical Activity	Savings Possible Through Increased Physical Activity
Cardiovascular Disease (85,000 deaths)	42 percent of all deaths in California are due to CVD.	$14 billion	Sedentary persons have double the risk of fatal CVD than physically active persons	Increased levels of physical activity could prevent 24,000-29,000 deaths from CVD
Overweight and Obesity	44 percent of males and 26% of female adults are overweight. 17 percent of males and 18.5 percent of females are obese.	$9 billion	Physical activity helps reduce body weight and body fatness and prevents future increases	Physically active and fit yet overweight persons have a 50 percent lower risk of CVD mortality compared to lean unfit persons
Lipid Metabolism	60 percent of adults have blood cholesterol above 200 mg. Only 29 percent of adults know their blood cholesterol level.	$5 billion	Endurance exercise will increase HDL-C and reduce triglyceride levels if accompanied by weight loss; endurance exercise will decrease LDL-C	For every one percent drop in blood cholesterol, a two percent drop in mortality results

Diabetes	six percent of adults have diabetes with higher prevalence among older and racial/ethnic minority populations.	$10 billion	Physical activity can reduce the risk for developing NIDDM by 33-36 percent Physical activity reduces weight gain and central adiposity and enhances insulin sensitivity	Physical activity converts 50 percent of impaired glucose tolerance (IGT) patients to normal glucose tolerance, as well as 50 percent of NIDDM patients to non-diabetic status One-third of deaths attributable to diabetes could be averted with increased levels of physical activity.
Hypertension, stroke (15,000 deaths)	20 percent of adults have high blood pressure (BP>140/90), of which 90 percent have mild-moderate hypertension.	$1 billion	Endurance exercise results in an average reduction of 10.5 mmHg in systolic and 8.6 mmHg in diastolic BP	Physical activity lowers mortality risk 40-60 percent in persons with hypertension and the risk of developing HTN 20-35 percent
Cancer 50,000 total deaths from all cancers 5,000 deaths from colorectal cancer 4,300 deaths from breast cancer	Colorectal cancer is the third most commonly diagnosed cancer among men. Breast cancer is the most commonly diagnosed cancer among women.			One-third of deaths from colon cancer attributed to physical inactivity 12 percent of breast cancer risk attributable to physical inactivity

Table 2: Energy Expenditure Benefits of Replacing Common Sedentary Activities with Regular Physical Activity[15]

Sedentary Way	Kcals*	Active Way	Kcals*
Use remote	<1	Get up to change channel	3
30 mins of phone calls – sitting	4	Standing for 3 10-minute calls	20
Using garage door opener	<1	Open garage door twice/day	2-3
Hiring maid to clean and iron	0	30 min ironing + 30 min vacuum	152
Using lawn service	0	30 min do yourself mowing	360
30 min waiting for pizza	15	30 min cooking	25
Buying pre-sliced veggies/fruit	0	15 min washing, slicing, chopping	10-13
Using leaf blower	100	30 min raking	150
Let dog out in yard	2	Walk dog 30 min	125
Use car wash	18	Wash/wax 60 min	300
Email colleague	2-3	Walk 1 min, talk 3 min	6
Take elevator 3 flights	0.3	Climb 3 flights of stairs	15
Park close, walk 10 sec	0.3	Park 1st spot, 2 min walk 5x/wk	8
Ride escalator 3 times	2	Walk 1 flight of stairs, 3x/wk	15
Cashier unloads shopping cart	2	Unload cart yourself	6
1 hr internet shopping	30	Walk 1 hr in shopping mall	145-240
Sit in car at drive-in window 30 min	15	Park and walk inside, 3x/wk	70
Pay at pump	0.6	Walk in to pay, 1x/wk	5
Sit and listen to 60-min lecture	30	Give 60-minute lecture	70

1. Assume person's caloric intake remains the same

2. Complete all of the tasks daily or as listed:

   - Active Way = 10,500 kcals/month
   - Sedentary Way = 1,700 kcals/month

3. Difference = 8,800 kcals/month or equivalent of 2.5 pounds/month or 30 pounds per year (*doesn't include any structured exercise or recreation*)

*Estimates are for 150-160 pound person in kilocalories.

Table 3: Physical Activity Guidelines for California Children, Youth and Adults[16]

Preschool Children	All preschool children should participate every day in a form of physical activity appropriate for their developmental level and physical health status. This should occur in the context of home, preschool, day care or other care giving settings. Free play designed to provide opportunities for each child to develop fundamental motor skills and to reach his or her potential at his or her own rate is preferable to structured sessions. Encourage as much free play as possible to take place in safe outdoor environments. In structured sports programs, participation and enjoyment should be emphasized rather than competition and victory. Emphasis should be placed on the promotion of physical activity as a natural and lifelong activity of healthy living. Setting, format, rules, and equipment should be modified accordingly. Sedentary behaviors such as watching television or videos should be kept to a minimum (no more than one hour per day total).
Children Five to 12 years	Elementary school children should accumulate at least 30-60 minutes of age and developmentally appropriate physical activity on all or most days of the week. An accumulation of more than 60 minutes, and up to several hours per day, of age and developmentally appropriate activities is encouraged for elementary school children. Given that children demonstrate patterns of intermittent activity, accumulation of physical activity over the day seems a practical approach. Some of the child's activity each day should be in periods lasting ten to15 minutes or more that includes moderate to vigorous activity. Intermittent activity involves alternating bouts of moderate to vigorous activity with periods of rest and recovery. Extended periods of inactivity are discouraged for children. Sedentary behaviors such as watching television or videos, playing video games, and surfing the Internet should be kept to a minimum (no more than one hour per day total). A variety of physical activities are recommended for children. As many of these activities as possible should take place in a safe outdoor environment.

Youth 13-17 years	All adolescents should be physically active daily, or nearly every day, as part of play, games, sports, work, transportation, recreation, physical education, or planned exercise in the context of family, school, and community activities. Adolescents should engage in at least 60 minutes of moderate to vigorous physical activity per day on most days of the week. Thirty minutes of physical activity per day is a minimum. One hour per day represents a more favorable level. Physical activity can be performed in a continuous fashion or intermittently throughout the day.
Adult 18-59 years	**General Health Benefits:** All adults should accumulate a minimum of 30 minutes of at least moderate intensity physical activity on most, if not all, days of the week. Intermittent moderate to vigorous activities during the day should last from eight to 10 minutes, although shorter bouts may be needed when first starting a physical activity program. Integrating physical activity into one's daily lifestyle and routine is an effective way to accumulate physical activity over the day. **Cardiorespiratory Fitness, Body Composition, and Additional Health Benefits:** Adults should engage in moderate intensity endurance activity for 20-60 minutes three to five days per week. Endurance activity is any activity that uses large muscle groups, which can be maintained continuously, and is rhythmical and aerobic in nature. Examples include walking, hiking, running, jogging, cycling, bicycling, cross-country skiing, aerobic dance/group exercise, rope skipping, rowing, stair climbing, swimming, skating, and various endurance game activities or some combination thereof. Duration is dependent on the intensity of the activity; thus, lower-intensity activity should be conducted over a longer period of time (30 minutes or more), and, conversely, higher-intensity activity should be done over a shorter period of time (20-30 minutes). Moderate-intensity activity is recommended for adults not training for athletic competition. **Muscular Strength, Muscular Endurance, Skeletal, and Flexibility Benefits** One set of eight to ten resistance training exercises that condition the major muscle groups should be performed two to three days per week.

	Most persons should complete eight to 12 repetitions of each exercise; however ten to one repetitions may be more appropriate for persons who are older and/or more frail (approximately 50-60 years of age and above). Flexibility exercises that stretch the major muscle groups should be performed a minimum of two to three days per week.
Older adult ≥ 60 years	All older adults should meet the guidelines listed above for adults in addition to the recommendations below. Balance, agility, mobility, coordination, and reaction time exercises should be performed by persons experiencing a diminished capacity in these areas of function. Physical activity level should be increased more gradually in older adults to decrease the risk for soreness, discomfort, and injury. Older adults who have been sedentary should start with physical activity sessions of short duration and light intensity. Older adults with existing medical conditions or those who are unsure about their safety during physical activity should first consult their physician before embarking on a physical activity program.

Resources/Web Sites

1. 2005 USDA Dietary Guidelines for Americans. http://www.healthierus.gov/dietaryguidelines/

2. The National Association for Sports and Physical Education's (NASPE) physical activity guidelines for infants, toddlers, and preschoolers: http://www.aahperd.org/naspe/template.cfm?template=toddlers.html

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California Food Guide

Health and Dietary Issues Affecting Latinos

By Lucia Kaiser, Ph.D., R.D.

What's New?

Latinos comprise one of the fastest growing sectors of California's population. In 2000, Latinos represented 32.4 percent of the state's population, with people of Mexican descent comprising 25 percent of the total state population.[1]

Public Health Implications

Compared to Latinos in the rest of the United States, relatively more of California's Latinos are recent immigrants, non-citizens, and of Mexican or Central American descent.[2] Nevertheless, the Latino population is culturally, ethnically, and racially diverse. In addition to country of origin, levels of education and acculturation influence dietary patterns and health profile of this population. These facts must be appreciated to work effectively with this population.

Definition

There has been considerable debate about the appropriate name (e.g. Latino vs. Hispanic) to refer to this population.[3] Previously, some have argued that "Latino" is more appropriate than "Hispanic" to refer to a population with national origins mostly from Latin America and the Caribbean. However, many surveys have found that the preferred form of ethnic self-identification is actually through specific national origin, such as Mexican, Mexican American, Puerto Rican, Cuban, Dominican, etc. Given the increasing rates of intermarriage among Latino subgroups, questions regarding the meaning and usefulness of these identifiers will likely continue in the 21st century.

Traditional Food Patterns

Although the use of beans, rice, and hearty stews or soups is common in many parts of Latin America and the Caribbean, traditional food patterns vary widely across, and even

within, countries of this region.[4, 5] Reflecting Spanish and Indian influences, the traditional Mexican diet is based on corn, beans, squash, and chili but also includes dairy products, meats, and other foods introduced from Spain. In the northern wheat-growing region of Mexico, flour tortillas, rather than corn, are common. By food group, traditional Mexican foods may include: 1) Grains--corn tortillas, flour tortillas, gruels (*atole),* wheat rolls, pasta, oatmeal, and rice; 2) Fruits--banana, guava, orange, lime, mango, papaya, melon, strawberries, pineapple, cactus fruit (*tunas),* and avocado; 3) Vegetables--chilies, tomatoes, onions, potatoes, tomatillos, zucchini and other squashes (both fruit and flowers), jicama, cabbage, cactus leaves (*nopales),* carrots, peas, chayote, purslane, and other wild greens; 4) Milk and milk products—cow's and goat's milk, cheese, evaporated milk, custard (*flan)*; and 5) Meat--legumes (pinto beans, garbanzo, lentils), chicken, beef, pork, eggs, seafood/fish, and pumpkin and sesame seeds.

Unlike Mexicans, Puerto Ricans have not traditionally eaten hot, spicy dishes and use plantains, red kidney beans, rice, and starchy tubers to a greater extent. Puerto Rican soups and stews are often made with a *sofrito* base, which is a mixture of chopped onions, peppers, cilantro, garlic, and tomato sauce.

The Salvadoran diet is based on beans, rice, corn, and vegetables. Salvadoran tortillas are thicker and smaller than those of Mexico. Use of black beans appears to be more common in Central America than in Mexico. A traditional Salvadoran food is the *pupusa*, which may consist of a tortilla stuffed with fried chicken strips or beans and cheese.

The traditional Colombian diet is based on rice, meat, vegetables, beans, plantains, and yucca root. The *arepa*, is a corn-based staple that, depending on the region of Colombia, may contain corn flour or fresh corn, cheese, eggs, legumes, and starchy vegetables. Due to the tropical climate year-round, an abundance of tropical fruits is consumed daily, primarily as beverages (water or milk-based). In some countries, such as Peru, potatoes are the staple.

Trends/Contributing Factors

A discussion of traditional dietary practices in subgroups of the Latino population is only a starting place for understanding Latino food patterns in the United States. A number of studies have reported profound dietary changes after immigration to the United States and between first and second or higher generation Latinos.[6, 7, 8, 9] Some key findings from more recent studies in California include the following:

- During pregnancy, Mexican-born women have diets higher in calories, fiber, vitamin A, vitamin C, vitamin E, folate, calcium, and zinc than United States born Mexican American women. Increasing years of residence in the United States is associated with lower intakes from food of fiber, folate, iron, and zinc among pregnant women of Mexican descent.[10]

- A survey in Monterey County found that a higher level of acculturation, as measured by years of United States residence or birthplace, is one of the strongest factors related to obesity in Latino adults living in the community.[11] In that study, greater consumption of high fat snack and fried foods and lower levels of physical activity were associated with obesity. Over the past decade, prevalence of obesity has increased by 47-48 percent among Latino women and men in the community and by 91 percent among men in the labor camp.[12]

As Latino immigrants have adopted the United States diet and lifestyle, their risk of diabetes has also increased. While genetic factors clearly play a role in determining risk of type two diabetes, the San Antonio Heart Study found numerous environmental factors, including diet and exercise, to be linked to greater risk of diabetes in Mexican-Americans, compared to their urban counterparts in Mexico City.[13, 14] This research also found that as Mexican-Americans become more affluent and educated, they are able to take steps to reduce their risk of obesity and diabetes. Although these findings are from older studies, more recent data, collected in California, indicate that higher socioeconomic status is associated with lower body mass index in Latinos.[8]

Another finding associated with Latina acculturation in the United States is decreased incidence and duration of breastfeeding. Infants of United States born Latinas are breastfed less than infants of non United States born mothers, and therefore both mother and child do not receive the health-protective benefits of breastfeeding. A large survey conducted in Los Angeles County, California, found that United States born Latinas were less likely to initiate breastfeeding (73 percent) than those not born in the United States (86 percent). United States born Latinas were also less likely to breastfeed at least six months (29 percent) than non-United States born Latinas (47percent).[15]

Differences in dietary patterns are evident among Latino adults and youth, with some behaviors placing the younger generation at increased risk of chronic disease.[8]
For example, about 32 percent of Latino adolescents in the 2001 California Health Interview Survey reported drinking two or more glasses of soda a day.[16] In Latino children who are overweight, high intake of sugar and sweetened beverages has been associated with early signs of poor beta cell function.[17] These early changes in pancreatic function are of particular concern in this population, and puts Latino children

at high risk for type 2 diabetes. The body of literature on food habits, dietary change, acculturation, and health in Latino populations may at times appear to be conflicting. Studies published in the 80s and even early 90s may not reflect the impact of more recent trends in Latin America. With global changes in the food supply, urbanization and aging of the population type 2 diabetes is expected to increase by 38 percent in Latin America over the next 10 years.[18] Up to 40 percent of the new cases may already have chronic complications at the time of their diagnosis. Mexican health experts are concerned about increasing rates of obesity and chronic disease in Mexico. Therefore, it is very important for public health professionals in the United States to recognize the emerging problem of deterioration in diet and health status that may occur in some immigrant populations before they arrive in the United States.

Burden

In the Latino population, high rates of poverty have not always translated into poorer dietary intakes and health status, which are often found in other low-income groups.[19] This paradox may possibly be due to strong family support and other protective cultural factors found in many less acculturated, recent immigrants from Latin America. There is some conflicting evidence as to whether or not Latino diets in the United States are higher in fat or lower in fruit and vegetables than those of the general population.[19, 20] Differences in age (or generation) and level of acculturation of the samples may account for some of the conflicting findings across studies. Compared to Whites and African Americans, Latinos nationwide have lower age-adjusted death rates from heart disease and many types of cancer.[21] However, rates of stomach, liver, gall bladder, and cervical cancer are higher in Latino than White populations.[22] Compared to non-Latino Whites and Asians (but not African Americans), Latinos have higher death rates from diabetes, and these rates have increased over time.[21]

Incidence and Prevalence

Prevalence of overweight and obesity is higher in Latino adults and children than in the non-Latino White population.[21] Longer length of residence in the United States, or being United States born, increases the risk of obesity and diabetes.[11, 23] In 1999-02, 71.4 percent of Mexican American women and 74.1 percent of Mexican American men were overweight or obese, compared to 57 percent and 69.5 percent of non-Latino White women and men, respectively.[21] Of particular concern is the increase in prevalence of overweight among Mexican American boys, ages 6-11 years, from 17.5 percent in 1988-94 to 26 percent in 1999-02. Prevalence of overweight among Mexican-American girls increased from 15.3 percent to 17.1 percent over that same time period. In general, lack of physical activity, high consumption of sweetened

beverages, and skipping breakfast appear to contribute to disparities in overweight among teenagers from poor and non-poor families.[24] Among Latino youth, skipping breakfast or lunch and watching TV/videos for three or more hours daily is associated with overweight.[25]

Other risk factors, including hypertension and metabolic syndrome, are also higher in the Latino population, compared to the non-Latino White population.[21, 26] Using the International Diabetes Federation definition of metabolic syndrome, prevalence of metabolic syndrome in 1999-02 was 50.6 percent in Mexican-American men and 46 percent in Mexican-American women, compared to 41.9 percent non-Latino White men and 34.4 percent in White women.

Despite differences in income and access to prenatal care, the rate of low birth weight in Mexican American mothers (6.28 percent) is slightly lower than that of non-Latino White mothers (7.02 percent).[21] However, the prevalence of low birth weight is particularly high (10.1 percent) among Puerto Rican mothers. Incidence of neural tube defects is higher in Latino than in White and African American populations,[27] and folic acid fortification efforts may not entirely reduce this disparity.[28, 29]

National data show that breastfeeding rates are higher among Latino women (76 percent) than non-Latino White (68.7 percent) or African American mothers (45.3 percent).[21] More Latino mothers continue breastfeeding for at least three months or more (54.3 percent), compared to non-Latino White (49.7 percent) or African American mothers (33.7 percent). Although the latest recommendations are to breastfeed exclusively for the first six months of life, the Feeding Infants and Toddlers Study found that only 14 percent of Latino infants are breastfeeding exclusively at four and five months of age.[30]

“Any” initiation breastfeeding may be a misleading indicator, as we see that women who begin breastfeeding with both bottle and breast, have a lower “exclusive” duration breastfeeding rate, and research shows that it is exclusive breastfeeding that produces the best health outcomes.[31] In 2004, the California Newborn Screening Test form, which is completed after an infant’s birth, showed that 29 percent of Latina women exclusively breastfed in comparison to the 40.5 percent state average. The national low “exclusive” breastfeeding duration data for Latinas is consistent with California specific data. In 2004, The Maternal and Infant Health Assessment reported that 36.6 percent of Latina women were still exclusively breastfeeding in comparison to the 42.2 percent state average.[32] As Latino babies are over 51 percent of the births in California, this lack of exclusive breastfeeding will affect the health of a great many children in the state. See the “Normal Infant Feeding Chapter” for tables on breastfeeding initiation and duration.

Prevalence of iron deficiency is higher in young Mexican-American than in White or African American children. Prolonged bottle-feeding may be partly responsible for the high prevalence in this group. At 24-48 months of age, 36.8 percent of Mexican-American children are still bottle-fed, compared to 16.9 percent of White and 13.8 percent of African American children.[33]

Barriers to Implementation/Myths

Lack of health insurance and access to care is an important barrier in this population. In addition to receiving inadequate care for health problems, uninsured and underinsured populations also lack preventive health services. Among Latino men, discussing weight and exercise with a health care provider is associated with more accurate self-perception of weight and efforts to lose weight.[11] This finding suggests that greater access to health care can increase awareness of the need to make lifestyle changes to prevent health problems. Nationwide, Mexican-American adults have the highest percentage (37.8 percent) lacking health insurance, compared to non-Latino White (16 percent), African American (18 percent), and Puerto Rican (17.9 percent) adults.[34] Approximately 40 percent of the Latinos in California are uninsured. Even among those having health insurance, many other factors impede access, including lack of Spanish-speaking, culturally competent staff; availability of evening appointments and transportation; and lack of culturally and linguistically appropriate written materials.

Food insecurity is prevalent among low-income Latino households and poses a barrier to improving nutrition. In the 2003 California Health Interview Survey, 38.2 percent of low-income Latino respondents reported food insecurity (with or without hunger), compared to 28.1 percent of the White sample.[35] Food insecurity is seasonal (often worse in the winter) and exacerbated by limited transportation. Some immigrants are also confused about the selection of foods in United States supermarkets (i.e., how to select the most nutritious item for the best price).[36] Supplies of fruits and vegetables are particularly low in food insecure Latino households.[37] Another aspect that needs to be considered is that many Latino immigrants have experienced past food deprivation in their home countries.[38] Seasonal patterns of food insecurity, especially where a history of past food insecurity exists, may set the stage for over consumption during times when food supplies and income are less limited.[39]

Due to relatively high rates of poverty, Latino families are more likely than Whites to live in poor neighborhoods that may pose additional barriers to improving health.[3] Some of these environmental barriers include fewer supermarkets, high crime rates that discourage outdoor activities, and an abundance of fast food restaurants.[40]

Nevertheless, in low-income communities with a high concentration of Latino households, traditional Latino culture and values have been shown to positively influence diets.[41, 42] Thus, in designing environmental interventions, it is important to build on cultural strengths in Latino communities.

Common Concerns/Strategies

- Successful interventions need to consider not only the diversity in diet due to country of origin but also to education and acculturation levels of the target group.[43] For example, messages targeting recent immigrants with less than a sixth grade education should encourage people to retain some traditional foods, such as legumes and mixed dishes with vegetables, while including healthful new foods like olive oil, canola oil, and low-fat dairy products. With this group, like many other low-income and/or limited literacy audiences, less emphasis should be placed on use of written materials (even in Spanish) and more on cooking demonstrations; small group discussion; other interactive activities; and colorful, pictorial aids.

- Second- and higher generation Latinos may use Spanish very little, if at all. Some have long abandoned the traditional recipes of their parents and grandparents and are not likely to return to that style of eating. Yet, this group may still identify with elements of their Latino culture and respond to more mainstream messages packaged with a Latino flair.

- Educational materials should be culturally-adapted and tested with the target group, not merely translated from English into Spanish. Some excellent materials developed in other states may have very limited use among some of California's Latino populations due to differences in regional food habits and Spanish usage. For example, Spanish words for specific foods vary in different Latin American countries.

- Many Latinos are concerned about improving the health of their families. Although recent immigrants may acknowledge that diet can affect health, fewer are able to explain how breastfeeding or vegetables and fruits are protective. Yet, many want more specific guidance on choosing healthful diets for themselves and their families. Guidance must also consider that this audience also faces time and cost constraints in choosing and preparing a healthful diet.

- Nutrition interventions may be more effective if they also incorporate information on stress reduction and management.[44] Among some Latino subgroups, emotional stressors (referred to as *susto*) are perceived to be causally related to onset of

illness and chronic disease. Even among Latino schoolchildren, stress has been associated with unhealthy eating patterns.[45]

- Interventions should aim to reach the entire family, even if different channels must be used. A focus on changing individual behavior is less likely to be effective than emphasizing the benefits of change at the family level. Assuming that the Latino woman is the gatekeeper of her family's nutrition may not be valid. A California study recently reported that shared meal decision-making among members of Latino households results in poorer quality diets (i.e., more fast food, lower fiber, higher saturated fat).[46] To help Latino families improve nutrition, health professionals must explore avenues to reach children, husbands, and other relatives directly.

- Community-level interventions are needed to make it easier for Latino populations to adopt healthier lifestyles through greater access to healthy foods and more physical activity. Engaging community members to develop these interventions and building on cultural strengths is critical to success.

Opportunities for Improvement

Opportunities for improvement among Latino populations in California and elsewhere include the following:

- More research is needed on the food practices and nutrition issues of certain Latino populations, particularly farm workers, recent immigrants, and rural Latinos. Among those who seasonally travel across the border into Mexico, the burden of infectious disease, including parasites, on nutritional status needs more attention. Research should determine and evaluate culturally sensitive, effective approaches to obesity and diabetes prevention.

- Health professionals at all levels need training in delivery of culturally competent services, particularly related to diabetes and other conditions common in this population. More Latino students should be recruited and trained to become health care providers. Culturally sensitive outreach programs to prevent obesity and diabetes should be designed to meet the needs of diverse Latino audiences, especially young parents and those with different levels of acculturation.

- Greater access to health care is needed for both uninsured and underinsured groups.

- Efforts must be made to address environmental and community issues. In particular

increased access to healthy foods through retail stores, farmers markets, and family-owned Latino stores and increased access to more safe and affordable ways to be physically active.

Clinical Implications

Global trends indicate that obesity and chronic disease are on the rise in Latin America. This trend has implications for the health of newly arrived immigrants from those countries. Increasing access to culturally competent health care services is critical in the Latino population.

Resources/Web Sites

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California Food Guide

Health and Dietary Issues Affecting African Americans

By Linda L. Cowling, M.P.H., R.D.

What's New?

- Heart disease and cancer are the first and second leading causes of death for African-American adults 18 years and older in California[1] and nationally.[2]
- Diabetes was the fourth leading cause of death among African-American adults 18 years and older, accounting for 812 deaths in California[2] and 12,687 deaths nationally during 2002.[3]

Public Health Implications

In an attempt to eliminate health disparities among minority populations, in 2002, the United States Department of Health and Human Services (HHS) created an educational campaign designed to help make good health an important issue among racial and ethnic minority populations. The campaign ***Closing the Health Gap*** supports HHS' efforts to eliminate racial and ethnic health disparities and promote the goals of Healthy People 2010. It also advances the HHS Steps to a Healthier U.S. program and the President's Healthier U.S. Initiative.[4]

Introduction*

Despite improvements in the overall health of Americans during the past few decades, minorities, primarily African Americans, American Indians, and persons of Hispanic origin, tend to have more chronic health problems, live in poverty, lack insurance coverage, and be unable to work because of a disability.[5] These disparities are multi-variant, complex, and rooted in an inequitable health care system. Contributing factors include lack of access to health care; barriers to care; biological, socioeconomic, ethnic, and family factors; cultural values and education; and culturally insensitive healthcare systems.[6, 7]

* African American, non-Hispanic black, and Black may be used in the text depending on the citation source. Similarly for White and Caucasian.

Definition

African Americans, also known as Afro American or Black Americans, are an ethnic group in the United States whose ancestors were predominantly indigenous to sub-Sahara and West Africa. The majority of African Americans are of African, European and Native American ancestry.[8]

According to the 2004 U.S. Census figures, some 37.5 million African Americans lived in the U.S., comprising 12.9 percent of the total population. In 2000, 54.8 percent of African Americans lived in the South, 17.6 percent in the Northeast and 18.7 percent in the Midwest, while only 8.9 percent lived in the western states. Approximately 88 percent of African Americans lived in metropolitan areas in 2000. With over two million African-American residents, New York City had the largest Black urban population in the U.S. Among cities of 100,000 or more, Gary, Indiana, had the highest percentage of Black residents of any U.S. city, with 85 percent, followed closely by Detroit, Michigan, with 84.6 percent.[9]

African-American cuisine traditionally includes many nutritious items such as yellow and green leafy vegetables which are rich in vitamins and antioxidants; fish; poultry; and beans, which are naturally low in fat and excellent sources of protein. However, many of the traditional methods of cooking such as deep frying, seasoning with ham or ham hocks, or adding gravy are in conflict with the heart-healthy recommendations to reduce fat and sodium intake. Many African-American rites revolve around food. The popular term for African-American cooking is “soul-food.” Staples of soul food include fried chicken, fried pork chops, cornbread, and ribs. Many of these dishes use large amounts of pork fat, butter, and salt for flavor.[10]

When the African-American 5 a Day Campaign surveyed African Americans in California, they reported out-of-home eating weekly or less often (61 percent). Of these, only two percent never ate out and the remaining respondents dined out two or more times per week and ate significantly fewer daily servings of fruits and vegetables than those eating out less frequently (2.7 vs. 3.3 servings, $p<.001$). These frequent diners tended not to meet the daily recommended number of fruit and vegetable servings (13 percent vs. 21 percent, $p<.05$). In this survey, out-of-home eating was associated with lower fruit and vegetable intake.[11]

When dining out, fast food was the most popular restaurant choice among African Americans (29 percent), casual sit-down restaurants ranked second (26 percent), and soul food establishments came in third (22 percent). African Americans eating at fast food restaurants most often ate significantly fewer fruits and vegetables. However, there were no differences in fruit and vegetable intake when eating at other types of dining establishments.[11]

Fast food consumption is associated with a diet high in energy (calories), low in essential micronutrients. Frequent fast food consumption may contribute to weight gain,

because fast foods can provide more than one-third of the day's energy, total fat and saturated fat. Negligible amounts of milk and fruits and large amounts of non-diet carbonated soft drinks tend to be consumed at fast food places. Also, adults who report eating fast food regularly tend to have higher mean body mass index (BMI) values than those who did not eat fast food.[12]

Burden

In 2003, health care spending in the U.S. reached $1.7 trillion.[13] Despite this tremendous expenditure, it is well documented that ethnic and racial minorities are disproportionately affected by many health conditions that negatively impact their health in comparison to White Americans.

While the causes associated with disparities in health and health care are varied, it is important to understand the role socioeconomic status plays in health status. Lower socioeconomic status often results in inadequate housing; poor nutrition; bad social environments, and working conditions; poor access to or limited contact with the health care system; and fewer social amenities that directly or indirectly affect health. The impact of lower socioeconomic status on morbidity and mortality is especially pronounced among African Americans.[14] Unemployment due to disability was higher for non-Hispanic black men and women age 55-64 years than for other racial and ethnic groups. In 2001, 16 percent of disabled Medicare participants for age 45-64 years were Black adults, and they represented only 11 percent of the population in this age group.[5] Higher rates of unemployment due to disability for Black adults may be explained in part by a higher prevalence of heart, kidney, and other diseases and jobs that are physically demanding and less likely to accommodate a disabled or partially disabled worker. Also, African Americans tend to have higher rates of enrollment in the Medicare End-Stage Renal Disease Program, partially due to their higher prevalence of diabetes and hypertension.[11]

Data released by the U.S. Census Bureau shows that the number of uninsured Americans stood at 45.8 million in 2004, an increase of 800,000 people over the number of uninsured in 2003. Lack of insurance was much more common among those with low incomes. Some 24.3 percent of people with incomes below $25,000 were uninsured; almost triple the rate of 8.4 percent for people with incomes over $75,000. African Americans were much more likely to be uninsured than non-Hispanic whites (19.7 percent vs. 11.3 percent, respectively).[15]

The nation's official poverty rate rose from 11.7 percent to 12.1 percent, and median household income declined 1.1 percent or $42,409 during 2001 to 2002 according to reports released from the U.S. Census Bureau.[16] Among people who identified solely as Black or African American in 2002, 24.1 percent were in poverty, higher than the 22.7 percent for those who reported Black or African American in 2001, compared to 8.0 percent for non-Hispanic single race white, 10.0 percent to 10.3 percent for Asian, and 21.8 percent for Hispanics.[17] More than 60 percent of Black and Hispanic children <18

years and more than half of the Black and Hispanic population ≥ 65 years were poor or near poor during 2003 (Table 1).[18]

Table 1: Persons and Families Below Poverty Level, According to Selected Characteristics, Race, and Hispanic origin: United States, Selected Years 1973–2003[18] (Data are based on household interviews of the civilian non-institutionalized population)

Selected characteristics, race, Hispanic origin	*1973*	*1980*	*1985*	*1990*	*1995*	*2000*[2]	*2001*	*2002*	*2003*
All persons	**% below poverty**								
All races	11.1	13.0	14.0	13.5	13.8	11.3	11.7	12.1	12.5
White only	8.4	10.2	11.4	10.7	11.2	9.5	9.9	10.2	10.5
Black or African American only	**31.4**	**32.5**	**31.3**	**31.9**	**29.3**	**22.5**	**22.7**	**24.1**	**24.4**
Asian only	- - -	- - -	- - -	12.2	14.6	9.9	10.2	10.1	11.8
Hispanic or Latino	21.9	25.7	29.0	28.1	30.3	21.5	21.4	21.8	22.5
Mexican	- - -	- - -	28.8	28.1	31.2	22.9	22.8	- - -	- - -
Puerto Rican	- - -	- - -	43.3	40.6	38.1	25.6	26.1	- - -	- - -
White only, not Hispanic or Latino	7.5	9.1	9.7	8.8	8.5	7.4	7.8	8.0	8.2
Related children under 18 years of age in families									
All races	14.2	17.9	20.1	19.9	20.2	15.6	15.8	16.3	17.2
White only	9.7	13.4	15.6	15.1	15.5	12.4	12.8	13.1	13.9
Black or African American only	**40.6**	**42.1**	**43.1**	**44.2**	**41.5**	**30.9**	**30.0**	**32.1**	**33.6**
Asian only	- - -	- - -	- - -	17.0	18.6	12.5	11.1	11.4	12.1
Hispanic or Latino	27.8	33.0	39.6	37.7	39.3	27.6	27.4	28.2	29.5
Mexican	- - -	- - -	37.4	35.5	39.3	29.5	28.8	- - -	- - -
Puerto Rican	- - -	- - -	58.6	56.7	53.2	32.1	33.0	- - -	- - -
White only, not Hispanic or Latino	- - -	11.3	12.3	11.6	10.6	8.5	8.9	8.9	9.3

Source: Centers for Disease Control and Prevention website. www.cdc.gov/nchs/data/hus/hus05/pdf#053 Accessed August 25, 2006.

Persons with incomes below or near the poverty level were at least three times as likely to have no health insurance coverage as those with incomes twice the poverty level or higher.

In 2003, persons living below the poverty level reporting fair or poor health were three times more than those with a family income more than twice the poverty level (20 percent and 6 percent, age adjusted). Fair or poor health among Hispanic persons and non-Hispanic black persons was twice as high as non-Hispanic white persons (see Table 1 and 2).[5]

Table 2: Respondent-assessed Health Status According to Selected Characteristics: United States, Selected Years 1991–2003[18]
(Data are based on household interviews of a sample of the civilian non-institutionalized population)

Characteristic	*1991*	*1995*	*1997*	*1999*	*2000*	*2001*	*2002*	*2003*
	% of persons with fair or poor health							
Total	10.4	10.6	9.2	8.9	9.0	9.2	9.3	9.2
Age								
Under 6 years	2.7	2.7	1.9	1.4	1.5	1.6	1.6	1.4
6–17 years	2.6	2.5	2.1	1.8	1.8	1.9	2.1	2.0
18–24 years	4.8	4.5	3.4	3.4	3.3	3.3	3.6	3.8
25–44 years	6.4	7.2	5.9	5.6	5.7	6.0	6.2	6.3
45–54 years	13.4	13.4	11.7	11.5	11.9	11.8	12.7	12.1
55–64 years	20.7	21.4	18.2	18.5	17.9	19.1	17.9	18.9
65 years and over	29.0	28.3	26.7	26.1	26.9	26.5	26.3	25.5
65–74 years	26.0	25.6	23.1	22.7	22.5	22.9	22.0	22.3
75 years and over	33.6	32.2	31.5	30.2	32.1	30.7	31.3	29.2
Race								
White only	9.6	9.7	8.3	8.0	8.2	8.2	8.5	8.5
Black or African American only	**16.8**	**17.2**	**15.8**	**14.6**	**14.6**	**15.4**	**14.1**	**14.7**
American Indian and Alaska Native only	18.3	18.7	17.3	14.7	17.2	14.5	13.2	16.3
Asian only	7.8	9.3	7.8	8.6	7.4	8.1	6.7	7.4
Hispanic or Latino	15.6	15.1	13.0	11.9	12.8	12.6	13.1	13.9
Mexican	17.0	16.7	13.1	12.3	12.8	12.4	13.3	13.7

Source: Centers for Disease Control and Prevention website. www.cdc.gov/nchs/data/hus/hus05/pdf#053 Accessed August 25, 2006.

Evidence suggests that African Americans suffer increasing health disparities in the incidence, prevalence, mortality, and burden of diseases and adverse outcomes in comparison to other populations. They have greater rates of heart disease, diabetes, cancer, stroke, and obesity. In 1999–2002, 50 percent of non-Hispanic black women were obese compared with nearly one-third of non-Hispanic white women. The prevalence of obesity among men differed little by race and ethnicity (28–29 percent).[19]

Overall mortality was 30 percent higher for Black Americans than for White Americans in 2003, and age-adjusted death rates for the Black population exceeded those for the white population by 43 percent for stroke, 31 percent for heart disease, 23 percent for cancer, and almost 750 percent for HIV disease.[20]

Mortality from cancer for males, the second leading cause of death, was most frequently diagnosed as prostate, followed by lung and bronchus, and colon and rectum. Cancer incidence at these sites is higher for Black males than for males of other racial and ethnic groups. In 2001 age-adjusted cancer incidence rates for Black males exceeded those for White males by 50 percent for prostate, 49 percent for lung and bronchus, and 16 percent for colon and rectum (see Table 2).[20]

The most frequently diagnosed cancer site in females is breast cancer and incidence is highest for non-Hispanic white. However, breast cancer mortality was 37 percent higher

for Black females than for White females in 2003. Cervical cancer rates were higher for Black women than the average for all women and experienced the highest death rates in 1997–2001, 5.6 deaths per 100,000 despite their high Pap smear screening rates.[21]

Table 3: Age-adjusted Cancer Incidence Rates, 1990–2002[18]
(Data: Surveillance, Epidemiology, and End Results [SEER] Program's 13 population-based cancer registries)

	1990	*1995*	*1999*	*2000*	*2002*	*1990–2002*
All sites, sex, race	**Number of new cases per 100,000 population**					
All persons	475.7	470.3	477.6	469.3	458.2	–0.5
White	483.2	476.4	496.5	480.4	466.9	–0.4
Black or African American	**512.7**	**532.2**	**527.7**	**511.8**	**504.3**	**–0.6**
American Indian or Alaska Native	265.1	272.1	269.4	224.1	199.7	–2.0
Asian or Pacific Islander	335.7	337.7	340.5	331.4	334.0	–0.3
Hispanic or Latino	341.1	358.7	362.4	349.8	346.7	–0.1
White, not Hispanic or Latino	490.0	484.4	497.4	492.3	478.4	–0.3
Prostate						
Male	166.7	165.7	178.3	175.9	171.5	–1.5
White	168.2	160.4	172.8	171.1	166.3	–1.8
Black or African American	**218.3**	**271.6**	**280.0**	**281.3**	**265.1**	**–0.7**
American Indian or Alaska Native	84.8	66.4	67.3	36.8	46.6	–5.9
Asian or Pacific Islander	88.8	103.2	105.8	104.8	98.7	–0.9
Hispanic or Latino	114.7	138.4	143.9	142.2	141.0	0.2
White, not Hispanic or Latino	169.2	160.0	171.4	170.3	166.0	–1.8
Breast						
Female	129.2	130.6	137.6	133.1	129.9	0.4
White	134.3	136.2	144.3	140.1	135.8	0.5
Black or African American	116.6	121.8	122.8	118.8	119.3	0.1
American Indian or Alaska Native	46.7	66.1	58.1	55.4	47.9	–1.3
Asian or Pacific Islander	86.9	86.6	97.1	91.6	97.4	1.4
Hispanic or Latino	84.5	88.8	92.0	92.6	88.5	0.5
White, not Hispanic or Latino	**138.4**	**142.2**	**153.0**	**147.7**	**144.2**	**0.7**

Source: Centers for Disease Control and Prevention website. www.cdc.gov/nchs/data/hus/hus05/pdf#053 Accessed August 25, 2006.

Infant mortality, the risk of death during the first year of life, is related to the health of the mother, public health practices, socioeconomic conditions, and availability and use of appropriate health care for infants and pregnant women. During 2000–2002, the infant mortality rate was highest for infants of non-Hispanic black mothers. Rates were also high among infants of American Indian or Alaska Native mothers, Puerto Rican mothers, and Hawaiian mothers.[22]

Incidence and Prevalence

African Americans have one of the highest levels of obesity in the U.S. Fifty-eight percent of African American men and 69 percent of African American women are either overweight or obese.[23] Among African American children at 6-11 years of age, 17 percent of boys and 22 percent of girls are overweight. Among African American

adolescents at 12-19 years of age, 21 percent of boys and 27 percent of girls are overweight. Studies have shown that overweight adolescents have a 70 percent chance of becoming obese adults, increasing to 80 percent if one or more parent is overweight or obese.[24]

Increasing numbers of African Americans suffer from health problems associated with obesity, such as high cholesterol, stroke, hypertension, asthma, sleep apnea, polycystic ovarian syndrome, and orthopedic problems.[25]

Obesity and overweight contribute to the high prevalence of type 2 diabetes in the African American community. Approximately 2.8 million or 13 percent of African Americans have diabetes and are twice as likely to suffer from type 2 diabetes as whites, and 25 percent of African Americans between the ages of 65-74 have diabetes.[25]

The highest rates of diabetes are found among black women—one in four women over 55 years of age has diabetes. African Americans also have higher rates of complications from diabetes, such as blindness, cardiovascular disease, end stage renal disease (kidney disease) and amputation.[25]

Within California, the statistics are just as startling. According to the California Department of Health Services, 27 percent of adults are obese, while in total, 65 percent are overweight and obese, and heart disease and cancer account for (52.2 percent) of deaths among African Americans in California. Diabetes was the fifth leading causing of death among African-American adults 18 years and older accounting for 704 deaths in California during 2001.[25]

According to the American Heart Association, cardiovascular disease (CVD) ranks as the number one killer of African Americans, claiming the lives of 36 percent of the more than 290,000 African Americans who die each year. It was also reported that the rate of high blood pressure in African Americans in the U.S. is among the highest in the world.[26]

Based on an American Cancer Society report, it was noted that African Americans are less likely to survive for five years after being diagnosed with cancer than whites at all stages of diagnosis. This may be due to reduced access to medical care; being diagnosed at a later stage, when the disease has spread to regional or distant tissue; and/or disparities in treatment. Although cancer death rates decreased for African Americans in the 1990s, African Americans still have a higher death rate from all causes of cancer compared to whites.[27]

Trends/Contributing Factors

Poor dietary choices and limited access to healthy foods, inactive lifestyles, cultural norms and beliefs, and low socio-economic status all contribute to the high prevalence of obesity and overweight among African Americans. Fewer than half of all African

Americans meet the minimum recommended servings of fruits and vegetables and do not consume enough fiber.[28]

African Americans tend to consume processed and fast foods that are higher in fat and calories and lower in nutrients. Larger meal portions consumed also contribute to increased fat and calories. Scientists estimate that as many as 50 to 70 percent of cancer deaths in the U.S. are caused by human behaviors such as smoking and dietary choices. Some important steps in preventing cancer include maintaining a healthy weight, being physically active, avoiding tobacco use, and eating a low-fat diet that is high in fruits and vegetables.[29]

In a 2004 survey, the majority of the African Americans surveyed reported out-of-home eating weekly or less often (61 percent). Of these, only two percent never ate out. The remaining respondents dined out two or more times per week and were classified as regular diners. When dining out, a fast food restaurant was the most popular choice among African Americans (29 percent). Casual sit-down restaurants ranked second (26 percent) and soul food restaurants came in third (22 percent). African Americans who reported eating at fast food restaurants most often ate fewer servings of fruits and vegetables (2.5 vs. 3.3 servings) and were less likely to reach the daily recommended number of fruit and vegetable servings (8 percent vs. 21 percent).[30]

With respect to physical activity, when surveyed, more than half of African Americans reported that they did not participate in the recommended levels of physical activity (30 minutes of moderate or vigorous physical activity, five days a week).[31]

Within California, 18 percent of African Americans reported that they did not participate in any leisure time physical activity in the past month.[32]

Although African American men get less physical activity than White men, the greatest disparity in physical activity is seen among African American women. Various barriers have been cited, such as: a lack of time; physical and emotional exhaustion; lack of motivation to be physically active; living in a high crime area; inclement weather; lack of recreational facilities; and an absence of social support.[33]

Barriers to Implementation/Myths

African American culture may play a role in the prevalence of overweight and obesity. Cultural factors have historically affected dietary choices, physical activity levels, and body weight acceptance.

Historically, African Americans lived an extremely active lifestyle that may have provided protection from the unhealthy effects of a high-fat diet. Unfortunately, sedentary lifestyles have caused health problems related to their diets to surface.

Ethnic disparities in prevalence of overweight highlight the importance of examining cultural differences among children from different racial and ethnic backgrounds and their

effects on adiposity. For example, several studies have shown that African American girls and women experience less social pressure about their weight. Thus, they tend to be more satisfied with their bodies, and have less negative attitudes about being overweight compared to white girls and women. These cultural differences have been hypothesized to account, in part, for the higher prevalence of obesity observed among African American girls and women.[34]

The correlation between body image size and ethnic and gender background for Americans, especially for standards of attractiveness, is a primary determinant of body size. Black women are more satisfied with a larger body size than White women because African-American men consider a large buttock and wide hips as features of attractiveness.[35] As a result, most black women are not only comfortable with a large body size but maintain large bodies to increase acceptance by Black males.

Although obesity and overweight affect African Americans from all socioeconomic levels, poverty appears to play a major role in the prevalence of obesity. Low socioeconomic status and the resulting stress and difficulties can contribute to poor choices and high rates of obesity. More African Americans with higher and middle incomes meet minimum dietary recommendations than do those with lower incomes.[36]

Among African Americans who think they should eat more fruits and vegetables, over 75 percent listed difficulty purchasing fruits and vegetables at fast food restaurants as the leading barrier to eating more fruits and vegetables. The reasons stated for not eating more fruits and vegetables was they are hard to get at work and hard to buy in restaurants.[37]

Common Concerns/Strategies

Access to safe, affordable, nutritionally adequate foods determines a community's food security. Limited access to healthy and inexpensive foods in poor neighborhoods is a major barrier for weight control and good health. Studies have shown that there are fewer grocery stores with affordable fruits and vegetables, and other healthy low-fat items close to low-income neighborhoods.[36]

In most low-income neighborhoods, fast food and processed foods are cheaper and more convenient to purchase than healthier produce and whole grains.[30]

Another factor affecting African Americans is limited or no access to physical fitness programs and facilities in low-income neighborhoods. In most low-income communities, there are limited numbers of parks, open spaces, and biking or walking trails. Also, after-school sports and recreational programs are non-existent or limited, and many parents do not allow their children to play outside because of high crime rates.[31]

In addition to poverty, other factors can contribute to difficulties in controlling weight and improving one's health status. These include disparities in education and awareness about prevention and treatment of overweight and obesity. Also, because there is a

lack of negative social pressure to lose weight within the African American community, individuals engage in weight loss only for a short period of time.[32]

Obesity is curable and its complications are often reversible. However, a combination of diet, exercise, social support, medical treatment, and community involvement is needed to effectively treat obesity. Unfortunately, treatment options for poor African Americans are limited because black people have a long history of economic deprivation and inadequate health care.[33] High poverty rates and lack of health insurance are barriers to appropriate health care in the African American community.

Although African Americans are more likely to report chronic disease than Whites, they are less likely to see a physician on a regular basis or consult with a registered dietitian. African-American patients without a regular physician are less likely to receive preventive services and culturally appropriate care for diseases related to obesity such as diabetes and hypertension. Also, African Americans are more likely to report negative health care experiences and treatment with disrespect during health care visits in comparison to White Americans.[34]

Despite the barriers, there are several programs nationwide that are aimed at improving the health of African Americans. Below is a sample of a few of those programs:

Randy Klebanoff, MSPH, MPH, and Naoko Muramatsu, Ph.D., developed ***Lively Ladies,*** a community-based physical education and activity intervention targeted at low-income, preadolescent, African American girls in community-based youth services organizations in Chicago. The goal of the program is to incorporate healthful habits in an enjoyable way. The program is successful because it takes advantage of existing community-based youth programs, obtains the support of the organization, and involves parents.[36]

Sisters Together: Move More, Eat Better (http://win.niddk.nih.gov/notes/summerfall03notes/sisters.htm) is based on a pilot program conducted in Boston from 1994-1998. The program was based on research which showed that Black women preferred receiving information from trusted family and community sources, as well as from the media. Based on these findings, community partnerships were created with churches, barber and beauty shops, health centers, newspapers, and radio stations with a high number of African-American listeners. A culturally sensitive intervention campaign resulted in successful weight loss for many of the women involved.[37]

Steps to Soulful Living tested the effects of a culturally adapted weight loss program on African Americans. Black women participated for six months and achieved relatively large weight loss, thus demonstrating that interventions which were tailored specifically to the African American community can be effective.[38]

Within California, the California Department of Health Services, Cancer Prevention and Nutrition Section has developed the ***African American 5 a Day Campaign*** *(Campaign).* The *Campaign* is a public health initiative designed to improve the health of the low-income

African American community by offering education, advocacy, and policy development on healthy eating and physical activity. Its purpose is to empower African American adult women, ages 18-54, and their families to consume the recommended levels of fruits and vegetables and be physically active every day. The *Campaign* is also charged to encourage food secure households by promoting participation in nutrition assistance programs.

The *Campaign* works with communities throughout California to create environments where healthy eating and physical activity are socially supported and easy to do. Through the work of 16 Faith-Based Community Projects and six *Regional Nutrition Network* Agencies, the *Campaign* provides services to the nearly 40 percent of African Americans in California who are low-income individuals.

In partnership with the American Cancer Society and the National Cancer Institute, the *Campaign* Faith-based Community Projects implement *Body & Soul: A Celebration of Healthy Living* (http://www.bodyandsoul.nih.gov/). *Body & Soul* is a model program that has been proven to increase fruit and vegetable consumption among African Americans. The Faith-Based Community Projects also work with local congregations and faith-community leaders to create safe communities for physical activity and increase access to healthy foods to uplift and support the quality of life for African American families.[39]

Opportunities for Improvement

Closing Gaps in Health Disparities:

In order to help improve the health status of African Americans, the gap in racial and ethnic disparities in health care must be addressed. The Institute of Medicine (IOM) report, *Unequal Treatment: Confronting Racial and Ethnic Disparities in Care,* provides compelling evidence that racial and ethnic disparities persist in medical care for a number of health conditions and services. These disparities exist even when comparing individuals of similar income and insurance coverage.[40]

A review of studies from 1984 to 2001 investigating racial and ethnic differences in cardiac care provides evidence of lower rates in diagnostic and revascularization procedures for at least one of the minority groups under study. Evidence of racial and ethnic disparities among patients with comparable insurance and the same illness has been the most troubling since insurance coverage is widely considered as the “great equalizer” in the health care system.[41]

In 1999, the U.S. Department of Health and Human Services (DHHS) established a national goal of eliminating health disparities by the end of this decade. The decision to have one set of goals for all Americans, rather than a set for Whites and another set for minority populations has helped to focus public and private sector attention on racial and ethnic disparities in health and the health care system.[42]

While attention to racial and ethnic disparities in health and the health care system has increased among policy makers, there is little agreement on what can or should be done to reduce these disparities. The U.S. Congress provided leadership on this issue by legislatively mandating the IOM study on health care disparities and creating in statute, the National Center on Minority Health and Health Disparities at the National Institutes of Health. Congress also required DHHS to produce an annual report, starting in 2003, on the nation's progress in reducing health care disparities which has provided an important first step for addressing health and health care disparities.[43]

The IOM study committee for *Unequal Treatment* recommended the use of a comprehensive, multi-level strategy to address potential causes of racial and ethnic disparities in care that arise at the patient, provider, and health care system level. The recommendations pointed to five broad areas of policy challenges:

- Raising public and provider awareness of racial and ethnic disparities;
- Expanding health insurance coverage;
- Increase the number and improve the capacity of providers in underserved communities;
- Improving the quality of care;
- Adopting communication practices that promote behavior change; and
- Increasing the knowledge base of causes and interventions to reduce disparities.[43]

Improving Supermarket Access in Low-Income Communities:

Research shows that there are fewer supermarkets in low-income communities than in middle class or upper middle class communities. In 1995, the University of Connecticut's Food Marketing Policy Center examined census and grocery store information for 21 major metropolitan areas across the United States. Findings determined that there were 30 percent fewer supermarkets in low-income areas than in higher income area. It also found that low-income consumers were less likely to possess cars, thereby further limiting their access to food choices.[44]

Due to a lack of supermarkets in low-income communities, residents often shop at smaller neighborhood stores. Small stores provide fewer food choices at higher prices than supermarkets. The reasons for differences in price, quality, and selection are varied, but are often tied to the economies of scale. Smaller stores that cannot buy in volume have limited access to large-scale wholesale produce, and often do not have the space or equipment needed to offer fresh produce on a daily basis.

Prices at neighborhood stores can exceed those at chain supermarkets by as much as 76 percent. In a 1993 study in Eastern Pennsylvania, researchers found that the average full-service supermarket offered 19 kinds of fruit, 29 kinds of vegetables, and 18 kinds of meat, while the average small store only carried 6 kinds of fruit, 5 kinds of vegetables, and 2 kinds of meat. The study also showed that the produce and other foods offered in smaller stores were often lower in quality.[42]

By having fewer supermarkets in urban, low-income communities, residents have less access to healthy foods. Not only are low-income residents' food purchases limited by their financial constraints, they also do not have access to fresh, healthy, high quality, affordable food. Limited supermarkets make it harder for individuals to meet their dietary needs, and therefore contribute to ever increasing rates of chronic disease in low-income communities.

Many cities have begun to explore public/private partnership as ways of meeting the public's need for infrastructure, community facilities, and services. Public/private partnerships are agreements between government and private sector organizations that feature shared investment, risk, responsibility, and reward.[43]

Below are examples of two successful public/private partnerships:

In Harlem, two community organizations the Community Association of East Harlem Abyssinian Triangle (EHAT) and the Abyssinian Development Corporation, worked for ten years to bring a supermarket to the community. The supermarket, which opened in 1999, faced many challenges along the way, particularly from small local grocers concerned about their own businesses. The store has proven to be very successful. Data from a 1999 report revealed that supermarkets are meeting or exceeding industry averages in almost every category.[45]

The last full-service grocery store in West Oakland, California, a low-income African-American community, closed its doors in 1993. In 2001, a group of concerned citizens, community-based organizations, and social services agencies formed the West Oakland Food Collaborative to increase access to nutritious food while stimulating community economic development. The cornerstone of their efforts was the Mandela Farmers' Market, which opened in April 2003. The market is doing well and turnout is increasing, with approximately 200 customers a week.[46]

Opportunities to Change Attitudes Within the African-American Community:

In order to improve their health, African Americans must develop a new attitude when it comes to eating, physical activity habits, and acceptable body size. While it is refreshing to know that African Americans are less apt to belittle an overweight woman or girl, it is important to understand the huge impact weight, particularly excess weight, has on health.

The African-American community is traditionally based on family, sharing, and cooperation. Many of the traditional ways of sharing and interacting center on food which are typically high in fat and high in calories. African Americans tend to focus less on the health consequences of what is being eaten and more on simply enjoying the company and emotional support of friends and family.

During times of crisis, African Americans often pull together by way of food. If someone in the community falls on hard times, they can count on neighbors to bring over a plate

of food or dish to see them through. While no one is expecting African Americans to give up the tradition of sharing and caring for one another or stop eating foods that are important to them and their families. However, if African Americans are to be successful in losing weight and keeping it off, they must rethink what to eat, how much to eat, and healthier ways of preparing their favorite foods.

In the spring of 2005, the U.S. Department of Agriculture released a new food guide pyramid called MyPyramid. The new pyramid contains a rainbow of colored, vertical strips which represents the five food groups plus fats and oil. Although the recently released MyPyramid does not specifically address foods traditionally consumed by African Americans; based on previous editions of the Food Guide Pyramid, a Soul Food Pyramid was developed to categorize foods important to African Americans within the six major food groups, as well as offer serving guidelines for a well balanced, healthy diet.[47]

In addition to the Soul Food Pyramid, various recipe books are available in bookstores and via the internet that bring together many African American favorite recipes, prepared in a heart healthy way such as the National Institutes of Health's *Heart Healthy Home Cooking: African American Style.*[48]

Resources/Web Sites

www.ca5aday.com
www.9aday.cancer.gov
www.hschange.org
www.nih.gov
www.americanheart.org
www.census.gov
www.soulfoodpyramid.org
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California Food Guide

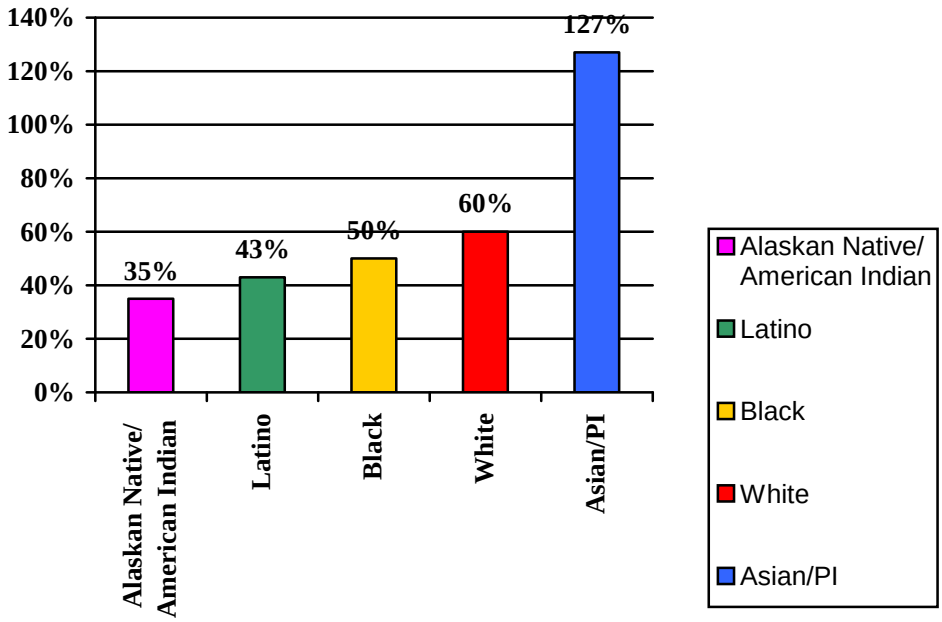
Health and Dietary Issues Affecting Asians

By Kim-Phuc Nguyen, M.S.

What's New?

Low-income Asian and Pacific Islander American (API) children are joining other racial/ethnic groups in the obesity epidemic. The percent change in the prevalence of overweight among low-income API Californian children aged between 5-19 is alarming. From 1992 to 2001 the percent of overweight in these groups has more than doubled from 5.9 percent to 13.4 percent.[1]

Table 1: Percent change of overweight* from 1992 to 2001, low-income CA children from 5 to < 20 years old by race/ethnicity.[1]



*Overweight = BMI > 95th percentile. Overweight is comparable to obesity in adults.[1]

Definition

Asian refers to people having origins in any of the original peoples of the Far East, Southeast Asia, or India. It includes people who indicated their race or races as "Asian Indian," "Chinese," "Filipino," "Korean," "Japanese," "Vietnamese," or "Other Asian," or wrote in entries such as "Burmese," "Hmong," "Pakistani," or "Thai."

Pacific Islander refers to a person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands. It includes people who indicate their race as "Native Hawaiian," "Guamanian or Chamorro," "Samoan," and "Other Pacific Islander."[2]

Incidence and Prevalence

California is home to the largest Asian population in the United States and these populations continue to grow. Between 1990 and 2000, the Asian population in California grew 11 percent from 2.7 million to 3.7 million.[3] According to Census 2000, Chinese are the largest Asian group in California with 980,642 persons.[2] Filipinos represent the second largest group with 918,678 persons. With an increase of 60 percent during the past decade, the Vietnamese are the fastest growing population in the state and the third largest Asian ethnic community with 447,032 persons. Koreans are the fourth largest group with 345,882. Asian Indians are the fifth largest group with 314,819 and Japanese are the sixth group largest with 288,854. Other Asian subgroups including Cambodian, Hmong, Laotian, Thai, and Malaysian, constitute almost half a million persons in California.

Little is known about the differences in nutritional status and health risks of these Asian subgroups. Moreover, very few studies are available on the food habits of these populations in California. This section presents an overview on food habits and nutritional issues for select Asian subgroups living in California and other parts of the United States.

Common Concerns/Strategies

There are many similarities across the Asian subgroups living in California. Many Asians still consume some traditional foods, particularly rice, and a wide variety of fruits, vegetables, meat, poultry, and fish. Overall, an increasing trend of meat consumption is seen among all Asian ethnic populations. Fresh vegetables and fruits are more affordable in their countries of origin while meat products are more affordable in the United States. Furthermore, the availability and consumption of unhealthy foods, including alcohol and snacks high in fat and sugar, contribute to poor health in these populations.

Tea has been a favorite drink of many Asian people through the centuries. It is reputed for its healthy and medicinal properties and is believed to clear the sight and mind, and to fight stress. A growing body of evidence suggests that moderate consumption of tea may protect against several forms of cancer, cardiovascular diseases, formation of kidney stones, bacterial infection, and dental cavities.

The consumption of dairy products among Asian Americans in California appears to be higher than in Asia. However, Asian American women are believed to be at an increased risk for osteoporosis and osteopenia due to low calcium intake. Lactose intolerance (also referred to as "lactase non persistence" or "lactose malabsorption") or a learned aversion to milk products also contributes to this problem. National Osteoporosis Risk Assessment found that 65 percent of Asian-American women have low bone mineral density, the

highest among all racial/ethnic groups.[4] Seventy-three percent of postmenopausal Asian women have calcium intakes below recommended levels.[5]

Although most Asian Americans know that physical activity is important, exercise is rarely a part of their U.S. lifestyle. Work consumes most of their days, leaving little time for personal activities. Refugees, in particular, have so many things to worry about (i.e. jobs, family stresses, adaptation to a new lifestyle) that exercise is not a priority. Furthermore, community events promoting physical activities are rare. In California, U.S. born men of Chinese, Filipino, Japanese and other Asian heritage are more obese than their ethnic counterparts in their homelands.[6] The American Heart Association reports that 64 percent of Asian-American women are sedentary, which can contribute to obesity, a risk factor associated with type 2 diabetes.[7] Diabetes is the fifth leading cause of death for Asian Americans between the ages of 45 and 64.[8]

Opportunities for Improvement

For many subgroups, acculturation is negatively affecting their dietary patterns. Some general nutrition recommendations that might be applicable to Asian Americans include the following:

Encourage:

1. Breastfeeding. Point out the nutritional and heath advantages of breast milk.
2. Maintenance of healthy and nutrient-rich traditional Asian diets.
3. Consumption of whole grain products such as brown rice and whole wheat noodles.
4. Fruit consumption rather than desserts high in fat and total calories.
5. Consumption of low-fat or nonfat dairy products for those who can tolerate and like milk. For lactose intolerant individuals or those who do not consume dairy or milk products**:** Encourage alternate calcium sources including Lactaid milk; calcium-fortified soymilk, juices and tofu; dried fish; soft-shelled crabs and shrimp; canned fish with edible bones (salmon, sardines); collards and broth made from vinegar-soaked bones.
6. Consumption of lean meats and poultry without skin.
7. Consumption of a variety of shellfish and fish without skin and guts. For consumer educational material about safe seafood consumption, refer to the brochures in the link below. For more information on chemical contaminated fish read the chapter on “Environmental Contaminants of Foods.”

Reduce:

1. Oil and fat used in stir-frying and deep-fried cooking. Encourage steaming and boiling rather than deep-fat frying.
2. Consumption of high cholesterol organ meats including liver, heart, kidney, brain, intestine, and tripe.
3. Use of monosodium glutamate (MSG), chicken and beef essence, soy sauce, shrimp paste, fish sauces, and other high sodium sauces and salty traditional snacks for salt-sensitive individuals.

4. Consumption of soft drinks, pastries, and sweet desserts and sauces made with coconut milk and sweetened condensed milk.

While tremendous progress has been achieved to improve the health of the American people, Asian Americans, who suffer from the stereotype of being the "model minority" which presupposes economic success and physical well being, have not fully reaped the benefits of this effort. Nutrition education efforts targeting these communities remain largely underdeveloped.

- Intervention programs and health education materials need to be tailored to different Asian subgroups.
- Dietary recommendations need to be culturally appropriate for Asian Americans whose food customs rely heavily on traditional Asian beliefs and values.
- Nutrition education, about both American and ethnic foods, should be delivered to Asian youth. They eat both foods and are significantly influenced by their families' practices and cultural tradition as well as their peers in the American culture.
- Physical activities need to be incorporated into nutrition education programs. Tasks should include ways to incorporate physical activities into daily life including how to make time to exercise, how to get started, and how to monitor progress.

Food Patterns and Burden of Asian Races

CHINESE

Food Patterns

A predominant number of Chinese immigrants and refugees living in the U.S. are from China, Hong Kong, Taiwan, and other Southeast Asian countries. Culturally, Chinese often rely on traditional beliefs and practices concerning health and medicine and shop at Asian supermarkets.

- Main staples: rice, rice noodles, egg noodles, wheat noodles, wonton wraps, mung bean noodles, and buns. Bread, oatmeal, and whole grain cereal are also eaten by Chinese Americans.
- Protein sources: beef, pork, chicken, duck, fish, eggs, tofu, and other soy products, shellfish, and other seafood. The consumption of beef and poultry may be higher than other protein sources.
- Fruits and vegetables: Chinese dishes make extensive use of a wide variety of vegetables including asparagus, bamboo shoots, bitter melon, bean sprouts, broccoli, cabbage (bok choy, yau choy, and napa), celery, mushrooms, kohlrabi, water-convolvulus, watercress, and pumpkin. Some traditional fruits and vegetables are replaced by more commonly available American foods such as potatoes, lettuce, apples, peaches, and watermelons.

- Flavor is enhanced with the use of fresh coriander/cilantro, five-spice powder, sesame seeds, ginger, and garlic. Condiments such as MSG, soy sauce, oyster sauce, bean sauce, fish sauce, and shrimp paste are used in many dishes.
- Sugar intake has increased in this population in the U.S., mainly through soft drinks, candy, and pastries. Fruit, as snacks and dessert, is consumed less often.

Burden

- Chinese Americans consume diets exceeding 30 percent of calories from fat.[9]
- Cardiovascular disease is a leading cause of death among the Chinese population. The prevalence of hypertension among elderly Chinese American women is 34 percent.[10]
- Foreign-born Chinese Americans may be a high-risk group for osteoporosis.[11]
- In a study of Chinese Americans aged 60 and over living in Boston, 12.5 percent of men and 13.3 percent of women have diabetes.[12]
- Risk of colorectal and breast cancer increase with length of stay in U.S. Breast cancer is the most common cancer among Chinese Americans women. There is a high rate of liver cancer compared to other Asian subgroups.[4]

FILIPINO

Food Patterns

- Main staples: rice, rice noodles, wheat noodles, mung beans, bread, spaghetti, macaroni, crackers, and cereal. Rice is not usually eaten at breakfast.
- Traditional foods: include ingredients from other cultures. Common Chinese ingredients such as oyster sauce are regularly used. Lime, tamarind, ginger, and coconut milk are also key ingredients.
- Protein sources: The consumption of fish is down while chicken, beef, pork, and egg consumption has increased. Legumes and nuts are used infrequently. Filipinos also like organ meats such as tripe or pork blood. Dinuguan (chocolate meat) is cooked with pork blood, pork, tripe, onion, and garlic.
- Vegetables: Compared to other Asian subgroup, Filipinos eat more salads and raw vegetables. Common vegetable choices are cabbage, leafy greens, broccoli, mustard greens, eggplant, green beans, bitter melon, okra, tomato, potato, and onion. Vegetables are usually boiled or sautéed. Common choices are bamboo shoots, bean sprouts, bitter melon, peppers, okra, squash, and yam leaves.
- Fruits: Filipinos eat a wide variety of fruit including bananas, guava, lychee, both green and ripe mangoes, melon, both green and ripe papaya, pineapple, and apples. Juice is also popular.
- Dairy products: evaporated milk, cheese, ice cream, yogurt, water buffalo milk, and goat's milk.
- The Filipino diet is relatively high in fat and cholesterol compared to other Asian Americans. Dishes such as fried fish, deep fried pork leg, pork rind, deep fried chicken, roasted pig, pancit (sautéed vegetable, shredded chicken, shrimp, and rice noodles), lumpia (fried egg rolls), and adobo (onion, garlic, pork/chicken, soy sauce, and vinegar) are eaten frequently.

- The typical diet uses high-sodium condiments. Fish sauce, shrimp paste, anchovy paste, and soy sauce are popular ingredients.
- Pastries, custards, rice cakes, cookies, soft drinks, and high-fat snack foods are often eaten.

Burden

- Filipino Americans exhibit significantly higher levels of hypertension compared to other Asian groups and these levels are similar to those in African Americans who live in the U.S.[6]
- Twenty-six percent of Filipino-American women are obese.[4]
- Cancer of the thyroid is often found in Filipino-American women.[4]
- Prostate cancer is the most common cancer among Filipino-American men.[6]
- Breast cancer is the most common cause of death among Filipino women.[4]

VIETNAMESE

Food Patterns

- Main staples: rice and rice products such as rice noodles, rice paper, and flour. French-style bread and wheat noodles are also widely consumed. Rice is eaten at least once a day. Some eat rice at breakfast, but a large number consume bread, noodles, and breakfast cereals.
- Protein sources: fish, pork, chicken, beef, and shellfish. Since immigration, Vietnamese eat more meat, poultry, and shellfish and less fish. Pork is preferred to beef.
- Fruits and vegetables: banana, papaya, pineapple, plum, mango, orange, watermelon, Fuji apple, bitter melon, yam, bok choy, ong choy, yam leaves, water spinach, carrots, green beans, broccoli, tomatoes, squash, cabbage, mustard greens, cauliflower, and watercress. Lettuce, bean sprouts, and herbs are often served in the raw form to accompany many dishes.
- Dairy products: Cow's milk and other dairy products are less commonly consumed. Preferred dairy items include Laughing Cow cheese, sweetened condensed milk, and ice cream. Soymilk is also a common beverage.
- Fish sauce is a widely used condiment and often diluted with water, garlic, chili, vinegar, and sugar.
- Other foods that are consumed more often by Vietnamese people in the U.S. than in their homeland include fruit juices and soft drinks. Among Vietnamese-American teens, traditional foods are often eaten, but with acculturation there is an increase in the consumption of steak, pizza, deep fried chicken, ice cream, sodas, and milk.
- Many Vietnamese Americans are shifting toward a diet high in fat and low in fiber.[13]

Burden

- Some pregnant Vietnamese immigrants have diets that are low in calcium, iron, vitamin E, and thiamin.
- Vietnamese Americans are at risk for hypertension, which makes them vulnerable to strokes. Heart disease is the second leading cause of death among Vietnamese.[4] Studies from 1978-1985 and from 1991 found that

Vietnamese-American women had the highest rates of hypertension among all Asian-American ethnic groups.[4]
- Cervical cancer is the most common cancer among Vietnamese women. The rate is five times higher than that of Caucasian women.[15]

KOREAN

Food Patterns

- Staple foods: rice and noodles from wheat, mung beans, and buckwheat (served with hot or cold soup). Rice is still eaten daily, but overall consumption has decreased. The diet centers around rice accompanied by one protein-rich main dish and various side dishes. Meals customarily include at least one vegetable, one protein side dish, and kimchi.
- Protein sources: beef (especially barbecued), fish, shellfish, and soybean products. Pork is consumed less often than beef and chicken. Beef and beef variety cuts are consumed frequently; fish is consumed weekly.
- Fruits and vegetables: Fresh fruits are often served as desert. Vegetables, legumes, and nuts such as bean sprouts, bamboo shoots, cabbage, lotus root, seaweed, Asian pears, dates, grapes and plums, are consumed often.
- Dairy products: Milk and cheese are not popular in Korea, but are often well accepted in the U.S. Current literature indicates that meat and dairy product consumption are increasing.[16] American foods such as oranges, low-fat milk, bagels, tomatoes, and bread are regularly consumed at breakfast and lunch.
- Korean foods are usually spicy and salty. Foods are usually seasoned with chili peppers, Chinese parsley, ginger root, sesame oil, corn oil, soy sauce, soy bean paste, garlic, sesame seeds, and rice vinegar.
- Kimchi is a spicy traditional side dish made with various kinds of vegetables (sometimes with fish), with Napa cabbage being the most popular vegetable used. There are more than 200 varieties of kimchi, but the main ingredients are red pepper, garlic, green onion, and ginger.
- The less acculturated Koreans consume more vegetables and less fruits, sweets, and fats than the more acculturated Koreans.[17]
- Roasted barley or beverages from water of boiled corn are consumed after meals. Ginseng, an ancient therapeutic tea, is believed to be an aphrodisiac that promotes health, strength, and happiness.[16]

Burden

- Data suggest that cancer is the leading cause of death in Korean Americans between the ages of 25-44 years and heart disease is the leading cause of death for those aged in 45-64 years.[18]
- Colorectal cancer is second most common cancer for Korean-American women (after breast cancer).[19] Stomach cancer is most common cancer among Korean-American men.[20]
- High blood pressure is the leading cardiovascular disease risk factor among Korean-American elderly.[21]

ASIAN INDIAN

Food Patterns

- Asian Indians include many American foods in their meal plans, yet continue to eat many traditional foods. Traditional mixed dishes with grains, legumes, and vegetables are consumed less often in the U.S., but many continue to prepare those dishes at least once a week.
- Main staples: A typical diet is composed of cooked rice, broiled Indian bread, dal, roots, tubers, achar, yogurt, and tea with milk. Dal is a name for lentils, beans, and split peas. Achar are pickles that are prepared with vegetables or fruits such as lime and raw mango to which salt, chili powder, and oil are used as seasonings.
- Protein foods: Legumes such as lentils, garbanzo, and kidney bean. Sprouted dals are also used in raw salad dishes. Animal protein sources are milk and dairy products, goat, fish, poultry, and eggs.
- Consumption of legumes has decreased and meat intake has increased in the U.S.
- Fruit and vegetables: Many types of vegetables are also prepared daily with a variety of spices, condiments, fresh ginger, onions, or garlic. Some common fruits and vegetables include: bananas, dates, figs, oranges, mangos, grapes, nectarines, plums, apples, peaches, watermelons, papayas, pineapples, cabbages, potatoes, carrots, eggplants, spinach, and squash. There is a decrease in vegetable intake in U.S. Asian Indians. Indian consumption of fruit juice, fruits, margarine, chips, cola, alcohol beverages, and coffee has increased.[22]
- Dairy products: More cheese and ice cream are eaten in the U.S. Other common choices include whole milk, buttermilk, and ghee. Ghee is a clarified butter, served with rice or applied to Indian bread. Fermented dairy products such as yogurt are popular. Milk is considered a beverage for children. Paneer is a homemade cottage cheese that is deep-fried and added to vegetable dishes.
- Typical weekday snacks include apples, cookies, nuts, milk, crackers, and chips. Indian snacks are consumed more often on weekends.
- Common for them to follow a vegetarian diet.
- Traditional Hindu beliefs avoid beef and the Muslims avoid pork.

Burden

- Asian Indians in the U.S. have one of the highest rates of coronary heart disease of any ethnic group studied.[6]
- This population has a predisposition for diabetes. Trends toward increased caloric intake and inadequate exercise may increase risk of type 2 diabetes.[22]
- Asian Indian women in America have the highest rate of gestational diabetes in the country, with a prevalence rate of 56.1 per 100,000.[23]

JAPANESE

Food Patterns

- Main staple: short grain rice (sticky rice). Rice may be mixed with rice vinegar and served with sliced raw fish.
- Protein sources: soybean products and a wide variety of fish and shellfish.
- Fruits and vegetables: are preserved or dried, but fresh ones are preferred. Some preserved and dried fruits and vegetables include daikon (white radish), seaweed, chrysanthemum leaves, algae, and tangerines.
- Dairy products: are still not popular with first generation Japanese Americans. Milk, butter, and ice cream are consumed more by subsequent generations.
- The Japanese use a large amount of seaweed and algae in their cooking for seasoning, as a wrapping, or in salads and soups. Grated daikon is mixed with lemon juice or vinegar to make dressing for vegetables, poultry, or seafood.
- Most second generation (and up) Japanese Americans eat a typical American diet, but use more rice and soy products than other ethnic groups.
- The Japanese-American diet is high in calories, protein, fat, and carbohydrates. The mean daily intake of fat in Japanese-American men was 32.4 grams, in contrast to a mean intake of only 16.7 grams of fat in Japanese men.[6]
- Japanese Americans use more fats, oil, and sugar. They also eat more poultry and meat than fish and fewer fruits and vegetables than the Japanese in Japan.

Burden

- Japanese Americans have a stomach cancer rate that is twice as high as most other populations in the U.S., that is believed to be related to eating nitrite-rich salty foods (e.g., cured meats).[24]
- The Western diet may increase the risk of colon cancer, heart disease, and diabetes among Japanese Americans. Relatively high rates of Type 2 diabetes have been reported among second-generation Japanese-American men (20 percent) and women (16 percent) aged 44-74.[25]
- Prostate cancer is the most common cancer among Japanese-American men.[6]
- Japanese-American men and women have the highest adjusted mean of cholesterol levels compared to other Asian groups.[26]
- Eighteen percent of Japanese American women are obese.[4]

HMONG

The Hmong originally migrated southward from China about 300 years ago, settling in the remote mountainous area of Laos, Vietnam, and Thailand. Since many Hmong fought for the U.S. in Laos during the Vietnam war, their lives, and the lives of their families, were in danger when the U.S. pulled out. Hmong refugees were transported to the U.S. from their homeland in Northern Laos because of promises of protection.

Food Patterns

- Main staples: rice, sticky rice, rice noodles, rice paper, cellophane, or mung bean noodles. Flour noodles, French bread, and cereal are also common items.

- Protein sources: legumes (mung beans, soybeans, tofu), beef, chicken, pork, and fish.
- Vegetables: A wide variety are eaten. Popular vegetable choices include mustard greens, squash, lemon cucumbers, chayote leaves, yam leaves, bitter melon leaves, onchoy, pepper leaves, snap peas, mustard greens, beans, chili peppers, bamboo shoots, fresh coriander/cilantro, cucuzzi squash, pumpkin, and sugar cane.
- Dairy products: milk and cheese are consumed in very low amounts and many adults do not drink milk regularly. Whole milk may be preferred.
- Contemporary food practices include a higher consumption of eggs, but meat is still preferred. Fish is eaten in a much lower amount.
- Fresh produce is highly valued by Hmong Americans.
- Other foods include coconut milk.
- Seasonings such as fish sauce and soy sauce, both of which are high in sodium, are an essential aspect of Hmong cooking. Hot peppers, ginger, garlic, coriander, coconut, and lemon grass also contribute to the robust flavor of Hmong diet.[27]
- Most Hmong do not consume tea, coffee, or other flavored beverages with their meals. The traditional Hmong diet includes very little sugar.

Burden

- Riboflavin, calcium, iron, magnesium, and zinc consumption were found to be less than 80 percent of the RDAs in the Hmong adult.[28]
- Some Hmong also experience lactose intolerance.[28]
- Pregnant Hmong women do not appear to make dietary changes to accommodate pregnancy. As one study shows, they only consumed 100 calories more than non-pregnant counterparts.[29] This can be detrimental for the development and growth of the fetus and also harm the mother's health. The postpartum diet is very limited and be may be of concern.
- Major health concerns include increased risk of heart disease, diabetes, and increased incidence of obesity.[39]

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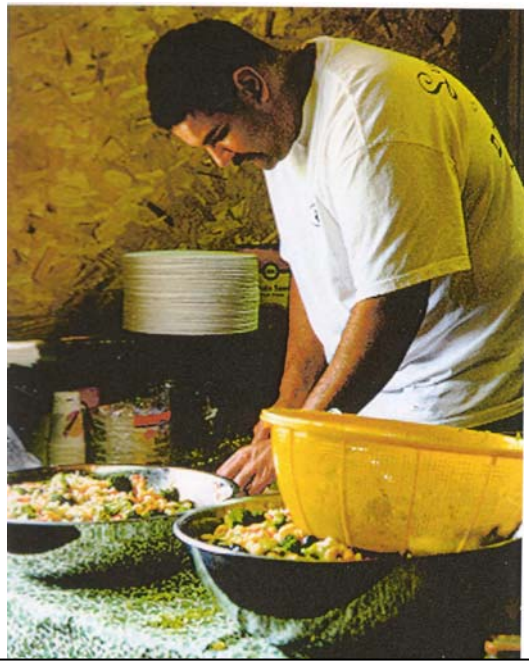
California Food Guide

Health and Dietary Issues Affecting American Indians

By Stacey Kennedy, M.S., R.D.



What's New

According to the 2000 census, 333,300 people of American Indian/Alaska Native (AI/AN) descent live in California, making the Golden State with the highest number of American Indians. AI/AN have the highest prevalence of type 2 diabetes in the world.

Public Health Implications

Diabetes is being diagnosed at young ages in Native American Indian Communities and has become an urgent priority. AI/AN adults ages 50-64 in California have a significantly higher prevalence rate of diabetes (19.6 percent) compared with Whites (8.3 percent).[1] Cardiovascular disease (CVD) used to be rare among AI/AN. The current rates of CVD in American Indians exceed rates in other U.S. populations and can be fatal.[2] AI/ANs historically have had very low rates of cancer but cancer is now the second leading cause of death for AI/AN over the age of 45, and rates appear to be increasing.[3]

Definition

AMERICAN INDIAN TRADITIONAL FOODS

In the 1800s wild plants and wild game dominated the land in California. Before the time of agriculture, they were probably dominant in the areas that later became agricultural. The abundance of wild vegetable foods in California was largely determined by the geographical environment.

Indians boiled foods in almost all native cultures. Stone boiling was the dominant method in California. The earth oven was used to prepare plant and animal foods. Some foods were heat and steam cooked (normally overnight). Broiling or roasting were common methods of preparation. Smoking and drying meat was also common

and a great variety of vegetable foods were preserved by drying.

Food has immense social and spiritual importance in the culture of American Indians. Every tribe prepared and preserved its food in some way to store food for future use. Recipes are well reported in many localities. In areas where hunting and fishing dominated, the Indians were well nourished. Acorns were a staple food, the nutmeats were ground and then leached before final preparation and consumption.

Foods traditionally eaten by some American Indians in California include the following:[4]

Game and wild fowl (squirrel, deer, rabbit, elk, grouse, quail, and other fowl)
Seafood (salmon, trout, eel, clams, mussels)
Nuts and seeds (acorn meal, hazelnuts, black walnuts, pine nuts, grass seeds)
Grains and beans (corn, beans, corn tortillas)
Vegetables (turnip, wild potato, wild carrots, bitter roots, camass bulbs, squash, wild celery, greens, yucca, cactus, mushrooms, wild onions, garlic)
Fruits and flowers (cactus fruit, yucca flowers, squash blossoms, wild strawberry, gooseberry, raspberry, blackberry, tuber berries, huckleberry, service berry, salmon berry, choke cherry, wild plum, melons, peach).

Burden

Lifestyles of California tribes have drastically changed over time. Compared with their ancestors many Indians have a more sedentary lifestyle. Diabetes, obesity, and poverty are now epidemic among tribes in California. Moreover diet has changed dramatically for American Indians. Poor diet is known to be a contributing risk factor to diabetes, obesity and CVD. Current foods eaten by American Indians contain more fat, sugar, preservatives, and artificial ingredients than the traditional foods.

Incidence and Prevalence

The AI/AN population is one of the smallest minorities, compromising only 1.6 percent of the total United States population. California is home to more AI/AN than any other state. California Indian country is 4.5 times larger than the Navajo Nation of Arizona, stretching over 123,000 square miles. There are 107 federally recognized tribes. Of the 627,600 self-reported American Indians in California, the largest number of people reside in Los Angeles County according to the Census 2000. There are 221,000 AI/AN currently living in non-urban portions of California that make up the Indian Health Service population area. Despite their numbers as a group, California's Indians are the most medically underserved in the nation.

Prevalence data in this section has been collected for both American Indians and Alaskan Natives due to the fact that most research and census data report both groups together.

- American Indian and Alaskan Native adults, ages 50-64, in California, have a significantly higher prevalence rate of diabetes (19.6 percent) compared with Whites (8.3 percent).[2] One in five AI/AN adults age 65 and over report having diabetes.[5]
- Approximately six in ten AI/AN California adults diagnosed with diabetes have also been diagnosed with high blood pressure -- nearly 2.8 times the rate of diabetes in AI/AN adults not diagnosed with diabetes.[5]
- Approximately one in four (26.2 percent) AI/AN adults with diabetes in California has also been diagnosed with heart disease, nearly 3.4 times the rate of adults not diagnosed with diabetes.[5]
- Approximately four in five AI/AN California adults with diabetes (81.1 percent) are overweight or obese. This proportion is highest among AI/AN adults ages 18-64 (86.4 percent).[5]

Trends/Contributing Factors

When American Indians were uprooted from their lands, many became dependent on commodity foods. These foods include canned meat, poultry, fruit juice, peanut butter, eggs, powdered and evaporated milk, dried beans, instant potatoes, peas, and string beans. Younger American Indians in California are less likely than their grandparents to supplement their diets with wild game and wild foods like squirrel, rabbit, deer, acorn mush (puree), greens, nuts, berries, and mushrooms. Many southwestern items, like beans, rice, and tortillas, are now listed as traditional American Indian foods. One study carried out among 198 rural women living in California found that 60 percent of the women did not eat any fruit and 28 percent did not eat any vegetables on the previous day.[6] The regular consumption of milk and vegetables was positively related to dietary quality in these women.

Only 50 years ago, infectious diseases, malnutrition, and infant mortality were the leading health problems for AI/AN populations. Because of advances in sanitation and improved access to food and modern medical care, those problems have been reduced, but not eliminated. Modern diseases (e.g., obesity and diabetes) are on the rise. These modern or chronic diseases are in turn related to multiple factors that might be cultural, genetic, socioeconomic, or behavioral.[7]

Obesity increases the risk for certain chronic diseases, including cardiovascular disease and diabetes. The prevalence of overweight and obesity has increased for the general U.S. population as well as among AI/AN. California data derived from the U.S. Behavioral Risk Factor Surveillance System (BRFSS) indicates that AI/AN individuals were more likely to report obesity (BMI of $\geq$30 kg/m^2) (23.9 percent) than respondents of other racial/ethnic groups (18.7 percent). These estimates are probably conservative, because respondents tend to underreport weight.[7]

Research derived from BRFSS has demonstrated that the prevalence of diabetes among AI/ANs is increasing among all age groups. Diabetes awareness (defined as ever having been told by a health professional that he or she has diabetes) was much higher in the AI/AN population (9.7 percent) than respondents of other racial/ethnic groups (5.7 percent). Pacific Coast Indians had a rate of 10.6 percent. The percentage of adults who actually have diabetes is likely higher because, in certain cases, the respondents were unaware of their health status regarding this condition. In fact, the National Health and Nutrition Examination Survey III reported that for every two U.S. adults with diagnosed diabetes, one person has undiagnosed diabetes. Thus, the burden of diabetes for AI/ANs might be even more substantial than these estimates indicate.[7]

Although tribes differ in their use and abuse of alcohol, American Indians as a group report the highest prevalence of alcohol dependence and the highest number of alcohol-related deaths of all ethnic groups in the U.S. Indian Health Service estimates age-adjusted alcohol-related deaths to be five times higher than the general U.S. population. Alcohol consumption is higher in men than in women. Despite the negative impact alcohol consumption has had on some tribes, it remains unclear how and why alcohol use disorders develop in greater proportion in American Indians than in the general U.S. population.[8]

Barriers to Implementation/Myths

Living in poverty has taken its toll on the health and nutritional status of American Indians in California. The consequences of poverty are exacerbated for the many American Indians living in communities such as reservations located in rural areas. Often in these rural areas food costs are high and availability, in addition to selection, is limited. Poverty also imposes barriers on transportation options. Isolation and financial constraints have forced families in these rural areas to rely on less expensive, often high-fat foods, and few fruits and vegetables. American-Indian communities often cite lack of availability, poor quality, and high expense as barriers to fruit and vegetable intake.[9]

The USDA Food Distribution Program on American Indian Reservations provides commodities that are a significant source of food in many AI/AN communities. Unfortunately, until recently, the commodity foods, which provide the basis for many American Indian diets, were very high in fat.

Common Concerns/Strategies

In some areas traditional foods may not be available. Sharing information about lower fat versions of modern and traditional foods may provide opportunities for health promotion among those who live in urban locations. A daily diet containing a variety of vegetables, fruits, grains, legumes, lean meats, and fish offers a reduced risk of heart disease, cancer, diabetes, and other diseases. These nutrient rich foods contribute to a

healthful lifestyle and a fuller life. Traditional forms of physical activity such as dancing or gathering materials for basket weaving, carving, and regalia making as well as collecting native foods for ceremonial and personal use should be recognized and encouraged as part of a healthy lifestyle. The many health benefits from traditional food choices and preparation methods are now acknowledged.

Opportunities for Improvement

Eating a regular diet of native and natural foods will help American Indians prevent and control many of today's chronic diseases. Most native foods are appropriate for diabetics, people with heart disease, and most people with gastrointestinal problems. They are low in fat, high in nutrients, and a good fiber source.

Cultural awareness is an essential quality to effective nutrition education. It is an in-depth understanding, acceptance, and respect for the values, assumptions, and beliefs widely shared by a group of people, which structure behaviors of group members from birth until death.[10] Among health service providers there is often an assumption that diversity will disappear as a result of assimilation. However AI/AN, like many ethnic groups are committed to sustaining their cultural identity. Increasingly, cultural knowledge and understanding are important to personnel responsible for quality programs.

The design of “one-size-fits all” nutrition education programs that are aimed at the dominant culture may or may not provide relevant, applicable information for the native population. To provide quality nutrition education it is important to become familiar with the values, customs, and behaviors of American Indians. In the native culture, the family is highly valued and cooperation rather than competition among community members may be emphasized. Many families have evolved from an extended kinship family to a nuclear family. American Indian groups learn best by doing, and teaching comes from oral tradition. American Indians believe food is medicine and often times traditional medicine is integrated with Western medicine. Food habits occur within a cultural context and the nutrition educator has responsibility to become familiar with the broader aspect of culture as it relates to other dietary habits and heath. American Indian groups, in the midst of widespread social, environmental, and economic changes, are in need of better food resources and culturally sensitive nutrition education.

Clinical Implications

Poor dietary habits as well as obesity appear to play a major role in the development of type 2 diabetes among indigenous peoples living in California. The reduction in consumption of the traditional foods appears to play a key role in the increased prevalence of certain chronic diseases in the American Indian population in California.

Resources/Web Sites

1. "California Indian Women: Good Nutrition for All," an 18 minute videotape summarizing the results of a collaborative study between the University of California Cooperative Extension and Indian Health Service Clinics focuses on the healthy food habits of American Indian women and their families. This program features members of California Indian tribes. 1995. If you would like a copy, please contact Rita Mitchell at ritamitc@berkeley.edu

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http://hearstmuseum.berkeley.edu/

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www.ihs.gov/MedicalPrograms/diabetes/nutrition/n_facts.asp

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California Food Guide

Health and Dietary Issues Affecting Eastern Europeans and Middle Easterners

By Sharmila Chatterjee M.Sc., M.S., R.D., C.D.E.

What's New?

In many nutrition studies and health reports, data on Middle Easterners and Eastern Europeans are not broken down by subgroup. Thus it is difficult to differentiate between subgroups from the same region. Little is known regarding their nutritional status and health risks. In addition, very few studies are available on food habits of these populations in California. In the 2000 U.S. Census Bureau report, the majority of the people from the Middle East claimed an Arab Ancestry.[1]

For the Eastern Europeans, a recent study has shown that people who closely follow the "Mediterranean Diet" live longer than other Europeans.[2] It is not a specific diet or a program but a collection of foods and traditional eating habits followed by the people of the Mediterranean region. There are at least 16 countries bordering the Mediterranean Sea and the diets vary between these countries according to culture, ethnic background, and religion. But there are a number of characteristics common to them all:

- A high consumption of fruits, vegetables, potatoes, beans, nuts, seeds, bread, and other cereals.
- Olive oil, which is high in monounsaturated fat, is used for cooking and dressing moderate amounts of fish, but little meat.
- Moderate consumption of red wine usually with meals.
- Low to moderate amounts of full fat cheese and yogurt.
- An active lifestyle.

Public Health Implications

Research suggests that the incidence of type two diabetes, hypertension, high rates of insulin resistance, low levels of high density lipoproteins (HDL) cholesterol, and a tendency towards abdominal obesity are the major health risk factors prevalent among Arab Americans.[3]

A recent World Health Organization (WHO) report showed that obesity rates have increased globally, including in the Middle East and Eastern Europe.[4]

Definition

According to the 2000 U.S. Census Bureau report, about 1.2 million people in the United States reported an Arab ancestry.[1] An Arab ancestry includes people with ancestries originating from Arabic-speaking countries or areas of the world known as Arab. These include people who reported being Arab, Egyptian, Iraqi, Jordanian, Lebanese, Middle Eastern, Moroccan, North African, Palestinian, and Syrian. Kurds and Berbers who are not considered as Arab were included in this group as well.

The largest Arab groups in the United States are Lebanese, Syrian, and Egyptian. Over 25 percent of Middle Easterners have settled in California.[3] Of the total Middle Eastern population in California, 190,000 (56 percent) are Arabs, including 53,000 are Lebanese, 19,000 are Syrian, and 30,000 are Egyptian.[1] A significant number (14,000) of Palestinians also live in California. The number of people with Arab ancestry increased in most states between 1990 and 2000. In the state of California alone the population increased by 48,000, more than any other state.[1]

People from the other non-Arab countries, who live in California, include 159,000 Iranians, 24,000 Israelis and 15,000 Turkish.[5] Iranians are the second largest Middle Eastern group of people living in California after Arabs. About 47 percent of the total Iranian immigrant population in the United States lives in California.

The countries from the Middle East that are at the Eastern end of the Mediterranean Sea include Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Saudi Arabia, Syria, Turkey, United Arab Emirates, and Yemen.[3]

The countries bordering the Mediterranean Sea include the nations of Greece, Albania, Romania, Bosnia-Herzegovina, the Federal Republic of Yugoslavia (containing the continent republics of Montenegro and Serbia), Croatia, Slovenia, Bulgaria, and the Former Yugoslavian Republic of Macedonia (FYROM).[3] The people from these countries collectively are known as the Balkans or Eastern Europeans.

A significant group of people originating from the Eastern European countries living in California includes 125,000 Greeks, 56,000 Romanians, 39,000 Croatians, and 49,000 Yugoslavians.[5]

Traditional Food Habits of The Middle East and East European Countries[3, 6, 7]

Both the Middle East and Eastern European countries have similar food cultures. Many ingredients such as wheat, olives, and dates are indigenous. The most significant differences in food habits are dietary restrictions due to religion and geographical locations. The food compositions are very similar, but the method of cooking or the terms used for a particular dish may slightly differ between the East European countries and the Middle East.

Dairy

Most dairy products are eaten in fermented forms (yogurt and cheese). Whole milk is commonly used for making puddings and desserts. A high incidence of lactose intolerance is reported.

Adaptation to the United States: Ice-cream is more popular. Feta cheese is most commonly used.

Meat/Poultry/Fish/Eggs/Legumes

Lamb is the most popular meat. Traditionally, pork is eaten only by Christians and not by Muslims or Jews-similarly, Jews do not eat shellfish. Egyptians and many Middle Easterners do not combine fish with dairy products in a meal. Kosher beef, kosher poultry, herring, and sardines are most commonly consumed. A popular dish is *kabob*, which are marinated pieces of meat that are threaded onto skewers and grilled over a fire.

Legumes such as chickpeas (garbanzo beans) are most commonly used to make *hummus*, *soup* and *falafel* (deep fried balls). Other legumes used in many dishes are black beans, lentils, navy beans, and red beans.

Adaptation to U.S.: Lamb is still very common. There is a higher intake of beef and less use of legumes than in their homelands.

Breads/Cereals

Some form of wheat or rice usually accompanies every meal. Leavened loaves are very typical of Greece and other Eastern European countries and leavened flat breads are common among the nations of the Middle East. Pita or p*aid,* is a thin round Arabic bread with pockets in the center known as *pocket bread* in the U.S. *Lavash*, is a larger crisp flat bread also called *cracker bread* is the most common form of bread consumed. *Filo* dough (paper thin pastry sheet) is used to make a dessert with nuts called *baklava* or *paklava*. A popular salad made with bulgur is called *tabbouleh*, which is mixed with tomato, mint, olive oil, vinegar, and parsley.

Adaptation to the U.S.: Pita bread is widely used. Bread and grains are eaten at all meals.

Vegetables/Fruits

The most popular vegetable is eggplant. A popular version is *baba ghanoush* (a dip made with grilled eggplant and *tahini*, olive oil, lemon juice, and garlic puree). Often vegetables are stuffed with rice or meats. Green and black olives are present in many dishes and olive oil is frequently used for cooking and food preparation.

Fruits are eaten raw as desserts or snacks. Apricots, cherries, figs, dates, grapes, melons, pomegranates and, quince are preferred. Pears, plums, and pumpkins are more popular in Eastern Europe. In general, vegetables and fruits are preferred raw or mixed into salads.

Adaptation to the U.S.: Less fruits and vegetables are consumed.

Burden

Overall obesity is on the rise for people from the Middle East and Eastern Europe.[4] Since the culture in the Middle East does not promote physical activity, the immigrant population does not perceive it as a health benefit. Therefore, the lack of physical activity can give rise to obesity related health problems.

Research has shown that diabetes, hyperlipidemia, and obesity are a major health problem among Arab Americans.[8, 9, 10, 11, 12] Relatively high rates of undiagnosed diabetes and abnormal glucose tolerance especially among young adults seem to indicate that the future prevalence of diabetes and cardiovascular disease will continue to rise as the population ages. Increase in prevalence of diabetes will impose a significant public health burden and present a challenge to health care providers.

Incidence and Prevalence

The prevalence of abnormal glucose tolerance is common in Arab Americans affecting 41 percent of the population between the ages of 20-75 years and greater than 70 percent of those over 60 years of age. About 18 percent of the population between the ages of 20-75 years have diabetes whereas 36 percent of men and 54 percent of women over the age of 60 years have diabetes.[9] The prevalence of diabetes in Arab countries varies from three percent in Sudan to 35 percent in Bahrain. A study reported that the combined prevalence of impaired glucose tolerance (IGT) and diabetes in Bahrainis varied from 40 percent in men aged 40-49 years of age to 60 percent in women aged 60-69 years of age.[10]

High prevalence of increased plasma cholesterol has also been reported in this group.[11] The underlying syndrome for the Arab populations is comprised of insulin resistance, raised total cholesterol levels and raised Apo-lipoprotein B levels.[11] The authors concluded this pattern resembles that of the metabolic disorder known as metabolic syndrome occurring in familial combined hyperlipidemia.[11]

The prevalence of obesity, especially among women, is very high in this population. It is reported that glucose intolerance and insulin resistance increases as women pass through menopause.[9, 10] In men, abdominal obesity is the cause for increased insulin resistance and glucose intolerance.

Research has also shown that increased body mass index (BMI) among Arab Americans was significantly correlated with increased blood pressure, increased total cholesterol and decreased HDL-cholesterol levels putting them at high risk for cardiovascular diseases (CVD).[11] High incidence of CVD has also been reported among the Saudi population.[12]

Similarly, a recent report showed that the rate of obesity is increasing faster in the countries of Eastern Europe compared to Western Europe due to the arrival of fast foods and lack of physical activity. A WHO report stated that the two European countries leading the pack in this epidemic are Romania and former Yugoslavia.[13]

Trends/Contributing Factors

There is very little information on adaptation of the Eastern European or Middle Eastern diet in the United States. One study found that lack of acculturation to healthy American lifestyle is correlated with increased prevalence of impaired glucose tolerance.[14] On the contrary populations that maintained their traditional food habits have been shown to have a decreased risk of mortality compared to westernized society.[15]

However, like all other immigrant groups, increasing length of stay is associated with some Americanization of the diet with traditional foods eaten on special occasions or as part of the main meal. Greek Americans prefer an American type of breakfast and lunch, but dinner consists of traditional foods.[3] It has been reported that since 1960 olive oil consumption has decreased in Greece and that alcohol consumption has increased.

One study found that, in the past, the Middle East had a food insecurity problem that is now replaced with abundant availability of food due to urbanization.[16] Obesity and its related chronic diseases are emerging, particularly in the urban areas. Lack of physical activity among Middle Eastern women may be contributing to the increasing prevalence of obesity especially in older women.[16] In addition, sedentary lifestyle and the increased intake of fat, greater than recommended allowances, has added to the increasing prevalence of obesity and its metabolic complications.

Barriers to Implementation/Myths

Obesity among the Arab populations is not always perceived as a health risk. It is very likely that cultural preference for female plumpness added to physical and cultural barriers to physical activity contribute to the very high prevalence of obesity among adult Arab women.[16] An active lifestyle for both men and women is not easy to promote to those of Middle Eastern decent, particularly in the context of health benefits. So far, little attention has been given to this problem.

Different religious and dietary restrictions could be a barrier as well. Many people from these cultures observe Muslim, Jewish, and Eastern Orthodox religions, which influence their food choices. For example, Muslims do not eat any form of pork or meat that has been slaughtered without mentioning God's name. This may restrict their choices of lean meat. Muslims cannot drink alcoholic beverages or foods flavored with alcohol. During Ramadan, Muslims fast from sunrise to sunset practicing a religious obligation.[7]

The kosher dietary laws concerning selection, preparation, and eating of food remain influential in Jewish religious and family life. The Jewish laws of kashrut, or keeping kosher, determine which foods are kosher and non-kosher.

Hence, the cultural food habits and habits influenced by religion may already limit their choices of various foods that are available in the United States, coupled with the lack of availability of ethnic foods, which further add to their limitations.

Common Concerns/Strategies

Since the data on Middle Easterners and Eastern Europeans are not broken down by subgroup, it is extremely hard to differentiate between the subgroups. Moreover, there is very little information regarding their nutritional status and food habits in the United States let alone California. Prevalence information about obesity, diabetes or cardiovascular diseases among Arab Americans or Eastern Europeans in California is not available. Therefore, creating a community based intervention program to prevent obesity, diabetes, and cardiovascular diseases would be extremely difficult.

In addition, not much research has been done on Eastern Europeans living in the United States related to the prevalence of any particular disease. Although obesity has been reported among Romanians and former Yugoslavians, little is known about this population in the United States.

Research indicates that people who follow a traditional Mediterranean diet live longer.[2] These studies have been done in the Mediterranean region and there is no data available in the United States to show if the immigrant population improved their longevity by following the traditional diet.

Variations that exist in each cultural group, such as different religious backgrounds, locations of origin, lengths of stay in the United States, and cultural diversity within the Middle East and Eastern Europe, may impose challenges for developing community based programs targeting ethnic groups appropriately. Caution should be taken not to generalize cultural characteristics to individuals belonging to this subgroup.

Opportunities for Improvement

There is definitely a need for increased public health awareness and regular surveillance for obesity, diabetes, and cardiovascular diseases in Arab-American communities. It is also essential to develop culturally sensitive community-based strategies aimed at prevention and management of obesity and its metabolic complications.

Health promotion strategies that emphasize the adverse health consequences of obesity will have to take into account the apparent perception of obesity as a desirable attribute in Arab populations.

Given the significant prevalence of diabetes, preventive programs are imperative considering the relatively young age of the population with IGT and impaired fasting glucose (IFG) among Arab Americans. If this young population is not monitored and treated they are at high risk for developing type two diabetes. Similar programs to prevent cardiovascular diseases are also necessary.

It is also important to have the ability to work with persons from culturally diverse backgrounds such as those from the Middle East and Eastern Europe. Many people from these cultures follow different religions, which significantly influences their food habits and religious practices. Therefore, knowledge on their culture and ethnicity is essential while developing such programs.

Clinical Implications

High prevalence of obesity is reported among Middle Easterners and Eastern Europeans. Metabolic syndrome is a common health problem among the Arab Americans.

Resources/Web Sites

1. http://www.nal.usda.gov/foodstamp/Topics/ethnic.htm
2. http://www.semda.org/info/pyramid.asp?ID=1
3. http://www.nal.usda.gov/fnic/pubs/bibs/gen/ethnic.html#12

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California Food Guide

Body Weight

By Sharon B. Sugerman, M.S., R.D., F.A.D.A. and Amy C. Fong, B.S.

What's New

- State-level prevalence of obesity in adults, based on self-reported weight and height, increased significantly between 1995 and 2005, moving states farther away from the Healthy People 2010 target of 15% prevalence for obesity.[1]
- California spends an estimated $6.4 billion on health costs due to obesity and an additional $2.0 billion due to overweight each year, split about evenly between direct and indirect costs.[2]

Public Health Implications

Obesity has been designated as a "national epidemic," and, as Table 1 shows, prevalence has risen rapidly over the past two decades, especially during the 1990's.[3, 4]

In 2003-2004, approximately 66 percent of the United States adult population aged 20 years or older was categorized as measured overweight or obese,[5] while 22 percent were self-reported as overweight and obese.[6] The prevalence of overweight among children and adolescents in the U.S. has tripled since 1980. An estimated 19 percent of 6-11 year olds and 17 percent of 12-19 year olds in the U.S. were overweight in 2003-2004.[5] California has not been spared. In California, 60.2 percent of those age 18 and older were overweight or obese and 22.5 percent were obese by self-report in 2005.[7] In contrast, about two percent of Americans[8] and Californians[7] were underweight.

Healthy People 2010 Goals[9]

The United States Department of Health and Human Services (USDHHS) major goals related to improving health through decreasing the prevalence and consequences of overweight, obesity, and eating disorders are:

- Increase the proportion of adults over age 20 that are at a healthy body weight from 42[†] to 60 percent[§].
- Reduce the proportion of adults who are obese from 23[†] to 15[§] percent.

[†] At the time baseline data was established for Healthy People 2010 goals.
[§] By 2010

- Reduce the proportion of children and adolescents who are overweight or obese to 5[§] percent from 11[†] percent.
- Increase the proportion of worksites that offer nutrition education and/or weight management programs for employees from 55[†] to at least 85[§] percent for worksites employing more than 50 people.
- Increase the proportion of primary care providers who provide counseling or education related to diet and nutrition from 42[†] to 75[§] percent for patients with cardiovascular disease, hyperlipidemia, and diabetes diagnoses.
- Reduce the relapse rates for persons with eating disorders including anorexia nervosa and bulimia nervosa (no targets given).

Table 1: California Obesity Trends Among U.S. Adults; BRFSS,* 1984-2005[4]

Year	Percentage of Californian Adults
1984	8.6%
1985	7.6%
1986	8.1%
1987	9.2%
1988	11.7%
1989	10.0%
1990	11.0%
1991	11.3%
1992	12.8%
1993	13.5%
1994	14.8%
1995	15.2%
1996	15.0%
1997	16.4%
1998	17.6%
1999	18.8%
2000	19.7%
2001	21.2%
2002	19.5%
2003	23.0%
2004	22.2%
2005	22.6%

*** Behavioral Risk Factor Surveillance System**

Definition

Please be reminded that this body weight chapter was written from a public health perspective and should not be regarded as a medical perspective.

Overweight and Obesity in Adults

Overweight and obesity refer to a gradient of a condition in which a person's body weight and proportion of the body fat potentially impair health. Body mass index (BMI) and waist circumference are both used to assess body fat and are predictors of risk for diseases related to obesity. BMI is used to identify obesity on a population basis. BMI is calculated using the following equation:

$$\frac{\text{weight (kilograms)}}{\text{height}^2\text{ (meters)}} \quad \text{or} \quad \frac{\text{weight (pounds)}}{\text{height}^2\text{ (inches)}} \times 704.5$$

The most recent adult body weight standards based on BMI from the National Heart, Lung, and Blood Institute are presented in Table 2, with a BMI $\geq$ 30 kg/m^2 defined as obesity and a BMI $\geq$ 25 kg/m^2 and $\leq$ 30 kg/m^2 defined as overweight.[10]

Table 2: Weight Classification by BMI, Waist Circumference, and Associated Disease Risk*

Body Weight Category by BMI Status	BMI (kg/m^2)	Disease Risk** Relative to BMI Status and Waist Circumference	
		Not-at-risk waist circumference	At-risk waist circumference
		Men $\leq$ 40 inches ($\leq$102 cm) Women $\leq$ 35 inches ($\leq$ 88 cm)	Men > 40 inches (>102 cm) Women > 35 inches (> 88 cm)
Underweight	<18.5	--	--
Normal	18.5-24.9	--	***
Overweight	25.0-29.9	Increased	High
Obesity, Class I	30.0-34.9	High	Very High
Obesity, Class II	35.0-39.9	Very High	Very High
Extreme Obesity, Class III	$\geq$ 40	Extremely High	Extremely High

* Adapted from National Institutes of Health, National Heart, Lung, and Blood Institute, The Practical Guide: Identification, Evaluation and Treatment of Overweight and Obesity In Adults. Table 2, p. 10. 2000.

for Type 2 Diabetes, Hypertension, and Cardiovascular Disease

*** Waist circumference may increase risk for chronic disease even in normal weight individuals.

The chart presented in Table 3 (following page) can be used to determine BMI for adults using body weight (pounds) and height (inches). Between 1991 and 2001, nationwide, the proportion of adults defined as obese increased from 12 percent to 20.9 percent.[11]

Body fat distribution is an independent risk factor for chronic disease. It is important to remember that BMI correlates with the amount of body fat but does not directly measure body fat. As a result, some people, such as athletes, may have a BMI that identifies them as overweight even though they do not have excess body fat.

Table 3: Determining Body Mass Index (BMI) for Adults

To use the table, find the appropriate height in the left-hand column labeled Height. Move across to a given weight (in pounds). The number at the top of the column is the BMI at that height and weight. Pounds have been rounded off.

BMI	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	40	45	50
Height (inches)	**Body Weight (pounds)**																			
58	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167	191	215	239
59	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173	198	222	247
60	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179	204	230	255
61	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185	211	238	264
62	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191	218	246	273
63	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197	225	254	282
64	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204	232	262	291
65	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210	240	270	300
66	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216	247	278	309
67	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223	255	287	319
68	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230	262	295	328
69																				33

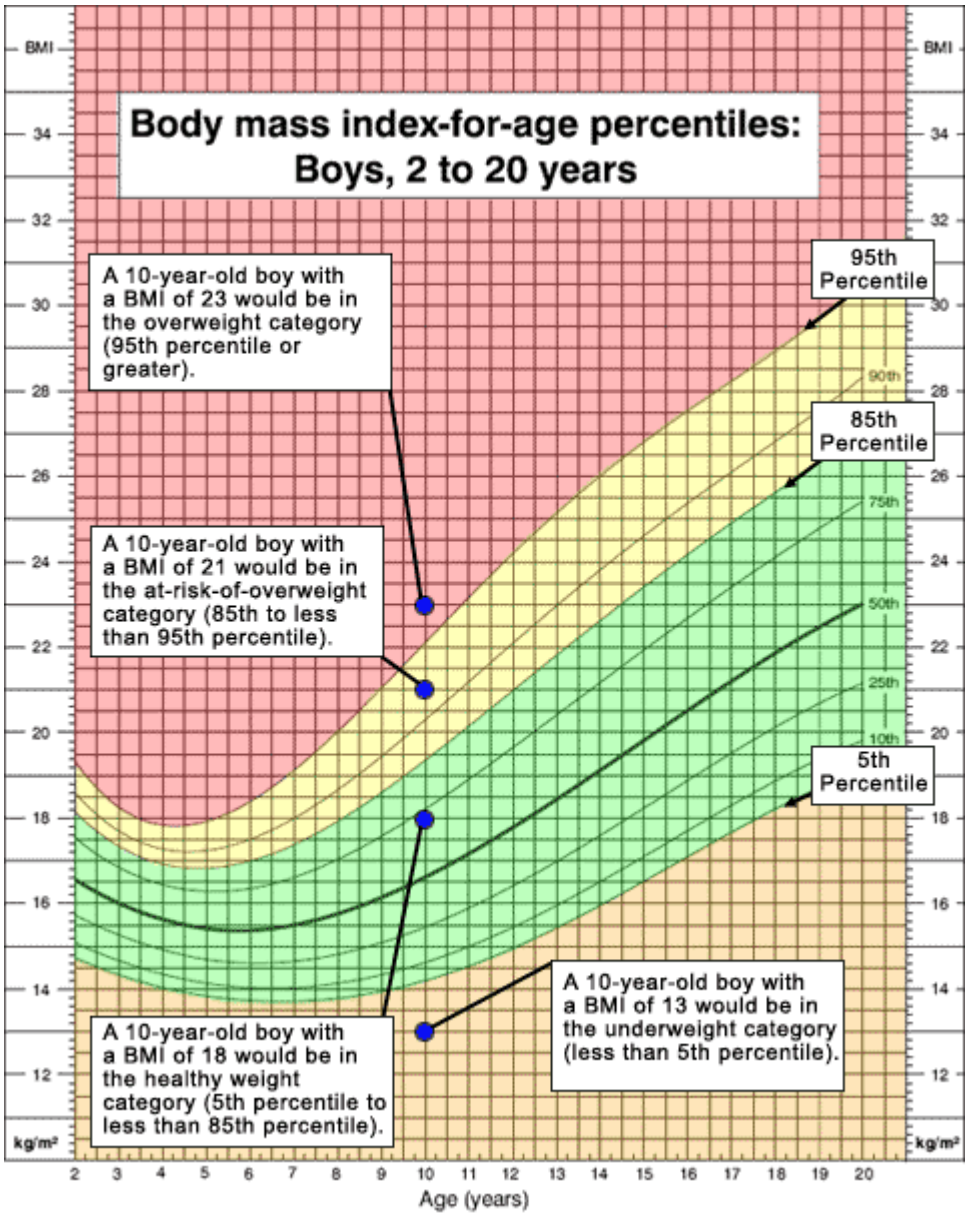
Elevated waist circumference is a measure of central body fat. It is defined as > 40 in. (> 102 cm) for men and > 35 in. (> 88 cm) for women and can be a marker of metabolic syndrome, in both men and in older men and women.[12, 13, 14] Metabolic syndrome is a combination of disorders that is associated with elevated risk for the obesity-related chronic diseases, diabetes, and cardiovascular disease. Besides abdominal obesity, it is characterized by high triglycerides, high low-density lipoprotein (LDL) cholesterol, insulin resistance or glucose intolerance, elevated blood pressure, elevated high-sensitivity C-reactive protein in the blood, and high fibrinogen or plasminogen activator inhibitor [–1] in the blood.[15] Little literature exists about prevalence of high waist circumference among the general population. One Canadian study that used 90 cm or more as its definition of high waist circumference found a prevalence of about 20 percent in among 907 men who had participated in the Quebec Health Survey.[12] Based on pre-defined "action levels," in a study of 20-59 year olds from the Netherlands, larger waist circumference identified people at increased cardiovascular risks.[16]

- Both overweight and central fat distribution relate to preventable ill health.
- Compared with people with waist circumferences below "action level" 1 (94 cm in men, 80 cm in women) those with waist circumferences between action levels 1 and 2 (94-101 cm in men, 80-87 cm in women) are one and a half times to twice as likely to have one or more major cardiovascular risk factors; people with waist circumferences above action level 2 are two and a half to four and a half times as likely to have one or more major cardiovascular risk factors.
- A waist circumference above action level 1 should be a signal to avoid weight gain or lose weight, to maintain increased physical activity, and to give up smoking in order to reduce the risk of cardiovascular disease.
- Patients with a waist circumference above action level 2 should seek advice from health professionals for weight management.

Overweight and Obesity in Children and Adolescents

During childhood growth and development, it has been suggested that the term "obese" not be used. However, excess weight in childhood and adolescence is an important risk factor for obesity in adulthood.[17] Additionally, it can bring serious health burdens to children, including hypertension, high cholesterol, glucose intolerance, and psychosocial problems.[18, 19] "Overweight" is defined as $\geq$ the 95th percentile of BMI based on the 2000 U.S. Growth Charts specific to gender and age (also called "BMI for Age"). "At-risk for overweight" among children and adolescents aged 2-19 years is defined as having a BMI for age that falls into the sex-specific 85th up to 95th percentile category.[20, 21]

The example that follows demonstrates how to interpret BMI for a ten-year-old boy.[21] The CDC BMI-for-age and other growth charts for boys and girls ages 2-20, as well as various growth charts for boys and girls ages birth to 36 months are available at: http://www.cdc.gov/nchs/about/major/nhanes/growthcharts/charts.htm#Summary[20]



Under the growth chart definition, an estimated 19 percent of 6-11 year olds and 17 percent of 12-19 year olds in the U.S. were overweight in 2003-2004.[5] California teens and children also report high rates of overweight. The 2002 California Teen Eating, Exercise and Nutrition Survey (CalTEENS) found 9 percent of teens self-reported overweight and another 15 percent self-reported reported at-risk for overweight.[22] In 2000, more than one third of all California adolescents surveyed reported having tried to

lose weight, most frequently by exercise, but also by dieting, fasting and smoking.[23] The parents of children age 9-11 years also proxy self-reported high prevalence of overweight and at-risk for overweight. Among those taking part in the 2003 California Children's Healthy Eating and Exercise Practices Survey (CalCHEEPS), over one-third (38 percent) were overweight or at risk for overweight.[24] It is worth noting that children who reported having a lesson in nutrition during the past school year were significantly less likely to be at-risk than other children.

Even very young children are experiencing a problem with excess body weight, with one survey finding nearly 14 percent of low-income children under two as overweight.[25] Among 2-5 year old children, the prevalence of overweight was nearly 15 percent among a national sample of low-income children[26] and 14 percent among a national sample of children of various income levels.[5] California's youngest children have measured obesity rates even higher than the national average, with 17.5 percent of 2- 5 year olds having a BMI $\geq$ the 95th percentile.[27] This is over triple the expected rate of five percent.

Underweight in All Age Groups

A BMI < 18.5 is considered underweight for adults. For teens and children, underweight is defined as a BMI < 5th percentile for gender and age. Rates of underweight are very low. Only two percent of California adults are underweight according to the 2003 California Health Interview Survey (CHIS).[28] Information about teen and child underweight is scarce, except for low-income children. For low-income California children, 5.3 percent of children younger than five years old were measured as underweight (< the 5th percentile), while this was true for only 2.6 percent of youth age 5-20 years old.[27] Based on the definition used, five percent of children would be expected to be classified as underweight.

Both anorexia nervosa and bulimia nervosa are eating disorders that are related to weight loss and weight gain, respectively. They are not primarily a nutritional problem, but rather are mental health disorders. Anorexia nervosa in particular is an extreme form of underweight, characterized by self-starvation, excessive weight loss and body image distortion.[29] The National Eating Disorders Association (NEDA) estimated that eating disorders such as anorexia nervosa and bulimia nervosa affect nearly ten million females and one million males in the United States.[30]

On the other hand, bulimia nervosa is more easily hidden. Bulimia nervosa is characterized by routine, secretive, binge eating followed by compensatory behaviors to rid the body of the large amounts of food eaten.[29] Individuals suffering from bulimia may be able to hide the disorder from others for years because they maintain normal or above normal body weight. It has been estimated that as many as one to three percent of adolescents are bulimic.[31]

Disparities

Adults - Race/Ethnicity, Poverty, Income, and Education

Substantial socio-demographic disparities exist in obesity among adults. Although, among the four most populous race/ethnic groups, the highest levels of obesity were seen among African American and Hispanic individuals, nationally no significant differences between race/ethnic groups among men were observed.[11] Conversely, compared to non-Hispanic white women, Mexican American and non-Hispanic black women were significantly more likely to be obese. In 2003-2004, nearly 58 percent of non-Hispanic black women aged 40-59 years were obese (BMI of 30 or higher) in contrast to 38 percent of non-Hispanic white women of the same age group.[5] It is worth noting that recent research suggests universal standards applied to all racial groups may be inappropriate. Use of percent body fat as an obesity measure rather than BMI reduces the gap between African American and white women by half due to higher lean body mass in the African-American women.[32] Among Native American/Alaska Native (NA/AN) men and women, the obesity rate is nearly identical between the genders—23.9 and 23.8, respectively, but much higher than the 181.7 percent mean of both male and female respondents who were not NA/AN.[33]

There has also been debate on whether current BMI cut-off-points accurately reflect overweight and obesity in Asian populations. The concern is that current BMI cut-off points may underestimate health risks associated with obesity in Asian populations.[34] In parts of Asia there is a high prevalence of type 2 diabetes and cardiovascular diseases with BMIs below the World Health Organization (WHO) cut-off point of > 25 kg/m^2 for overweight (WHO defines obese as > 30 kg/m^2). Evidence suggests Asian populations have different associations between BMI, percent of body fat and health risks than European populations.[35] The disparities among obesity in adults are evident when adjusting for age. Older adults (40-79 years old) are more likely to be obese than younger adults (20-39 years old), however there is debate about whether the same criteria as it relates to health risk is appropriate for the elderly.[36, 37]

Poverty is another factor in which obesity disparities are apparent. Women with income below 130 percent Federal Poverty Level (FPL) are about 50 percent more likely to be obese than those with higher income (greater than 130 percent FPL).[8] Several studies have documented an association between food insecurity and overweight particularly for low-income women—less so for men.[38, 39]

However, while lower income individuals have greater obesity levels than higher income people[40] concern about increasing prevalence of overweight among affluent individuals has also been raised. According to a study using data collected from the National Health and Nutrition Examination Survey, in the past 30 years obesity prevalence among the highest income group (>$60,000) has increased three times faster than the lowest income group (<$25,000).[41] Lack of education is a factor related to disparity also, with the highest obesity rates among those with less than a high school education.[11]

An increased prevalence of overweight affects some groups of Californian adults at disparate rates as well (Table 4). Most men, African American and Latino people, those older than 24 years of age and persons with a high school education or less are at greatest risk. In particular, African American and Latino men exhibit the highest rates of overweight, 75 percent and 76 percent, respectively. Nearly 73 percent of adults with less than high school education are overweight compared to 55 percent of adults with some or more college.[42]

Table 4: Prevalence and Trends in Overweight,‡ California Adults Age 18 and Older[4]

Population	Prevalence Percent			Percent Change	
	1984	1994	2004	Since 1984	Since 1994
Total	40	50	60	+50	+20
Gender					
Men	51	59	68	+33	+15
Women	30	42	52	+73	+24
Ethnicity					
White	38	48	55	+45	+15
African-American	46	59	70	+52	+19
Latino	48	60	71	+48	+18
Asian/Other@	27	31	42	+56	+35
Education					
Less than high school	53	62	73	+38	+18
High school graduate	39	51	64	+64	+25
Some or more college	36	46	55	+28	+20
Income					
Less than $20,000		54	64	n/a	+19
$20,000 – <$35,000		50	66	n/a	+32
$35,000 - < $50,000		51	60	n/a	+18
More than $50,000		49	56	n/a	+14
Age					
18-24	20	32	45	+125	+41
25-34	36	44	59	+64	+34
35-44	48	59	65	+35	+10
45-54	45	59	64	+42	+8
55-64	43	60	64	+49	+7
65+	45	45	57	+27	+27
Gender by Ethnicity					
Men					
White			62	n/a	n/a
African-American			75	n/a	n/a
Latino			76	n/a	n/a
Asian/Other			62	n/a	n/a
Women					
White			43	n/a	n/a
African-American			63	n/a	n/a
Latino			65	n/a	n/a
Asian/Other			34	n/a	n/a

‡ Overweight is defined as BMI greater than or equal to 25.
Ψ "Other" includes Native American, unknown, and all other responses

Turning to a larger California dataset, which allows the inclusion of over-sampled Native American and Asian respondents, nearly 33 percent of California Asian adults ages 18 and older are either overweight or obese according to 2003 CHIS findings. This figure

is considerably lower when compared to other race/ethnic groups: non-Latino white (53.7 percent), Non-Latino American Indian/Alaska Native (64.0 percent), Latino (65.0 percent) and African American (65.7 percent) Californians, as categorized by CHIS.[28] While the California Asian population reports the lowest rate of obesity, as noted above, it is not clear that the standards as defined should be applied to all ethnic groups.

Children and Adolescents – Race/Ethnicity, Poverty

Nationally, among teenagers, 1999-2004 data shows that nearly 22 percent of African American, 17 percent of White children, and 16 percent of Mexican-American children were overweight.[5] The disparities among overweight California adolescents are evident when looking at differences between gender, race/ethnicity, and income. Based on CalTEENS data, twelve percent of California male adolescents were classified as overweight compared to only five percent of female adolescents, while data from the 2003 CHIS with a larger sample show that nearly 16 percent of male teen respondents, 12-17 years old were overweight compared to almost nine percent of female adolescents.[28] Latino and African American adolescents were at risk for overweight or overweight significantly more than those from other ethnic groups. Nearly 30 percent of African American and Latino teens experienced a higher prevalence of overweight plus at-risk for overweight than other race/ethnic groups.[22] This pattern was also confirmed in the California survey with the larger sample: the highest prevalence of overweight was in Latino and African American adolescents, 17.6 percent and 12.9 percent, respectively. Income-related, teens living in poor households (below 100 percent FPL) are more likely to be overweight or obese than those from households 300 percent FPL and above (18 and 9 percent, respectively).[28]

Among a national sample of low-income children, both Hispanic and American Indian/Alaskan Native prevalence rates were above 18 percent.[25] In California, of particular alarm is the change among low-income Asian children. During the years 1992 to 2004, the rate of overweight increased more rapidly among California Asian children age 5-20 years old than in any other race/ethnic group.[27]

In a more representative sample of California children, those at greatest risk for overweight plus obesity were boys (41 percent), children from lower-income households of $\leq$ $19,999 (47 percent), and ethnic minorities: African Americans (42 percent), Asian/Other (39 percent), and Latinos (44 percent).[24]

Underweight – Adults, Children, and Teens

Rates of underweight are highest among Asian (5.5 percent) and lowest among Latino Californians (1.3 percent, with little difference among other racial/ethnic groups. Those adults living in households below 200 percent of the Federal Poverty level are more likely to be underweight (2.6 percent) than those living above it (1.9 percent).[28] For low-income California children in the under five age group, Latino children showed the lowest prevalence of underweight (4.6 percent), while most other racial/ethnic groups were above 6 percent. In the 5-20 year old age group, only Asian/Pacific Islander children were noticeably different than other youth, with a 5 percent underweight prevalence compared to 1.9-3.1 percent prevalence for other racial/ethnic groups.[27]

Burden

Obesity is a risk factor for the development of many serious medical conditions. Excess body fat is related to increased risk of coronary heart disease,[43, 44, 45, 46] diabetes,[11, 47] hypertension,[48] gall bladder disease,[49] and stroke.[50] Post-menopausal breast cancer,[51] as well as cancers of the colon, kidney, and lining of the uterus all have increased incidence in obese.[52] Obesity also contributes to other conditions that diminish quality of life, including osteoarthritis,[53] infertility,[54] sleep disruption (apnea),[55] asthma, and other breathing problems.[56, 57] For obese adults, weight loss of 10 percent improves glucose tolerance, hyperlipidemia, and blood pressure.[10]

One indicator of the burden of a condition is its associated cost in death and disease. Since 1993 it has been speculated that, following tobacco; the combination of diet, physical inactivity, and obesity, as a whole, is the second most preventable cause of death.[58, 59, 60] Newer methodology used by Flegal and colleagues disputed that calculation, indicating obesity to be responsible for 112,000 annual deaths which was somewhat offset by a positive effect on mortality among those with a BMI in the 25 to 30 range, for a net effect of only 25,800 deaths attributable to overweight and obesity.[61] This contrasts with the substantially larger number of deaths earlier calculated by the groups of McGinnis (300,000), Allison (280,000) and Mokdad (350,000). On the other hand, there is little doubt that the effect of obesity and, to a lesser extent overweight, is substantial on increasing risk of numerous medical conditions, especially chronic diseases contributing to a notable economic and social burden.[11, 45, 47, 49, 51]

The total economic cost of a disease includes both medical cost and lost productivity. Obesity costs the United States billions of dollars annually. National estimates of the medical expenses related to overweight and obesity put the direct cost at nearly $93 billion per year in 2002 dollars.[62] In California, the total cost for overweight and obesity combined for an estimated $8.4 billion in 2000. Obesity alone contributed approximately $3.4 billion to the total cost in the lost productivity costs of absenteeism, presenteeism,[€] and short-term disability, as well as workers compensation.[63]

In addition, consumers spend over $34 billion per year trying to lose weight or to prevent weight gain. This figure encompasses all types of weight loss and maintenance efforts, including low calorie foods, artificially sweetened products, and books and other publications on dieting. It is estimated between one to almost five billion dollars alone are spent on weight loss programs and supplements annually.[64]

While the number of persons who are so severely underweight that it presents a serious health problem is not nearly as dramatic and there is little economic research, extreme underweight, i.e. anorexia nervosa, does evoke a financial burden. The cost of inpatient treatment can be $30,000 or more per month. Many patients need repeated

[€] Presenteeism is defined as “The problem of workers being on the job but, because of medical conditions, not fully functioning.” http://www.medterms.com/script/main/art.asp?articlekey=40516

hospitalizations. The cost of outpatient treatment, including therapy and medical monitoring, can be $100,000 or more.[65]

Trends/Contributing Factors

At the national level, the prevalence of adult obesity increased by 50 percent during the past two decades.[9] In 1991, no states reported more than 20 percent of their population was obese. Thirteen years later in 2004, 42 states have obesity rates of more than 20 percent.[66] The California Behavioral Risk Factor Surveillance System (BRFSS) found self-reported rates of overweight increased over 75 percent for women and 33 percent for men between 1984 and 2004. Besides women, the greatest escalation in California obesity rates occurred in the following population segments: African American (52 percent) and Asian/Other (56 percent) ethnic groups, high school graduates (64 percent), and younger persons, ages 18-24 years old (125 percent) and 25-34 years old (64 percent) (See Table 3).[42]

Trends are similar for adolescents and children. Nationally, between 1988-94 and 1999-2000, obesity escalated 38 percent for boys 6-11 years old, 37 percent for boys 12-19, 32 percent for girls 6-11 years and 60 percent for girls 12-19 years.[67] For low-income younger children, overweight rates for two through four year olds in California increased by nearly 30 percent between 1992 and 2004. Between 1992 and 2004 for California low-income 5 to less than 20 year olds, rates escalated 38 percent for American Indian/Alaska Native, 59 percent for Latino, 73 percent for African American, 76 percent for White and an astonishing 158 percent for Asian/Pacific Islander youth.[27]

Many factors contribute to these alarming trends. Obesity reflects an imbalance of caloric intake and energy expenditure. The interaction between genetic tendencies, an abundant food supply, and low levels of physical activity have produced an environment leading health professionals have labeled "toxic," to denote that it facilitates the development of high rates of obesity.[68, 69] Furthermore there may be a variety of psychosocial factors that contribute to the development or perpetuation of obesity.[70, 71]

Contributing Factors: Food

Americans are eating more than in the past. The average one-day caloric intake in the United States increased by 150 calories a day between 1977-78 and 1994-96.[72, 73] This many excess calories a day would be expected to produce a weight gain of more than 15 pounds a year. Food intake is influenced by portion size, beginning as early as age five, portion size of many foods have been increasing since the 1970s, and consumers now think of the large portion sizes as the norm.[74, 75, 76, 77]

Many of the excess calories come from low nutrient foods, high in sugar and/or fat.[78] The Healthy Eating Index (HEI) is a composite measurement of dietary quality – a high score indicates better dietary quality. A low score on the HEI is positively related to obesity. The highest score possible is 100, a “good” score is anything above 80, and

the average score in the United States is just a little above 60, "needs improvement."[79] Sugary beverages in particular have been associated with obesity and weight gain.[80] In a large, population-based national dietary survey, for the U.S. population as a whole, three food groups – sweets/desserts (12.3 percent), soft drinks (7.1 percent), and alcoholic beverages (4.4 percent) contribute about one quarter of all calories consumed.[78] Three categories of food made up about 30 percent of the calories for one day for 6-11 year olds and over one-third of the calories for 12-17 year olds in 1999-2002:[81]

- Sugary beverages (soda, fruit drinks, punches),
- Sweets (frozen desserts, cakes, sweet rolls, donuts, candy, cookies),
- Chips, and fried foods (fried chicken, French fries).

In California, 73 percent of adolescents reported eating two or more pastries, fried foods, desserts, candy, or soda on the day preceding the interview; 42 percent ate three or more servings of these foods.[23] California children also are not choosing nutritious low calorie foods for snacks. Fruits and vegetables eaten as snacks averaged less than one-half serving per person. In contrast, high calorie, low nutrient snacks, such as soft drinks, fruit drinks, sweet desserts, and fried snack foods averaged to 3.8 servings per day.[82]

Contributing Factors: Inadequate Physical Activity/Screen Time

Concurrently, reported energy expenditure is low for many people – adults, teens, and children. In 2003 only 53 percent of California adults reported engaging in any combination of moderate or vigorous activities for at least 30 minutes each day five or more times per week.[83] Twenty-three percent engaged in no leisure time physical activity at all in the past 30 days in 2005.[7] Only 26 percent of California teens reported getting the recommended daily one hour or more of vigorous activity in 2000. Males (32 percent) and white teens (31 percent) were more likely than females or those from other ethnic groups to meet this goal. Males were more likely to engage in vigorous activity while females were more likely to report doing moderate activities.[23] Children ages 9-11 were doing somewhat better. On the 2003 CalCHEEPS, children reported spending an average of 75 minutes a day on moderate and vigorous physical activities, with 53 percent meeting the 60 minutes or more daily recommendation. Again, boys were active, on average, significantly longer than girls, 103 vs. 78 minutes respectively, with most of the difference occurring in vigorous activity.[24]

People report inadequate levels of physical activity when trying to control their weight, too. On the 2001-2002 NHANES, 51 percent of U.S. adults (N = 2051) tried to control their weight in the previous 12 months, 34 percent of men and 48 percent of women tried to lose weight, while 11 percent and ten percent, respectively, tried only not to gain weight. The top four methods used for weight control were the same for both weight losers and weight maintainers, but the percentages varied: ate less food; exercised; ate less fat; and switched to foods with lower calories. Less than one fourth used the recommended method of combining reduced caloric intake with the Dietary Guidelines

for Americans 2005 (Dietary Guidelines) recommended higher levels of physical activity.[84, 85]

Time spent in sedentary leisure activity exceeded that spent on physical activity for teens and was virtually the same for children.[23, 24] Excess television watching is associated with body mass index for both adults and for children, as is television watching in the bedroom for young children.[86, 87, 88, 89, 90] California teenagers reported an average of 134 minutes a day spent watching television, watching videos, playing computer games, and playing videos compared to 66 minutes in moderate to vigorous physical activity. African American teens spent almost three hours a day on these pursuits.[23] In the 2003 CalCHEEPS, children age 9-11 years reported spending 90 minutes a day on sedentary leisure activities vs. 90 minutes on "moderate and hard" physical activity. African American children and children from very low-income households spent 1 ¾ to over two hours engaged in these sedentary pursuits.[24]

Contributing Factors: Lack of Economic Resources

There has been speculation that federal food assistance programs may contribute to obesity, but the evidence suggests this is not the case. For women, the association between participation in the Food Stamp Program and obesity that was observed between 1976-80 and 1988-94 leveled off entirely by 1999-2002. During this time period the association continued to rise steeply among eligible non-participants and low/moderate income women, both whose rates exceeded those of participants by 1999-2002. Obesity also continued to increase sharply among moderate/high income women. For men, findings were moving in the opposite direction. Little association was shown for children, with one major exception. Mexican American boys showed a strong positive association between food stamp participation and BMI/overweight.[91] On the other hand, there is mixed evidence about a positive relationship between food insecurity and obesity.[39, 92] Food insecurity may be a contributing factor to obesity for several reasons. Mechanisms that have been suggested include the need to stretch food dollars to maximize calories, poor food choices as a coping strategy to sacrifice food quality before quantity, overeating when food is available, and physiological changes, i.e., the body compensates for periodic shortages by becoming more efficient at storing calories as fat.[91]

Contributing Factors – Environmental Issues

Urban sprawl and other neighborhood-related elements are environmental factors that are associated with the prevalence of obesity. This "sprawling" neighborhood design encourages sedentary lifestyles as there are limited opportunities for physical activity. Findings from an ecological study examining the relationship between urban sprawl, health and health-related behaviors revealed a small but significant association with minutes walked, obesity, BMI, and hypertension among those living in sprawling counties than those living in compact counties. Compared to residents living in compact counties, those living in sprawling counties walked less, weighed more and had higher prevalence of hypertension.[93] Time spent in a car is associated with obesity as is low levels of mixed land use area, e.g., neighborhood is mostly residential.[94] Both

race/ethnicity and socioeconomic status are strongly related to excess weight (See Disparities section). Research demonstrates less access to physical activity facilities in low income and minority neighborhoods. This, in turn, is associated with higher rates of teen overweight and diminished likelihood of achieving fives days/week or more of moderate-to-vigorous physical activity.[95]

Contributing Factors –Psychosocial Factors

Psychosocial factors such as income level, adverse childhood events, and certain psychiatric diagnoses can lead to an increased risk for obesity. One in four persons seeing a primary care physician about weight problems has an active psychiatric illness, usually depression.[96] There is also a relationship between exposures to abuse or household dysfunction with risk factors such as smoking, severe obesity, physical inactivity, depressed mood, and suicide attempts as the frequency of adverse childhood events increase.[97] It has been proposed that stress and psychosocial problems may affect the endocrine system leading to metabolic abnormalities that increase the risk for obesity.[98] Some feel that it is important for those treating obesity to assess for these possible contributors and refer clients to the appropriate treatment programs. For some, it may be more important to first address these underlying psychosocial issues before any formal weight loss programs are attempted.[70] It is beyond the scope of this chapter to go into the specific treatment modalities.

Contributing Factors – Societal Norms

Even in a time period in which over 65 percent of Americans are overweight, the entertainment and fashion industries perpetuate a cultural norm in which beauty requires a trim figure and beauty may be more highly regarded than more productive characteristics. Young women, in particular, may have false expectations of what their bodies should or can look like and may have distorted pictures of their personal appearance. A person's perception of body weight may affect feelings about oneself and may consequently have impact upon behavior regarding body weight – such as dieting to extremes, purging, and binge eating. Findings from the 2000 California Women's Health Survey revealed that nearly 64 percent of women responded "Yes" to whether perceived body weight affected how they felt about themselves. In 2002, 50 percent of all women *mistakenly* perceived themselves to be overweight. In fact, nearly 40 percent of women with a body mass index less than 18.5 (underweight) and 17 percent of women who were at a healthy weight classified themselves as overweight. These results suggest that many women may be at risk of misperceptions that could have negative consequences on their behavior and increase risk of eating disorders.[99]

The negative views society has on obesity and the social pressures to be thin may lead Californians to feel more self-conscious about their weight. According to the 2003 CDPS, 45 percent of California adults tried to lose weight.[84] The 2000 California Teen Eating, Exercise and Nutrition Survey (CalTEENS) revealed that 36 percent of adolescent respondents reported they tried to lose weight in the past 30 days, with15 percent of adolescents reported going on a diet, fasting and smoking as practices they

had used to lose weight. This figure is likely to be under-reported due to social desirability. Female adolescents were significantly more likely to report going on a diet, fasting and smoking as a method to lose weight compared to male adolescents (22 vs. five percent, respectively).[23]

As a leading channel that exposes us widely to one another's world, television can be a powerful barrier to an appropriate perception of body size and weight status. In a major study examining the impact of the introduction of television in two towns in the Pacific islands of Fiji, dieting became so commonplace that in 1998, 69% of those studied said they had gone on diets to lose weight and 74% said they thought they were "too big or fat." The study showed that girls living in houses with a television set were three times more likely to show symptoms of eating disorders.[100]

Contributing Factors – Perinatal (See also chapters on Prenatal Nutrition and on Maternal Nutrition During Lactation)

Factors occurring during the perinatal period may also contribute to overweight and obesity as a person gets older. During pregnancy, diabetes that is not controlled and, possibly, high birth weight are potential contributors; low birth weight is another likely risk factor.[101, 102, 103] After pregnancy, not breastfeeding may be associated with later higher body weight status.[104]

Barriers to Implementation/Myths

Societal, Systems, Policy, and Environmental Barriers

Multiple environmental changes have contributed to the present epidemic and act as barriers to arresting it. The most desirable method of achieving and maintaining a healthy weight is to balance eating nutritious foods with adequate exercise.[85] Factors that encourage people to eat both more food and less healthy food include availability of more food and calorie-dense foods, the growth of the fast food industry with a concurrent escalation in serving sizes at little extra cost, and the increased availability and marketing of snack foods. In addition, another barrier is increased time for socializing in environments that associate socializing with eating and drinking.[105] Major societal changes in role responsibilities, conflicting information on what is healthy, and demands for time that detract from healthy eating and adequate physical activity add yet more challenges to obesity prevention and reversal.

Barrier: Family Structure

An increase in single-parent households and households with two working parents may result in less time for food shopping and meal preparation than in the past, leading to a greater reliance on ready-to-eat and fast foods. It also may result in more children meeting their own food needs. In California, nearly one-third of children age 9-11 years old reported having the responsibility of preparing their own breakfast and evening snacks and over 50 percent having the responsibility for preparing their own after-school snacks.[106]

Barrier – Food Marketing

New food products are introduced to the public at an ever-increasing rate and disproportionate amounts of advertising dollars are spent promoting unhealthy foods. Americans are inundated with advertising by the food industry. In 1997, food manufacturers spent more than $7 billion on food advertising. Over 75 percent of the $7 billion was spent on television advertising; potentially increasing the negative impact high levels of television viewing has on weight status. Less than 3 percent was spent advertising fruits and vegetables, while more than 32 percent went to promote foods like candy, cookies, salty snack foods, soft drinks (including bottled water), and baked goods. An additional $3 billion was spent advertising eating and drinking establishments, with fast food promotion predominating.[107] The marketing of low nutrition, high calorie food is particularly egregious towards young children who lack the skills to analyze the claims of food ads. A study of Saturday morning children's television advertising found that about 55 percent of the ads were for foods like candy, soft drinks, sweets, chips, and fast foods.[108] Another study found that each year a typical child aged 6-11 years could be exposed to 11,000 food advertisement, with nutrient-poor, high-sugar food advertisements aimed at children. Candy, sweets, soft drinks and convenience/fast foods were the most frequently advertised, comprising 83 percent of all advertised foods.[109]

Barrier – Out of Home Eating

The percentage of meals eaten out of the home and of calories consumed from those meals is increasing in the United States, with fast food the most common source.[110] Frequency of eating out is positively related to body fat for men, women and children, and there is consumption of more calories for several reasons.[111, 112, 113] Restaurant food tends to be higher in fat and lower in fiber than home food, i.e., higher in energy density.[114] Restaurant portions are often large, food is prepared with the aim of being highly palatable, meals offer increased dietary variety, and "value" pricing encourages low-cost purchase and consumption of extra calories from sugared beverages and French fries that may increase meal size consumed. In a nationally representative sample, 37 percent of adults and 42 percent of children reported eating fast food on the prior day.[110] Higher intakes of energy, fat, saturated fat, sodium, and carbonated soft drink were seen in those who reported eating fast food compared to those who did not.[115] In a different sample from four U.S. cities, children and teens reported consuming almost twice the calories (770 vs. 420) and a significantly greater percentage of calories from fat (36.3 vs. 27.4) for meals and snacks eaten from restaurants, fast food venues, and similar establishments then they ate when they ate at home.[113]

In 2003, 40 percent of California adults ate at least one meal outside the home on the prior day and 40 percent of those meals were eaten at a fast food place. Young adults ate at least one meal outside the home significantly more than did older adults—47 percent of 25-34 year old males and 53 percent of 18-24 year old females compared to 22 percent and 27 percent, respectively of older adults 65 years and over. Eating fast food was related to greater likelihood of eating deep fat fried foods and fewer fruits and vegetables.[83] In 2003, 31 percent of California teens reported eating one or more fast

food meal or snack on the previous day, increasing to 37 percent of African-American teens,[22] while in 2001, 60 percent of teens who ate fast food reported eating deep fried food on the day before the survey compared to 21 percent for those who did not eat fast food.[23]

Barrier – Physical Inactivity and the Built Environment

At the same time, there has been a reduction in opportunities to burn calories during daily living. Children watch more television, the availability of physical education classes at school has diminished, sidewalks for safe walking are not part of many neighborhoods, and automation and labor-saving equipment are prevalent in both the workplace and household. Automobile travel has replaced walking and bicycling for most everyday transit, and suburban living has produced neighborhoods where shopping is centralized and isolated rather than integrated into residential streets.[115] In fact, reliance on automobiles in the United States is even evident for trips less than one mile, with an estimated 75 percent of these trips taken by car.[116] Time spent in automobiles may be linked to obesity. One study found there was a six percent increase in the likelihood of obesity for each additional hour in the car.[94] In addition, unsafe neighborhoods can be a serious barrier for the disadvantaged and ethnic minorities most in need of activity opportunities. At a more individual level, overweight persons may have difficulty finding suitable exercise equipment and instruction or experience bias when engaging in organized or structured physical activity that discourages them from further efforts.

Convincing children to limit television viewing and other sedentary pursuits shows some promise as a strategy for obesity prevention.[117] However, this is a challenge because it requires educational efforts aimed to both children and their parents. Engaging adolescents in additional physical education may require system-wide changes. The California school system requires only two years of high school physical education classes.[118] Teens who are juggling heavy class loads, jobs, and extra-curricular activities may be reluctant to take a class that is not required. Only 55 percent of CalTEENS boys and 53 percent of girls reported being enrolled in a physical education class by ages 16-17 compared to 93 and 92 percent respectively for 12-13 year old boys and girls.[23]

Barrier – Cost

Cost is another barrier to obesity prevention and achieving weight loss. Health services that help people learn effective methods of weight control, such as consultation with a dietitian, are often not covered by medical insurance or are covered for only a few visits, not enough time to implement and sustain long-term lifestyle change. Further, although it is possible to eat a healthy diet in a thrifty manner, lower prices per calorie for refined grain products, added sugars, and added fats compared to lean meat, fish, vegetables, and fruits contribute to a perception, particularly among those of low income, that it is too costly to eat healthy foods.[119]

Barrier – Conflicting Weight Control Information

Consumer confusion is yet another barrier. The public is inundated with a wide variety of diets purported to lead to weight loss. Often there is conflicting information and the consumer does not know how to make a sound judgment about choosing a weight loss diet (See Box 1). A 2005 paper by Dansinger and colleagues used a comparative experimental design to compare four prominent weight loss programs: Atkins, Ornish, Weight Watchers, and Zone. The Atkins diet severely restricts carbohydrate consumption; the Ornish diet is very low fat and vegetarian; Weight Watchers uses a calorie/fiber-based point system; and the Zone recommends a diet very high in protein, medium in fat, and relatively low in carbohydrates (30-30-40 percent of each, respectively, 0.75 protein to carbohydrate ratio required with each meal). At the end of one year, they found only a 4.6-7.3 lb. weight loss, with the Atkins dieters losing the least and the Ornish dieters losing the most. Adherence ranged from 50-53 percent for the more extreme Ornish and Atkins diets to 65 percent for Weight Watchers and the Zone diet.[120]

These fad-diets have not shown to be effective over time. Individuals who adhere to fad-diets may see immediate results but have difficulty maintaining weight loss over time. Sustaining weight loss requires a change in eating and exercise lifestyle. Thus, access to reliable resources about weight-loss and weight management is essential. Achieving a healthy weight requires gradual weight loss through the reduction of caloric intake, improved dietary intake and increased physical activity (See Box 1). Federal government material, such as Aim for a Healthy Weight and the Weight Information Network and those from other reputable organizations such as the American Academy of Pediatrics and the University of California Berkeley Center for Weight and Health provide tools for successful weight loss and maintaining a healthy weight (See Resources).

Box 1: Safe and Effective Weight-Loss Diets for the General Public*

A safe and effective weight loss diet should…

- Produce **gradual weight loss**—1 to 2 pounds a week.
- Contain foods from each of the **major five food groups.**
- **Limit fat**, especially saturated fat.
- **Limit added sugar.**
- Provide the individual with guidance regarding **moderate portion sizes.**
- Contain enough **variety in food choices to prevent boredom** when followed for an extended time period.
- Include foods and meal patterns that allow for **differences in ethnicity, culture, food preferences, and lifestyle.**
- Contain foods that are **affordable** to the individual.
- **Be consistent with overall good health practices** so that, with less calorie restriction, it can be followed for life so re-gaining weight can be avoided.
- Be **paired with an individualized, regular physical activity plan** that can be adopted for life.

Information compiled from: National Heart, Lung, and Blood Institute website: *Aim for a Healthy Weight*
http://www.nhlbi.nih.gov/health/public/heart/obesity/lose_wt/index.htm
Dietary Guidelines for Americans 2005- Chapter 3 Weight Management
National Institute of Diabetes and Digestive and Kidney Disorders Weight Control Information (WIN) website: *Choosing a Safe and Successful Weight Loss Program*
http://win.niddk.nih.gov/publications/choosing.htm

Individual Barriers

Several individual barriers to change need also be mentioned. The first is an individual's lack of perception of the need to change – either due to a lack of awareness that one's body weight status is too high or lack of knowledge of the risks of obesity as a contributor to many other diseases. Box 2 describes the conditions, both those that can be changed and those that cannot, that should serve to alert an individual and her health provider that her body weight status may be of greater concern than the average.

Lack of time is another barrier to eating healthier foods, such as fruit and vegetables, and to being more physically active frequently cited by both adults and teens.[22, 84, 99,121] It is worth noting that while one third of teens reported that they did not have enough time to be more physically active, one third also reported watching two hours or more of TV a day, with a mean of over 2 ½ hours of daily TV.[22]

Box 2 -- Rx Clinical Implications #1: Personal Adult Factors That Raise the Risk from Overweight and Obesity*

- History of coronary heart disease, heart attack, or coronary artery disease, surgery, and/or procedures
- Type 2 diabetes
- Sleep apnea
- Impaired fasting glucose
- Hypertension
- LDL-cholesterol ≥ 160 mg/dL OR 130 - 159 mg/dL if accompanied by two or more other risk factors
- HDL-cholesterol < 35 mg/dL
- Serum triglycerides ≥ 400 mg/dL
- Family history of early coronary heart disease
- Cigarette smoking
- Male ≥ 45 years
- Female ≥ 55 years or postmenopausal
- Physical inactivity

* Compiled from National Institutes of Health. 1998. *Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults*. National Heart, Lung, and Blood Institute. Obesity Education Initiative. http://www.nhlbi.nih.gov/guidelines/obesity/ob_gdlns.htm

Myths

Myth Only adults need to worry about the health effects of being overweight.

Fact Children as young as 2-5 years old that were overweight or at-risk for overweight were more likely to have high or borderline high blood pressure than children of normal weight.[122] Rather than pushing a child into strict dieting, parents should be encouraged to play more actively with their young children, limit television, and prepare and serve healthy foods.

Myth The likelihood overweight children will become overweight or obese in adulthood is slim.

Fact Findings have demonstrated that overweight children's risk of becoming overweight in adulthood increase with age.[123] The chances of overweight children becoming overweight adults is 1.3 times greater at age 1-2 years to 17.5 times greater at 15-17 years old compared to children of normal weight at those ages.[124] However, even overweight toddlers are at increased risk of later overweight.[125]

Myth Children spend most of their free time engaging in physical activities such as exercising and playing sports.

Fact In the U.S., based on findings from a seven-day media use diary, children ages 8-18 years spend over 5.5 hours free time watching television and movies/videos, using computers, and playing video games combined compared to 1.25 hours engaging in physical activities including exercising and playing sports.[126]

Myth Parents should not be concerned about the amount of television children watch.

Fact Television viewing has a very strong relationship to overweight in children. Young people who watched more than five hours of television daily were nearly five times more likely to be overweight than those watching zero to two hours of television.[127] TV watching has also been associated with obesity in adults.[128]

Myth There are few disparities related to the underweight population in the United States.

Fact Although underweight only affects approximately 2 percent of adults, alarming disparities among those underweight exist. Women were nearly four times as likely as men to be underweight. Young adults (18-24 years) and the oldest adults (75 years and over) were nearly twice as likely to be underweight than other adult age group. Disparities exist among race/ethnicity and gender with nearly 9 percent of Asian women found to be underweight.[8]

Common Concerns/Strategies

The cause of rising obesity levels is multi-factorial and complex. A diversity of strategies will be required to prevent further increases in obesity rates and turn them around. They include individual, institutional, community, and environmental systems as well as policy-level changes. The Institute of Medicine's extensive report on prevention of childhood obesity identified immediate steps that should be taken in seven sectors of society.[129] Only one addressed change at the individual/family level. Other sectors included the federal government; state and local governments; industry and media; health-care professionals; community and non-profit organizations; and state and local education authorities; and schools.

People are more vulnerable to increased risk of obesity simply because they are at certain points in the lifecycle (See Box 3). Pregnancy, infancy, early childhood, puberty, and menopause are periods when intervention efforts may affect long-term change.[103]

From a prevention perspective, implementing strategies that result in increased physical activity and improvement in dietary behaviors that have the most consistent evidence as helping to prevent obesity is crucial. Key dietary behaviors include eating less dietary fat, more total carbohydrate, more dietary fiber, more fruits and vegetables, fewer sweetened beverages, more calcium, more dairy, and less restaurant-prepared/fast food, skipping fewer breakfasts, and doing more breastfeeding. In addition, facilitating changing from a dietary pattern high in red meat, high fat dairy, other saturated fats, and large amounts of sugar to a pattern high in legumes, whole grains, low fat dairy, fruit, and vegetables can be implemented as a more general strategy that incorporates many of the key dietary behaviors.[85, 103]

Box 3 – Rx Clinical Implications #2: Key Stages of Life and Raised Obesity Risk[101]

- Before birth - An environment in the uterus that produces a low birth weight baby∞
- Infancy and early childhood – Rapid weight gain in the first four months; more gain in weight for age than height for age in the first two years; earlier time in childhood between 4-8 years when BMI starts to climb again after reaching its lowest point (adiposity rebound)
- Puberty – Early puberty and higher BMI are associated, but the relationship may be in both directions; can be influenced by lower levels of physical activity at this life stage
- Pregnancy – Women at higher risk to retain more pregnancy weight: gain more than others during pregnancy, are African-American, are teens who are still growing, and/or are lower-income
- Menopause – Associated with increased body fat, especially in the abdominal area; intensified due to reduced physical activity that often occurs at this life stage
- Old age - Not a high risk time period for *becoming* overweight; levels off during a person's sixties and starts to decline after 70 years of age; *healthy weight range may be higher than for younger people*

∞ Both low and high birth weight (HBW) have been associated with higher attained BMI in childhood and adulthood, but recent studies suggest that the relationship between HBW and lean body mass in later life may be positive, while the relationship with adiposity is less clear.

Recently, increased attention has been paid to intervention beyond that at the personal level. At a community and societal level, multiple steps must be taken to bring about changes in the environment and in social norms. Public awareness must be increased about contributing factors to poor eating and exercise habits. In addition, the serious--rather than merely cosmetic—health and economic implications of obesity need to be addressed. A paradigm shift to an upbeat, positive message is needed that turns the

educational emphasis from ideal weights and rigorous exercise to messages of reasonable goals, strategies to overcome barriers, peer support, and habits employed by people who are successful at maintaining a healthy weight. Improved nutrition and fitness should be the focus even for those who remain overweight. Messaging that stigmatizes those who are overweight is counterproductive and may contribute to the development of eating disorders. For both youth and adults, messages must be culturally appropriate, relevant, and, for youth in particular, emphasize near-term benefits of eating healthy food and becoming physically active. In addition, the same marketing techniques that have been used to promote unhealthy foods and sedentary pursuits can be used to advocate healthy lifestyle practices.

Innovations in food assistance programs can be initiated to encourage children and adults to choose healthier foods. Examples would include limiting the sale of foods that compete with the federal School Meal Program to those that are consistent with the U.S. Dietary Guidelines and dissemination of incentives in the WIC and Food Stamp programs for purchase of fruits, vegetables, whole grain, and low fat dairy items.

New programs for obesity prevention must be developed and existing programs should be expanded to reach a larger target population. For youth, sustainable school-based initiatives can foster a positive atmosphere for promoting healthy eating and physical activity and for preventing/rectifying overweight. For example, initiating policy that mandates daily physical education that emphasizes life-long activity increases the likelihood that youth will reach the daily goal for an hour of physical activity, while policy change that promotes high quality foods in vending machines and cafeterias improves the probability of healthier eating.[129] The evidence-based review cited above for family interventions noted the positive evidence for similar components in successful primary and secondary prevention programs in schools, as well as physical activity environmental changes and possibly changes in the food environment and media influences. High school-based programs were more likely to be successful than those in elementary schools.[130] For adults, multi-channel strategies are needed that deliver practical, attainable messages and provide opportunities for "health moments" in the workplace, supermarket, restaurants, and media.[131] Physical activity options need to be developed that provide the already overweight with user-friendly, affordable facilities, equipment and instruction to achieve fitness.[132]

Changes in the community infrastructure that encourage physical activity have the potential to alter social norms, e.g. the development of school athletic facilities that are available for public use when not being used by students. Policies that improve neighborhood and park safety and increase access to sidewalks, bicycle paths, and shopping and recreation within walking and biking distance can improve the physical environment, which is associated with lower rates of obesity.[133] Building safe communities and fostering social support networks, such as worksite walking clubs, extensive parks, and recreational activity programs, are additional approaches to making physical activity the social norm.

At the individual level, for weight reduction, effective weight control programs for adults should incorporate dietary therapy, physical activity, and behavior therapy. The

combination of a lower calorie diet and increased physical activity leads to weight loss, decrease in abdominal fat, and increased cardio respiratory fitness. Behavior therapy is helpful for both weight loss and maintenance of weight. Pharmacotherapy and weight-loss surgery are options clinicians may consider when working with severely obese individuals. At a minimum, practitioners should encourage overweight individuals with two or more additional risk factors to set a six-month target weight loss goal of 10 percent of body weight, which substantially reduces the severity of obesity-related risk factors.[10]

Box 4 - Characteristics of People Who Have Successfully Lost 30 or More Pounds and Kept It Off for One Year or More*

- Make major changes in their eating and physical activity habits to lose weight and keep it off. They keep these changes up after losing the weight.
- Do 60 to 90 minutes of daily physical activity.
- Eat breakfast every day.
- Eat healthy low-calorie, low-fat foods that include fruits, vegetables, and other high-fiber foods.
- Keep track of their calorie intake on an ongoing basis.
- Weigh themselves almost every day.

* The National Weight Control Registry: Research Findings
http://www.nwcr.ws/Research/default.htm

However, weight loss is usually not recommended for most children unless there are serious co-morbidities such as metabolic syndrome. Preferentially, the goal is to prevent further weight gain, allowing the child's height to catch up with their weight. Calorie restrictive dieting may slow growth and intellectual development. Food-based goals should encourage consumption of fruit, vegetables, and dairy and decreased consumption of sugary drinks, fat, and fast foods. For children, approaches that increase physical activity and reduce sedentary activity may be effective strategies to prevent obesity or help bring weight in line with continued growth.[134, 135] An intervention that encouraged children to budget television/video game time and choose more selectively, enlisted parent cooperation, and provided television monitors produced a significant relative decrease in body mass index and other measures related to body fat for intervention participants compared to controls.[117]

An extensive evidence-based analysis found that, for children and teens that are *already* overweight there is insufficient research to support routine recommendation for individual intervention. However, for family-based interventions, with school-age children, multi-component programs were recommended and evidence was strongest for including parent training, dietary counseling, and physical activity paired with a reduction in sedentary behavior, and family behavioral counseling as components of the intervention. Since only limited research with pre-school-age children and adolescents was available, evidence-based conclusions were not drawn for these populations.[130]

Opportunities for Improvement

- **Federal government** should be encouraged to take a leadership role; provide coordinated leadership for obesity prevention in children and youth.
- **Local governments** should be encouraged to change zoning ordinances and provide developers with incentives for designing communities that incorporate mixed-used land usage, a grid design, walking trails, safe routes to school, and other neighborhood features that increase physical activity patterns. New buildings could be developed in a manner to encourage physical activity such as stair climbing.
- **Medical community and food programs** should be encouraged to provide healthcare providers, especially pediatricians, and food programs with training and resources to address childhood obesity, inappropriate feeding practices, and the advantages to the baby of breastfeeding
- **Schools** in California should be encouraged to consider instituting a daily, more intensive, interesting physical education requirement for all students, grades K-12. They should also be encouraged to limit the sale of competitive foods on campus to items consistent with Dietary Guidelines. Concurrently, the school system could consider subsidizing the cost of fruits, vegetables, whole grain foods, and low fat/nonfat dairy products and soy foods/beverages. Schools should be encouraged to not permit marketing of unhealthy food products on their premises.
- **Local businesses and agricultural community representatives** should be encouraged to provide support and technical assistance for the establishment of farmers' markets and the addition of fresh produce to convenience stores to increase access to and make available affordable healthy foods for all segments of the population.
- **California Department of Social Services, CDHS, or a Food Stamp affiliate** should be encouraged to consider initiating a pilot program to provide and track usage of bonus Food Stamps for purchase of high nutrient low calorie foods, such as fruits and vegetables.
- **Government and civic organizations** should be encouraged to give public recognition to restaurants and fast food establishments that voluntarily display nutrition information, such as calories, and develop and promote lower calorie, high nutrient menu choices and appropriate portion sizes.
- **Worksites** should be encouraged to provide employees with on and off-site benefits that 1) facilitate physical activity; 2) support healthy food service and vending options; and 3) encourage their health insurance carriers to include healthy lifestyle benefits for their employees. They could receive public recognition, and incentives for their effort.

Achieving Success: California Obesity Prevention Plan

To help reverse the trend in unhealthy body weight endemic in California, change is required in many sectors of daily life. Governor Schwarzenegger's Summit on Health, Nutrition, and Obesity in September 2005 brought together public and private leaders from industry, philanthropic organizations, health care, and other key segments with the ability to address this crisis, encouraging them to initiate the types of changes in that would foster an environment conducive to healthy eating and active living. In preparation for the Summit, the State developed a 10-step Vision for California that presents us with a California future in which this goal can be achieved. In September, 2006 the Governor's office released the *California Obesity Prevention Plan: A Vision for Tomorrow, Strategic Actions for Today* to further help realize this goal by strategically employing all sectors of California – employers, schools, health care, industry, family, entertainment and government – to take action together. (See http://www.dhs.ca.gov/CAObesityPrevention/California%20Obesity%20Prevention%20Plan.pdf)[131]

Governor's Vision for a Healthy California
A Vision for California – 10 Steps toward Healthy Living[131]

1. Californians will understand the importance of physical activity and healthy eating, and they will make healthier choices based on their understanding.
2. Everyday, every child will participate in physical activities.
3. California's adults will be physically active every day.
4. Schools will only offer healthy foods and beverages to students.
5. Only healthy foods and beverages will be marketed to children ages 12 and under.
6. Produce and other fresh, healthy food items will be affordable and available in all neighborhoods.
7. Neighborhoods, communities, and buildings will support physical activity, including safe walking, stair climbing, and bicycling.
8. Healthy foods and beverages will be accessible, affordable, and promoted in grocery stores, restaurants, and entertainment venues.
9. Health insurers and health care providers will promote physical activity and healthy eating.
10. Employees will have access to physical activity and healthy food options.

Resources/Web Sites:

American Obesity Association.
1250 24th St., NW, Suite 300
Washington, DC 20037
Phone: (202) 776-7711
Fax: (202) 776-7712
Website: http://www.obesity.org

- *A Taxpayer's Guide on IRS Policy to Deduct Weight Control Treatment; Preventing the Elimination of Disability Coverage for the Obese*

American Society of Bariatric Physicians.
5453 East Evans Place
Denver, CO 80222-5234
Phone: (303) 770-2526
Fax: (303) 779-4834
E-mail: info@asbp.org
Website: http://www.asbp.org/

California Adolescent Nutrition and Fitness Program (CANFit)
2140 Shattuck Avenue, Suite 610
Berkeley, CA 94704
Phone: (510) 644-1533
Fax: (510) 644-1535
E-mail: info@canfit.org
Website: http://www.canfit.org

- Preventing Obesity in the Hip-Hop Generation Workshop
- *Promoting Health and Preventing Obesity in After School Programs; Obesity and Diabetes Prevention in Communities of Color*

California Center for Public Health Advocacy
P.O. Box 2309
Davis, CA 95619
Phone: (530) 297-6000
Fax: (530) 297-6200
http://www.publichealthadvocacy.org

- *The Growing Epidemic: Child Overweight Rates on The Rise In California Assembly Districts*
  http://www.publichealthadvocacy.org/policy_briefs/overweight2004.html

California Department of Health Services
Director's Office
MS 0000, P.O. Box 997413
Sacramento, CA 95899-7413
Tel: (916) 440-7400
Fax: (916) 440-7404
Website: www.dhs.ca.gov

- *California Obesity Prevention Plan: A Vision for Tomorrow, Strategic Actions for Today*. http://www.dhs.ca.gov/CAObesityPrevention/

California Department of Health Services
Office of Women's Health
MS 0027, P.O. Box 997413
Sacramento, CA 95899-7413
Tel: (916) 440-7626
Fax: (916) 440-7636
Website: http://www.dhs.ca.gov/director/owh/
Email: OWHmail@dhs.ca.gov

- Body Weight and Obesity-Related Risk Factors and Relationships among California Women: 1997 – 2002 in *Women's Health: Findings from the California Women's Health Survey, 1997-2003*, an examination of trend data on women's health issues; Office of Women's Health http://www.dhs.ca.gov/director/owh/owh_main/cwhs/wmns_hlth_survey/97-03_findings/CWHS_Findings_97-03.pdf
- Data Points 2003-2004; Results from the California Women's Health Survey; Office of Women's Health (Selected Data Points) http://www.dhs.ca.gov/director/owh/owh_main/cwhs/wmns_hlth_survey/03-04_data_points/060703%20Data%20Points%20Press.pdf
  - Healthy Weight among California Women, 2004
  - Prevalence of Obesity and Disparities in Obesity-Related Factors among California Women, 2004

The California Endowment
1000 North Alameda Street
Los Angeles, CA 90012
Tel: (800) 449-4149
Fax: (213) 928-8801
E-mail: questions@calendow.org
Website: http://www.calendow.org/

- Healthy Eating, Active Communities Program http://www.calendow.org/program_areas/heac.stm

The California Endowment Sample Publications:

- Preventing Obesity in California: A Call for Policy and Community-Based Approaches http://www.calendow.org/reference/publications/pdf/disparities/Health%20in%20Brief%20V4I1.pdf
- National Evaluation Meeting on School Nutrition, Physical Activity Policies http://www.calendow.org/reference/publications/pdf/disparities/TCE1217-2004_National_Evalu.pdf
- A Survey of Californians About the Problem of Childhood Obesity
- http://www.calendow.org/reference/publications/pdf/disparities/TCE1126-2003_A_Survey_of_Ca.pdf

California Obesity Prevention Initiative
California Department of Health Services
MS 7211; P.O. Box 997413
Sacramento, CA 95899-77413
Phone: (916) 552-9889
Fax: (916) 552-9912
obesityprevention@dhs.ca.gov

- *Do More, Watch Less! TV reduction tool*
  http://www.dhs.ca.gov/ps/cdic/copi/documents/COPI_TV_Tool.pdf

Cancer Prevention and Nutrition Section (CPNS)
MS 7204; P.O. Box 997413
California Department of Health Services
Sacramento, CA 95899-7413
Phone: (916) 449-5406
Fax: (916) 449-5415
Website: http://www.dhs.ca.gov/ps/cdic/CPNS
Email: research@dhs.ca.gov

- *The Economic Costs of Physical Inactivity, Obesity, and Overweight in California Adults: Heath Care, Workers' Compensation, and Lost Productivity. Topline Report* (with the & Epidemiology and Health Promotion Section)
  http://www.dhs.ca.gov/ps/cdic/CPNS//press/downloads/CostofObesityToplineReport.pdf
- *CPNS Statewide Survey Data Tables and Reports*
  http://www.dhs.ca.gov/ps/cdic/CPNS//research/rea_surveys.htm
- *California Data Sources Related to Obesity and Obesity Prevention*
  http://www.dhs.ca.gov/ps/cdic/CPNS//research/ca_datasources.htm

Center for Healthy Weight

Lucile Packard Children's Hospital
725 Welch Road
Palo Alto, California 94304
See website and appropriate service for phone contact information:
http://www.lpch.org/clinicalSpecialtiesServices/ClinicalSpecialties/centerHealthyWeight/index.html

- A comprehensive program designed to prevent and treat overweight and obesity in children and adolescents – patient care, research, and development of community programs

Center for Weight and Health

College of Natural Resources
University of California
101 Giannini Hall #3100
Berkeley, CA 94720-3100
Phone: (510) 642-2915
Fax: (510) 642-4612
http://nature.berkeley.edu/cwh/
Contact: Gail Woodward-Lopez at gwlopez@nature.berkeley.edu

- An extensive source of research reports, resources, tools, educational materials, links, and a directory of professionals on website

Sample Center for Weight and Health Tools:

- *Children and Weight tool kits for health professionals and communities*
- *Let's Get Moving!: Working Together to Promote Active Lifestyles in Young Children* (For persons working with children ages 2-7)
- *"Fit Families Novela Series" and "Let's Get Moving!" video kits*
- Asian language pamphlets on nutrition for parents and families - Download both low and high resolution pamphlets in Korean, Vietnamese, Chinese, Hmong, and English. Topics in all languages include healthy food, healthy weight, fast food, active play, and limiting screen time.

Sample Center for Weight and Health Publications:

- *Obesity--Dietary and Developmental Influences*
- *Weighing the Risks and Benefits of BMI Reporting in the School Setting*

Centers for Disease Control and Prevention, National Center for Health Statistics
6525 Belcrest Road
Hyattsville, MD 20782-2003
Phone: (301) 458-4636
http://www.cdc.gov/nchs/

- Overweight and Obesity Home Page
http://www.cdc.gov/nccdphp/dnpa/obesity/
- Obesity Trends: U.S. Obesity Trends 1985–2004
http://www.cdc.gov/nccdphp/dnpa/obesity/trend/maps/index.htm
- *Research to Practice Series #1 - Can Eating Fruits and Vegetables Help People Manage Their Weight?*
http://www.cdc.gov/nccdphp/dnpa/nutrition/pdf/rtp_practitioner_10_07.pdf
- Body Mass Index Home Page
http://www.cdc.gov/nccdphp/dnpa/bmi/index.htm
-- Calculating body mass index for children
http://www.cdc.gov/nccdphp/dnpa/bmi/bmi-for-age.htm
-- Children's growth charts http://www.cdc.gov/growthcharts/
- Childhood Overweight Home Page
http://www.cdc.gov/healthyyouth/obesity/index.htm

Federal Trade Commission Website: http://www.ftc.gov/

Western Region
Federal Trade Commission
901 Market Street, Suite 570
San Francisco, CA 94103

Western Region
Federal Trade Commission
10877 Wilshire Blvd., Suite 700
Los Angeles, California 90024

- *Weight Loss Advertising: Analysis of Current Trends*
http://www.ftc.gov/bcp/reports/weightloss.pdf

For Consumer Complaints contact the Consumer Response Center:
Consumer Response Center, Federal Trade Commission
600 Pennsylvania Ave, NW
Washington, D.C. 20580
Phone: toll free 877-FTC-HELP (382-4357); 9:00 am to 5:00 pm Eastern Standard Time, Monday through Friday
Electronically: https://www.ftc.gov/ftc/complaint.htm

Food and Nutrition Information Center
National Agricultural Library/USDA
10301 Baltimore Avenue, Room 304
Beltsville, MD 20705-2351

- *Eating Disorders: a Food and Nutrition Resource List for Consumers*
http://www.nal.usda.gov/fnic/pubs/bibs/gen/eatingdis.htm
- *Reports and Studies on Obesity* http://www.nal.usda.gov/fnic/reports/obesity.html

Healthy Weight Network
402 South 14th Street
Hettinger, ND *58639.*
Phone: (701) 567-2646
FAX: (701) 567-2602
Website: www.healthyweight.net

- *Healthy Weight Journal http://www.healthyweight.net/hwj.htm*
- *Women Afraid to Eat: Breaking Free in Today's Weight-Obsessed World*
- *Children and Teens Afraid to Eat: Helping Youth in Today's Weight-Obsessed World*

Kaiser Permanente Community Health Initiatives
Community Health Initiatives – programs run by regional KP organizations
Healthy Eating Active Living (HEAL)
Northern California Regional Administrative Office
1950 Franklin
Oakland, CA 94612
Website: http://xnet.kp.org/communitybenefit/chi/index.html

- *KP Farmers' Market Resource Guide*
- *KP TV Turnoff Report*

National Association to Advance Fat Acceptance
P.O. Box 188620
Sacramento, CA 95818
Phone: (916) 558-6880
Fax: (916) 558-6881
Website: http://naafa.org

National Eating Disorders Association
603 Stewart St., Suite 803,
Seattle, WA 98101
Business Office: (206) 382-3587
Toll-free Information and Referral Helpline: (800) 931-2237
info@NationalEatingDisorders.org
http://www.nationaleatingdisorders.org/p.asp?WebPage_ID=337

National Heart, Lung, and Blood Institute
P.O. Box 30105
Bethesda, MD 20824-0105
Phone: (301) 592-8573
Fax: (301) 592-8563
E-mail: NHLBIinfo@rover.nhlbi.nih.gov
Website: http://www.nhlbi.nih.gov/

NHLBI Publications

- *WeCan!* Ways to Enhance Children's Activity and Nutrition – parent and family tips
- *The Practical Guide: Identification, Evaluation, And Treatment Of Overweight And Obesity In Adults.* (with NAASO below) http://www.nhlbi.nih.gov/guidelines/obesity/prctgd_c.pdf
- *Aim for a Healthy Weight – Information for Patients and the Public; Information for Professionals* http://www.nhlbi.nih.gov/health/public/heart/obesity/lose_wt/index.htm

North American Association of the Study of Obesity
NAASO Executive Office
8630 Fenton St. Suite 412
Silver Spring, MD 20910
Phone: (301) 563-6526
Fax: (301) 587-2365
Website: http://www.naaso.org

- Obesity Online – Educational resource offering free downloadable slides, free CME, critical presentations, searchable references, etc.
- *Obesity* (journal)

Shape Up America!
15009 Native Dancer Road
N. Potomac, MD 20878
Phone: (240) 631-6533
Fax: (240) 632-1075
E-mail: info@shapeup.org
Website: http://www.shapeup.org/

- 10,000 Step Pedometer Program
- *Fitness and Weight Management Directory*
- *Parent Guide for the Assessment & Treatment of the Overweight Child*

Shaping America's Youth (SAY)
Academic Network, LLC
120 NW 9th Avenue, Suite 216
Portland, OR 97209-3326
Phone: 800-SAY-9221
Fax: (503) 273-8778
E-mail: www.academicnetwork.com
Website: info@shapingamericasyouth.com

- *Publications and Resource list* http://www.shapingamericasyouth.com/Page.aspx?hid=29
- *Shaping America's Youth Summary Report*

Strategic Alliance
265 29th St.
Oakland, CA 94611
Phone: (510) 444-7738
Fax: (510) 663-1280
Email: SA@preventioninsitute.org
Website: www.eatbettermovemore.org/

- Resource list http://www.preventioninstitute.org/sa/resources.html
- *ENACT: Environmental Nutrition and Activity Community Tool*
- *Unhealthy Marketing to Kids*

TV Turnoff Network
1200 29th Street, NW
Lower Level #1
Washington, D.C. 20007
Phone: (202) 333-9220
Fax: (202) 333-9221
E-mail: email@tvturnoff.org
Website: www.tvturnoff.org

- *The Overwatched American*

Trust for America's Health
1707 H Street, NW 7th Floor
Washington, D.C. 20006
Phone: (202) 223-9870
Fax: (202) 223-9871
E-mail: info@tfah.org
Website: http://healthyamericans.org/

- *F as in Fat 2006: How Obesity Policies are Failing in America* http://healthyamericans.org/reports/obesity2006/

U.S. Department of Health and Human Services

- *The Surgeon General's Call to Action Prevent and Decrease Overweight and Obesity;* To download: http://www.surgeongeneral.gov/topics/obesity/
  To order: The stock number is 017-001-00551-7; the cost is $5.50 per copy.
  Superintendent of Documents
  U.S. Government Printing Office, Mail Stop SSOP
  Washington, D.C. 20401-0001
  Phone: toll free 1-866-512-1800
  Fax: (202) 512-2250
  Order online at http://bookstore.gpo.gov/.

U.S. Department of Health and Human Services
BodyWorks Tool Kit
Website: http://www.womenshealth.gov/BodyWorks/index.cfm
Contact: For more information about the BodyWorks Program, becoming a trainer, or how to find a trainer in your community,Dr. Jonelle Rowe, M.D., M.A.
Office on Women's Health
bodyworks@hagersharp.com

- BodyWorks is a program designed to help parents and caregivers of young adolescent girls (ages 9-13) improve family eating and activity habits. Using the BodyWorks Toolkit, the program focuses on parents as role models and provides them with hands-on tools to make small, specific behavior changes to prevent obesity and help maintain a healthy weight. The Office on Women's Health, U.S. Department of Health and Human Services, developed BodyWorks following two years of formative research.
- The BodyWorks program uses a train-the-trainer model to distribute the Toolkit through community-based organizations, state health agencies, non-profit organizations, health clinics, hospitals, and health care systems. The program includes one six-hour training module for trainers and ten 90-minute weekly sessions for parents and caregivers.

The Weight-Control Information Network, National Institute of Diabetes and Digestive and Kidney Diseases (WIN)
1 WIN Way
Bethesda, MD 20892-3665
Phone: (202) 828-1025 or 1-877-946-4627
Fax: (202) 828-1028
E-mail: win@info.niddk.nih.gov
http://win.niddk.nih.gov/index.htm
http://win.niddk.nih.gov/publilcations/health_risks.htm

- *Do You Know the Health Risks of Being Overweight?*
- *Sisters Together: Move More, Eat Better – a program and materials for African-American Women*
  http://win.niddk.nih.gov/publications/SisPrmGuide2.pdf
- *Active at Any Size*
- *Choosing a Safe and Successful Weight Loss Program*
  http://win.niddk.nih.gov/publications/choosing.htm

World Health Organization (WHO)
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Telegraph: UNISANTE GENEVA
Website: http://www.who.int/en/

- The WHO Child Growth Standards:

  General Information: http://www.who.int/childgrowth/en/
  Specific Standards: http://www.who.int/childgrowth/standards/en/
  WHO Child Growth Standards: Methods and development:
  http://www.who.int/childgrowth/publications/technical_report_pub/en/index.html

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California Food Guide

Cardiovascular Disease

By Sharon B. Sugerman, M.S., R.D., F.A.D.A. and Alexandra E. Ossa, M.P.H.

What's New

- The Dietary Approach to Stop Hypertension (DASH) Eating Plan is one of only two eating patterns selected to be included in the Dietary Guidelines for Americans 2005. The DASH plan demonstrates effectiveness both in reducing LDL cholesterol, as well as hypertension and may also improve bone health.[5, 6, 7]
- A recent Journal of Hypertension report indicates that home-based blood pressure monitoring is "interchangeable" with the traditional ambulatory method to detect high blood pressure. The results concluded that home monitoring is an overall efficient method to monitor blood pressure because, of its low cost and convenience for repeated measurements, whereas, infrequent ambulatory measures might not reveal a problem.[8]

Public Health Implications

Cardiovascular disease (CVD) and stroke are the first and third causes of death in the United States.[1] Over one-third of all deaths in the U.S. are due to CVD and stroke. More people die from CVD than from cancer, chronic obstructive pulmonary diseases, diabetes, and AIDS combined.[2, 3] Many of these illnesses can be linked to poor diet and physical inactivity.

Selected Healthy People 2010 Goals – Cardiovascular Health (CVH) Program.[4]

Coronary heart disease (CHD):

- Reduce coronary heart disease deaths by 20 percent from 208 per 100,000 to 166.
- Reduce hospitalization of older adults with heart failure as the principal diagnosis (target varies with age group).

Stroke:

- Reduce stroke deaths by 20 percent from 60 per 100,000 to 48.

High blood pressure:

- Reduce the proportion of adults with high blood pressure from 28 percent to 16 percent.
- Increase the proportion of adults whose high blood pressure is under control from 18 percent to 50 percent.
- Increase the proportion of adults who are taking action for their high blood pressure by losing weight, increasing physical activity, and/or reducing sodium intake to help control their blood pressure from 72 percent to 95 percent.
- Increase the proportion of adults who have had their blood pressure measured within the preceding two years and can state whether their blood pressure was normal or high from 90 to 95 percent.

High cholesterol:

- Reduce the mean total blood cholesterol from 206 mg/dL to 199 mg/dL.
- Reduce the proportion of adults with high total blood cholesterol levels from 21 percent to 17 percent.
- Increase the proportion of adults who have had their blood cholesterol checked within the preceding five years from 68 percent to 80 percent.

The American Heart Association, the leading advocacy organization for CVD, has set a goal of reducing CHD, stroke, and risk by 25 percent by the year 2010.[9]

Indications of a heart attack include sweating, anxiety, and chest pains.

Warning Signs of a Heart Attack:[10]

- **While some heart attacks are sudden and intense most are slow and involve mild discomfort.**
- **Chest discomfort (pressure) lasting for a few minutes that may come and go.**
- **Discomfort in the upper body – shoulders, neck, and arms.**
- **Shortness of breath, nausea, and sudden cold sweat.**

AHA, 2005c (http://www.americanheart.org)

Definition

Cardiovascular disease includes a number of diseases of the heart and blood vessels: coronary heart disease (CHD) is also known as coronary artery disease (CAD), ischemic heart disease, or just heart disease. Coronary heart disease leads to angina pectoris (chest pain) and heart attack and can, over time, contribute to congestive heart failure, a condition in which the heart can no longer pump blood effectively to the other parts of the body, and lead to arrhythmias (abnormal heart rhythms).[11] Another type of cardiovascular diseases include cerebrovascular disease (stroke), transient ischemic attacks (TIAs – "mini strokes") and their precursor, hypertension (HTN), more commonly known as high blood pressure (HBP). CHD and stroke are the two major causes of CVD deaths. In CHD, a condition called atherosclerosis occurs, in which fatty deposits (cholesterol) build up on the interior walls of the arteries that lead to the heart.[12] See the following link for more information: http://www.nhlbi.nih.gov/health/dci/Diseases/Atherosclerosis/Atherosclerosis_WhatIs.html. This build up over time eventually reduces blood flow and oxygen to the heart, in turn impairing the heart's ability to supply blood to the rest of the body.[13] In cerebrovascular disease the blood vessels leading to the brain are affected and the blood supply to the brain is interrupted.[14]

Burden

In 2005, the American Heart Association estimated the cost of cardiovascular disease and stroke in the United States to be $393.5 billion. This includes the direct costs of hospitals/nursing homes, medical professionals, drugs, and medical durables, as well as the indirect costs of lost productivity, morbidity, and mortality.[3] This represents an increase of over 20 percent since the year 2000 ($326.6 billion). In California there were $5.3 billion in lost productivity due to CVD mortality and over $1 billion due to cerebrovascular disease in 1991.[14] By comparison, $190 billion dollars were the associated costs of all cancers in the United States.[3] Reducing CVD risk factors could significantly lower health care costs. Even if CVD rates remain stable, the financial costs to society will continue to escalate from the increasing cost of treating CVD.[16]

Incidence and Prevalence

Over 70 million Americans or nearly 25 percent of the U.S. population have one or more types of CVD.[3] In the United States, about 13 million people have been diagnosed with CHD, seven million people have had heart failure, and four million have cerebrovascular disease.[3, 4] Like the death rate, the prevalence of chronic CVD increases with age, is more prevalent in men than in women, and occurs more among African-Americans than among white Americans.

Projected incidence and prevalence for CVD is not easily calculated. Although the rate of heart disease has been decreasing, cardiovascular diseases are still more common in older adults, and the population is growing older.

Statistics:

National:
In 2002, over 927,000 people died in the United States due to CVD. On average, one death due to CVD occurs every 34 seconds in the United States--2600 deaths a day.[1, 3] It is the leading cause of premature, permanent disability including stroke in the United States.[1] Annually, 700,000 strokes occur in the United States, of which nearly one quarter (163,000) ends in death.[17]

California:
From 2000-2002 an average of nearly 70,000 people died from CVD in California.[18] The total deaths from stroke in California fell 2.9 percent from 18,078 in 2001 to 17,551 (2002) but, accounted for 88.2 percent of all deaths in people aged 65 and older.[18]

Age and Gender Differences:

- About 84 percent of cardiovascular disease deaths in the U.S. occur in people age 65 and older.[3]
- About 150,000 Americans under age 65 are killed by CVD. [3]
- Since 1984, the number of CVD deaths for females has exceeded those for males.[19]
- In 2002, CVD caused the deaths of 493,623 females compared with 433,825 males. Females represent 53.2 percent of deaths from CVD.[3]
- Post-menopausal women are two-to-three times more likely to have CHD than women of the same age who are pre-menopausal.[3]
- On average, men experience their first heart attack five years earlier in life (65.8 years old) than women (70.4 years).[3]
- Since the 1990's, blood pressure in children has increased, much of which can be attributed to their increase in weight and their decrease in physical activity placing them at risk for developing hypertension and an adult form of diabetes.[20, 21]
- In California, six times as many people 65 years and older report having been diagnosed with heart disease than do adults under age 65. Three times more who are over 65 have been diagnosed with high blood pressure, but the ratio is reversed for the percentage that have been diagnosed and are taking medication to reduce their blood pressure.[22]
- Although equally likely to have high blood pressure, California men are significantly less likely than women to be taking medication to control it.[22]

Racial/Ethnic Disparities:
Racial/ethnic disparities exist for many aspects of CVD, with African-Americans being at particularly high risk compared to all other racial/ethnic groups. Compared to White Americans, African Americans living in the United States in 2002:

- Have an age-adjusted heart disease death rate that is 47 percent higher than the national average (170.8) for males and equal to for females.[3]
- Have a CHD death rate of 250.6 (men) and 169.7 (women) per 100,000 compared to 220.5 and 131.2 respectively for the population as a whole.[3]

- Who are aged 65 - 74 are twice as likely to be hospitalized with heart failure (20.0 per 1000 vs. 10.1 per 1000).[3]
- Have among the highest prevalence of hypertension in the world.[3]
- Will develop much higher blood pressure and at an earlier age.[3]
- Who have CHD are more likely to be less educated, more over weight or obese, physically inactive, have diabetes, and live in the southeastern U.S.[3]
- Have a higher incidence of stroke, more severe strokes, and higher stroke mortality.[33]
- Are almost twice (1.8) as likely to die from a stroke.[17] In California, the disparity is somewhat less — 2002 age adjusted death rates due to stroke were 44 percent higher among African-Americans.[24]

East Indian people (Indian and Pakistani decent) like African Americans have significantly greater cardiovascular morbidity and mortality than Whites.[26]

In 1999, Latinos had a reported death rate of 138.4 per 100,000 from coronary heart disease and 40 per 100,000 from stroke. [3]

Mexican-Americans in comparison to Black and White Americans have the lowest prevalence of hypertension (25.1 percent) however, they are the group least likely to be aware of their condition or have it under control (49.8 percent and 17.3 percent) respectively.[27]

Racial/ethnic reduced risk:
Asian Americans/Pacific Islanders are the least likely to die of coronary heart disease compared to White and African Americans at 115.5 per 100,000 and stroke at 52 per 100,000. Native Americans/Alaskan Natives also have a lower death rate from coronary heart disease at 123.9 per 100,000 and 40 per 100,000 for stroke.[2]

<u>Education and Income-Related Disparities:</u>
Death rate information is not available by educational level and income status; however, the self-reported California Health Information Survey Data presented in Table 1 suggests that there are disparities in related factors. For example, both stroke and high blood pressure decrease in a linear fashion with increasing education, and taking medication to control high blood pressure increases. The relationship is less clear cut for heart disease. Both those with a high school degree, as well as those with at least a bachelor's degree reported lower rates of heart disease than those with less than a high school degree or some post high school education without a bachelor's degree. However, of those diagnosed with heart disease or stroke, reported high cholesterol was reported less frequently in more educated Californians.

Of those who have had heart disease or a stroke, high cholesterol is seen least frequently in the two highest income groups by Federal Poverty Level (FPL) – encompassing those reporting a household income at or above 200 percent FPL. Not

taking medication to control high blood pressure is reported by more respondents indicating household incomes below FPL than by those at or above 200 percent FPL.[28]

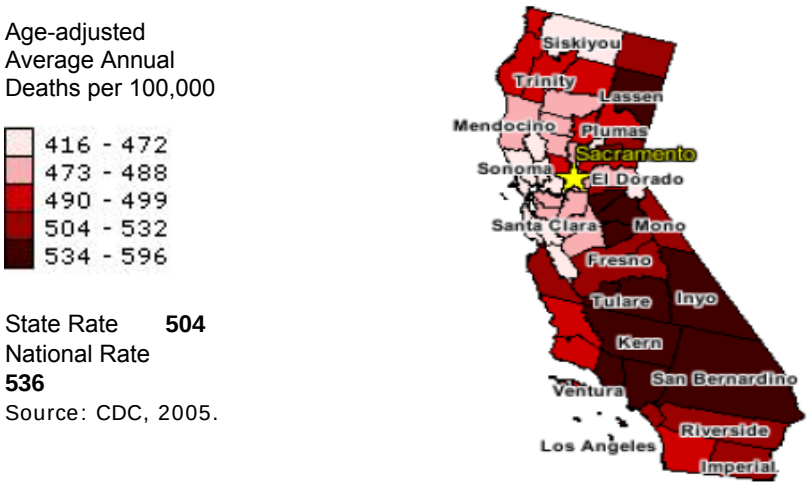
Table 1: Reported Prevalence of Selected Cardiovascular Diseases and/or Risk Factors in Adults by Selected Characteristics 2003[1] California Health Interview Survey (CHIS)

Selected Characteristics	Ever Diagnosed - Any Kind of Heart Disease		High Cholesterol[2]	Ever Had a Stroke[3]		Ever Diagnosed with High Blood Pressure		Not Currently Taking Medicine for High Blood Pressure[4]
Total	**1,763,000 (6.9%)**		**1,868,000 (32.2%)**	**333,000 (8.8%)**		**6,012,000 (23.5%)**		**1,941,000 (32.3%)**
Gender								
Male	881,000 (7.0%)		907,000 (32.2%)	137,000 (8.4%)		2,884,000 (23.0%)		1,001,000 (34.7%)
Female	882,000 (6.8%)		961,000 (32.1%)	196,000 (9.2%)		3,128,000 (24.0%)		940,000 (30.1%)
Age								
18-64	847,000 (3.9%)		1,278,000 (34.4%)	--		3,856,000 (17.7%)		1,707,000 (44.3%)
65+	916,000 (24.3%)		590,000 (28.2%)	333,000 (8.8%)		2,156,000 (57.2%)		234,000 (10.9%)
Race/Ethnicity[5]								
White	1,162,000 (8.8%)		1,123,000 (31.8%)	242,000 (9.2%)		3,393,000 (25.7%)		960,000 (28.3%)
Native American-Alaska Native	25,000 (8.3%)		23,000 (31.6%)	Sample too small		80,000 (26.7%)		29,000 (36.6%)
African-American	110,000 (6.9%)		149,000 (30.0%)	21,000 (10.4%)		544,000 (33.9%)		137,000 (25.1%)
Asian	144,000 (4.8%)		212,000 (36.0%)	31,000 (7.4%)		665,000 (22.1%)		179,000 (26.9%)
Latino/Hispanic Origin	270,000 (4.1%)		308,000 (32.3%)	29,000 (7.4%)		1,149,000 (17.2%)		565,000 (49.2%)
Education								
Less than high school	441,000 (8.5%)		462,000 (34.7%)	95,000 (11.7%)		1,366,000 (26.3%)		480,000 (36.5%)
High school	404,000 (6.6%)		439,000 (33.9%)	88,000 (9.7%)		1,483,000 (24.4%)		495,000 (33.4%)
Post high school/AA degree	461,000 (7.5%)		506,000 (32.0%)	79,000 (9.0%)		1,560,000 (24.2%)		490,000 (31.6%)
Bachelor's/post-grad degree	457,000 (5.9%)		460,000 (29.1%)	71,000 (6.9%)		1,605,000 (20.5%)		476,000 (29.9%)
Federal Poverty Level Group								
0 – 99%	262,000 (6.8%)		302,000 (34.2%)	43,000 (9.3%)		854,000 (22.2%)		320,000 (37.5%)
100 – 199%	396,000 (8.2%)		433,000 (34.5%)	106,000 (12.1%)		1,243,000 (25.7%)		421,000 (33.9%)
200 – 299%	276,000 (7.7%)		264,000 (31.1%)	59,000 (8.6%)		958,000 (26.7%)		306,000 (32.0%)
300% and above	829,000 (6.2%)		869,000 (30.8%)	125,000 (7.2%)		2,957,000 (22.2%)		894,000 (30.2%)
Health Insurance Status								
Currently Insured	1,632,000 (7.6%)		1,698,000 (32.0%)	332,000 (8.9%)		5,417,000 (25.4%)		1,558,000 (28.8%)

Currently Not Insured	130,000 (3.1%)		170,000 (33.9%)		1,000 (4.5%)		594,000 (14.0%)	383,000 (64.5%)

[1] All findings are from the 2003 CHIS except high cholesterol question, numbers reported in thousands.
[2] Cholesterol asked only of respondents told by doctor they had heart disease or high blood pressure.
[3] Stroke question asked only of Californians age 65 and older.
[4] Medication question asked only of respondents had been told by a doctor they had high blood pressure.
[5] Race/ethnicity defined by UCLA Center for Health Policy Research as group the respondent "most identifies with." Excludes other single races and > one race.

Figure 1: California Total Population Ages 35+, Heart Disease Death Rates 1996-2000[29]



Trends/Contributing Factors

The annual incidence of deaths attributed to cardiovascular diseases declined substantially among U.S. adults during 1980-2000 from 350 per 100,000 in 1980 to 196 in 2000.[30] Rates of decline varied substantially, and were related to socioeconomic status and concurrent health conditions. Rates declined most steeply among economically advantaged persons, increasing the gap between people of low socioeconomic status and others in terms of mortality, morbidity, and risk factors for heart disease and stroke.[31] However, the decline was not as substantial for those adults with diabetes. Adults with diabetes are more likely to report having a history of CVD than adults without diabetes.[30] The increasing prevalence of diabetes poses a major and growing threat to the U.S population as the proportion of heart disease deaths due to diabetes is projected to increase from 21 to 29 percent of the total over the first quarter of the 21st century.[4]

The factors contributing to the downward trend include both personally modifiable risk factors, as well as advances in medical care:

- a substantial decline in cigarette smoking;
- a decrease in average blood cholesterol;
- reduced consumption of saturated fat, percentage of calories from fat, and dietary cholesterol;

- a reduction in average blood pressure and an increase in the percentage of people who have high blood pressure that is being treated and controlled;
- and improvements in diagnosis and treatment of heart disease, cholesterol, and stroke.[31]

Table 2: Modifiable Cardiovascular Risk Factors[32, 33, 34]

	At Risk
*** Elevated LDL-cholesterol**	
• **Without CHD and fewer than 2 other risk factors**	≥ 160 mg/dL
• **Without CHD and 2 or more risk factors**	≥ 130 mg/dL
• **With known CHD**	≥ 100 mg/dL
Elevated total cholesterol	≥ 240 mg/dL 200 - 239 mg/dL if HDL <40 mg/dL or 2 or more non-lipid risk factors
*** Low HDL-cholesterol**	< 40 mg/dL
*** Hypertension**	Systolic ≥ 140 mm Hg Diastolic ≥ 90 mm Hg Or on anti-HTN medication
Abdominal obesity	Men: Waist > 40 inches Women: Waist >35 inches
Cigarette smoking	Current smoker
Homocysteine level in blood	>10 micromoles/liter
Diet high in saturated fat and/or cholesterol	> 10% of calories as saturated + trans fat > 300 mg dietary cholesterol/day
Diets low in fruit and vegetables	< 5 daily servings (2 ½ cups) of fruit and vegetables
Diets high in sodium	> 2300 mg/day (direct, progressive relationship w. HTN)
Physical inactivity	< 30 minutes of physical activity daily

* Whole-body obesity raises risk for this factor

Sources: National Cholesterol Education Program. *Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III), Final Report*, 2002; Kris-Etherton P and Burns JH. *Cardiovascular Nutrition: Strategies and Tools for Disease Management and Prevention,* 1998; American Heart Association: Healthy Lifestyle web pages; ***http://www.americanheart.org/presenter.jhtml?identifier=1200000***, 2005e.

Some risk factors are not modifiable: age (men ≥ 45 years; women ≥ 55 years) and family history of early CHD are two of them. One major modifiable risk factor for CHD that is strongly influenced by diet is high blood cholesterol, in particular, elevated levels of low-density lipoprotein cholesterol (LDL).[35] More than 50 million adults in the United States have high blood cholesterol that requires medical treatment.[36] In turn, blood cholesterol is negatively influenced by diets high in fat, especially saturated fat and *trans* fatty acids, and, to some extent, dietary cholesterol.[37, 38] Elevated LDL cholesterol is also associated with low intake of fruits and vegetables.[39] An additional risk factor for CHD is homocysteine, a naturally produced amino acid that, when elevated, can cause narrowing and hardening of arteries and blood clots (atherosclerosis) which reduces the blood flow/supply to the heart and can cause heart attack and strokes. Consumption of foods high in folic acid including green, leafy vegetables and cereals fortified with folic acid, and vitamins B12, and B6 can lower blood homocysteine levels and reduce risk of heart attack.[40, 41] The DASH diet, with its strong emphasis on fruits and vegetables, has proven effective at reducing homocysteine levels.[42]

Contributing Health Conditions and Lifestyle Behaviors:

Several diseases themselves increase risk for CHD. High blood pressure is a major risk factor for CHD, stroke, and heart failure. About 65 million people in the United States have high blood pressure. Diabetes is also a major risk factor. In 2002, there were almost 14 million diagnosed cases of diabetes in the U.S. In fact, more than 65 percent of people with diabetes die annually from heart disease or stroke.[43] Excess weight also increases the risk for both high blood pressure and diabetes, and abdominal obesity directly increases risk for overall CVD. Currently, in the United States 65 percent of adults 20 years and older, and 16 percent of children and teens aged 6-19 years old are considered overweight or obese.[44] In 2003, 5.2 million (20.4 percent) adult Californians alone were classified through self-report as obese; another 9 million (35.2 percent) were overweight.[45] It is estimated that, in 2004, more than 28 percent of California children were overweight or at risk for overweight.[46] However, despite, increases in obesity, over the 40 years leading up to 2000, cardiovascular risk factors, such as high cholesterol and high blood pressure, decreased substantially over the same time period, both in overweight/obese and in lean persons.[47]

Physical *inactivity* is another major risk factor of cardiovascular disease for both adults and children. In 2003, 22.3 percent of adult Californians reported no physical activity, while 53.3 percent did not take part in *regular* physical activity. This compares with 23.1 percent for no physical activity and 52.8 percent for no regular physical activity nationwide.[48] The relative risk of coronary heart disease associated with physical inactivity ranges from 1.5 to 2.4, a similar risk observed for high cholesterol, high blood pressure and smoking.[49, 50, 51]

However, lack of physical activity is not just a problem for adults but is slowly and steadily affecting the health of children living in the U.S. In 2002, nearly 23 percent of children nationwide report getting no free-time physical activity.[52] As physical education classes and programs are cut from the schools and children spend more of their leisure time in front of the television or playing video games their sedentary lifestyle is having a

negative impact on their health. In a recent article, the American Journal of Medicine (2005) reported that more than one in three American adolescents are physically unfit and have many risk factors for heart disease. Of 3,100 adolescents who performed treadmill tests, 34 percent were revealed to be in poor physical condition. The percentage was conservative as some could not even perform the test since they were at too high of a risk for heart attack. This figure projected to the entire U.S. population means that as many as 7.5 million adolescents may be at risk for CVD, diabetes, and other related illnesses due to poor physical condition. This extreme amount of physical inactivity contributes to about 250,000 (12 percent) deaths per year in the United States.[34]

Physical *activity* on the other hand has a protective effect and reduces the risk of dying from coronary heart disease and of developing high blood pressure, high blood lipid abnormalities, diabetes, and other chronic illnesses.[16, 34] In 2003, 28.3 percent reported 20 minutes or more of vigorous physical activity at least three days a week, a little above the national average of 26.3 percent.[48]

Warning Signs of a Stroke:[10]

- Sudden numbness in face, arm, leg, or one side of body
- Sudden confusion, trouble speaking, or understanding
- Sudden difficultly seeing out of one or both eyes
- Sudden loss of balance, walking, or standing
- Sudden and severe headache with no known cause

AHA, 2005c (http://www.americanheart.org)

Barriers to Implementation/Myths

Myths

M High cholesterol affects more men than women.

F No, beginning at age 45 a higher portion of women will have total blood cholesterol levels of 200 mg/dL or greater.[53]

M More women suffer and die from breast cancer than from heart disease.

F One in 2.5 women will die of heart disease or stroke, compared with one in 30 from breast cancer. **Go Red** is a new national campaign created by the American Heart Association to raise women's awareness of the severity of heart disease and that it is the **number one** killer of women in the United States.[54]

M The majority of Americans with high blood pressure know they have it and have it under control.

F Of those with high blood pressure 30%, are not aware of their condition and only 34% are on medication to control their hypertension.[53, 55]

M Cardiovascular disease only affects a person's heart health.

F Cardiovascular disease affects more than an individual's heart but, is also linked to their mental well-being. Recent studies reported that prevalence of psychological distress is common among patients with heart failure (10%), heart attack (6.4%) and CHD (4.1%) whereas, it is only 2.8% for non-diseased patients.

Myths cont'd

M Heart attacks are more common in people over 65 years old

F Almost half of all reported heart attacks are in people younger than 65.[3]

M Testing and treatment of high cholesterol in the elderly is not effective in reducing illness or preventing heart disease.

F An extensive review of the literature found risk reduction activities effective for the elderly to prevent those with CHD from having a heart attack, and to prevent others from developing CHD.[57]

M Children do not suffer from cardiovascular disease.

F CVD is the second cause of death next to accidents for children under age 15. CVD in children is mostly due to congenital (birth) defects that claim about 2,200 lives a year. However, as more children are becoming overweight they are developing preventable risk factors like high blood pressure and diabetes, factors that contribute to CVD.[3, 20] Twenty-five percent of a random sample of 14 and 15 year-old teens in Texas demonstrated two or more CVD risk factors.[58]

M Heart disease and type 2 diabetes are two entirely different entities

F Both medical conditions are highly related, sharing common origins and pathways, such as insulin resistance and chronic low-grade inflammation. These contribute to blood vessel dysfunction and atherosclerosis and show themselves as CVD.

M To be protective against cardiovascular disease, exercise must be intense and completed over a continuous period.

F Thirty minutes of activity accumulated most days are recommended for chronic disease risk reduction. Moderate-intensity physical activities include brisk walking and doing housework and gardening in a more energetic manner, among others.

M Exercise testing is important only for elderly people or for people who are having CVD symptoms such as chest pain.

F Low fitness levels carry increased risk for CVD events. For this reason doctors should consider exercise as part of the regular physical exam for women over age 50 and men over age 40, especially if they have more than two other typical CVD risk factors.

M All diets that contain more than 30 percent fat raise risk for heart disease.

F Diets with 35 percent of calories from fat can improve cholesterol patterns if at least 15 percent is monounsaturated fat, no more than 8 percent is saturated, and total calories are suitable for reaching and maintaining a healthy weight.[59]

Barriers

Many of the same barriers that apply to obesity such as, diet and physical inactivity are the same barriers that prevent individuals from achieving good cardiovascular health.

Cardiovascular diseases are very influenced by diet.[32, 33] Diets high in salt/sodium intake make individuals more prone to developing hypertension. Dietary Guidelines for Americans 2005 recommends that adults and children consume less than 2,300 mg of sodium a day, about a teaspoon of salt.[60] However, for many U.S. adults, salt intake far exceeds their daily allowance, placing them at risk for developing high blood pressure or exacerbating existing high blood pressure. Diets high in fat and cholesterol consumption are also greatly associated with CVD. Consumption of too many foods rich in saturated fat such as meat, eggs, and dairy products have been shown to increase “bad” or LDL cholesterol levels and total cholesterol.[61] Poor dietary habits can be attributed, to a variety of factors:

- An abundance of high calorie, high fat, high sodium, and sugar foods, such as snack foods and convenience foods, along with their easy accessibility, coupled with substantial advertising to promote the consumption of these items;
- Extended work hours for adults, making it more difficult to prepare and consume healthy meals and fresh foods at home.[62]
- Increased eating out, especially at fast food restaurants that encourage excess consumption through large portions or "super-sizing" meals.[63]

In addition to poor diet, lack of physical activity exacerbates and increases an individual’s risk for developing cardiovascular diseases. Factors that increase the likelihood of this include:

- Increased time spent by children and adults in sedentary pursuits, such as watching television, playing video games, and computer use.[64]
- Neighborhoods that are either not safe for outdoor recreation, or are designed so that walking as a means of destination transportation is difficult or impossible.
- Sedentary jobs with extended work hours for adults, making it more difficult to find time for recreational physical activity.[64]

See chapters on Body Weight and Physical Activity for more Barriers.

Common Concerns/Strategies

A healthy diet, coupled with increased physical activity, is the major non-pharmaceutical means of preventing heart diseases and stroke. Although not part of a food guide, efforts to prevent people from beginning the habit of smoking and reinforcing both individual and population-based efforts to help smokers quit must also be included in strategies to reduce CVD.

At the Individual Level:
Overall, dietary change and increased physical activity are the cornerstones to reducing the risk of CVD. One primary role of health professionals is to help people make lifestyle modifications that are individualized and sustainable, such as identifying an acceptable eating plan that is palatable yet nutritious, and physical activities that are enjoyable and convenient to do. Initial steps to a more heart healthy lifestyle can be taken both during routine health care and in the public health setting. Both individual practitioners and group or community based efforts can be used to screen individuals for risk factors and educate them about what people can do to reduce their risk.

One highly effective method for reducing cardiovascular disease is through the consumption of healthier foods such as fruits and vegetables, and reducing consumption of salt, sugar, and fat intake. The DASH diet which is rich in fruit and vegetables has proven to be effective in lowering blood pressure, particularly for African Americans.[65, 66] Diets high in fruit and vegetable intake have also shown to be effective in stemming rising blood pressure in children.[67]

For children, primary prevention efforts, in particular, school, after-school, and family-based interventions that encourage children to develop positive eating and physical activity habits, have shown to be the most potentially successful in reducing the risk of CVD and its long-term health effects.[68]

For low-income women age 40-64, participation in the California WISEWOMAN project enables them to receive testing for cholesterol and blood pressure, as well as lifestyle education at no or low cost.[69] Education programs like this can help women adopt healthy eating patterns, encourage women to be more physically active, and provide support for stress reduction and smoking cessation.

Sometimes diet and physical activity may not be enough, either as primary or secondary prevention strategies. While diet and physical activity can be highly effective in preventing and even treating CVD and its risk factors, if intractable high LDL-cholesterol is a problem, drug therapy is the next step. Drug therapy can add synergistically to improvements made in lifestyle behaviors.

Population-based:
For adults, worksite and community-based strategies can provide an environment supportive of lifestyle change. Widespread availability of competitively-priced meals and snacks in the workplace cafeteria, fast food restaurants, and vending machines provide incentives for choosing healthier food at work. Flex time, low cost community center or school-based gyms, and safer neighborhoods promote more walkable communities and increased physical activity. At a policy level, health claims for foods that reduce risk of heart disease should be maintained and expanded as science provides new evidence.

For children, systems, environmental, and policy changes in school and after-school care institutions can reinforce individual nutrition and physical activity education by

limiting availability of less desirable choices and providing easy access to healthy foods and physical activity opportunities.

See also the chapters on Body Weight and Physical Activity for more Strategies.

Table 3: Dietary Constituents Positively Associated With Risk Reduction for CVD*

	Sources and suggested amounts
Omega-3 fatty acids	Fatty fish - salmon, sardines, mackerel; Also tofu, soy, canola, and flaxseed oils, and nuts; 900 mg/day; two or more fish meals/week.[32] Fish oil supplements for patients with severely elevated serum triglycerides. Fish eaten four times/week reduces cholesterol by an average of 14 percent.[70] Each 20 gram/day increase in fish consumption was related to a 7 percent lower risk of CHD mortality.[71]
Monounsaturated fat	Canola, olive, high oleic safflower, and sunflower oils, nuts – up to 20% of daily calories.[32]
Soluble fiber	Oats, oat bran, rice bran, barley, apples, oranges, prunes, carrots, legumes; 10-25 gm/day.[32]
Antioxidants - Carotenoids and Beta Carotene	Dark green and deep orange vegetables, mangoes and apricots; eat at least 5 cups of high beta carotene foods each week.[60,72]
Folic acid with Vitamin B_6 and B_{12}	Dark green leafy vegetables, oranges and orange juice, fortified whole grains, legumes; 400 mg/day from food; 400 – 1,000 µg/day.[32]
Potassium	Fruits and vegetables, especially leafy green vegetables, fruit from vines, and root vegetables; meat, milk, and cereal products are other sources of potassium. The recommended intake of potassium for Recommended intakes for potassium for children 1 to 3 years of age is 3,000 mg/day, 4 to 8 years of age is 3,800 mg/day, 9 to 13 years of age is 4,500 mg/day, and adolescents and adults is 4,700 mg/day.[60]
Alcohol	Especially, red wine; limit to moderate amounts - no more than 2 drinks/day for men, 1 drink a day for women; do not start drinking if a nondrinker.[32, 73]
Soy protein	Tofu, tempeh, textured vegetable protein, soy burgers, soy "milk"; 25 -50 mg soy protein/day can reduce total cholesterol by 4-8%, with higher effects in people with high cholesterol.[74]
Plant sterol esters or Plant stanol esters	Found in very small amounts naturally in plants; for CVD risk reduction, prepared spreads, e.g., margarine and salad dressing, for both; also snack bars and plant stanol ester dietary supplements for stanols. Diets low in saturated fat and cholesterol that include at least 1.3 grams of plant sterol esters or 3.4 grams of plant stanol esters, consumed in 2 meals with other foods, may reduce the risk of heart disease.[75]

* See also Kris-Etherton, 2002 for further information.[76]

At present, heart/stroke health-related label claims are approved for fruits, vegetables, and grains containing at least 0.6 gm of soluble fiber/serving; foods containing at least 6.25 gm soy protein/serving; foods containing at least 0.65 g plant sterol esters or 1.7 g plant stanol esters/serving; low saturated fat, low cholesterol foods; low sodium foods, and foods that are at least 51% whole grain by weight.[77]

Rx: Clinical Implications

Table 4: Diets for the Prevention and Treatment of Cardiovascular Diseases*

Diet	Used for	Description
Step I	A starting point diet for the general public to reduce CVD risk factors	About 55% of energy from carbohydrate, 15% from protein and ≤ 30% from fat; limit saturated fat to 8-10%, polyunsaturated fat to no more than 10%, and monounsaturated fat to no more than 15%; cholesterol < 300 mg/day; 5 or more servings of fruits/vegetables a day; 25-30 grams of fiber/day; less than 2300 mg sodium for people with hypertension.[32]
DASH	The general public and people with high blood pressure	Food-based; 7-8 grain products, 4-5 vegetables, 4-5 fruits, 2-3 low fat dairy, 2 or fewer meats/poultry/fish a day and 4-5 servings of nuts, seeds, or legumes a week; low saturated and total fat; high dietary fiber, potassium, calcium, and magnesium; moderately high in protein.[60]
Therapeutic Lifestyle Changes	For people at high risk or with known heart disease: -- High LDL-cholesterol or other lipid problems -- CHD or other CVD -- Diabetes mellitus, insulin resistance, or metabolic syndrome	Total fat from 25-35% with the higher amount recommended for persons with metabolic syndrome or diabetes; limit saturated fat to less than 7% of calories, polyunsaturated fat up to 10%, and monounsaturated fat up to 20%; less than 200 mg cholesterol/day; carbohydrate, mainly from foods rich in complex carbohydrates (fruits, vegetables, whole grains) to equal 50-60% of total calories; about 15% protein; total calories to maintain desirable body weight and prevent weight gain[32]
Very low fat, high carbohydrate	Patients with diagnosed CVD and high-risk patients	At least 65% of energy from carbohydrates; total fat about 10%; saturated fat < 6% of calories; vegetarian diet with emphasis on low fat grains, legumes, vegetables, and fruits. Adherence to the diet, plus aerobic exercise, stress management training, smoking cessation and group psychosocial support for 5 years showed reduced atherosclerosis while patients on standard CVD treatment increased.[78]
High mono-unsaturated fat (MUFA)	An alternative for those who are not high risk and do not want to follow a low fat diet	Limit fat to 35% of calories of which 15% are from high-MUFA foods; limit saturated fats to 9% or less. Good sources: avocado, olives, nuts, peanut butter, tahini paste; olive, canola, and peanut oils.[59]
Mediterranean		A variation of the high MUFA diet - olive oil is the primary source of fat; bread, pasta, rice, grains, potatoes, fruits, vegetables, beans, nuts and seeds make up the basic diet; saturated fat ≤ 8%; total fat 25-35%; red meat and butter seldom eaten or in very small amounts; cheese, yogurt, fish, and poultry in low to moderate amounts; zero to four eggs/week; sweets a few times a week; wine in moderation with meals.[79]
Sodium-restricted	People with high blood pressure, African Americans, older adults	Sodium is limited to 1,500 mg/day or less; prepare most food at home or inquire carefully when eating out; meet a 4,700 mg/day potassium recommendation with food; may be part of any of the other diets.[60]
The Polymeal – based on modeling, not actually tested	The general population	Food-based, wine – 150 ml/day; fish – 114 g four times/week; dark chocolate – 100 g/day; fruit and vegetables – 400 g/day; garlic – 2.7 g/day; almonds – 68 g/day; in theory, this diet would reduce heart disease risk by up to 76%.[80]

* For all diets, individualize calories to achieve and maintain a healthy body weight. See also Kris-Etherton, 2002 for further information.

At-a-Glance: American Heart Association's Dietary Recommendations for Children and Adolescents[81]

Here is a summary of key American Heart Association dietary recommendations for preventing the development of cardiovascular disease from infancy and childhood.

Start in infancy.

- If possible, feed breast milk exclusively for the first four to six months and continue breastfeeding until one year of age.
- Delay introducing juice until at least six months of age and then use only 100 percent juice and limit to no more than 4-6 oz. per day. Only feed juice from a cup.
- Introduce healthy foods and continue offering if initially refused. It may take up to 10 tries for a baby to accept a new healthy food.
- Do not introduce foods without overall nutritional value simply to provide calories.
- Respond to cues the baby is full and do not overfeed. Do not force children to finish meals if not hungry.

Serve foods with high nutrition.

- Serve whole grain breads and cereals rather than refined grain products. Look for "whole grain" as the first ingredient on the food label and make at least half your grain servings whole-grain. Recommended grain intake ranges from 2 oz. per day for a one-year-old to 7 oz. per day for a 14-18 year old boy.[1]
- Serve a variety of fruits and vegetables daily, while limiting juice intake. Each meal should contain at least one fruit or vegetable. Children's recommended fruit intake ranges from 1 cup per day, between ages 1 and 3, to 2 cups for a 14-18 year old boy. Recommended vegetable intake ranges from ¾ cup a day at age one to 3 cups for a 14-18 year old boy.[1]
- Introduce and regularly serve fish as an entrée. Avoid commercially fried fish.
- Serve nonfat and low-fat dairy foods. From ages 1-8, children need 2 cups of milk or its equivalent each day. Children aged 9-18 need 3 cups.[1]
- Don't overfeed. Estimated calories needed by children range from 900 per day for a 1-year-old to 1800 for a 14-18-year-old girl and 2200 for a 14-18-year-old boy.
- Keep your child's activity level in mind. Be physically active for at least 60 minutes day.

Reduce "empty" calories.

- Make foods with high calories and little nutritional value an occasional discretionary item in a diet otherwise based on nutrition-rich foods.
- Reduce intake of sugar-sweetened beverages and foods.
- Reduce salt intake in processed and home-cooked foods.
- Choose cereals, breads, and prepared foods containing whole grains and higher fiber and with low salt and sugar.
- Reduce intake of high-calorie, nutrient poor foods such as salty snacks, ice cream, fried foods, cookies, and sweetened beverages.
- Limit snacking during sedentary activities or in response to boredom.
- Restrict the use of juice, soda, and sports drinks as snacks.

Reduce saturated fats and trans fats.

- Use nonfat (skim) or low-fat dairy products for all family members.
- Serve only lean cuts of meat.
- Limit fried foods.
- Use vegetable oils and soft margarines low in saturated fat and trans fatty acids instead of butter or other animal fats.
- Remove skin from poultry and visible fat from meat before eating.
- Use canola, soybean, corn, safflower, olive or other unsaturated oils in place of solid fats when preparing food.
- Limit sauces high in fat and calories, such as Alfredo and hollandaise, cream and cheese sauces.
- Serve more fish more frequently, especially oily fish that contains heart-healthy omega-3 fatty acids (such as salmon and tuna). Bake or broil fish instead of frying.

[1]MyPyramid.gov shows 3 oz. grain per day for a sedentary two year old, 8 oz. grain per day for a sedentary 14-18 year old boy, MyPyramid recommendations for 3 cups of milk for girls begins at age 11, and MyPyramid does not show recommendations for one year olds for any of the food groups.

- Serve some entrees based on legumes, beans, or tofu instead of meat.

Foster a physically active lifestyle.

- Encourage 60 minutes of moderate to vigorous play or physical activity daily.
- Limit time in front of the television or computer to no more than one to two hours per day.
- Don't put a television set in a child's bedroom.
- Provide opportunities for children to participate in sports.
- Encourage schools to provide opportunities for both competitive and noncompetitive sports.
- Participate in regular daily physical activity yourself and promote active family recreation.
- Encourage outdoor play whenever possible.

Promote healthy eating behaviors for the whole family.

- Have regular family meals.
- Parents should choose meal times, not children.
- Keep the kitchen stocked with a variety of nutrient-dense foods, such as fruits and vegetables, instead of high-calorie/nutrient poor foods such as salty snacks, ice cream, fried foods, cookies, and sweetened beverages.
- Serve portion sizes appropriate to a child's size and age (for example, a one year-old toddler only needs two ounces of grains a day).
- Parents need to show children how to be healthy by eating properly and making regular exercise important in their lives.

Source: AHA, 2005h; http://www.americanheart.org/presenter.jhtml?identifier=4575

Opportunities for Improvement

The California Heart Disease and Stroke Prevention and Treatment Task Force was charged by the legislature to develop a Master Plan for heart disease and stroke for the State of California. During 2004, the California Heart Disease and Stroke Prevention Program held a series of public forums, bringing together local expert panelists and community members to address issues in five goal areas: 1) changes that need to be made to reduce CVD death and disability; 2) identification of what the general public and health care professionals need to learn about CVD; 3) what needs to happen in California schools, workplaces, and communities to prevent CVD; 4) what needs to change in the healthcare setting to improve prevention and treatment of CVD; 5) and how health disparities in CVD could be reduced.

Many recommendations were generated. The following are representative of draft recommendations relating to physical activity, schools, community planning/access, nutrition, and reducing health-related socioeconomic disparities. Note that policy recommendations for the primary and secondary prevention of cardiovascular disease through nutrition and physical activity substantially overlap those for obesity.

- Provide wellness programs and informational classes in the workplace, along with an environment that is conducive to supporting physical activity.
- Offer tax breaks and other legislative incentives for healthful activities at workplaces.

- Teach physical education and activity in all schools; give weight to their true value by having specific standards, adequate funding, and adequate time allocated during the school day.
- Adequately fund schools so they are not supporting themselves with revenues from unhealthy food and drink sources.
- Develop after school fitness programs for non-athletes and open schools for public use after school hours.
- Support local efforts to improve access to quality nutritious foods, including farmers' markets and community garden projects.
- Ensure that supermarkets and farmers' markets sell fresh fruit and vegetables in low-income communities.
- Look at factors that support people in engaging in healthy behaviors and address these from a population-specific standpoint: housing, jobs, jobs with health insurance, pedestrian-friendly communities, and access to healthy foods.
- Develop educational materials that are culturally, language, and reading-level appropriate. Make them widely available in multiple languages in a variety of community locations.
- Collect local data on heart disease and stroke similar to cancer registry data.

Additional recommendations on cardiovascular disease can be found at http://www.dhs.ca.gov/ps/cdic/chdsp/Public%20Forum%20Report%2005-31-05.pdf.[82]

Resources/Web Sites

American Heart Association; the major voluntary organization for heart health research, professional and public education, and community service; publishes *Circulation, Hypertension* journals; (http://www.americanheart.org)

American Heart Association
National Center
7272 Greenville Avenue
Dallas, Texas 75231
(888) AHA-USA-1 or (214) 373-6300

Scientific reports on:

Children

- Overweight in Children and Adolescents (Circulation 2005;111:1999:2012)
- Cardiovascular Health Promotion in Schools (Circulation 2004;110:2266)
- American Heart Association Guidelines for Primary Prevention of Atherosclerotic Cardiovascular Disease Beginning in Childhood (Circulation 2003;107:1562)

- Obesity, Insulin Resistance, Diabetes, and Cardiovascular Risk in Children (Circulation 2003;107:1448)
- Cardiovascular Health in Childhood (Circulation 2002;106:143)

The General Public

- Circulation, special obesity-themed issue, April 19, 2005
- American Heart Association Guide for Improving Cardiovascular Health at the Community Level (Circulation 2003;107:645)
- Exercise and Physical Activity in the Prevention and Treatment of Atherosclerotic Cardiovascular Disease (Circulation 2003;107:3109)
- American Heart Association Guidelines for Primary Prevention of Cardiovascular Disease and Stroke: 2002 Update (Circulation 2002;106:388)
- American Heart Association Dietary Guidelines Revision 2000 (Circulation 2000;102:2284)
- Obesity and Heart Disease (Circulation 1997;96:3248)

Programs:

- *The Cholesterol Low Down*
  A program that offers strategies for modifying diet and lifestyle to reduce the risk of heart disease and stroke associated with high cholesterol.
  http://www.americanheart.org/cld
- *Choose to Move*
  A free, 12-week behavior modification program to help women build more physical activity into their busy day.
  http://www.americanheart.org/choosetomove
- *Go Red For Women*
  A nationwide movement mobilizing women to reduce their risk of heart disease. Participants are encouraged to wear red on the first Friday in February to raise awareness about women's No.1 killer. Has printed materials and a Web site.
  http://www.americanheart.org/goredforwomen
- *Justmove.org*
  A feature of the American Heart Association Web site that focuses on fitness with a variety of personalized tools. http://www.justmove.org
- *Search Your Heart (also available in Spanish)*
  A faith-based heart disease and stroke educational program to help African Americans, Hispanics/Latinos, and Asians reduce their risk of heart disease and stroke. http://www.americanheart.org/presenter.jhtml?identifier=3008521

Children's Education Programs:

- *HeartPower!*
  An educational program for students that promotes healthy choices for lifelong cardiovascular health.
  http://www.americanheart.org/presenter.jhtml?identifier=3003357
- *Hoops for Heart*
  An educational and fund-raising program in which middle school students perform basketball skills. Funds raised support research and educational programs to reduce disability and death from heart disease and stroke.
  http://www.americanheart.org/presenter.jhtml?identifier=2360
- *Jump Rope for Heart*
  An educational and fund-raising program for elementary school students that promotes physical activity. Funds raised support research and educational programs to reduce disability and death from heart disease and stroke.
  http://www.americanheart.org/presenter.jhtml?identifier=2441

Consumer Cookbooks:

American Heart Association Cookbooks and Health Information Books
http://www.americanheart.org/cookbooks

Partner Program:

A preventive health alliance with the American Cancer Society and American Diabetes Association to educate consumers and medical professionals about the leading causes of death and disability in the United States: heart disease, cancer, stroke, and diabetes. Also discusses the four key steps to take to reduce risk: eat right, don't smoke, get active, and see your doctor. More info: (866) 399-6789.
http://www.everydaychoices.org

American Stroke Institute, a Division of the American Heart Association; publishes the journal *Stroke* (http://www.strokeassociation.org/presenter.jhtml?identifier=1200037)
Evidence Report/Technology Assessment No. 127, Acute Stroke, Evaluation and Treatment

American Stroke Association
National Center
7272 Greenville Avenue
Dallas TX 75231
1-888-4-STROKE or 1-888-478-7653

National Heart, Lung, and Blood Institute. (http://www.nhlbi.nih.gov); the major federal health institute for research and education on heart disease and high blood pressure
National Cholesterol Education Program. (Bethesda (MD): National Heart, Lung, and Blood Institute (US) http://www.nhlbi.nih.gov/about/ncep/index.htm

- *National Cholesterol Education Program. (2002) Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. National Heart, Lung, and Blood Institute, National Institutes of Health. NIH Publication No. 02-5215. Accessed 10-18-05* http://www.nhlbi.nih.gov/guidelines/cholesterol/index.htm
- Ten year heart attack risk calculator; http://hin.nhlbi.nih.gov/atpiii/calculator.asp?usertype=prof

National High Blood Pressure Education Program. Bethesda (MD): National Heart, Lung, and Blood Institute (U.S.); [modified 1999 Oct 12; cited 2000 Apr 18]. Available from: http://www.nhlbi.nih.gov/about/nhbpep/index.htm

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Other NHLBI selected publications and resources:

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- NHLBI/National Recreation and Parks Association. (2001). Hearts and Parks Community Mobilization Guide. *National Institutes of Health. NIH Publication No. 01-1655.* http://www.nhlbi.nih.gov/health/prof/heart/obesity/hrt_n_pk/hnp_resg.htm
- *US DHHS. Public Health Service. Report of the Task Force on Behavioral Research in Cardiovascular, Lung, and Blood Health and Disease (1998). National Institutes of Health* http://www.nhlbi.nih.gov/resources/docs/taskforc.htm
- Latino Cardiovascular Health Resources website. Professional and consumer materials. http://www.nhlbi.nih.gov/health/prof/heart/latino/latin_pg.htm Accessed 10/18/05.
- JumpSTART, a school-based program that offers elementary school teachers a series of fun, field-tested activities to promote active, healthy lifestyles for grades three to five. Website contains a letter of introduction, an 8-page teachers' guide, and a 2-page handout to send home. http://www.nhlbi.nih.gov/health/prof/heart/other/jumpstrt.htm Accessed 10/18/05.

NHLBI Information Center
Attention: Web Site

P.O. Box 30105
Bethesda, MD 20824-0105
301-592-8573 (Voice)
301-592-8563 (FAX)
E-mail: NHLBIinfo@rover.nhlbi.nih.gov

California Heart Disease and Stroke Prevention Program.
http://www.dhs.ca.gov/ps/cdic/chdsp/
E-mail: heart@dhs.ca.gov

California Department of Health Services WISEWOMAN Program.
http://www.dhs.ca.gov/ps/cdic/ccb/cds/wisewoman.htm
E-mail: heart@dhs.ca.gov

Centers for Disease Control and Prevention (CDC). Cardiovascular Health website http://www.cdc.gov/cvh. Includes maps of CHD or stroke risk for each California county and extensive atlas on heart disease and stroke.

CDC WISEWOMAN website. Well-Integrated Screening and Evaluation for Women Across the Nation program; administered nationally by the CDC (See also California WISEWOMAN Program above). http://www.cdc.gov/wisewoman/

Elsevier Science, Inc. publishes *Journal of the American Dietetic Association American Journal of Hypertension, Journal of the American College of Cardiology; Atherosclerosis; American Journal of Preventive Medicine*

655 Avenue of the Americas
New York, NY 10010
(212) 989-2997

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http://www.nhlbi.nih.gov/about/framingham/index.html

Heart Check. Assessing Worksite Support for a Heart Healthy Lifestyle. Version 4.1. New York State Dept. of Health, Healthy Heart Program. The Heart Check survey is a 250-question instrument that looks at the ways in which a workplace environment supports employee wellness and healthy living in the areas of nutrition, physical activity, smoking, overall wellness, and employer/employee readiness.
http://www.co.tompkins.ny.us/wellness/worksite/heartck/sitehistory.html

International Society on Hypertension in Blacks (ISHIB); scope now includes renal disease, diabetes, stroke, and lipid disorders; publishes quarterly journal *Ethnicity and Disease*

2045 Manchester Street, NE
Atlanta, GA 30324
(404) 875-6263

Sports, Cardiovascular, and Wellness Nutritionists (SCAN) - A practice group of the American Dietetic Association; conducts annual symposium; self-study materials; listserv on Cardiovascular Nutrition; publishes quarterly newsletter, *PULSE; SCAN's Annual Guide to Books and Organizations; SCAN's Innovative Product Catalogue of Nutrition and Health Education Materials* (www.scandpg.org)

Dietetic Practice Group of the American Dietetic Association
7730 East Belleview, G-6
Englewood, CO 80111
(303) 779-1950

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California Food Guide

Diabetes

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What's New

Diabetes rates have reached epidemic proportions.

- The number of people with diabetes in California is expected to double by the year 2020. In 2003 it was estimated that 6.6 percent of the adult population had diabetes.[1] As of 2001, more than 12,000 adolescents had type 2 diabetes.[2]
- The number of children, adolescents, and adults with diagnosed and undiagnosed pre-diabetes is increasing.
- Type 2 diabetes now affects a growing number of children and adolescents.
- The burden of diabetes falls disproportionately on women.[3]
- 32.8 percent of boys and 38.5 percent of girls born in 2000 will develop diabetes.[4]
- Modest improvements in weight, a low fat, high fiber diet, and regular physical activity are all aspects of prudent advice to prevent pre-diabetes and type2 diabetes.
- The theory of the fetal origins of chronic disease is being accepted as a possible factor in life time risk for diabetes (see page 3, Incidence and Prevalence).
- Breastfeeding appears to decrease the risk of obesity/overweight and type 2 diabetes in some populations;[5, 6] and, may be an independent protective factor against development of type 1 diabetes.[7, 8]
- Breastfeeding exclusively for the first 6 months and continuing for the first year of life, reduces the risk of being overweight or risk of overweight among preschool children.[9] Since obese children are at risk for becoming obese adults, breastfeeding may play a critical role in reducing the prevalence of cardiovascular disease and other adult diseases related to obesity.[8, 10, 11, 12]

Public Health Implications

- Diabetes is a chronic disease that can be controlled and complications delayed or avoided. Consistent self management and access to quality diabetes care are essential.[13]
- Diabetes is a silent killer. Chronic hyperglycemia is the leading cause of adult blindness, kidney failure, and amputations and is a contributor to heart attacks and strokes.[13] Many people first become aware that they have diabetes when they develop one of its life-threatening complications.

Public Health Implications Continued

- Diabetes and associated complications are a major public health problem.
- Diabetes is becoming more prevalent in all age groups due to unhealthy lifestyle habits and higher detection. Women are at increased risk.
- Of primary concern are the increased rates of overweight and obesity from unhealthy lifestyle habits, including, but not limited to, poor food choices, physical inactivity, and choosing not to breastfeed an infant.
- Complementary and alternative medicines, supplements and treatments may be used more frequently by people with diabetes.
- Objectives for Healthy People 2010 diabetes,* diabetes related and diabetes prevention topics include:
  - Chapter 5 Diabetes
  - Chapter 4 Kidney Disease
  - Chapter 12 Heart Disease and Stroke
  - Chapter 16 Maternal, Infant and Child Health
  - Chapter 18 Mental Health and Mental Illness
  - Chapter 19 Nutrition and Overweight
  - Chapter 21 Oral Health
  - Chapter 22 Physical Activity and Fitness
  - Chapter 28 Vision and Hearing

*http://www.healthypeople.gov/document/tableofcontents.htm#parta

"Diabetes mellitus is a group of metabolic diseases, characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both."[14] The two major forms of diabetes are called type 1 and type 2, and both cause similar kinds of complications. Gestational Diabetes Mellitus (GDM) is an early indication of glucose intolerance, as is pre-diabetes and/or impaired glucose tolerance (IGT).

- Type 1 diabetes is caused by a failure of the pancreas to make insulin due to the autoimmune destruction of the insulin producing beta cells and accounts for about 5-10 percent of all cases of diabetes. Those with type 1 diabetes must take insulin to survive and perform multiple daily blood glucose (sugar) tests to assist with treatment decisions.[15]

- Type 2 diabetes, due to insulin resistance and relative insulin deficiency, accounts for 90-95 percent of all cases of diabetes. Risk increases with age, obesity and a sedentary lifestyle. Weight reduction, using a low-fat, high-fiber diet, and increased physical activity, have been shown to reduce the risk of developing type 2 diabetes and to slow its progression.[15]

- Gestational Diabetes Mellitus (GDM) is also an important form of diabetes with onset or first recognition during pregnancy. GDM complicates approximately seven percent of all pregnancies in the United States and is a risk factor for later development of type 2 diabetes for the mother and her offspring. The percentage of

women with GDM in California is greater because of the presence of high risk ethnic groups.[15]

- Pre-diabetes can lead to type 2 diabetes which was formerly called Impaired Glucose Tolerance (IGT) or Impaired Fasting Glucose (IFG). People with pre-diabetes have a 1 in 3 chance of developing type 2 diabetes within ten years, but this can be delayed or prevented through weight management by healthy eating and physical activity.

Burden

Since diabetes can damage almost every major organ and shorten life span by an average of ten to15 years, the human and economic implications of this trend are profound. In 2000, diabetes contributed to the deaths of 24,510 Californians. Because diabetes is a contributor to mortality, this is likely to be an underestimation. It is estimated that the direct and indirect cost of diabetes in California per year is over $17.9 billion.[13]

"Long-term complications of hyperglycemia include retinopathy with potential loss of vision; nephropathy leading to renal failure; peripheral neuropathy with risk of foot ulcers, amputations, and Charcot joints; and autonomic neuropathy casing gastrointestinal, genitourinary and cardiovascular symptoms, and sexual dysfunction. People with diabetes have an increased incidence of artherosclerotic cardiovascular, peripheral arterial, and cerebrovascular disease. Hypertension and abnormalities of lipoprotein metabolism are often found in people with diabetes."[14]

Incidence and Prevalence

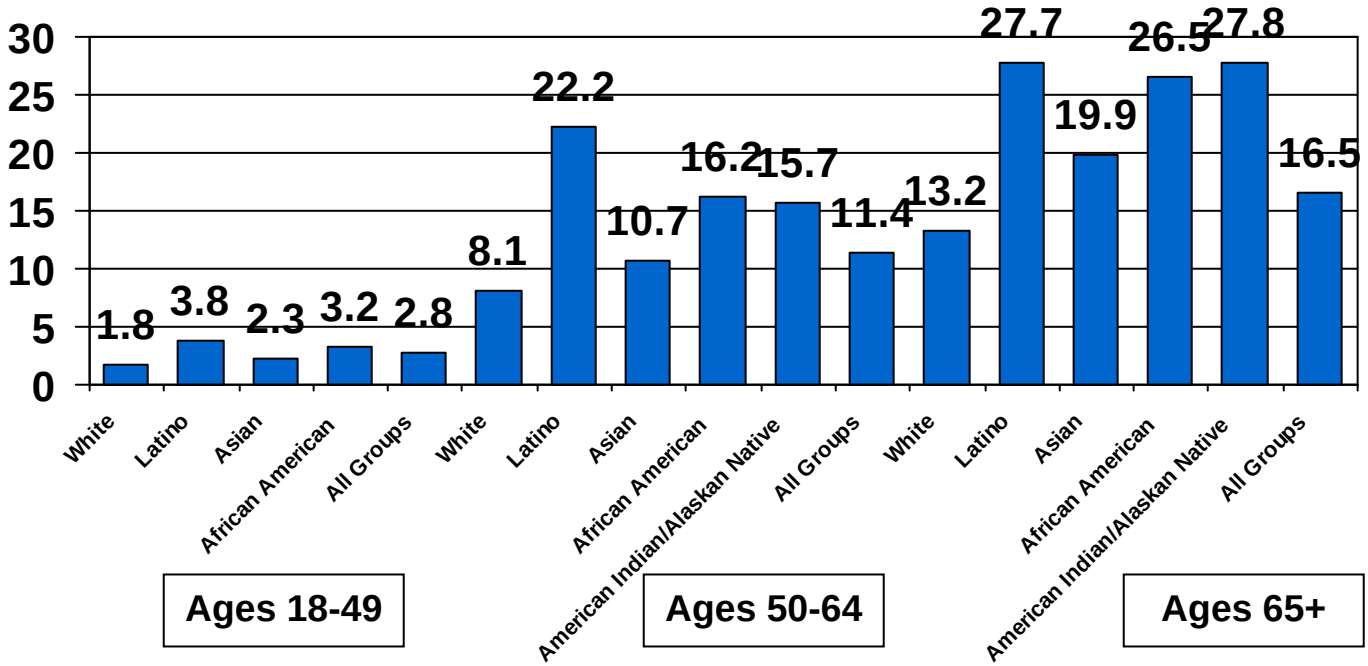
In 2003 it was estimated that 6.6 percent of the adult population had diabetes.[1] As of 2001, more than 12,000 adolescents had type 2 diabetes.[2] Diabetes is a particular health challenge because about one-third of all people with diabetes are undiagnosed. The prevalence of diabetes is highest among adults 50 years and older, particularly African American, American Indian/Alaska Native, and Latino adults (see Table 1). In California, other groups with high rates of diabetes include adults who never attended high school, have incomes below 100 percent of the Federal Poverty Level, and/or live in rural areas of the state. Gestational diabetes, pre-diabetes and type 2 diabetes are all part of the cycle of diabetes. The fetal origins of chronic disease theory recognizes that prenatal exposure to a hyperglycemic environment adversely affects fetal islet cell function in the pancreas which can lead to childhood obesity and pre-diabetes during the child's adolescence. This then predisposes adult impaired islet cell function and GDM for their offspring.[16]

Table 1: Diabetes Prevalence by Race/Ethnicity, Adults Ages 18 and Over, California, 2003[1]

Race/Ethnicity	Diabetes Prevalence %	Percentage Point Change from 2001
White	5.6	0
Latino	7.5	+0.7
Asian	6.4	+1.4*
African American	9.3	-1.2
American Indian/Alaska Native	9.9	+0.9
All Adults	**6.6**	**+0.4***

***** Significant change from 2001

Table 2: Diabetes Prevalence by Age and Race/Ethnicity, Adults Ages 18 and Over, California, 2003[1]



Trends/Contributing Factors

Between 1990-98, California experienced an estimated increase of 67 percent in the prevalence of diabetes.[17] This trend in California, also observed nationwide, is probably due to the obesity epidemic, because excess body weight is a major risk factor for type 2 diabetes, which accounts for 90 percent or more of all cases of diabetes. Complex social, economic, and environmental factors also contribute to the increased morbidity and mortality of obesity and diabetes.

As of 2003 In California, Imperial County has the highest proportion of residents with diabetes at 11.2 percent and Marin and Nevada/Plumas/Sierra Counties have the lowest proportion of residents with diabetes at 3.1 and 2.7 percent, respectively.[18] It is estimated that only 70 percent of people with diabetes have been clinically diagnosed.[19]

Barriers to Implementation/Myths

There is a significant amount of published literature and on-going research that describes the impact of social, economic, and environmental factors on morbidity and mortality from chronic disease, including the specific relationship of these factors to the prevalence of diabetes. Although we know that there is a genetic risk associated with diabetes, that alone does not explain the recent serious increase in diabetes. Many factors contribute to the increase in diabetes morbidity and mortality, including being female, social, economic, and environmental conditions such as lack of health insurance, limited access to high quality, culturally and linguistically appropriate health care; and factors that influence nutrition and physical activity.[4]

There are multiple and complex social and environmental factors that influence individual choices and behavior changes regarding eating and physical activity that play a particularly important role in the growing epidemics of both diabetes and obesity. Some of these factors are, the trend to larger portions of low cost, high-calorie foods and beverages; multi-billion-dollar advertising and marketing of unhealthful products; limited opportunities for physical activity in schools and communities; limited access to healthful foods in low-income neighborhoods; increased television viewing and computer use.[4]

Common Concerns/Strategies

Primary Prevention:

- Type 2 diabetes may be prevented or postponed by weight management through routine physical activity and proper nutrition.[15] A diet that is low in fat and high in fiber is particularly beneficial.
- Breastfeeding appears to be a factor in the prevention of obesity, overweight and type 2 diabetes.[5,6,8,9,10,11,12,20]
- Breastfeeding may be a factor in preventing type 1 diabetes.[7, 8]
- Early diagnosis and the appropriate treatment of:
  1. Overweight and obesity can prevent or postpone the onset of type 2 diabetes.
  2. Pre-diabetes can prevent or postpone the onset of type 2 diabetes.
  3. Gestational diabetes mellitus can prevent or postpone the onset of pre-diabetes and type 2 diabetes for both the mother and her offspring.

Secondary Prevention:

- Implement evidence-based guidelines for basic diabetes care for all people with established diabetes to prevent or delay recurrent events or disease progression.

- Regulation of blood glucose to achieve near-normal levels is a primary goal.[21]
- Follow the American Diabetes Association's "Standards of Medical Care in Diabetes." These are updated every January in the Clinical Practice Recommendations: http://care.diabetesjournals.org/content/vol29/suppl_1/
- Utilize and share California specific diabetes resources and website links that are available from the California Diabetes Program's Diabetes Information Resource Center (DIRC) at http://www.caldiabetes.org/.
- Refer people with diabetes to disease management and treatment programs where diabetes care is provided by a team of health care professionals including a doctor, a dietitian, a nurse, a diabetes educator, a behavioral medicine specialist, and other multi-specialty health care providers. The team acts as advisors to the person with diabetes, helping him/her develop an individualized self-management plan. This will include meal planning, planned physical activity, blood glucose monitoring, taking diabetes medicines, identifying and treating depression, handling episodes of illness, identifying low and high blood glucose, managing diabetes when traveling, and more.
- Recognize that modest improvements in weight, a low fat, high fiber diet, and regular physical activity are all aspects of prudent advice to prevent pre-diabetes and type 2 diabetes. Specific dietary advice for treatment of diabetes is beyond the scope of the California Food Guide. The American Diabetes Association stresses an individualized approach that includes assessing the individual's metabolic parameters and lifestyle factors, identifying goals, designing interventions to achieve these goals, and evaluating outcomes. A registered dietitian working in collaboration with an individual's primary care provider can develop an individualized medical nutrition therapy (MNT) plan. A registered dietitian can be located through: http://www.eatright.org/Public/

Opportunities for Improvement

It is a critical time for California communities and policy makers. The prevalence of diabetes is increasing dramatically. The state's diabetes related death rate – already higher than that of the nation as a whole – is rising. The state's racial and ethnic diversity means a growing number of Californians will be at risk for developing diabetes. There are increasing numbers of children and adults who are overweight or obese, which indicates an even greater increase in the prevalence of diabetes in the years to come. The frightening emergence of type 2 diabetes among children is the unmistakable warning sign that generations of California children will suffer from preventable chronic health conditions at rates higher than ever before.[4]

Action must be taken or millions of Californians – both children and adults – will be sentenced to a future of chronic health problems, overweight, obesity, and early death. In addition to the human suffering, California families and businesses will face unparalleled increases in long-term health costs, and the public health care system is likely to be stretched beyond its capacity.

Calling for individual behavior change alone will not solve the epidemic. Instead legislators and policy makers should be encouraged to address the community and environmental factors that perpetuate the epidemic. California's Plan for Diabetes: A Coordinated Plan to Help Guide our Work in Diabetes indicates that policies should be established that employ the following strategies to reduce diabetes-related deaths in California:[15]

- Ensure access to health care to prevent, delay, treat, and manage the diabetes.
- Create healthy nutritional and physical activity environments that promote healthy lifestyles and weight management.
- Place special emphasis on racial/ethnic and geographic communities experiencing the greatest burdens of diabetes.[4]
- Promote breastfeeding as the normal method of infant feeding in California for at least the first year of life in order to provide proven benefits to the mother, infant, and society.
- Reduce the burden of diabetes in future generations.
- End discrimination against people with diabetes.
- Develop collaborative relationships with non-traditional partners, such as the food and entertainment industries.
- Broaden and increase collaboration within state and local agencies and departments.
- Significantly increase the Federal and State commitment to cure, prevent, and control diabetes.

Clinical Implications

- Prevention is considered a more cost-effective and desirable strategy than treatment of type 2 diabetes.[22]
- Appropriate screening, diagnosis, case management, and self-management education will improve clinical outcomes.
- There is a cycle of diabetes from mother to child to mother. Intervention should begin prior to conception and continue during the prenatal and postnatal periods.[16]
- Families and communities, in particular high-risk populations, must be targeted for education regarding diabetes prevention and management.
- Clinical assessment should include queries about the use of complementary and alternative medicines and treatments in the care and management of diabetes.

Resources/Web Sites

- American Diabetes Association (ADA) www.diabetes.org
- American Dietetic Association (ADA) www.eatright.org
- Behavioral Diabetes Institute http://www.behavioraldiabetes.org
- California Center for Public Health Advocacy www.publichealthadvocacy.org
- California Diabetes Program ((CDP) www.caldiabetes.org
  - Diabetes Information Resource Center (DIRC)
  - Basic Guidelines for Diabetes Care
  - California's Plan for Diabetes
- California Diabetes and Pregnancy Program (CDAPP), Sweet Success www.llu.edu/llumc/sweetsuccess
- Center for Weight & Health, University of California, Berkeley, College of Natural Resources http://nature.berkeley.edu/cwh/
- Centers for Disease Control and Prevention (CDCP) www.cdc.gov/diabetes/
- Diabetes in California – African Americans
  http://www.healthpolicy.ucla.edu/pubs/publication.asp?pubID=80
  http://www.healthpolicy.ucla.edu/pubs/files/AfrAm_Diabetes_FactSheet.pdf
- Diabetes in California – Latinos
  http://www.healthpolicy.ucla.edu/pubs/publication.asp?pubID=73
- Diabetes in California – American Indians and Alaska Natives
  http://www.healthpolicy.ucla.edu/pubs/publication.asp?pubID=81
- Healthy People 2010 http://www.healthypeople.gov
- Lumetra http://www.lumetra.com
  - Improve Preventive Care
  - Diabetes Resource Guide for Quality Improvement 2004
- National Diabetes Education Program, National Institute of Health
  http://ndep.nih.gov
- National Institute of Diabetes & Digestive & Kidney Disease (NIDDK)
  http://www.niddk.nih.gov

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California Food Guide

Iron Deficiency

By Jan Schilling, M.S, M.P.H., R.D. and Sheri Zidenberg-Cherr, Ph.d.*

What's New?

The National Academy of Science has released new Dietary Reference Intakes for iron and addresses special needs (see page five).[1]

Public Health Implications

Healthy People 2010 Objectives:[2]

- Eliminate disparities in the incidence of iron deficiency to five percent among children aged 1-2 years, one percent among children aged 3-4 years, and seven percent among non-pregnant females aged 12-49 years.

Among children iron deficiency is found in:

6% of Whites	In each ethnic group are subgroups where iron deficiency is much higher, especially among 6-24 month old infants and toddlers.
10 % of African Americans	
17% of Hispanics	

Among pregnant women the prevalence of iron deficiency is greater among low-income pregnant women in their third trimester than among children.

In 2003 in California 13.7 percent of children less than five years recorded low hemoglobin or hematocrit tests.[3] In that age group the highest prevalence of iron deficiency anemia (IDA) was for black, not Hispanic children with a prevalence of 17.7 percent. Among 5-20 year olds the prevalence of low hemoglobin or hematocrit was 12.7 percent with the highest prevalence of IDA among black, not Hispanics registering 22.3 percent.

In infants and preschool children, iron deficiency anemia may cause: • poor growth • lower mental and motor test scores • behavioral disturbances, and • increased susceptibility to lead poisoning.[1]	**In pregnant women,** iron deficiency anemia may increase the risk for: • preterm delivery, • low birth weight infant, • maternal mortality, and • infant mortality.[1]

Definition

Iron deficiency is the most common known nutrient deficiency and is most frequently found in children and pregnant women.[4] Iron is a major component of hemoglobin that carries oxygen to all parts of the body, including the brain. Iron also has a critical role within cells assisting in oxygen utilization, enzymatic and signaling systems especially for neural development and overall cell function everywhere in the body. Therefore iron deficiency affects all body functions, above and beyond its manifestations through anemia, which appear late in the process of tissue iron deficits.

The continuum from iron deficiency to IDA has many associated consequences, depending on the severity of iron depletion. Using sensitive techniques, recent studies show that iron deficiency, without anemia, has important discernable outcomes that result in reduced work capacity, particularly endurance and in other subtle functional limitations.

As deficiency progresses to anemia further consequences become more evident including changes in behavior and, intellectual performance, reduced resistance to infection, increased susceptibility to lead poisoning, loss of appetite, tachycardia, and cardiomegaly. In pregnant women, iron deficiency anemia, particularly early in gestation, is associated with adverse effects for both the mother and fetus, including increased prenatal complications, premature delivery, and low birth weight.

Low hemoglobin or hematocrit tests do not necessarily mean iron deficiency so this condition should be confirmed with a test for serum ferritin or a mean corpuscular volume (MCV) or an erythrocyte protoporphyrin (EP) test to help discriminate iron deficiency from other forms of anemia. However, when the prevalence of anemia in the population group reaches higher than 20 percent, then iron deficiency is the culprit in more than 75 percent of the cases and may co-exist with other causes in the majority of anemic cases.[3]

Burden

The median financial cost of productivity loss due to iron deficiency anemia is estimated to be around four dollars per capita. On a per capita basis, losses are greatest in affluent countries, where wages are highest.[5] In the United States, where the population is more than 300 million, the cost may be more than 1.2 billion dollars. The loss from poor growth rate associated with other health consequences resulting in lower productivity, impaired immunity, and increased susceptibility to heavy metal toxicity are not included in these estimates.

The Center for Disease Control and Prevention (CDC) revised standards for identification of IDA in l998.[4] Adjustments for smoking and altitude are found in the CDC publication.

Table 1: Cutoff values for Iron Deficiency Anemia in Children, Women of Childbearing Age, and Pregnant Women.[4]

	Hemoglobin (≤g/dL)	Hematocrit (≤%)
Children (Age in Years)		
1-<2	11.0	32.9
2-<5	11.1	33.0
5-<8	11.5	34.5
8-<12	11.9	35.4
Non-pregnant women and lactating women (age, in years)	11.8	35.7
12-<15	12.0	35.9
15-<18	12.0	35.7
≥18		
Pregnant women (Weeks' gestation)		
12	11.0	33.0
16	10.6	32.0
20	10.5	32.0
24	10.5	32.0
28	10.7	32.0
32	11.0	33.0
36	11.4	34.0
40	11.9	36.0
First trimester	11.0	33.0
Second trimester	10.5	32.0
Third trimester	11.0	33.0

Incidence and Prevalence

Among children the prevalence of iron deficiency in the United States declined between the years 1976-80 and l988-94, to nine percent for 1-2 year old children and four percent for 3-4 year olds- it continues to be the most common nutrient deficiency in that age group.[2]

Data from the 2003 California Pediatric Nutrition Surveillance System Trend Analysis are based on hemoglobin with no confirming blood analysis. It shows 13.7 percent of 500,508 low-income children examined were anemic.[6] Disproportionate prevalence of anemia occurred among Black, nonHispanic children under age five, where the percent was 17.7 percent, and among 6-11 month olds, where the prevalence recorded was 19.9 percent. However, it must be appreciated that these data are based solely on hemoglobin or hematocrit values, and thus not truly indicative of the prevalence of iron deficiency anemia.

Among non-pregnant females of childbearing age the prevalence of iron deficiency increased over recent decades. In l996, 29 percent of low-income pregnant women in their third trimester were anemic.[2]

Nutrition education and iron supplementation may reduce this prevalence.

Trends/Contributing Factors

Among the factors contributing to IDA is:

- Dietary choices low in iron and/or containing iron in forms that are poorly absorbed,
- Lack of nutrition knowledge,
- Lack of access to iron and vitamin C rich foods,
- Excessive milk intake by toddlers,
- Lack of nutrition education by health care providers and schools resulting in lack of attention to IDA and IDA's effects on brain development and cognitive function,
- Internal bleeding,
- Gestational iron deficiency of their moms, preterm birth, low birth weight, early umbilical cord clamping, early weaning, and lack of use of iron fortified products such as cereals, and
- Other medical conditions.

Dietary Reference Intakes (DRIs)

The National Academy of Sciences modeled the 2002 DRI's on evidence reviewed.[1] Recommendations are derived from body weight and estimated body iron loses. DRIs for gender and age groups are listed in Table 2.

Table 2: Dietary Reference Intakes[1]

Infants	**Iron (mg/day)**
0-6 mo	.27*
7-12 mo	11
Children	
1-3 yrs	7
4-8 yrs	10
Males	
9-13 yrs	8
14-18 yrs	11
19-30 yrs	8
31-50	8
50-70	8
>70	8
Females	
9-13 yrs	8
14-18 yrs	15
19-30 yrs	18
31-50 yrs	18

Females(Table 2 Cont'd)	Iron (mg/day)
50-70 yrs	8
>70 yrs	8
Pregnancy	
≤18 yrs	27
19-30 yrs	27
31-50 yrs	27
Lactation	
≤18 yrs	10
19-30 yrs	9
31-50 yrs	9

*Adequate Intake

Full term infants are born with iron stores that meet iron requirements until 4-6 months of age, thus the DRIs for infants 0-6 months of age are relatively low.[1] The DRI for iron is 1.8 times higher for vegetarians due to the lower bioavailability of iron from plant foods.

The Dietary Reference Intakes address special needs:[1]

- As heme iron found in animal products is more bioavailable than iron found in plants, the iron requirement for vegetarians is 1.8 times higher than for omnivores.
- A reduced menstrual blood loss among women using oral contraceptives may result in a 60 percent reduction from expected blood loss, and an appropriate reduction in need for iron.
- Whereas postmenopausal women on Hormone Replacement Therapy (HRT) may experience uterine bleeding, especially during the first year of therapy, they may have higher iron requirements than women not on HRT.
- Blood donors may have lower serum ferritin concentrations and require supplemental iron.
- Athletes undergoing prolonged training may require 30 percent more iron.
- The gastrointestinal effects of supplemental iron appear to be reduced when taken with food.
- Accidental iron overdose is the most common cause of poisoning deaths in children under seven in the United States. Supplements should be kept out of reach of children.
- Different strategies may be needed to reduce iron deficiency in disparate groups.

Common Concerns/Strategies

Enriching white bread and flour with iron is required when the term *enrichment* appears on the label. Fortification of ready-to-eat cereals has increased, with many products, now supplying anywhere from ten to 100 percent of the DRI for iron.

Additional fortification may be undesirable due to the danger of iron overload in a small group of people suffering from hemochromatosis.

Vegetarians, especially vegans, are vulnerable to iron deficiency as they do not consume meats which are the sources of heme iron that has a greater bioavailability and enhances the absorption of vegetable and cereal iron. Vegans should regularly include iron-enhancing foods in their meals such as fruits rich in vitamin C. They should also minimize iron-inhibiting foods, particularly tea and other herbal infusions, when consuming plant sources of iron rich food. Vegans may require an iron supplement, especially during pregnancy.

A reduction in the higher prevalence of iron deficiency among young children can be achieved by:

- Increasing the proportion of new mothers who breastfeed,
- Educating parents and caregivers to introduce iron rich solid foods and foods that enhance iron absorption after six months of age, and
- Reducing or eliminating the use of baby bottles after 12 months of age.

If combined with measures of iron status, changes in the prevalence of iron deficiency anemia over time can be used as indicators to evaluate the effectiveness of the programs' ability to decrease the prevalence of iron deficiency.

Strategies for reducing IDA include:

- Educating the public through the media, including television, about the need for preventing iron deficiency.
- Educating medical and health professionals and students on the need for accurately testing individuals at risk for IDA at the recommended ages, especially low-income women and children.
- Educating health care providers on appropriate treatment regimens, including best available prescription iron preparations, appropriate doses, length of therapy, and re-testing protocols. Encourage providers to emphasize with patients the need for adequate diet during and after treatment.
- Educating patients about the importance of taking iron prescriptions as told.
- Providing information about IDA and ways to stay healthy and prevent it in school health curricula.
- Referring all low-income women, infants, and children to their local WIC programs.
- Counseling individuals with low hemoglobin or hematocrit about permanently increasing iron rich food in their diets.
- Giving iron supplements to all individuals with confirmed IDA as a temporary measure while iron rich foods are being incorporated into the diet and retesting for IDA one to three months after treatment.

Iron Overload

Accidental iron overdose from the ingestion of excessive iron supplements may cause vomiting and diarrhea leading, in extreme cases, to death in children less than six years of age.[1] Iron supplements should be stored out of the reach of young children as they may be mistaken for candy.

A small group of people, especially those of Celtic extraction, absorb excessive amounts of iron from food and are subject to hemochromatosis with normal intakes of iron. Health care providers should screen for this condition.[1]

Due to a potential association between high iron intake and cardiovascular disease it is prudent that men and postmenopausal women, who have no medical indications for iron supplementation, avoid iron supplements and foods fortified with 100 percent of the daily requirement.[7]

Opportunities for Improvement

Steps that can help prevent IDA include:

- Prevent iron deficiency through education and food offered in day care, schools, government programs, and the media,
- Ensure education about iron deficiency in health education classes of all schools,
- Promote iron rich foods and education in the Food Stamp Program,
- Promote iron rich foods and education in food security programs such as food banks,
- Develop iron deficiency education posters, flyers, and food identification tags for school and childcare Foodservice programs,
- Support Contra Costa County's model for an Anemia Task Force in each county,[8]
- Require health care providers to test all low-income pre-menopausal women and children between 6 months and 5 years for iron deficiency, and
- Recommend that health care providers educate all individuals with iron deficiency about iron rich food and such food enhancers of iron absorption as heme and vitamin C.

Iron Rich Food

The Center for Disease Control and Prevention provided recommendations for preventing iron deficiency in infants and preschool children that appeared in the April 3, 1998 edition of the Morbidity and Mortality Weekly Report:[4]

- Encourage exclusive breast feeding for at least six months after birth,
- At about age six months or when the extrusion reflex disappears, introduce infants to plain, iron-fortified infant cereal or pureed meat products. (Two or more servings per day of iron-fortified infant cereal meet an infant's requirement for iron).

- By approximately age six months, encourage one feeding per day of foods rich in vitamin C (e.g., fruits, vegetables, or juice) to improve iron absorption, preferably with meals.
- After age six months, or when the infant is developmentally ready, introduce plain, pureed meats, fish, egg yolk, beans, and tofu.

The Institute of Medicine has provided recommendations for preventing IDA in women of childbearing age**,** in the l993 publication titled "Iron Deficiency Anemia":[7]

- Eat a varied diet and enhance iron absorption by including meat, ascorbic acid-rich foods (fruit juice or fruit), or both in meals. Avoid tea or coffee with meals.

Highly bioavailable heme iron is two to three times more absorbable than non-heme iron and is less influenced by inhibitory factors in the diet.[1,9] Examples of these foods are found in Table 3.

Table 3: Heme Sources of Iron and Iron Content[10]

Heme sources of Iron:	Iron Content (mg) 3 oz. Portion
Chicken liver & other organ meats*	9.3
Sardines & other fish with bones	2.5
Beef, lean including ground	2.5
Shrimp, drained solids	2.3
Turkey, light meat	1.1
Chicken, light meat	1.0
Egg	1.0
Pork, lean	0.9

*high in cholesterol
From USDA Nutritive Value of Foods Home and Garden Bulletin 72. 2002. http://www.nal.usda.gov/fnic/foodcomp/Data/HG72/hg72_2002.pdf.[10]

Non-heme iron is found in both plant and animal sources but is less absorbable than heme iron.[9] Other food constituents affect iron bioavailability.
Enhancers of the absorption of iron in non-heme foods include:

- The presence of a heme food. For example a stew/soup made with beans, tomatoes, and a small amount of meat would maximize iron absorption from this dish compared to beans alone,
- Vitamin C-rich foods such as orange juice, tomatoes, bell peppers, strawberries, cantaloupe, cabbage, or broccoli.

Inhibitors of non-heme iron absorption include:

- Phytates, (found in grains);
- Soy protein and soy fiber; oxalates (found in spinach);
- Polyphenols in tea[7]

Table 4: Non-heme sources of Iron, Serving size, and Iron Content[10]

Non heme sources of Iron:	Serving size	Iron Content (mg)
Pumpkin seeds (Pepitas)	1cup	18
Cream of wheat	1 cup	10.3
Lentils, dry, cooked	1 cup	6.6
Walnuts, English	1 cup	5.3
Soybeans, green cooked, drained	1 cup	4.5
Enriched cereals	1 cup	4.5-18 (read the label)
Cashew	1 cup	5.3
Sunflower seed kernels	1 cup	4.3
Almonds, shelled & sliced	1 cup	4.1
Peas, cooked from frozen	1 cup	3.8
Beans, black, brown, lima, pinto, red cooked	1 cup	3.6-4.5
Chickpeas or garbanzos, canned	1 cup	3.2
Raisins, seedless	1 cup	3.0
Potato baked with skin	1 potato	2.7
Rice, white, enriched, cooked	1 cup	1.9
Apricots, dried, sulfured	10 halves	1.6
Oatmeal, cooked	1 cup	1.6
Peaches, dried	3 halves	1.6
Tofu	2 1/2 x 2 3/4 x 1"	1.3
Prunes, dried, pitted	5 prunes	1.0
Rye bread	1 slice	0.9
Spinach, raw, chopped	1 cup	0.8
Enriched breads	1 slice	.8 (read the label)
Parsley	10 sprigs	0.6
Peppers, hot chili, red	1 pepper	0.5

From USDA Nutritive Value of Foods Home and Garden Bulletin 72. 2002. http://www.nal.usda.gov/fnic/foodcomp/Data/HG72/hg72_2002.pdf.[10]

Other sources of iron are foods cooked in iron cookware and iron-fortified breads and cereals. Although the quantity of iron ingested from these sources may be significant, the iron is generally in a form that is poorly absorbed. However, breads and cereals are frequently eaten in large enough amounts that they may be an important daily source of iron.

Iron absorption can vary greatly from person to person, increasing significantly with low body iron stores. It can also vary from meal to meal. Coffee or tea or other herbal infusions taken with a meal can reduce absorption as much as 50 percent.

Iron deficient persons should be advised to eat or drink vitamin C rich food such as tomatoes or orange juice with their meals containing iron.

Clinical Implications

Health care providers can help prevent and control iron deficiency by counseling individuals and families about the need for iron rich foods and by monitoring iron status. With continued attention and education we may meet the 2010 national health objectives.

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***** Photo source: *Health Canada web site and Media Photo Gallery*, Health Canada, http://www.hc-sc.gc.ca Reproduced with the Permission of the Minister of Public Works and Government Services Canada, 2005.

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California Food Guide

Hunger and Food Insecurity

By Barbara MkNelly, M.S., Edye Kuyper, M.S. and Stephanie Nishio, M.P.H., R.D.

What's New

Nationally, household food insecurity figures rose in American households for the fifth consecutive year in 2004, from 10.1percent (1999) to 11.9 percent (2004). Households experiencing hunger rose from 3.1 percent to 3.9 percent during that same period.[1]

California's rate of food insecurity is higher than the national average (12.4 and 11.4 percent of households respectively according to three year averages for 2002-2004)[1] and increasing according to two statewide data sources.[2, 3]

Public Health Implications

- Healthy People 2010 food security objective:
  "Increase food security among U.S. households and, in so doing, reduce hunger**.**"
  - **Target:** 94 percent of all U.S. households.
  - **Baseline:** 88 percent of all U.S. households were food secure in 1995.
  - **Current Data**: 88.6 percent of all U.S. households were food secure in 2002-2004.
  - **Current Data**: 87.6 percent of California households were food secure in 2002-2004.
- Hungry and food insecure individuals are less able to learn and work at their full potentials.
- In the United States, hunger and food insecurity are positively correlated with low intake of fruits and vegetables, obesity among women, and chronic diseases.

Definitions

Hunger: "The uneasy or painful sensation caused by a recurrent or involuntary lack of food, which can lead to malnutrition over time."[4] Hunger is often experienced by individuals under severe economic constraints.

Food insecurity: A condition characterized by "limited access or uncertain availability of nutritionally adequate food."[5] Food insecurity can exist and be measured at the level of the individual, the household, and the community.

Food security*: "Access by all people at all times to enough food for an active, healthy life. Food security includes at a minimum: 1) the ready availability of nutritionally adequate and safe foods; and 2) an assured ability to acquire acceptable foods in socially acceptable ways (e.g., without resorting to emergency food supplies, scavenging, stealing, or other coping strategies)."[4]

Community food security: "A condition in which all community residents obtain a safe, culturally acceptable, and nutritionally adequate diet through a sustainable food system that maximizes community self-reliance and social justice."[6] Community food security efforts emphasize the sustainability of local food systems by engaging communities in the production, distribution, and consumption of food, through strengthening social networks.[7,8]

Poverty: "To be *impoverished* is to lack or be denied adequate resources to participate meaningfully in society."[9] It is a complex construct that can be acute or chronic and is intimately associated with hunger and food insecurity.

The concept of food insecurity differs from that of hunger. Hunger relates specifically to the physiological impact of not eating enough, whereas food insecurity includes components that are psychological and sociological, and that deal with access to food. Alternatively, community food security pertains to a geographical area and the physical and economic surroundings that enable residents to be food secure.

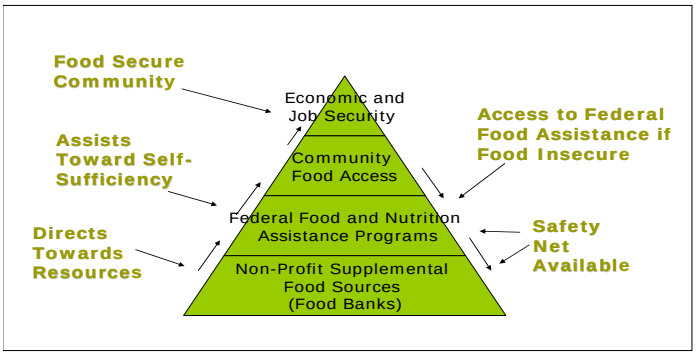
Both hunger and food insecurity can be either transitory or chronic realities for affected individuals, households, and communities. The United States Department of Agriculture (USDA) uses an 18-item questionnaire called the Core Food Security Module of the Current Population Survey to assess the prevalence of food insecurity at the household level throughout the U.S.[10] The Module categorizes households into three groups: food secure, food insecure without hunger, and food insecure with hunger.

When thinking about food security, it helps to picture a pyramid (see Figure 1). The pyramid's base addresses individual and household food security. Safety net programs

* In other contexts, the term "food security" may refer to the security and safety of the food supply from bioterrorism or natural disaster. This definition does not apply here.

are at the base of the pyramid and include programs like emergency food assistance, administered by non-profit food banks, and federal food and nutrition assistance programs. When households lack adequate food, they rely on these two sources to help them meet their immediate food needs and assist them toward self-sufficiency. The next level of the pyramid addresses community food security. At this level each resident in the community is food secure. Finally, the top of the pyramid addresses the root causes of hunger and food insecurity which is poverty. When a community achieves economic and job security it is food secure, as are all of its residents.

Figure 1: Food Security Pyramid



Source: Mercer L. Planting the Seed of Food Insecurity presentation. Second Harvest Food Bank of Santa Cruz and San Benito Counties, 2004

Burden

Hunger and food insecurity experienced at any point in the life cycle can have short- and long-reaching effects. It has been well documented that hunger and food insecurity negatively impact individuals, households, and communities at the physiological, psychological, and sociological levels.

Malnutrition

The authors of a UCLA health policy research brief point to the clear association between food insecurity and poor-quality diets, leading to poor nutritional status and poor health outcomes.[2] Inadequate food consumption is correlated with a weakened immune system, placing victims at greater risk of contracting infectious diseases, and reducing individuals' ability to recover from disease. When chronic, hunger may lead to malnutrition and various nutrient deficiencies, which can further jeopardize an individual's health status.

Chronic Disease

Diabetes: Inadequate perinatal nutrition may increase a child's risk of developing the type 2 diabetes later in life.[11] For adults with diabetes, living in a food-insecure household increases the risk of complications and the use of medical care.[12]

Overweight and Obesity[†]: Additionally, a seemingly paradoxical association between hunger, food insecurity and excess weight exists, as does an increased prevalence of overweight and obesity among low-income women who are food insecure.[13, 14, 15] Food deprivation experienced in an individual's youth is associated with negative nutrition-related behaviors and higher incidence of overweight later in the individual's life, even when the individual is no longer food insecure or living in poverty.[16]

Psychological Effects

The incidence of depression and other forms of mental illness is higher in households that experience food insecurity than in the general population.[17, 18] Several mechanisms may explain this association: data suggest that overweight experienced in childhood may impact future socioeconomic status by negatively impacting individuals' self-esteem, leading to an intergenerational cycle of overweight and reduced earning potential.[19] The threat of losing federal assistance benefits, like food stamps, can also contribute to depression, and food insecurity is very strongly associated with depression among mothers.[20]

Academic Achievement

Children living in food-insecure households tend to: 1) have poorer school performance and cognitive functioning, with more absences and tardiness;[21] 2) experience headaches and increased health problems, such as colds and ear infections;[2] and 3) have increased risk of emotional problems, with adolescents being more likely to have depressive and suicidal symptoms.[21]

Economic Impacts

The lost productivity and increased medical costs incurred by hungry and food insecure individuals can cause significant strain to the economy, especially when the compounded toll of food insecurity and hunger are considered over the span of a lifetime. Retrospective research also suggests that individuals who were poor as children are significantly more likely to be overweight as adults.[22]

Incidence and Prevalence

Food insecurity is higher in California (12.4 percent) than for the nation overall (11.4 percent) based on a three-year 2002-2004 annual average.[1] For this same period, 3.9 percent of California households experienced food insecurity with hunger compared to 3.6 percent nationwide. In a national ranking with "1" representing the "best" or lowest food insecurity prevalence, California ranked 41 out of 51 (50 states plus District of Columbia). North Dakota ranked first with a food insecurity rate of only 6.3 percent compared to Texas's 16.4 percent rate which ranked last.

While food insecurity affects people of every age and race/ethnicity, certain sub-groups are especially vulnerable. The California Health Interview Survey (CHIS) collects food

[†] BMI is calculated by taking an individual's weight in kilograms (kg) and dividing it by the individual's height in meters squared (m^2). (BMI = kg/m^2) Obesity is determined when an individual's body mass index (BMI) is $\geq$ 30 and overweight is a BMI $\geq$ 25.

security information only from adults having incomes less than 200 percent of the federal poverty level (FPL). Table 1 below describes low-income adults with the following characteristics that had the highest food insecurity prevalence in 2003:[2]

Table 1: Food Insecurity and Hunger Among Low-income (<200%FPL) Californian Sub-groups

Population Sub-group	Food Insecure (with and without Hunger)	Food Insecure with Hunger
Undocumented Residents	44.6%	10.2%
Pregnant Women	40.7%	16.1%
Single Headed Households with Children	40.6%	14.4%
Unemployed	40.4%	14.4%
Households with Children	38.3%	10.9%
Older Adults (age >64)	20%	4.3%

In terms of race/ethnicity, Latino low-income adults had the highest food insecurity prevalence (38.2 percent) compared to 37.3 percent among African American low-income adults, 28.1 percent among White low-income adults and 23.8 percent among Asian low-income adults. However, the rate of food insecurity with hunger was highest for African American low-income adults (13.8 percent) compared to 12.1 percent for White low-income adults, 9.7 percent among Latino low-income adults and only 3.9 percent among Asian low-income adults.

While little national or statewide systematic information is available, a comprehensive food security assessment conducted in California's Fresno County revealed farm workers experienced especially high rates of food insecurity.[23] Among low-income adults (<200% FPL), a survey with 450 farm workers found food insecurity to be 51 percent compared to 36 percent for Fresno County and 34 percent for California overall. Food insecurity with hunger among low-income farm workers was a disturbing 20 percent.

Similarly, California counties with predominately rural and/or agricultural-based economies tend to have the highest rates of food insecurity. In 2003, the counties with the highest food insecurity rates (40 percent and higher) among low-income adults were in declining order: Kern, Sutter/Yuba (combined sample), Napa, San Joaquin and Shasta (tied), and Tulare.[2]

Trends/Contributing Factors

Food Security Trends
Nationally, household food insecurity figures in American households rose for the fifth consecutive year in 2004, from 10.1 percent (1999) to 11.9 percent (2004); households experiencing hunger rose from 3.1 percent to 3.9 percent during that same period.[1] Since 1999, the number of people living in food insecure households increased by approximately 7 million people, totaling 38.2 million persons in 2004. Several sources corroborate that food insecurity is high and increasing in California.

- USDA's Core Food Security Module: food insecurity in California households rose from 11.8 percent (three year average for 1999-2001) to 12.4 percent (2002-2004), while food insecurity with hunger increased from 3.3 to 3.9 percent, a significant change.[1]
- 2003 California Health Interview Survey (CHIS): Among low-income adults (<200% FPL), there was a significant increase of almost 5 percentage points in food insecurity – from 29.1 percent in 2001 to 33.9 percent in 2003. An estimated 2.9 million low-income adults in California were food insecure in 2003 with more than 1 in 10 experiencing episodes of hunger.[2]
- 2000 California Women's Health Survey: food security decreased among California women, from 78.3 percent in 1999 to 73.4 percent in 2004. The decrease was statistically significant.[3]

Poverty Trends
The number of people in poverty in the United States increased from 31.6 million in 2000 to 37 million in 2004; the poverty rate rose from 11.3 percent to 12.7 percent over the same period.[24] While the poverty rate remained unchanged for 2005, the median earnings of both female and male full-time workers declined and "the poor also became poorer… the amount by which the average person who is poor fell below the poverty line ($3,236) in 2005 was the highest on record, as was the share of the poor who fell below *half* of the poverty line."[25] The number of uninsured people increased from 41.2 million people (14.6 percent of the population) in 2001 to 46.6 million (15.9 percent) in 2005.

In recent years (according to three year averages 2002-2004), California's poverty rate has been higher than the national rate – California's 13.2 percent (compared to 12.4 percent for the nation overall).[24] The most recent 2005 U.S. Census poverty data indicates that more than one in eight Californians have incomes below the FPL.[26] The percentage of California's children living in poverty increased from 16.4 percent in 2001 to 18.5 percent in 2005 as according to the U.S. Census.

Because the federal poverty rate does not allow adjustments for high cost of living regions and has other methodological limitations, many argue that there are far more persons functionally living in poverty than these figures reflect.[27] A recent Public Policy Institute of California report applies a "conservative adjustment for costs, based on housing rents" and concludes "California has substantially higher poverty than the rest

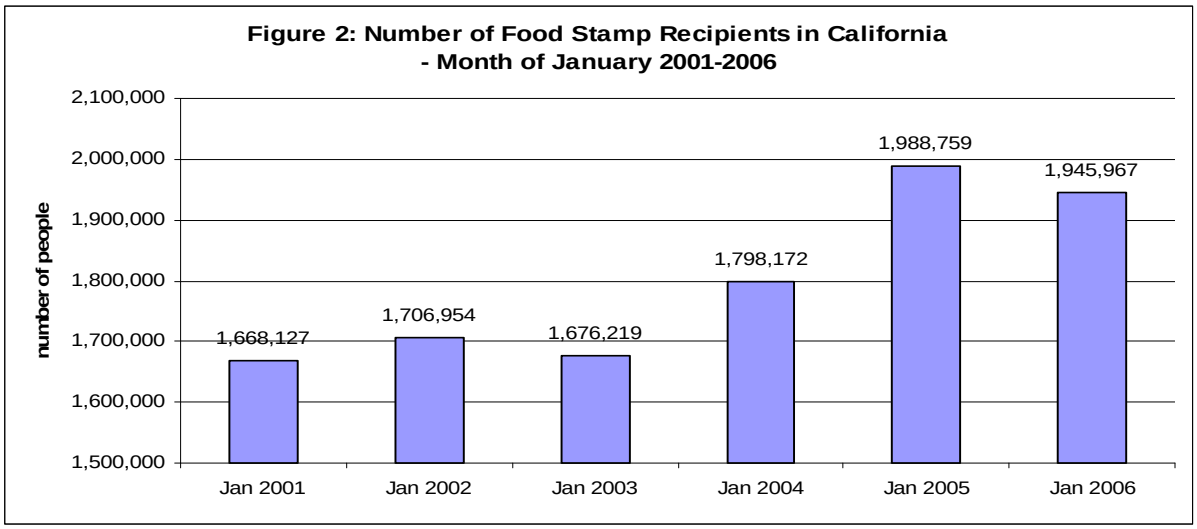
of the nation: 16.1 percent versus 12 percent…only Washington, D.C., and New York have higher poverty than California. Furthermore, Los Angeles, Monterey, and San Francisco Counties have poverty rates of about 20 percent – in the range of the ten highest poverty counties in the nation."[28]

Food Stamp Trends

Food insecurity and poverty trends indicate the likely heightened importance of the Food Stamp Program (FSP) for ensuring the health and adequate diets of low-income Californians.[‡] Nationally, economic trends have contributed to an increase in the number of people participating in the FSP – from 17.2 million in 2000 to 25.7 million people in 2005. According to a 2006 Center on Budget and Policy Priorities report, since 2001, the number of FSP recipients has risen

> "because of the recession, the continuing increase in poverty, and the weak gains for low-income working families during the recovery. Higher food stamp caseloads also reflect the provision of temporary relief to about four million victims of last year's hurricanes, as well as modest eligibility expansions and increased participation among eligible households."[29]

In California, the number of FSP recipients has also increased since 2001; but, most dramatically, during 2004 (see Figure 2). This pattern is likely at least partly explained by a number of important FSP improvements implemented in 2004 (e.g., removing the vehicle rule, reducing the reporting requirement, eliminating the lifetime ban for drug felons from receiving food stamps and transitional food stamp benefits for families leaving cash assistance). However, California's recent poverty and food insecurity trends also indicate the need for food stamp benefits is likely increasing as has been true for other parts of the country.



Source: Food Research and Action Center
http://www.frac.org/html/federal_food_programs/programs/fsp.html

[‡] This chapter focuses more on FSP than other federal nutrition programs because it is the largest government initiative specifically focused on alleviating hunger and food insecurity.

However, USDA's most recent food stamp participation rate figures show **an alarming drop in California's FSP participation rate** (i.e. the percent of eligible people participating in FSP) from 54 percent in 2000 to only 45 percent in 2003.[§] This almost nine percentage point decline compares to no change in the national rate (56 percent) and an 11 percentage point increase (from 72 to 83 percent) for Oregon, the highest performing state, over the same period.[30] Based on the most recent participation rates, over 2 million eligible people in California are not receiving food stamp benefits, which is an estimated increase of half a million people over a four year period.[31]

Food and Economic Trends
Other trends in the country's food economy that potentially contribute to the public health implications of hunger and food insecurity include the following:

- Over the past several decades, food (especially those high in fat and sugar) has become cheaper while at the same time obesity rates have risen.[32]
- In terms of their cost per calorie, healthy foods such as lean meat, fish, and fresh fruits and vegetables cost more than less healthy, high-calorie food with refined grains, added sugars or fats.[33]
- The "disappearance" of supermarkets from America's inner cities has been well documented. Beginning in the 1960s and continuing to the present day, supermarket chains migrated to the suburbs, low profit margins spur increased supermarket size and ancillary services – pharmacies, banks, etc. – which requires more land.[34]
- While supermarkets are less available, "many corner grocery stores [in inner-city neighborhoods] – which used to feature meat, dairy, produce, and other foods – have become primarily alcohol, cigarette, and convenience food outlets for a variety of reasons."[34]
- A study of over 200 neighborhoods also found that "fast-food restaurants are more prevalent in the low-medium and medium-wealth neighborhoods and become less prevalent in the highest-wealth neighborhoods."[35]

Barriers to Implementation/Myths

There are many myths that serve as barriers to the implementation of strategies designed to alleviate hunger and food insecurity. These myths pertain to the nature and even the existence of the problem as well as myths that undermine the effectiveness of "safety net" and community food security strategies.

> **Myth #1: Hunger only occurs in developing countries.**
> **Fact:** While hunger is certainly a problem in developing countries, it also affects people in the U.S. Rates of hunger in the U.S. have been rising, affecting 4.4 million households in 2004.[1] America's Second Harvest reports that 33 percent

[§] There is an approximately two-year time lag in reporting FSP participation rates due to the complexity of the data required. As a result, California's FSP participation figures are available into 2006 but the most recently available FSP participation rate refers to Fiscal Year 2003.

of their clients were food insecure with hunger in 2005. In addition, 4.5 million people receive food from America's Second Harvest food banks each week and between 24 and 27 million different people were served in 2005.[36]

Myth #2: People cannot be both hungry and obese.
Fact: Commonly referred to as the Hunger-Obesity Paradox, it is well documented that hunger and obesity can co-exist in the same individual, family, and community.[37] Not only is the rate of food insecurity highest among low-income households; so is the rate of obesity. For example, women with incomes <130% FPL are about 50 percent more likely to be obese than those with higher incomes (>130% FPL).[38] A number of studies have documented an association between food insecurity and obesity among low-income women, although not men.[39] While little conclusive evidence exists, a variety of possible explanations have been proposed: [2, 13, 37] 1) Due to limited economic resources, food insecure households might opt for lower cost energy dense foods instead of higher cost more healthful foods; 2) Limited resources dictate not only what food insecure households can afford to buy, but also where they can afford to live which can affect proximity to food stores, fast-food restaurants, social services, etc.; 3) A pattern of binge-like eating might occur whereby when food supply is low, mothers forgo eating but overeat when food is available; 4) Repeated periods of weight loss and weight gain might lead to increased metabolic inefficiency that ultimately results in overweight; and 5) While food insecurity and obesity might be associated, a causal relationship may not exist or may be reversed with overweight/obesity causing food insecurity.

Myth #3: People with jobs can afford to buy enough food.
Fact: People employed full-time may still have trouble feeding their households. In fact, 36 percent of households using the services of America's Second Harvest, a network of food banks throughout the U.S., report that at least one adult was employed in 2005.[36] Often full-time wages are insufficient to meet a household's needs. In California, it is estimated that a family with two children and two parents who work full-time would need to have an annual income of $63,921 to meet their family's basic expenses without public or private assistance. This breaks down to an hourly wage of $15.37 per hour per person.[40] Currently, California's minimum wage is $6.75 per hour[**]; the federal minimum wage is $5.15 per hour.

Myth #4: All Americans can pull themselves up by their bootstraps.
Fact: Limited education severely limits individuals' earning potential, placing them at risk for poverty, food insecurity, and hunger. Less than 16 percent of the general U.S. population has less than a high school diploma or equivalent, whereas 37 percent of emergency food assistance recipients have not completed high school.[36]

[**] California's minimum wage will increase to $7.50 per hour on January 1, 2007. It will increase again to $8.00 per hour on January 1, 2008.

Myth #5: It could never happen to me.
Fact: Millions of Americans are living less than one paycheck away from hunger.[41] Half of all Americans will experience poverty for at least one year of their adult lives by the time they reach age 65, and nearly 40 percent by age 45. In addition, two-thirds of Americans will spend at least one year of their lives with an annual income below 150% FPL by the time they reach age 65.[42]

Note: Californians at risk for hunger and food insecurity can turn to services provided through federally funded food and nutrition assistance programs such as FSP. These programs address households' immediate need for food, but their impact is limited by a number of factors, several of which are commonly misunderstood.

Myth #6: Food stamp recipients cannot have jobs or cars.
Fact: FSP rules do not prohibit recipients from having jobs or cars. Twenty-nine percent of food stamp recipients nationwide have jobs;[43] likewise, 29% of food stamp recipients in California are also employed.[43] In California, food stamp applicants may own cars and still be eligible for the Food Stamp Program.[44]

Myth #7: Food stamps have to be paid back and can prevent immigrants from becoming citizens.
Fact: There is a misconception that food stamps count as public charge, when in fact they do not. Food stamp recipients do not have to repay any of the benefits they are eligible to receive. Additionally, receiving food stamps does not affect one's immigration status.

Myth #8: The Food Stamp Program contributes to the problem of overweight and obesity.
Fact: In early 2004, the USDA convened a panel of experts to determine if there was a relationship between federal nutrition program participation and obesity.[45] The panel concluded that "the sparse research that has been published provides no consistent evidence of association and no evidence of a causal relationship between the four major Food and Nutrition Services food assistance programs and overweight." The panel emphasized the difficulty in separating out the effects of poverty from the potential food assistance effects on any health outcome such as obesity that would need to be addressed by future research. Many studies emphasize the importance of regular access to affordable and nutritionally adequate food as critical for preventing both obesity and food insecurity, which is a role federal nutrition programs are already playing.[46] In addition, some research has indicated a positive impact of school nutrition programs on obesity prevention among food insecure children.[47] Even researchers whose studies have found an association between the FSP and overweight conclude their results do not establish FSP causes overweight but they do indicate that "targeting healthy eating and weight reduction policies through the FSP" offers a way to reach families with members at risk of overweight.[48]

Myth #9: Increasing participation in the Food Stamp Program will cost California tax payers money.
Fact: According to the California Legislative Analyst's Office, increased food stamp participation has a beneficial impact on the state budget.[49] With increased resources to buy food, food stamp recipients are able to spend more on non-food taxable items, which translates into revenue for counties and the State General Fund. The California Food Policy Advocates (CFPA) estimates as much as $2.3 billion in additional federal funding would come into California if all eligible people were to participate in the FSP.[50] USDA estimates that each food stamp dollar stimulates $1.84 in new local economic activity so these additional federal dollars would generate an additional four billion dollars in economic activity statewide. Through increased purchases on taxable items, CFPA estimates full FSP participation would generate over $53 million for the state general fund and as much as $21 million for the counties.

Myth #10: Everyone has access to healthy foods.
Fact: Everyone does not have access to healthy foods. Rather, healthy food choices in lower income neighborhoods are often limited.[51] Choices may be limited for a number of reasons including: supermarkets leaving or choosing not to locate in low-income areas; neighborhood corner stores increasingly carrying alcohol, tobacco products, and convenience foods in lieu of healthier perishable items; and transportation barriers associated with getting to and from stores outside of an individual's neighborhood. In comparison to people living in higher income areas, studies have found that residents of lower income neighborhoods have less access to high quality foods, less variety in the foods available to them, and pay more for groceries when they are available.[34, 52, 53]

Myth #11: Hunger, food insecurity, and poverty are not political issues.
Fact: Policy can directly impact hunger, food insecurity, and poverty.[46] Policies and economic trends that reduce poverty may alleviate the root causes of hunger and food insecurity, but there are often barriers to their adoption. The political will for adopting policies that address hunger, food insecurity, and poverty fluctuates and does not necessarily coincide with the times of greatest need.

Common Concerns/Strategies

Millions of people are hungry and food insecure in California, despite the state's wealth and abundant production of food – and the number of hungry and food insecure Californians not only continues to exist, but continues to grow. The many approaches to eliminate hunger and food insecurity can be organized into three tiers:" safety net" programs; community food security; and addressing the underlying cause – poverty. This section will discuss strategies typical to each tier.

Tier One: "Safety Net" Programs

The two principal strategies for assisting hungry and/or food insecure individuals and their households is through federal food and nutrition assistance programs and food distribution programs. While these methods succeed in making food available to meet immediate needs, they do not address the underlying causes of hunger or food insecurity.

Federal food and nutrition assistance programs target specific low-income audiences and provide benefits, either direct food or financial resources, to supplement a household's food budget. Table 2 provides an overview of the different types of food and nutrition assistance programs available.

Table 2: Federal Food and Nutrition Assistance Programs

Program	Audience/ Income Eligibility	# of California Participants (FFY 2005)	Brief Description
General Programs			
Food Stamp Program	Families and individuals with incomes up to 130% FPL††	Monthly average:[54] 2 million people	Provides monthly benefits to be used for purchasing food.
Food Distribution Program on Indian Reservations (FDPIR)	Households at or below 100% FPL on Indian reservations, Native American families living in designated areas near reservations[55]	Annual participation: 6,644[56] people	Provides commodity foods to Indian Tribal Organizations (ITOs) or State government agencies for distribution. FDPIR is an alternative to the Food Stamp Program for ITOs preferring food distribution.[57]
Maternal and Child Programs			
Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)	Infants, children up to age 5, women who are pregnant, postpartum or breastfeeding and are at nutritional risk in households with incomes up to 185% FPL††	Monthly average:[54] 1.3 million women and children	Provides nutritious foods, nutrition education, breastfeeding support, and referrals to health care and other community resources to low income women, infants, and children.

†† Certain exceptions may exist for people who are disabled, elderly, or participating in MediCare.

WIC Farmers' Market Nutrition Program	WIC participants (incomes up to 185% FPL)††	Annual participation: Up to 115,000 households (FFY 2006)[58]	Provides coupons that can be used at approved farmers' markets, farms, or stands to purchase fresh fruits, vegetables and herbs.[59]
Child Programs			
Child and Adult Care Program	Children up to age 12 in day care and adults in adult day care	Daily average: 303,021 people[54]	Provides reimbursement for food and meal preparation costs, training in the nutritional needs of children, and onsite assistance.[60]
National School Lunch Program	School-aged children from households with incomes up to 185% FPL qualify for free or reduced price meals	Daily average: 2.8 million students[54]	Provides reimbursement for meals that meet the nutritional needs of children by providing a balanced meal containing at least one-third of the nutrients they need each day.[61]
School Breakfast Program	School-aged children from households with incomes up to 185% FPL qualify for free or reduced price meals	Daily average: 963,151 students[54]	Provides reimbursement for meals that meet the nutritional needs of children by providing at least one-fourth of the nutrients they need each day.[61]
Special Milk Program	School-aged children	Annual participation: 4.4 million students[62]	Provides reimbursement to schools, child care institutions, and eligible camps for half-pints of milk provided to children.
Summer Food Service Program	School-aged children up to age 18	Daily average in July: 665,532 students[54]	Provides free meals and snacks to low-income children when school is not in session.[63]
Older Adult Programs			
Congregate Nutrition Services	People at least 60 years old and their spouses	Annual participation: 121,463 seniors and their spouses[64]	Provides hot meals containing at least one-third of seniors' daily recommended allowances of nutrients, taking into account special senior nutrition needs. Also provides social interaction and stimulation.[65]

Home-Delivered Meal Services	People at least 60 years old and their spouses	Annual participation: 57,452 seniors and their spouses[64]	Provides hot meals containing at least one-third of seniors' daily recommended allowances of nutrients, taking into account special senior nutrition needs to homebound seniors. Also provides homebound seniors with social interaction via volunteers who deliver the meals.[65]
Seniors Farmers' Market Nutrition Program	People at least 60 years old with incomes up to 185% FPL[66]	Annual participation: 33,585 seniors[64]	Provides coupons that can be used at approved farmers' markets, farms, or stands to purchase fresh fruits, vegetables and herbs.

The Food Stamp Program, Special Supplemental Nutrition Program for Women, Infants, and Children, and National School Lunch Program (NSLP) are the three federal programs that reach the most hungry and food insecure individuals and households. In addition to making sure that people have access to food, these programs are taking steps to ensure that people have access to healthy food.

- In California, FSP participants can use their Electronic Benefits Transfer (EBT) cards at approved farmers' markets and flea markets to purchase fresh fruits, vegetables, and herbs.
- In California, the governor signed 2006 legislation (AB 2384) that will develop a "Healthy Food Purchase" pilot program that will provide food stamp participants a financial incentive for buying fresh fruits and vegetables. FSP benefits will be augmented based on the amount of FSP dollars spent on fresh produce.[67] Additionally, the "Healthy Purchase" pilot program will offer retailers in low-income areas technical assistance to increase the availability of fresh produce in their stores.
- Nationally, USDA issued its first proposed changes to the WIC food package in 30 years in August 2006.[68] These changes, if approved, will make the WIC food package more consistent with the Dietary Guidelines for Americans 2005 and better address the cultural food preferences of many Californians. The proposed changes include: adding fruits and vegetables, whole grain options, and alternatives to cow milk; reducing the amount of milk and juice for children and women; eliminating whole milk for participants age 2 and older; and substituting juice for infants with baby food fruits and vegetables. The new changes will also promote and support long term successful breastfeeding, which is a key early step in obesity prevention.
- In 2004, school districts participating in the NSLP and/or the School Breakfast Program were mandated to have a local wellness policy to promote the health of students and address obesity in place by Fall 2006. The policies must address goals for nutrition education and physical activity, nutrition guidelines for all foods

available at school, goals for other school-based activities designed to promote student wellness, and plans for evaluating implementation of the policy.[69] As a result of wellness policies, some school districts in California have increased healthy options in vending machines; eliminated fried foods; and replaced high-fat, sugar-laden, and frozen foods with healthy, freshly prepared school meals.[70]

Food distribution programs administered through food banks, food pantries/closets, and other nonprofit organizations also serve hungry and food insecure individuals and households. In contrast to the federal programs detailed above, these programs are able to immediately provide households with food. See Table 3 for a summary of different state and federal food distribution programs.

Table 3: State and Federal Food Distribution Programs

Program	Audience/ Income Eligibility	California Participation (FFY 2005)	Brief Description
Brown Bag Program	People at least 60 years old whose incomes are at or below 100% of the SSI/SSP for blind individuals or couples living independently	Pounds distributed: 260,767[64]	Provides surplus and donated fruits, vegetables, and other items through community organizations and food banks.
Commodity Supplemental Food Program	Pregnant or breastfeeding women, postpartum mothers, children up to age six not participating in the WIC program, seniors at least 60 years old in households with incomes up to 185% FPL	Annual participants: 55,362[71] Pounds distributed: 19,707,868[72]	Provides USDA commodities to food banks for distribution.

Program	Audience/ Income Eligibility	California Participation (FFY 2005)	Brief Description
The Emergency Food Assistance Program	Households with incomes up to 130% FPL; some distributions specifically target children or seniors	Pounds distributed: 71.3 million[72]	Provides USDA commodities which are distributed to households through food banks, food pantries, soup kitchens and other community based agencies.

Food banks play an important role in offsetting hunger, as people can go to them and their nonprofit partners to immediately receive a bag or box of food. Food banks receive food from state and federally funded food distribution programs, as well as food drives, private donations, and grants that allow them to purchase specific foods in order to meet their clients' needs. Together, there are approximately 60 food banks in California that supply 5,000 nonprofit community-based agencies, such as food pantries, with more than 200 million pounds of food annually. With the help of over 25,000 volunteers, the community-based agencies then distribute the food to more than two million hungry and food insecure individuals each year in California.[73]

In addition to making sure food is distributed to hungry and food insecure households, food banks in California are also taking steps to insure the food that is distributed is increasingly healthier.

- The California Association of Food Bank's Farm to Family and California Emergency Foodlink have developed a statewide produce network that distributes fresh and nutritious produce to needy California families who live at or below the poverty line. Farm to Family acquires fresh produce directly from growers and packers and deliver, with the help of California Emergency Food Link, the following day to food banks all across the state. Farm to Family distributed over 15 million pounds of fresh produce in 2006.
- Many food banks have banned sodas and no longer distribute them to food pantries/closets or clients.[74]
- REFB and Alameda County Community Food Bank request healthier donations from donors and have created suggestion lists.[74]
- Some food banks educate their donors, clients, and boards about healthy foods and healthy food options.
- Several food banks are also operating Kids Café programs where they provide free meals and snacks to low income children through a variety of existing after school programs in the children's communities.[75]
- Many food banks are participating in food distributions that provide low-income households with fresh produce.

- Some food banks have mobile pantries and mobile produce distributions that take food, including fresh fruits and vegetables, to where the people who need that food are located.
- Several California food banks are participating in “Backpack” programs that give children at schools in low-income communities a bag full of child-friendly foods on Fridays so that they will be well nourished for their return to school on Monday.

California's food banks depend a great deal on USDA commodity programs, donated food and food purchased with government and donated money to provide food assistance to the millions of low-income people they serve each year. As a result, food banks have limited choices in the food that they distribute. When food banks do have healthier options, the client response is very positive. California policy makers have not yet invested in a statewide food purchase program, as many state legislatures have, to ensure that an adequate and healthy supply of food is available at all times for the state's most at risk households. Pennsylvania’s State Food Purchase Program will be funded at $18.75 million in FY 2006-2007 and Washington State provided $8,734,821 in their 2005-2007 biannual state budget to food banks and tribal food voucher programs.

Tier Two: Community Food Security

Methods of addressing hunger and food insecurity on this second level focus on the community instead of the individual or household. Community food security (CFS) approaches complement those focusing on individuals and their households. In contrast to individual-level strategies which focus on shorter-term solutions and narrower approaches, “the CFS approach encompasses a wide range of disciplines and foci…. Its practice centers on creating and strengthening linkages between public, private, and non-profit sectors in every segment of the food system – from farm to table.”[7] Another aspect of CFS work that sets it apart from that focusing on individuals and households is that “CFS initiatives stress intervention and change at the policy level and/or local capacity building and community empowerment at the community level.”[7] Although each CFS initiative may not focus upon all six, there are six basic principles that CFS initiatives share:[76]

1. Low-Income Food Needs: Meeting the food needs of low-income communities, reducing hunger and improving individual health.
2. Broad Goals: Addressing a broad range of problems affecting the food system, community development, and the environment.
3. Community Focus: Building communities’ food resources to meet their own needs, including: supermarkets, farmers’ markets, gardens, and transportation.
4. Self-Reliance and Empowerment: Building upon communities’ and individuals’ assets to enable them to provide for their food needs.
5. Local Agriculture: Strengthening ties between farmers and consumers.
6. Systems-Oriented: Partnering with multiple agencies to form interdisciplinary collaborations.

As one might imagine, there are myriad ways to address community food security. Examples of initiatives occurring in California include:

Community Agriculture
Activities that enable community members to supplement their diets with produce grown in their own community, support local growers, improve access to fresh produce, and have the potential to improve dietary quality. Examples include: edible landscapes, gardens (community, personal, school), and urban farms.

Direct Marketing
Any marketing method where farmers sell their products directly to consumers. Types include: farmers' markets, roadside stands, community supported agriculture ("members" receive regular deliveries of local produce for a pre-arranged and fixed price), farm to school, and farm stands.[77]

Entrepreneurial Initiatives
"Activities designed to train community members to start and manage their own small businesses to provide an economic base for rural and urban communities, jobs, social cohesion, and the income necessary to purchase fresh and nutritious foods."[7]
Examples include: community kitchens, job training programs, and other products and services rendered for profit.

Food Policy Councils
Food policy councils (FPCs) can either be government sanctioned or the result of a grassroots effort. They are collaborations between stakeholders in the food system and provide a forum to voice concerns and interests. "The primary goal of most FPCs is to examine the operation of a local food system and provide ideas and recommendations for improvement; however, some FPCs choose to focus on solutions to a specific topic, such as hunger and food insecurity."[78]

Food Recovery and Gleaning
Activities related to "the collection of wholesome food for distribution to the poor and hungry. It follows a basic humanitarian ethic that has been part of societies for centuries. We know that "gleaning," or gathering after the harvest, goes back at least as far as biblical days."[79] Types of food recovery and gleaning include: field gleaning, perishable food rescue or salvage, food rescue, and nonperishable food collection.

Food Retailing
Activities intended to increase communities' access to retailers of healthy foods. Examples include: developing new grocery stores, improving existing small stores, starting and sustaining farmers' markets,[80] mobile markets, community supported agriculture, and food cooperatives.

Nutrition Education and Outreach
Activities designed to educate households with low incomes about healthy eating and physical activity; activities to ensure households know about and have access to federally funded food and nutrition programs. Examples include: Expanded Food and Nutrition Education Program, Food Stamp Nutrition Education, and WIC.

Transportation
Activities that increase access to healthy foods through the provision of transportation. Examples include: supermarket shuttles, farmers' market shuttles, and public transportation with stops at food retailers.

Tier Three: Addressing the Underlying Cause
While the previously described approaches to addressing hunger and food insecurity are important and seek to meet the needs of individuals and communities, they do not address the root cause of these conditions: poverty.

In 2004, California had 4.7 million people living in poverty, of which 1.8 million were children.[54] If hunger and food insecurity are to be eliminated, poverty must be addressed. Without the financial constraints of poverty, those who are hungry and food insecure will have more money available to meet their basic food needs. There are innumerable ways to decrease poverty including: increasing the minimum wage to a living wage; creating jobs; improving access to affordable housing, health care, and child care; and investing in job training programs and quality public education with measurable outcomes and accountability.

Opportunities for Improvement

The opportunities for addressing, and more fundamentally eliminating, food insecurity and hunger can be categorized according to the Food Security Pyramid (see Figure 1).

"Safety Net" Programs
The opportunities pertaining to the "safety net" strategies broadly pertain to the need for:[8, 46, 81, 82, 83] 1) additional outreach efforts so those in need are aware of the help available; 2) programmatic improvements, simplification and cross program coordination; 3) innovations that would improve the nutritional quality and impacts of existing efforts; and 4) steps tailored to better meet the needs of particularly *at-risk* and *underserved* groups.

For example, advocates in California have emphasized the need to increase participation in federal nutrition programs, especially when considering the state's budgetary constraints.[2] Because of the state's relatively low FSP participation rate and the fact that over a million eligible children do not participate in the School Breakfast Program, potentially billions of federal dollars remain untapped. In addition to increased outreach efforts, advocates encourage policy makers to take advantage of the flexibility offered in the federal programs to increase access and participation. The UCLA Center for Health Policy Research specifically, recommends:

- "The School Breakfast Program should "automatically be available for low-resource school children" and
- "Opportunities to sign up for the Food Stamp Program should be part of getting public and private health insurance, enrolling for WIC, and the Earned Income Tax Credit."[2]

They also caution "policymakers must resist cutting cash aid during tight budget times" so those unable to work due to age or disability have a "strong safety net:"[2]

Similarly, a recent brief by the National Governors Center for Best Practices emphasized the need to better coordinate poverty and work assistance programs (food stamps, Medicaid, child care subsidies, state children's health insurance programs, Temporary Assistance to Needy Families) by:[84]

- "Using the Internet to develop online screening tools, benefit calculators, and applications for multiple programs;
- Integrating access to services through call centers and local organizations; and,
- Developing comprehensive state approaches by increasing outreach, bundling services, simplifying benefits and using technology."

A variety of innovations for increasing the Food Stamp Program's positive nutritional impact are part of a policy statement currently under consideration by the American Public Health Association including:[82]

- encouraging demonstration projects for Bonus Value Food Stamps, starting with fresh fruits and vegetables;
- assuring farmers' markets are equipped to process food stamps;
- allowing states to set higher standards for retailer participation in the FSP, providing incentives for FSP certified retailers to provide fruits and vegetables, whole grains, low-fat dairy, and lean meat and exempting these type of healthy foods from current prohibitions against offering price promotions to food stamp customers;
- establishing state and community surveillance systems to track food insecurity, poor diet and physical activity rates as well as public policy that supports healthy eating, physical activity and food security.

Those concerned with public health also look to network of food banks, food pantries, and soup kitchens to help them provide more nutritious foods for individuals and families.[85] And, food banks are seeking additional resources and funding to augment these efforts.

In addition, advocates and academics have recommended the need for particular efforts to better serve sub-populations (e.g., pregnant women and farm workers) particularly vulnerable to food insecurity and hunger in California, including:[2, 86]

- Additional outreach to parties eligible to participate in federal nutrition programs.
- Recruiting bicultural, bilingual outreach and lay health workers.
- Developing tailored outreach materials.

- Increasing migrant health center funding.
- Implementing approaches that accommodate movement across county and state lines.

Community Food Security
The community food security opportunities broadly pertain to the need to:[7, 34, 80, 86]
1) apply community or food systems analysis rather than an individual or household approach;
2) engage the range of community actors in mutually beneficial achievement of an equitable and sustainable community food system by incorporating a systems, prevention and long-term goals approach;
3) build upon the assets, talents, skills, and resources already available in the community;
4) focus on the market place and agriculture rather than emergency food and government programs; and
5) forge innovative public/private and farm to school/community/home relationships that improve food retailing opportunities and access to good quality, affordable food.

Specific recommendations for improving the availability of good quality and affordable food in low-income communities include:[80, 86]

- Attract new grocery stores by creating dedicated financing sources, developing better information tools for assessing real business opportunities in low-income communities, reducing operating costs and improving service through training and transportation programs, facilitating site identification and development, streamlining license and permit processes, and utilizing mixed use retail "clusters" and neighborhood revitalization projects.
- Improve existing small stores by organizing collective buying for more favorable prices, buying directly from local farmers, connecting stores with small business resources and technical assistance, engaging community groups to encourage small stores to add fresh produce by generating community support, documenting unmet demand, providing nutrition education and promotional activities in collaboration with stores.
- Initiate and/or support farmers' markets by building community support, expanding the WIC Farmers' Market, Senior Farmers' Market Nutrition and FSP EBT at Farmers' Markets Programs, linking farmers with other community sites and resources, starting or sustaining farmers' market associations that assist farmers.

<u>Underlying Cause – Poverty</u>
California's economic context has led advocates to promote several specific poverty-oriented recommendations for increasing household incomes and the availability of affordable housing.[2]

In 2004, thirteen national anti-hunger organizations[‡‡] jointly crafted and disseminated *A Blueprint to End Hunger*. Many of the recommendations focus on improving and expanding the national nutrition programs as the "fastest and most direct way to reduce hunger." However, the Blueprint authors also acknowledge that

> "*if the United States is to end hunger and reach a point where essentially all Americans are able to buy the food they need, we must work to ensure that potential workers have job opportunities, earnings that allow them to provide for their for their families' basic needs, and the education and training they need to stay competitive. This would require the U.S. government to ensure a strong economy, improve the national education system, expand employment opportunities, and raise the minimum wage.*"[46]

The Blueprint to End Hunger challenges all of us to join the campaign to end hunger in America through a comprehensive set of recommendations for each sector of society (see Appendix 1).

Resources/Web Sites

- Alameda County Community Food Bank http://www.accfb.org
- America's Second Harvest http://www.secondharvest.org
- Bread for the World http://www.bread.org
- California Association of Food Banks www.cafoodbanks.org
- California Center for Research on Women and Families: http://ccrwf.org
- California Food Policy Advocates http://www.cfpa.net
- California Hunger Action Coalition www.hungeraction.net
- California WIC Association http://www.calwic.org/
- California WIC Program http://www.wicworks.ca.gov/
- Center on Budget and Policy Priorities www.cbpp.org
- Center for Food and Justice http://departments.oxy.edu/uepi/cfj/index.htm
- Center on Hunger and Poverty http://www.centeronhunger.org
- Children Now http://www.childrennow.org
- Community Food Security Coalition http://www.foodsecurity.org
- Community Food Security Initiative (USDA) http://attra.ncat.org/guide/a_m/cfsi.html
- Congressional Hunger Center www.hungercenter.org
- Economic Success Clearinghouse http://www.financeprojectinfo.org/WIN/food_security.asp
- End Hunger Network http://www.endhunger.com/
- Expanded Food and Nutrition Education Program www.csrees.usda.gov/nea/food/efnep/efnep.html
- Food & Agriculture Organization (of the United Nations) http://www.fao.org
- Food and Society http://www.foodandsociety.org

[‡‡] American's Second Harvest, Bread for the World, Center on Budget and Policy Priorities, Center on Hunger and Poverty, Community Food Security Coalition, Congressional Hunger Center, The End Hunger Network, Food Research and Action Center, MAZON: A Jewish Response to Hunger, The National Interfaith Hunger Directors, RESULTS, Share Our Strength, and World Hunger Year.

- Food First www.foodfirst.org
- Food Research & Action Center http://www.frac.org
- Food Security in the U.S. Briefing Room http://www.ers.usda.gov/briefing/foodsecurity/
- Food Stamp Program www.fns.usda.gov/fsp/
- Foodlink http://www.foodlink.org
- Institute for Agriculture and Trade Policy - Ag Observatory http://www.agobservatory.org/
- Institute for the Study of Homelessness and Poverty http://weingart.org/institute
- Institute on Assets and Social Policy (IASP) http://www.assetinstitute.org
- KIDS Can Make A Difference http://www.kidscanmakeadifference.org
- LA Coalition to End Hunger & Homelessness http://www.lacehh.org/
- LA Regional Food Bank http://www.lafightshunger.org
- Maternal and Child Health Library http://mchlibrary.info
- Mazon: A Jewish Response to Hunger www.mazon.org
- National Association of Farmers' Market Nutrition Programs http://www.nafmnp.org/
- National Center for Children in Poverty http://nccp.org
- National Conference for State Legislators www.ncsl.org
- National Food Policy Blog www.usfoodpolicy.blogspot.com
- National Governor's Association www.nga.org
- National School Lunch Program www.fns.usda.gov/cnd/Lunch/Default.htm
- National WIC Program http://www.fns.usda.gov/wic/
- Parents Action for Children http://www.Iamyourchild.org
- Sacramento Hunger Commission http://www.targethunger.com
- San Francisco Food Bank, Hunger 101 Activity http://www.sffoodbank.org/hunger101.html
- Share our Strength www.strength.org
- Southern Poverty Law Center www.splcenter.org
- State Food Policy Council http://www.statefoodpolicy.org
- Sustainable Food Center http://www.main.org/sfc
- The Children's Partnership http://www.childrenspartnership.org
- University of California, Berkeley Center for Weight and Health http://www.cnr.berkeley.edu/cwh
- USDA Community Food Security Initiative http://www.csrees.usda.gov/ProgView.cfm?prnum=1687
- USDA Food and Nutrition Information Center http://www.fnic.nal.usda.gov
- Urban Institute www.urban.org
- W.K. Kellogg Foundation's Food Systems and Rural Development http://www.wkkf.org/default.aspx?tabid=54&CID=4&NID=17&LanguageID=0
- World Hunger Year http://www.worldhungeryear.org
- World Watch Institute "Home Grown" Report http://www.worldwatch.org/pubs/paper/163/

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Appendix 1: Specific Recommendations from *A Blueprint to End Hunger*[46]
(http://www.frac.org/Blueprint%20to%20End%20Hunger.pdf)

1. Federal Government
• Live up to the official U.S. commitment to cut hunger and food insecurity in half by 2010, and commit to ending both by 2015. • Invest in and strengthen the national nutrition safety net. • Ensure that states, localities, and schools offer all federal food assistance programs and work actively to enroll eligible people in these programs. • Base monthly food stamp benefits on a realistic measure of what poor households need to buy food for an adequate diet. • Allow low-income families to participate in the Food Stamp Program without forfeiting the opportunity to save. • Extend food stamp eligibility to more struggling low-income people. • Expand access to child nutrition programs so that more eligible children benefit. • Strengthen federal commodity food programs. • Provide the WIC program with sufficient funds so all eligible people participate. • Invest in public education to increase outreach and awareness of the importance of preventing hunger and improving nutrition for health, learning, and productivity.
2. State and Local Government
• Strengthen local use of federal nutrition programs. • Adopt policies that would expand eligibility and promote participation in the Food Stamp Program. • Reduce the complexity and stigma of applying for food stamps. • Work with school districts and localities to ensure that they offer the full range of child nutrition programs. • Expand program outreach of benefits and services, especially to underserved populations, such as working-poor households, children, and the elderly. • Invest in public education to increase outreach and awareness of the importance of preventing hunger and improving nutrition for health, learning, and productivity.
3. Schools and Community Organizations
• Provide eligible children the full range of federal nutrition assistance programs, including free and reduced-price breakfast and lunch, after-school snacks and supper, the summer meals program, and the child and adult care meals program. • Ensure that all eligible children who wish to participate are enrolled in the school meal and child nutrition programs. • Invest in public education to increase outreach and awareness of the importance of preventing hunger and improving nutrition for health, learning, and productivity.
4. Nonprofit Groups

- Work to increase public awareness of the problem of hunger in the community and advocate for policies to end hunger.
- Ensure that state and local governments take advantage of all federal nutrition assistance programs.
- Educate low-income people about their potential eligibility for nutrition assistance and help connect them with the appropriate programs.
- Monitor program performance in food stamp offices, schools, and communities.
- Ensure that, once families are connected with food assistance, they also have access to affordable nutritious food.
- Continue to acquire and distribute balanced and nutritious food.

5. Labor and Industry

- Collaborate with government and community groups to connect low-wage workers to federal nutrition programs.
- Contribute time, money, food, warehouse space, and/or transportation capacity to local anti-hunger organizations.
- Support workplace giving campaigns that target hunger.
- Advocate for improved public policies to end hunger.

6. Individuals

- Urge elected officials to do more to reduce hunger by improving and expanding the national nutrition programs.
- Become involved with local anti-hunger organizations by donating time, money, and/or food.
- Raise local awareness of hunger by talking to friends and family, and working in your local community.

California Food Guide

Environmental Contaminants of Food

By Jan Schilling M.P.H., M.S., R.D. and Diana Lee M.P.H., R.D.

Environmental contaminants are chemicals present in the environment that have a known or potential impact on human health. They may be present in food and water supplies yet nutrients and phytochemicals in food offer some protection against their toxicity. This chapter addresses dietary exposures to environmental chemical contaminants, such as lead, mercury, pesticides, phthalates, polyaromatic hydrocarbons (PAHs), and persistent organic pollutants (POPs) that include dioxins, polychlorinated biphenyls (PCBs), and polybrominated diphenyl ethers (PBDEs). A number of the objectives outlined in Healthy People 2010 aim to reduce human exposure to chemical contaminants.[1]

What's New: Healthy People 2010 Objectives[1]

#8-1 Increase the proportion of persons served by community water systems who receive a supply of drinking water that meets the regulations of the Safe Drinking Water Act.

#8-10 Reduce the potential human exposure to persistent chemicals by decreasing fish contaminant levels.

#8-11 Eliminate elevated blood lead levels in children.

#8-13 Reduce pesticide exposures that result in visits to a healthcare facility.

#8-14 Reduce the amount of toxic pollutants released, disposed of, treated, or used for energy recovery.

#8-25 Reduce exposure of the population to pesticides, heavy metals, and other toxic chemicals as measured by blood and urine concentrations of the substances or their metabolites.

#10-7 Reduce human exposure to organophosphate pesticides from food.

Public Health Implications

Human exposure to hazardous agents in our food and water contributes to illness, disability, and death. Poor environmental quality has its greatest impact on people whose health may already be at risk, notably pregnant women, young children, the elderly, and people with preexisting illnesses. National efforts to ensure clean and safe food and water supplies continue to contribute significantly to improvements in public health and prevention of disability.

Definition

The major categories of environmental contaminants in food and water include agricultural chemicals (pesticides), chemicals migrating from packaging materials or food service utensils, and industrial and environmental pollutants) that build up in the food chain. Table 1 gives examples of health hazards posed by environmental contaminants found in food and water.

Table 1: Environmental Contaminants of Public Health Concern

Contaminant	Biomarker	Health Effects	Potential Food Related Sources	References
Lead	Blood	Learning and behavioral problems in children at low lead levels Seizures, coma, and death at levels of 70 micrograms/dL and above Hypertension and renal tubular dysfunction in adults with low-dose exposures Some evidence of early cognitive decline in the elderly, and increased risk of cataracts Lead in pregnant women is transmitted to the fetus and can affect nervous system development Good nutritional status, including high intakes of calcium, vitamin C, and iron can help reduce absorption of lead	Soil and dust on hands and in food Some herbal remedies such as greta or azarcon from Central America Food or beverages cooked, served or stored in glazed pottery from Mexico, Asia, or other countries Imported candies and candy wrappers, particularly those made with chili from Mexico Imported seasonings, especially from Mexico Mexican grasshopper treats (especially Oaxacan) Leaded glassware Food imported in lead-soldered cans Ayurvedic remedies (from South Asia) Sindoor, a South Asian cosmetic occasionally used as food coloring Water from faucets, pipes, and plumbing with lead or lead solder The major sources of	2, 3, 4, 5, 6, 7, 8

			environmental lead are paint produced before 1978 and lead-contaminated soil and dust	
Methylmercury	Blood	Adverse developmental and cognitive effects in the fetus, infants, and children In adults: ➢ Paresthesia ➢ Fatigue ➢ Vision changes ➢ Cognitive disturbances	Methylmercury, the organic form of mercury, is found in fish. The US Food and Drug Administration (US FDA) recommends that women of childbearing age, pregnant and breastfeeding women, and children **avoid** eating large predatory fish with the highest levels such as: ➢ **Shark** ➢ **Swordfish** ➢ **Tilefish** ➢ **King mackerel** The U.S. FDA also recommends limiting albacore tuna and tuna steak consumption to 6 oz. per week Methylmercury levels in fish caught recreationally may be at levels that pose health concerns	9, 10, 11, 12
Persistent Organic Pollutants (POPs) (e.g., polychlorinated biphenyls [PCBs], dioxins, polybrominated diphenyl ethers [PBDEs])	Blood Breast milk	Cancer Thyroid dysfunction Immunosuppression Hormone disruption Reproductive abnormalities Liver disorders Neurodevelopmental deficits	Fish and meats Animal fats Dairy products Eggs POPs enter the food chain and accumulate in the fatty tissues of animals and humans Highest levels are generally found in human breast milk	2, 13, 14, 15, 16, 17
Pesticides (chemicals used to control weeds, diseases, insects, fungi, or other pests on crops, landscape, or animals)	Urine, blood or breast milk depending on the chemical, e.g., cholinester-ase levels in blood serve	Organophosphate pesticides are associated with neurological dysfunction resulting from inhibition of acetylcholine breakdown in neural tissue Other health effects related to pesticides include: Birth defects	Food, including fruit, vegetables, cereal and grain products, meats, and dairy products Water supplies	2, 18, 19, 20

	as a biological marker for organo-phosphate pesticides	Respiratory effects Immune system effects Reproductive dysfunction Low birthweight Subtle neurodevelopmental effects Endocrine disruption Cancer		
Polyaromatic hydrocarbons (PAHs) (a class of chemicals that result from incomplete burning of organic substances like meats, coal, oil, or gas)	Urine, blood	Cancer Low birthweight Decreased head circumference in newborns	Smoked, charcoal-broiled, and roasted foods At high heat, such as when grilling meats, heterocyclic amines can form	2, 21, 22
Phthalates (a group of chemicals used to soften and increase flexibility of plastics and vinyls)	Urine	Animal and human studies show different phthalate compounds exhibit developmental and reproductive toxicity at various levels Cancer	Upon contact with foods, phthalates found in plastics can leach and migrate into foods, especially those with high fat content, such as full-fat dairy products, meats, fish, and oils Polyvinyl chloride infusion lines for parenteral nutrition	2, 23, 24, 25, 26, 27

Burden

Federal, state, and local government programs are charged with the responsibility to maintain high food safety standards. Monitoring and enforcement help ensure that our food supply is among the safest and most abundant in the world. Nevertheless, improvements are still needed. In a survey about public perceptions of environmental health risks, about half of Californians surveyed ranked chemicals in food and water as serious factors in causing disease.[28] Potential health hazards are associated with environmental chemicals in foods. Acute poisonings related to accidental chemical releases into the food supply have been reported.[29] More difficult to quantify are health effects related to chronic exposures to chemicals that are found in low levels in food. Metals like lead and mercury are known neurotoxicants that may enter the food chain. Persistent organic pollutants (POPs) include chemicals such as polychlorinated biphenyls (PCBs), dioxins, polybrominated diphenyl ethers (PBDEs), and organochlorine insecticides, like dichlorodiphenyltrichloroethane (DDT). Although PCBs

and most organochlorine pesticides are now banned for use in the United States, PBDEs continue to be produced and widely used, due to their flame retardant properties; and dioxins are largely formed as byproducts of combustion and other industrial processes.[13, 30] POPs are remarkably stable in the environment and can enter the food chain. They can be found in meat, dairy products, fish, and breast milk and, when eaten by humans, accumulate in our fatty tissues. A number of adverse health effects, such as immunosuppression, hormone disruption, reproductive abnormalities, neurodevelopmental disorders, and cancer, have been linked to long-term, low-dose exposures to POPs.[13] Pesticides (chemicals used to control weeds, diseases, insects, fungi, or other pests on crops, landscape or animals) may be inhaled, absorbed through the skin, or through the digestive tract. Farmers, agricultural workers, pest-control workers, and their families are most likely to be exposed to doses high enough to have an effect on health.[2, 20]

Human disease is multifactorial, involving environmental, lifestyle, socioeconomic, and genetic factors acting over a lifetime. Estimated total costs, including personal health care costs and lost productivity costs, for only nine environmentally related diseases in California amounted to more than ten billion dollars in 2000.[31] Costs are likely much higher since these estimates only looked at costs related to five cancers (prostate, cervical, ovarian, uterine, and childhood cancers), child lead poisoning, childhood asthma, neurodevelopmental disorders, and birth defects.

Exposures to many environmental contaminants are decreasing.[2, 32] For example, in 1993, approximately 22 percent of U.S. children lived in an area served by a public water system that had at least one major monitoring and reporting violation. This figure decreased to about ten percent in 1999[32] - the largest number of monitoring and reporting violations occurred for lead and copper. However, public and regulatory action is needed to reduce exposure to emerging chemicals of concern, such as PBDEs.[30, 31]

Incidence and Prevalence

Data on the incidence and prevalence of health disorders related to chemical contaminants in food are not readily available. Acute episodes related to inadvertent or accidental contamination of foods with heavy metals or pesticides are more likely to be reported; however, no mandatory reporting system exists. The existence of pesticide residues and their metabolites in human breast milk and in children is of particular concern because children are more heavily exposed per kilogram of body weight and are more vulnerable than adults to the effects of pesticides.[18]

The Centers for Disease Control and Prevention's (CDC) National Report on Human Exposure to Environmental Chemicals is an ongoing assessment of the exposure of the general United States population to environmental chemicals present in air, water, food, soil, dust, or other environmental media, using biomonitoring.[2] Over 140 chemicals or their metabolites, including mercury, lead, pesticides, PAHs, and phthalates are measured in blood and urine samples taken from selected participants in the 1999-2000

and 2001-2002 National Health and Nutrition Examination Survey (NHANES). Exposure levels identified in the CDC reports are useful for establishing reference ranges to determine whether individuals or groups of people have an unusually high exposure or exceed currently defined levels of concern. CDC currently considers an elevated blood lead level as one greater than ten micrograms per deciliter or a blood mercury level greater than 5.8 micrograms per liter. However, separate epidemiological and animal research studies are needed to determine body burden levels of a chemical that may cause or contribute to a particular health effect or disease.

Trends/Contributing Factors

Selected findings from CDC's report on human exposures[2] include:

- **Lead:** NHANES data indicate that the prevalence of elevated blood lead levels among U.S. children aged 1-5 years dropped from 88 percent in the late 1970s to 4.4 percent in the early 1990s and 1.6 percent in 1999-2002. However, risk of elevated blood lead levels is disproportionately higher among children enrolled in Medicaid or the Women, Infants, and Children (WIC) Supplemental Nutrition Program, and children from low-income and uninsured families targeted by federal- and state-supported health center programs. In the early 1990s, the prevalence among these low-income children was 8.4 percent, or nearly five times the 1.7 prevalence among children not enrolled in these low-income programs. For children served by WIC in the 1990s, one in nine children, or 12 percent, had elevated blood lead levels.[6] State data does not exist regarding prevalence of elevated blood lead levels among California children or adults. Analysis of California's Childhood Lead Poisoning Prevention Branch 2004-2005 data indicate that 4287 children were identified with elevated blood lead levels, or slightly under 1 percent of children tested. A few counties had two to four percent of tests with elevated blood lead levels. This reflects increased reporting following the universal laboratory reporting of blood lead tests in California that became effective in January, 2003, and is a decreased rate from previous years.[33]

- **Mercury:** Based on 1999-2002 data from the National Health and Nutrition Examination Survey, about six percent of women aged 18-49 years had blood mercury levels higher than the U.S. Environmental Protection Agency's (U.S. EPA's) recommended reference dose (5.8 micrograms per liter), below which exposures are considered to be unlikely to cause adverse effects in the developing fetus. Mercury is a neurotoxicant that can cross the placenta and affect brain and central nervous system development in infants and young children. Based on the blood mercury levels found in women of childbearing age, the number of births in 2000, and recent data documenting a higher fetal cord blood to maternal blood methylmercury ratio, it is estimated that more than 400,000 newborns may have been exposed in utero to mercury concentrations that put them at increased risk for adverse neurodevelopmental effects.[9-11]

- **POPs:** Levels of such POPs as dioxins, furans, and PCBs with dioxin-like toxicity have been presented for the first time in the most recent CDC report.[2] It is estimated that serum lipid-based levels of dioxins and dibenzofurans decreased by more than 80 percent in the 1980s.[2] The newer data will allow improved risk assessments used to determine health risks from exposure to these chemicals.

- **DDT:** Compared with levels of DDT in several smaller exposure studies conducted before 1990, levels of DDT and its metabolite, dichlorodiphenyldichloroethylene (DDE), are lower but still detectable, even though DDT was banned for use in the United States in 1973. Continued exposure in the United States is likely due to persisting levels in the environment or DDT residues in food. Serum DDE levels are four times higher among Mexican Americans than among nonHispanic whites and two times higher than among nonHispanic blacks.[2] DDT is still used in Mexico for mosquito control.

- **Phthalates:** Urinary levels of monoester metabolites of various phthalates were measured in the 1999-2002 NHANES survey. People are exposed to phthalates through direct contact with products containing phthalates or through food that is in contact with packaging that contains phthalates. Measurable amounts were detected and provide a reference range that is useful for determining whether people are exposed to higher levels than those in the general population.[2]

Although PBDEs analyses were not included in NHANES 1999-2000, they were included in 2001-2002. Reporting of values found will be forthcoming from CDC in future reports. Other previous studies report body burden levels of PBDEs appear to be increasing worldwide, with some of the highest levels reported in California women.[34]

Certain food processing methods also contribute to the presence of chemicals in foods that pose health concerns. For example, cooking meats by high-temperature cooking methods, such as grilling or sautéing, can lead to the formation of heterocyclic amines.[22] Also, frying, roasting, or baking can lead to the formation of acrylamide in foods, especially high carbohydrate foods. In 2002, Swedish researchers found acrylamide in high carbohydrate foods cooked at high temperatures, such as french fries and potato chips. Acrylamide is a genotoxicant, and based on high-dose animal studies, it is a potential human carcinogen. The U.S. FDA is developing methods for acrylamide analysis to assess dietary exposure of consumers and the potential for health risks.[35, 36]

Barriers to Implementation/Myths

Most health effects studies of environmental contaminants are conducted with animals. Many factors must be considered before extrapolating animal results to human health conditions, including route and timing of exposure, and endpoint of concern. Nevertheless, in keeping with the Precautionary Principle which advocates that society should not wait until it knows all of the answers before attempting to protect against significant harm, it is prudent to reduce our exposures to environmental contaminants.[37]

Pregnant women, young children, the elderly, and people with preexisting illnesses are of special concern. Industry, government agencies, and consumers must work together to formulate and implement strategies to prevent or reduce exposures to environmental contaminants having a negative impact on humans and their environment. Biomonitoring, or determining body levels of environmental contaminants, provides important information about exposure, but the presence of chemicals in our bodies does not by itself mean that the exposure causes disease. Learning more about body burden levels and exposures through scientifically sound biomonitoring studies will help facilitate the development of information about chemical exposures and their effects on human health.

Poisoning from lead, mercury, and other environmental contaminants are often, like hypertension, silent diseases. With some chemicals such as lead, unless levels are unusually high, there may be no symptoms. Developmental or neurologic effects may be subtle and require specific laboratory or clinical tests. Access to a laboratory or other facility capable of performing these tests, as well as the ability to pay for these tests, may be barriers for many families.

A number of environmental contaminants have been detected in breast milk.[15, 38] Despite their presence, breast milk remains the best source of nutrition for infants.[39, 40] Breast milk and breastfeeding provide multiple benefits for optimal infant growth, development and immunity, and for maternal health. Generally, the benefits of breastfeeding outweigh potential health risks from exposure to chemical contaminants in human milk. Continued efforts are needed to promote and support breastfeeding, and to reassure mothers who are concerned about environmental contaminants.[41]

Certified organically raised animals or produce have fewer environmental contaminants when compared to conventionally grown products; but, they do not differ in nutritive value. Recent evidence indicates that consumption of organic fruit, vegetables, and juice can reduce children's exposure levels from certain organophosphate pesticides to levels associated with negligible health risks, as estimated by the U.S. EPA.[42]

Because information on chemical contaminants is increasing, with potential new hazards emerging, healthcare professionals must be alert to new evidence. Consumers will rely on healthcare professionals to separate scientifically sound evidence from common myths. A good source of information for both consumers and healthcare professionals is the U.S. FDA Center for Food Safety and Applied Nutrition, accessible at www.cfsan.fda.gov.

Common Concerns/Strategies

Eat a variety of foods to maintain optimal nutritional status and to reduce exposure and impact of environmental contaminants.

To reduce exposure to lead in food:

- Eat a well-balanced diet with adequate amounts of iron, calcium, and vitamin C to minimize the absorption of lead from the digestive tract.
- Wash hands and faces of children frequently.
- Wash food before preparing it.
- Avoid imported canned products as the cans may have lead seams.
- Avoid preparing or storing foods or drinks in pottery ware with lead glaze or in leaded glassware.
- Avoid eating candy imported from Mexico as it may expose the person to lead.
- Do not use traditional remedies from other countries, particularly brightly colored remedies.
- Consider having your tap water tested for lead if your feeder line is old and may contain lead and if the water lines in your home may be soldered with lead.

To reduce exposure to mercury in fish and seafood:

- Women of childbearing age, pregnant and lactating women, and children should avoid shark, swordfish, tilefish, and king mackerel.
- If you eat canned tuna, eat chunk light tuna, which has less mercury than albacore (solid white or chunk white) tuna. If you eat albacore tuna or tuna steaks, limit consumption to six ounces per week and eat no other fish that week.
- Eat wild salmon, farmed catfish, shrimp, scallops, and pollock that have little or no mercury.
- Follow fish consumption advisories for areas where you fish. Contact the local health or environmental health department, or check the website for the California state agency that issues consumption advisories for sportfish: www.oehha.ca.gov/fish.html.
- For more detailed information about mercury in fish and seafood, check the websites for US FDA and US EPA listed below: (www.cfsan.fda.gov/seafood1.html and www.epa.gov/waterscience/fish/advisory.html)
- Check for multilingual educational materials available from the Environmental Health Investigations Branch, CA DHS, www.ehib.org

To reduce exposure to persistent organic pollutants in animal foods, fish, and shellfish:

- Decrease intake of animal fats;
  - Choose leaner cuts of meats and lower fat dairy foods.
  - Trim fat from meat and poultry.
  - Remove skin from poultry and fish.
  - Do not consume organ meats or guts of fish and shellfish.
  - Discard fats and oils in broths and pan drippings.

- Follow fish consumption advisories for areas where you fish (see above).

To reduce exposure to pesticide residues on produce:

- Select produce that is free of dirt, cuts, or other signs of spoilage.
- Wash produce in running water (do not use soap) to remove non-systemic pesticides.
- Scrub skin of produce or peel off outer leaves.
- Consider purchasing organic produce, if available and feasible.

To reduce exposure to phthalates in foods:

- Minimize storing and heating food in plastic packaging or containers. Consider using glass for storing and heating food.
- Reduce consumption of fatty foods like full-fat milk products, meat, fish, and oils.

To reduce exposure to PAHs and heterocyclic amines in foods:

- Avoid grilling foods when possible.
- Marinate foods before grilling.
- Before grilling, trim fat on meats; remove skin from poultry and fish, to have less fat drop into flames. Precook meats, fish, and poultry in oven or microwave and briefly grill for flavor.
- Flip food often when grilling.
- Remove all charred or burned portions of food before eating.

Opportunities for Improvement

- Promote the reduction/elimination of lead, mercury, persistent organic pollutants, pesticides, phthalates, and other contaminants from all food products and processing methods.

- Support legislation, policies, and procedures that reduce or eliminate environmental contaminants and promote pollution prevention/reduction measures.

- Circulate U.S. EPA and CDC reports on environmental contaminants via the internet and other public media.

- Educate healthcare and education professionals about the risks of environmental contaminants in our food supply and ways to reduce exposure.

- Develop and circulate low-literacy, illustrated materials in multiple languages on ways to reduce exposures to environmental contaminants in food.

- Develop media presentations in multiple languages to provide accurate information about environmental contaminants to the public.

- Continue to support and enhance national, state, and local systems to monitor existing and emerging environmental contaminants.

Clinical Implications

Sources of lead, mercury, persistent organic pollutants, toxic pesticides, and other environmental chemicals should be identified and measures taken to prevent or reduce human exposure to them. Women of childbearing age, pregnant and breastfeeding women, infants and children are particularly vulnerable. Clinicians can take an environmental exposure history to identify sources of exposure that include air, water, food, or direct contact, followed by appropriate biochemical and clinical tests as needed. Therapeutic measures will depend on the exposure and contaminant(s) of concern.[43, 44] Guidelines for taking an exposure history can be found at: http://www.atsdr.cdc.gov/HEC/CSEM/.

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California Food Guide

Vegetarian Diets

By Georgia Hodgkin, Ed.D., R.D., F.A.D.A. and Ella Haddad, Dr.P.H., R.D.

What's New?

The Dietary Reference Intakes have changed the nomenclature for essential amino acids.

Recent research has shown that postmenopausal women who consume higher levels of lignans perform better on tests for cognitive function than those who consume lower levels. Good sources of lignans are oilseeds, flax, broccoli, and berries.[1]

Vegetable consumption has been associated with less cognitive decline in aging women. Cruciferous vegetables, followed by green leafy vegetables, were linked to a slower decline than other vegetables. Fruits did not influence decline in cognitive function.[2]

Public Health Implications

Throughout the centuries, people have chosen vegetarian diets. As wealth increased, meat consumption also increased. Now more people are eating vegetarian meals because of the relationship between diet and disease. Other reasons for choosing meals without meat include those based on economics, ecology, ethics, and/or religion. The persuasions behind each will not be addressed here, but whatever prompts the decision to choose vegetarian meals, the recommendations for meal planning remain the same, as do the benefits. Research supports the health benefits of eating less meat and eating more plant-based, high-fiber foods.

Definition

Vegetarians can be divided into several categories based on their specific dietary choices, as noted in Table 1. Meat, fish, and poultry are usually not included in a vegetarian diet. Increasing numbers within the population say they are limiting their

consumption of animal products and follow a "plant-based" diet. In this instance, the majority of the meal comes from plants and meat is a condiment.[3]

MyPyramid food choices for all types of vegetarian diets are similar to those for non-vegetarian diets except for the meat and beans group (protein-rich group including dry beans, eggs, and nuts). For vegetarians, the preferred source of protein is from plants rather than animals. A second difference lies within the milk group (calcium-rich group including yogurt, cheese, or other dairy products) for total vegetarians who exclude milk and its products, and eggs from the protein-rich food group.

Table 1: Common Types of Vegetarian Diets

Lacto-vegetarian	Includes milk. No eggs, meat, fish, or poultry
Ovo-vegetarian	Include eggs. No meat, fish, or poultry
Lacto-ovo- vegetarian	Includes milk and eggs. No meat, fish, or poultry
Pesco-vegetarian	Includes fish. No meat or poultry
Pollo-vegetarian	Includes chicken. No meat or fish.
Total vegetarians (plant foods only-often referred to as vegans)	No milk, eggs, meat, fish, or poultry

Health Benefits of Vegetarian Diets

The American Dietetic Association and Dietitians of Canada's Position Statement on Vegetarian Diets states that "appropriately planned vegetarian diets are healthful, nutritionally adequate, and provide health benefits in the prevention and treatment of certain diseases." Those diseases include: cardiovascular disease, hypertension, type 2 diabetes mellitus, prostate cancer, colorectal cancer, renal disease, dementia, diverticular disease, gallstones, and rheumatoid arthritis.[4]

A healthful vegetarian diet emphasizes a variety and abundance of plant foods**.** Vegetarian diets can be planned to be nutritionally adequate for healthy people of all ages, and for pregnant and lactating women.

Vegetarian diets can be low in saturated fat; total fat and cholesterol; and high in fiber; antioxidants; folate and vitamin C, which can reduce the risk for chronic disease.[5] Diets that do not provide a wide variety of plant foods may reduce phytochemical intake and alter carcinogenesis.[6] More information about phytochemicals may be found in the chapter on fruits and vegetables. Additional health benefits of various components of vegetarian diets are listed in Table 2.

Table 2: Apparent Health Benefits of Components of a Vegetarian Diet*

***Some of the studies may be limited. This table has been compiled by the authors.**

Health Benefits	Diet Components	Possible Cause of Benefit
↓ all-cause mortality	15% ↓ with ↑ fruit and vegetable consumption[7]	Potassium, antioxidants, folic acid[7]
↓ ischemic heart disease mortality	24% ↓ in vegetarians over non-vegetarians[8-10]	Whole grains and their nutrients: linolenic acid, fiber, vit. E, Se, folate.[11] Nuts, cause unknown, seems to reduce sudden cardiac death. Fruits and vegetables: flavonoid quercetin.[12]
↓ CVD mortality	27% ↓ with ↑ fruit and vegetable consumption[7, 13]	Potassium, antioxidants, folic acid;[7] flavonoids: kaempferol, herperetin[12]
↓ stroke mortality	42% ↓ with ↑ fruit and vegetable consumption[7]	Same[7,12]
↓ risk of CHD	↑ fruit and vegetable consumption,[14] whole grains,[15] and nuts: almonds, macadamia nuts, pistachios, pecans, peanuts, walnuts[10]	Fruit/vegetables: ↑ plasma levels of alpha-carotene, beta-carotene, lutein, beta-cryptoxanthin, and ascorbic acid. Nuts: monounsaturated fat; in walnuts, n-6 and n-3 PUFA, arginine, folate, fiber, tannins, and polyphenolics[16]
↓ risk of cancer	↑ fruit and vegetable consumption[14]	Same[16]
↓ breast cancer	↑ dietary fiber[10]	↑ soy products[10]
↓ colorectal cancer	↑ garlic consumption[17]	Garlic (raw or cooked)[17]
↓ lung cancer	↑ fruit and vegetable consumption[12]	Flavonoid: quercetin[12]
↓ prostate	↑ vegetable consumption,[18] Brassica family (broccoli, cabbage, mustard and collard greens, bok choy), tomato; ↓ dairy plus substituting olive oil for other oils[19]	Lutein plus zeaxanthin;[19] glucosinolates;[20] flavonoid: myricetin[12]
↓ stomach	↑ garlic consumption[17]	Garlic (raw or cooked, not supplement)[17]
↓ blood pressure	Related to ↑ fruit and vegetable consumption[14]	Flavonoids[21]
↓ Type 2 diabetes risk factors	↑ intake of whole grains[15] and fiber[22] ↑ fruit and vegetable consumption[12]	Particularly soluble fiber;[22] flavonoids: quercetin and myricetin[12]
↓ BMI	↑ intake of whole grains[15]	Fiber[15]
↓ Waist-to-hip ratio	↑ intake of whole grains[15]	Fiber[15]
↓ fasting insulin	↑ intake of whole grains[15]	Insoluble fiber and magnesium[15]
↓ total serum cholesterol	↑ whole grains[15] ↑ fruits and vegetables[23]	Fiber, folic acid, potassium, magnesium, carotenoids, phytosterols, flavonoids, polyphenolics[15,23]
↓ LDL cholesterol	↑ soy and soy protein[24] ↑ fruits and vegetables[23]	Same[23,24]
↑ HDL cholesterol	↑ intake of soy and soy protein,[24] ↑ fruits and vegetables[23]	Same[23,24]
↓ asthma	↑ fruit and vegetable consumption[12]	Flavonoids: quercetin and herperetin[12]
↓ lumbar spine bone loss	↑ isoflavone-rich soy protein[25]	Isoflavones, not soy protein[25]
↓ colonic diverticula	↑ intake of dietary fiber[10]	Fiber[10]
↓ gallstones	↑ intake of dietary fiber[10]	Fiber[10]
↓ macular degeneration	↑ intake of fruits and vegetables, Especially spinach and collard greens [10]	Lutein and zeaxanthin[26]

The health benefits of vegetarian diets may stem from a number of components typical of vegetarian meal choices that are rich in whole grains, fruits, and vegetables. Those components may include: unsaturated fat, fiber, antioxidant vitamins, flavonoids, folic acid, and phytoestrogens. As science continues to identify beneficial chemicals in foods, individuals are well advised to choose whole-unrefined foods for their nutrition. Other equally or more-beneficial chemicals may be identified later that are part of the whole foods that individuals consume. In addition to food choices, those who follow a vegetarian diet often engage in positive lifestyle habits that lead to total, vibrant health, and well-being.

Proteins and Their Indispensable Amino Acids

Food proteins supply the amino acids needed for growth, tissue repair, and specific metabolic functions. Nine amino acids cannot be synthesized in adequate amounts by the body: histidine, isoleucine, leucine, lysine, methionine, threonine, tryptophan, phenylalanine, valine, and possibly arginine. These are called indispensable, formerly essential amino acids because an insufficient intake will result in negative nitrogen balance, weight loss, impaired growth in infants and children, and clinical symptoms.[27]

All nine indispensable amino acids are found in vegetable protein as well as animal protein. In addition, the amino acid ratios of vegetable proteins are similar to those found in animal protein. Some plant protein may be somewhat lower in lysine or the sulfur containing amino acids, methionine and cystine, than those of an animal source. However, the dynamic state of protein turnover in the body creates an amino acid pool that may be called on to meet the body's demand for amino acids by cells at any given time.[28] The consumption of all indispensable amino acids in a defined ratio, called protein complementation, is not necessary at every meal.[29] The necessity of complementation of plant proteins at every meal is no longer supported by science. Vegetarian diets meet current nutrition recommendations when there is sufficient total protein throughout the day along with adequate calories and other nutrients. Vegetarians are no longer advised to consciously combine proteins at meals.

Nutrient Adequacy of Vegetarian Diets

Previous Dietary Guidelines for Americans said that most vegetarians are lacto-ovo vegetarians and they "enjoy excellent health." Lacto-ovo-vegetarian diets that include dairy products and eggs are known to provide adequate protein, vitamins, and minerals. These diets also meet all of the recommended nutrient intakes for all age groups.[30] Later Dietary Guidelines continue to encourage the consumption of plant foods (fruits, whole grains, and vegetables), and recommend limiting sources of saturated fat and cholesterol (animal products, such as meat and full-fat dairy products).[31] Since meat is the usual source of protein, iron, and vitamin B_{12} for the majority of Americans, vegetarians should ensure that their food choices include sources of these nutrients.[31] Those who avoid milk and its products need to choose good alternate sources of calcium, protein, and vitamins B_2, B_{12}, and D.[31]

In addition to the nutrients mentioned above, total vegetarian diets (plant foods only) require appropriate planning and supplements to meet certain nutrient needs (Tables 3 and 4). Animal products are the only dietary sources of naturally occurring B_{12}. Since these diets are based entirely on plant foods, B_{12} fortified plant foods (some cereals, some soy beverages, some meat alternates) or a daily B_{12} supplement is required. The usual sources of calcium and vitamin D in most American's diets are dairy products, which are not consumed by total vegetarians. Thus, particular attention must be given to adequate sources of calcium and vitamin D, especially for meals for children and the elderly.[4, 30] Total calories may be insufficient when visible oils and fats are avoided. Some researchers are concerned about zinc and iron bioavailability due to the high fiber content of total vegetarian diets.[4] In their severely restricted forms, macrobiotic, Rastafarian, and fruitarian vegetarian diets are not recommended for children, due to the increased risk of iron-deficiency anemia, rickets, megaloblastic anemia, and protein-calorie malnutrition.[32]

Table 3: Nutrients of Concern for Total Vegetarians (plant foods only)[4, 31]

Nutrient	Rationale	Healthful Recommendations for Nutrients of Concern*
Calories	Food volume tends to be high with few calories	High calorie, low volume foods, such as avocado, dried fruit, nut butters, oils, olives, salad dressings, margarines
Protein	Most plant foods are low in protein	Cooked dry beans, vegetable and grain protein foods, tofu made with calcium sulfate, tempeh, nuts, nut butters, and seeds
Calcium	Few plant foods have substantial amounts	Cooked dark green vegetables, calcium-fortified soy milk, calcium-set tofu, calcium-enriched juices
Iron	Few plant foods have substantial amounts	Enriched breads and cereals, garbanzo beans, soybeans, lentils, tofu, pumpkin seeds, tomato juice, dried apricots, prune juice, and blackstrap molasses
Vitamin B_{12} (cyanocobalamin)	Vitamin B_{12} does not exist in plants.	Enriched ready to eat cereals, B_{12} fortified soy milk, B_{12} fortified vegetable and grain protein food products, fortified nutritional yeast, Vitamin B_{12} supplement
Vitamin D	Most vitamin D is obtained from sunlight; few foods are fortified with it.	Vitamin D-fortified soy milk, vitamin D-fortified cereal, or vitamin D supplement
Zinc	Few foods have substantial amounts.	Enriched ready-to-eat cereals, whole grains, cooked dry beans, nuts and seeds

***** See Tables 5 (below) and 6 (in Appendices II) for the number of servings recommended daily and serving sizes.

Table 4: Supplement Recommendations Across the Lifespan[4, 32]

Age Group	Total Vegetarians*	Lacto-ovo Vegetarians**	Omnivores**
Infants, 0-6 months Breastfed	Single dose of vitamin K at birth, vitamin B_{12}, vitamin D	Single dose of vitamin K at birth	Single dose of vitamin K at birth
Infants, 6-12 months breastfed, plus solid foods with iron and vitamin C	B_{12} and vitamin D	Vitamin D	Vitamin D
Toddlers	B_{12}		
Preschool	B_{12}		
Adolescents	B_{12}		
Adult	B_{12}		
50+ adult	B_{12}	B_{12}	B_{12}
Pregnant/lactating	B_{12}, prenatal supplement	Prenatal supplement	Prenatal supplement

* Read the labels on dairy substitutes to assure fortification with calcium, vitamin D, and B_{12}**.**

** If dairy products are limited or not part of meal planning, use substitute products containing calcium, vitamin D, and B_{12}.

Concern has been expressed for the adequacy of vegetarian diets to provide sufficient omega-3 fatty acids, since fish is not included in most vegetarian diets and is the major source of omega-3 fatty acids for most Americans. However, flaxseed, flaxseed oil, canola oil, walnut oil, and soy oil, plus green leafy plants are excellent sources of omega-3 fatty acids- see Table 5. The nutrient recommendations from the National Academy of Sciences state an adequate intake (AI) of omega-3 fatty acids to be 1.1 grams per day for females and 1.6 grams per day for males. The AI for omega-6 fatty acids is 12 gm per day for females and 17 grams per day for males.

Table 5: Plant Sources of Omega-3 Fatty Acids[33, 34]

Source (serving size)	Omega-3 (gm)	Omega-6 (gm)
Oils		
Flaxseed oil, 1 Tbsp	8.0	2.24
Walnut oil, 1 Tbsp	1.46	7.41
Canola oil, 1 Tbsp	1.30	2.84
Soy oil	0.95	7.14
Nuts and seeds		
Flaxseed, 1 Tbsp	1.99	.047
Walnuts, 1 oz.	1.91	8.91
Pecans, 1 oz.	0.19	4.48
Pistachios, 1 oz.	0.08	2.15
Peanut butter, 2 Tbsp	0.02	4.38
Beans		

Soybeans, cooked, ½ cup	0.32	2.39
Source (serving size)	**Omega-3(gm)**	**Omega-6(gm)**
Kidney beans, boiled, ½ cup	0.15	0.09
Lentils, boiled, ½ cup	0.04	0.14
Garbanzo beans, boiled, ½ cup	0.04	0.91
Green leafy plants		
Kale, raw, chopped, 1 cup	0.12	0.04
Collards, frozen, boiled, ½ cup	0.11	0.05
Spinach, boiled, ½ cup	0.08	0.01
Butterhead lettuce, 1 cup	0.05	0.02
Grains		
Rolled oats, dry, ¼ cup	0.02	0.44
White flour, ¼ cup	0.01	0.12
Whole wheat flour, ¼ cup	0.01	0.22

Vegetarian Food Pyramid

Food pyramids provide a framework for knowing what to eat and how much to eat for a nutritionally adequate diet. The USDA MyPyramid website does not include a pyramid for vegetarians. However the My Vegetarian Food Pyramid (see Appendix I), developed by the General Conference (of Seventh-day Adventists) Nutrition Council, graphically depicts the number of servings and lists the size of the servings for balanced nutrition.[31] A number of vegetarian food guides are available in cookbooks, materials for the public, and scientific literature, however the USDA and USDHHS do not have extensive dietary guides for vegetarians. Loma Linda University, in conjunction with experts in the fields of vegetarian diets, have compiled daily food guide recommendations for lacto-ovo-vegetarians. Please see Appendix II and Appendix III, to review these lacto-ovo vegetarian food guides for adults and children respectively.

Opportunities for Improvement

1. Offer a wide variety of vegetarian menu items in food programs, feeding programs, quantity food production facilities, and catering.

2. Train health care and hospitality (hotel, motel, and restaurant) professionals to support the public's choice of healthful vegetarian diets.

3. Recommend all nutrition education programs provide instruction on:
    - Plant-based foods and their possibilities for disease prevention/treatment,
    - Vegetarian meal planning, and
    - Production and manufacturing of vegetarian foods.

4. Consumers, food programs, feeding programs, restaurants, and caterers should provide the following foods daily:
    - deep green salad greens

- whole grain products
- reduced-fat or nonfat dairy products in menu selections

5. Food industry should fortify soymilk with Vitamin B_{12} (20% Daily Value), calcium (20-30% Daily Value), and vitamin D (25% Daily Value) and list content per serving on food labels.

6. Government, food industry, and philanthropists should fund research on vegetarian nutrition and disease prevention/wellness promotion.

7. Food services at conferences and conventions should provide vegetarian food choices.

Resources for Healthful Vegetarian Meal Planning

1. Dietary Guidelines for Americans 2005

These guidelines are intended to answer the question, "What should Americans eat to stay healthy and prevent disease?" They are meant for healthy individuals two years and older. According to the Guidelines, most calories should come from grain products, vegetables, fruits, low-fat dairy products, and lean sources of protein. Very few calories should come from fats and sweets.[30, 31] Updates for the Dietary Guidelines are usually published every five years. The 2005 Dietary Guidelines for Americans include recommendations for vegetarians at the MyPyramid web site. http://mypyramid.gov/pyramid/vegetarian.html.

2. My Vegetarian Food Pyramid

The USDA MyPyramid is a graphic depiction of the amounts of foods needed daily to meet nutritional needs for vegetarians. Foods are divided into groups based on their nutrient content. The MyPyramid lists the number of servings needed per day and serving sizes. The My Vegetarian Food Pyramid (Appendix I) is similar to the USDA MyPyramid, with the exception that protein sources are primarily from plants rather than animal sources.[31] Consuming the daily recommended amounts of foods or number of servings and using the appropriate serving size will assure adequate nutrition (see Appendices II and III).

3. The Food Label

A third helpful tool in menu planning from the U.S. government is the food label guidance system. The food label states the serving size of the chosen food and nutrients to be provided by that food item.

Each food label gives the percent daily value (DV) for a standardized serving size. DVs are set by the U.S. government and allow consumers to compare nutrient values of similar foods. DVs replaced the U.S. Recommended Dietary Allowances (U.S. RDAs), and is an umbrella term for two sets of reference values: Daily Reference Values

(DRVs) and Reference Daily Intakes (RDIs). Current nutrition recommendations were used to set the DRVs for total fat, saturated fat, trans fat,[39] cholesterol, total carbohydrate, dietary fiber, sugars, sodium, potassium, and protein for adults and children 4 years and older. The RDIs are the same as the U.S. RDAs for 19 vitamins and minerals. The values for total fat, saturated fat, cholesterol, sodium, total carbohydrate, dietary fiber, protein, vitamins A and C, calcium, and iron must appear on the label; all other vitamins and minerals are optional.[40]
http://www.cfsan.fda.gov/~dms/fdnewlab.html

Resources/Websites

Print Materials

American Dietetic Association (ADA). *Being vegetarian*. Chicago: ADA. 1996.

Craig W. Nutrition and wellness. *A vegetarian way to better health*. Berrien springs, MI: Andrews University. 1999.

Havala, Suzanne. *Being Vegetarian for Dummies* (Wiley 2001) and *Vegetarian Cooking for Dummies* (Wiley 2001).

Hodgkin G, Maloney S (eds). *Loma Linda University Diet Manual: A handbook supporting vegetarian nutrition.* Loma Linda, CA: Loma Linda University Press. 2003.

Mellina V, Davis B, Harrison V. *Becoming Vegetarian*. The Book Publishing Co. l996.

Messina V, Mangels R, Messina M. *The Dietitian's Guide to Vegetarian Diets: issues and applications, 2nd Edition*. Gaithersburg, MD: Aspen Pub. 2004.

Krizmanic, J. *A Teen's Guide to Going Vegetarian*. New York, NY: Viking Children's Books. 1994.

Websites

Accurate information, resources, and support

Vegetarian Nutrition Dietetic Practice Group. The American Dietetic Association. 120 South Riverside Plaza, Suite 2000, Chicago IL. 60606-6995.

http://www.eatright.org/cps/rde/xchg/SID-5303FFEA-EDABCC8D/ada Accessed 4/14/06.

How to plan vegetarian diets, research, and other sites

Department of Nutrition and Dietetics, School of Allied Health Professions, Loma Linda University, Loma Linda, CA 92350. http://www.llu.edu/llu/nutrition/veg.html Accessed 4/14/06.

Department of Nutrition, School of Public Health, Loma Linda University, Loma Linda, CA 92350. http://www.llu.edu/llu/sph/nutrition/resources.html Accessed 4/14/06.

Literature review and information about nutrition and vegetarian topics

Andrews University, Nutrition Department, Michigan: http://www.andrews.edu/nutrition/ Accessed 4/14/06.

Listing of soy terms, products, nutrient competition, and companies

U.S. Soyfoods Directory. Indiana Soybean Development Council, 423 West South Street, Lebanon, IN 46052-2461. Published yearly. http://www.soyfoods.com/ Accessed 4/14/06.

Professional resources

Loma Linda University Diet Manual: A handbook supporting vegetarian nutrition: http://www.llu.edu/llu/nutrition/veg.html Accessed 4/14/06.

Seventh-Day Adventist Dietetic Association: http://www.sdada.org/ Accessed 4/14/06.

Recipes, cookbooks, frequently asked questions, resources

American Dry Bean Board: http://www.americanbean.org/ Accessed 4/14/06.

Subject listing for information about vegetarianism

Vegetarian Resource Group Box 1463, Baltimore, MD 21203. A nonprofit organization for vegetarian nutrition education. http://www.vrg.org/ Accessed 4/14/06.

Vegetarian food pyramid and health-related education materials.

The Health Connection. 55 West Oak Ridge Drive, Hagerstown, MD 21740-7390 or http://www.healthconnection.org/ Accessed 4/14/06.
Telephone: 1-800-548-8700
FAX: 1-888-294-8405
E-mail: sales@healthconnection.org

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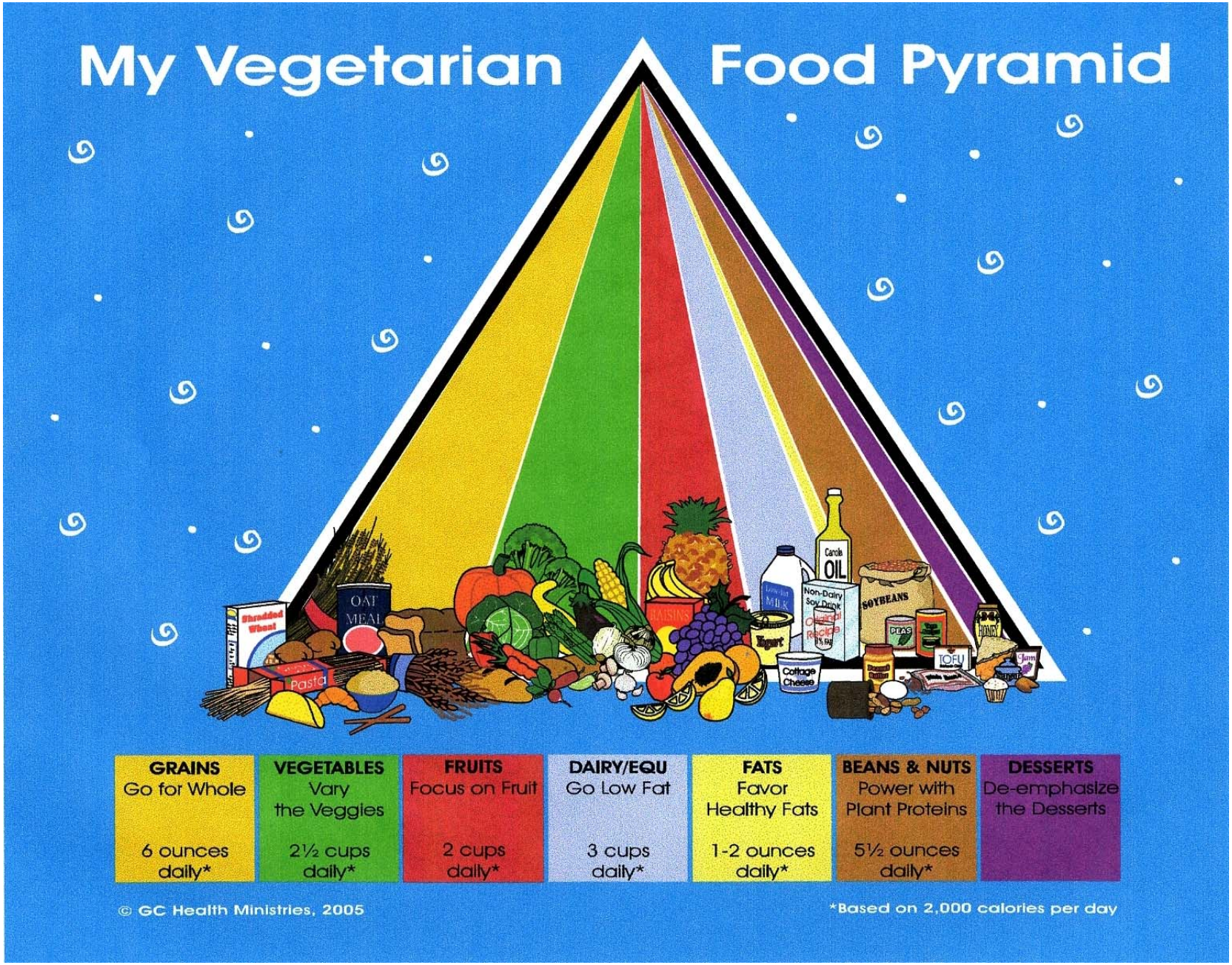
APPENDIX I


My Vegetarian Food Pyramid
GRAINS
Go for Whole
6 ounces daily*
VEGETABLES
Vary the Veggies
2½ cups daily*
FRUITS
Focus on Fruit
2 cups daily*
DAIRY/EQU
Go Low Fat
3 cups daily*
FATS
Favor Healthy Fats
1-2 ounces daily*
BEANS & NUTS
Power with Plant Proteins
5½ ounces daily*
DESSERTS
De-emphasize the Desserts
© GC Health Ministries, 2005
*Based on 2,000 calories per day

Appendix II: Daily Food Guide for Lacto-ovo Vegetarian **Adults**[Adapted from references 35-38]			
Food Group	**Serving Per day**	**Serving Size**	**Daily Recommendations**
Whole Grain Bread, Cereal, Rice, Pasta	6 or more	1 slice bread or 1 small roll ½ bun, bagel, pita 1 ounce (¾ cup) ready-to-eat cereal ½ cup cooked cereal, rice or pasta 4-6 small crackers 1 6 inch tortilla, 1 small pancake or waffle	Choose whole wheat or whole grain breads and cereals. Choose ready-to-eat cereals fortified with iron, zinc and vitamin B_{12}.
Dry Beans	1-3	½ cup lentils, split peas, or other cooked dry beans 3 ounces (½ cup) tofu or tempeh ½ cup vegetable protein (soy) food products	Eat to meet needs for protein, iron, zinc and other trade minerals. Eat one serving of cooked dry beans.
Eggs	0-1	1 egg	Limit yolks to 3 to 4 per week. Use egg whites freely.
Nuts and Seeds	1 or more	¼ cup almonds, walnuts, or other nuts and seeds. 2 tablespoons peanut butter, almond butter, tahini	Eat raw or dry roasted nuts and seeds or as a spread
Vegetables	5 or more	½ cup cooked vegetable 1 cup raw vegetable or salad ¾ cup vegetable juice	Eat a variety of raw or lightly steamed vegetables. Select vegetables with lots of color (dark green, orange, or red beta-carotene).
Fruits	3 or more	1 medium fresh fruit ½ cup cooked or canned fruit ¼ cup dried fruit ¾ cup 100% fruit juice	Eat a variety of raw, frozen, canned, or dried fruits. Select fruits with lots of color (dark orange or red for beta-carotene).
Milk or Fortified Milk Alternatives* **	2-3*	1 cup reduced-fat milk or yogurt 1 cup calcium-fortified soymilk 1 ½ ounces (1/3 cup grated) cheese 1 cup pudding: 1 ½ cups ice milk or frozen yogurt	Choose reduced fat and non-fat dairy products and yogurt, read labels to assure adequate fortification of milk alternatives.
Vegetable Fats and Oils	3 or more	1 teaspoon vegetable oil or margarine 2 teaspoons salad dressing	Use canola oil and olive oil (low in saturated fat and high in monounsaturated fat) and soy oil (high in omega-3 fats).
Vitamin B_{12}	2.4 µg	Milk, cheese, B_{12} fortified soymilk, eggs Fortified cereals Fortified vegetable and grain protein food products, fortified nutritional yeast, B_{12} supplement	Select a good source of B_{12} each day.

* Women who are pregnant or breast-feeding and anyone under 24 years of age needs 3 servings of milk or a milk alternative daily.

**DV (Daily Value)=daily nutrient recommendations for healthy adults and children four years and older.

*** If soy or another milk alternative is preferred, choose an alternate fortified with at least 5-7 grams of protein, 20-30% DV** (250-300mg) calcium, 20% (1 mcg. B_{12}), 25% DV (100 IU or 10 mcg) vitamin D per 8 ounces, tofu made with calcium sulfate.

Appendix III: Number of Servings* for Lacto-ovo Vegetarian Children[Adapted from references 27, 35-37]

Food Group	**1-2 yr. Male 1046 (NAS)	1-2 yr. Female 992 Cal	3-8 yr. Male 1742 (6 yr.)	3-8 yr. Female 1642 (6 yr.)	9-13 yr. Male 2279 (11 yr.)	9-13 yr. Female 2071 (11 yr.)	14-18 yr. M Male 3152 (16 yr.)	14-18 yr. Female 2368 (16 yr.)
Breads/cereals– 80 Cal	3.5	3	6	5.5	10.5	9	14	10
Vegetables – 25 Cal	1	1	3	2	3	3	5	4
Fruits – 60 Cal	2	2	3	3	3.5	3.5	4.5	4
Milk/dairy – Whole: 150 Cal, Low Fat: 120, 1% Non-fat: 100 Cal.	2.5 Whole	2.5 Whole	3 Low Fat	3 Low Fat	3 1% Non-fat	3 1% NF	4 1% NF	3.5 1% NF
Protein foods - lean, 75 Cal	2	2	5	5	6.5	6.5	8	6
Fats & Oils – 45 Cal	1	1	4	3	5.5	4	10	6
Desserts – 1 teasp. sugar, 2 gm fat, 45 Cal	1	1	2	2	2	2	4	3
Total Cal	1040	1000	1740	1630	2250	2063	3145	2345
% Fat	32%	33%	33%	33%	28%***	28%***	31%***	29%***
% Protein	16%	17%	18%	18%	17%	18%	16%	16%

* Bread serving = 1 slice bread, ¾ cup cold cereal, ½ cup cooked cereal, ½ cup pasta/rice, ½ bagel or English muffin, 3-4 crackers, ½ muffin
Vegetable serving = 1 cup raw leafy, ½ cup chopped raw, ½ cup cooked, 6 oz juice
Fruit serving = 1 medium piece, 1 cup berries, ¼ cup dried fruit, ½ cup canned fruit, 6 oz juice
Milk/dairy serving = 1 cup milk, 1 cup yogurt, 1 ¾ oz. cheese, 1 ½ cup cottage cheese, 1 ¾ cup ice cream
Protein foods = ½ cup cooked beans, ½ cup tofu, ¼ cup nuts or seeds, 2 tablespoons nut butter, ¼ cup meat alternative, 1 egg
Fats and Oils serving = 1 teaspoon oil, margarine, mayonnaise, nut butter; 1/8 avocado, 1 ½ teaspoon tahini
Desserts serving = 1 small cookie, 1 small piece of candy (e.g., 1/5 of 1.9 oz. Chocolate bar, 11 Gummi Savers, 1 LifeSaver lollipop, 13 M&Ms, 5 M&Ms with peanuts, small turtle), 5 animal crackers, ¼ small piece of cake, 1/3 cupcake, 1/6 small piece of pie

**The headings for the row include the age range, gender, and age used for the stated calorie level.[27]
***Calculations are based on lean protein choices. Children's menus could include medium fat or high fat protein foods such as cheeses or nut butters for these age groups, thus raising the percent fat.