

California Food Guide

Life Cycle: 9-18 Year Olds

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What's New

Nationally, estimated rates for overweight (BMI \geq 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 \geq 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 \geq 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 to 25 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) \geq 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>

¹Excludes pregnant women starting with 1971-74. Pregnant status not available for 1963-65 and 1966-70.

²Data 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 \geq 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 \geq 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 \geq 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 \geq 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 \geq 95th percentile). CalTEENS found in 2000 and 2002 rates of overweight (BMI \geq 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 \geq 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 \geq 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 (85 th Percentile)			Overweight (95 th percentile)			Overweight or obese (BMI \geq 95 th 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

¹Body Mass Index (BMI) was calculated using the equation: weight (kg)/height (m²)

²Source: 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 \geq 95th percentile) with a combined total of 45 percent overweight or at risk for overweight (BMI \geq 85th percentile).²⁵ Twenty-four percent of 12-14 year olds are overweight (BMI \geq 95th percentile) and 44 percent overweight or at risk (BMI \geq 85th percentile).²⁵ Fifteen to nineteen year olds have lower rates comparatively with 20 percent overweight (BMI \geq 95th percentile) and 39 percent overweight or at risk for overweight (BMI \geq 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 \geq 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 (85 th -<95 th percentile)	Overweight (\geq 95 th percentile)	At Risk for overweight (85 th -<95 th percentile)	Overweight (\geq 95 th percentile)	At Risk for overweight (85 th -<95 th percentile)	Overweight (\geq 95 th 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 games³⁸ 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

Activity Level	Males			Females		
	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 (kcal/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 years⁴⁹.

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 to 18 (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 rooms²³ 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 policies 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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