

# Breakfast is Brain Fuel

## Teacher Resources

- Centers for Disease Control and Prevention (CDC), *Overweight and Obesity*, [www.cdc.gov/obesity/index.html](http://www.cdc.gov/obesity/index.html)
- *Chronic Disease Prevention and Health Promotion*, Centers for Disease Control and Prevention (CDC), [www.cdc.gov/chronicdisease/index.htm](http://www.cdc.gov/chronicdisease/index.htm)
- Feeding America, <http://feedingamerica.org>
- Feeding Minds, Fighting Hunger, [www.feedingminds.org](http://www.feedingminds.org)
  - Hunger and Malnutrition Lessons, [www.feedingminds.org/fmfh/hunger-and-malnutrition/introduction/en/](http://www.feedingminds.org/fmfh/hunger-and-malnutrition/introduction/en/)
  - Youth Window, [www.feedingminds.org/yw/index\\_en.htm](http://www.feedingminds.org/yw/index_en.htm)
- *Foods Around the World* (Available for loan from the N.C. Division of Public Health, N.C. Nutrition Education and Training Resource Library, [www.nutritionnc.com](http://www.nutritionnc.com))
- Food Research and Action Center (FRAC)
  - *Annotated Bibliography, Research on the Impacts of Breakfast on Children and Adolescents*, [www.frac.org/pdf/bkfst\\_impact\\_bibliog.pdf](http://www.frac.org/pdf/bkfst_impact_bibliog.pdf)
  - *Breakfast for Learning*, [www.frac.org/pdf/breakfastforlearning.PDF](http://www.frac.org/pdf/breakfastforlearning.PDF)
  - *School Breakfast and Lunch*, <http://frac.org/federal-foodnutrition-programs/school-breakfast-and-lunch/>
  - *School Breakfast Scorecard*, <http://frac.org/newsite/wp-content/uploads/2009/09/breakfast091.pdf>
- *How to Read a Scientific Paper* Tutorial, [www.lib.purdue.edu/phys/inst/scipaper.html](http://www.lib.purdue.edu/phys/inst/scipaper.html)
- National Education Association, *Read Across America*, [www.nea.org/readacross/](http://www.nea.org/readacross/)
- N.C. Division of Public Health, North Carolina Nutrition Education and Training Program
  - *Students Succeed with School Meals, Fact Sheet - What's on the Menu?*, [www.nutritionnc.com](http://www.nutritionnc.com)
  - *Breakfast is Brain Fuel, Fact Sheet - What's for School Breakfast?*, [www.nutritionnc.com](http://www.nutritionnc.com)
  - *Food for Thought: Making the Grade through Healthful Eating K-5 Curriculum*, [www.nutritionnc.com](http://www.nutritionnc.com)
    - *Calories*
    - *Carbohydrates*
    - *Cut the Fat: Mooove to 1% or Less*
    - *Fats*
    - *Fiber*
    - *Food Labels: Nutrient Content Claims*
    - *Minerals*
    - *Protein*
    - *Teaching MyPlate*
    - *Vitamins*
    - *What are Oils?*
    - *What foods are in the Dairy Group?*
    - *What foods are in the Fruit Group?*

- *What foods are in the Grains Group?*
- *What foods are in the Protein Foods Group?*
- *What foods are in the Vegetable Group?*
- Share Our Strength, <http://strength.org>
- Teens Health from Nemours, *Hunger and Malnutrition*, [http://kidshealth.org/teen/food\\_fitness/nutrition/hunger.html](http://kidshealth.org/teen/food_fitness/nutrition/hunger.html)
- University of Missouri Extension, *Show Me Nutrition, Choosing Foods for Me 4<sup>th</sup> Grade Curriculum, Lesson Six, Your Day Starts with Breakfast* (Available for loan from the N.C. Division of Public Health, N.C. Nutrition Education and Training Resource Library, [www.nutritionnc.com](http://www.nutritionnc.com))
- U.S. Department of Agriculture
  - *Choose MyPlate* graphics slick  
[www.choosemyplate.gov/tipsresources/printmaterials.html](http://www.choosemyplate.gov/tipsresources/printmaterials.html)
  - *Choose MyPlate* coloring sheet  
[www.choosemyplate.gov/tipsresources/printmaterials.html](http://www.choosemyplate.gov/tipsresources/printmaterials.html)
  - *Dietary Guidance*,  
[http://fnic.nal.usda.gov/nal\\_display/index.php?info\\_center=4&tax\\_level=2&tax\\_subject=256&topic\\_id=1342](http://fnic.nal.usda.gov/nal_display/index.php?info_center=4&tax_level=2&tax_subject=256&topic_id=1342)
  - Dietary Guidelines for Americans, [www.dietaryguidelines.gov](http://www.dietaryguidelines.gov)
  - Dietary Guidelines 2010 Selected Messages for Consumers  
[www.choosemyplate.gov/downloads/MyPlate/selectedmessages.pdf](http://www.choosemyplate.gov/downloads/MyPlate/selectedmessages.pdf)
  - *Food Atlas*, [www.ers.usda.gov/FoodAtlas/](http://www.ers.usda.gov/FoodAtlas/)
  - *Food Security and Hunger Definitions*,  
[www.ers.usda.gov/Briefing/FoodSecurity/labels.htm](http://www.ers.usda.gov/Briefing/FoodSecurity/labels.htm)
  - *Food Security in the United States*, [www.ers.usda.gov/Briefing/FoodSecurity/](http://www.ers.usda.gov/Briefing/FoodSecurity/)
  - *Key Statistics and Graphics*,  
[www.ers.usda.gov/Briefing/FoodSecurity/stats\\_graphs.htm](http://www.ers.usda.gov/Briefing/FoodSecurity/stats_graphs.htm)
  - *MyPyramid for Kids Poster*, [www.mypyramid.gov/tips\\_resources/printmaterials.html](http://www.mypyramid.gov/tips_resources/printmaterials.html)
  - *MyPyramid Mini-Poster*, [www.mypyramid.gov/tips\\_resources/printmaterials.html](http://www.mypyramid.gov/tips_resources/printmaterials.html)
  - *Nutrition Facts Label*,  
[www.fda.gov/downloads/Food/LabelingNutrition/ConsumerInformation/ucm120909.pdf](http://www.fda.gov/downloads/Food/LabelingNutrition/ConsumerInformation/ucm120909.pdf)
  - *School Breakfast Program*, [www.fns.usda.gov/cnd/breakfast/](http://www.fns.usda.gov/cnd/breakfast/)
  - *School Breakfast Toolkit, Benefits of Breakfast Flyer*,  
[www.fns.usda.gov/cnd/Breakfast/expansion/benefitsbreakfast.pdf](http://www.fns.usda.gov/cnd/Breakfast/expansion/benefitsbreakfast.pdf)
  - *Using MyPlate Along with MyPyramid*,  
[www.ChooseMyPlate.gov/downloads/MyPlate/UsingMyPlateAlongWithMyPyramid.pdf](http://www.ChooseMyPlate.gov/downloads/MyPlate/UsingMyPlateAlongWithMyPyramid.pdf)
- U.S. Food and Drug Administration, *How to Understand and Use the Nutrition Facts Label*, [www.fda.gov/downloads/Food/LabelingNutrition/ConsumerInformation/ucm120909.pdf](http://www.fda.gov/downloads/Food/LabelingNutrition/ConsumerInformation/ucm120909.pdf)

**ANNOTATED BIBLIOGRAPHY**  
**Research on the Impacts of Breakfast on Children and Adolescents**

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- 1) **Affenito SG, Thompson DR, Barton BA, Franko DL, Daniels SR, Obarzanek E, Schreiber GB, Striegel-Moore.** “Breakfast Consumption by African-American and White Adolescent Girls Correlates Positively with Calcium and Fiber Intake and Negatively with Body Mass Index.” *Journal of the American Dietetic Association* 2005;105:938-945.

The authors, researchers at Saint Joseph College, Maryland Medical Research Institute, Northeastern University, Children’s Hospital Medical Center, Wesleyan University, and the National Heart, Lung, and Blood Institute, use data from the National Heart, Lung, and Blood Institute Growth and Health Study, a 9-year, longitudinal biracial cohort study with annual 3-day food records, to describe age- and race-related differences in breakfast consumption and to examine the association of breakfast intake with dietary calcium, fiber and Body Mass Index. The 2,379 study subjects were 1,166 white and 1,213 African American girls ages 9 or 10 years.

The subjects’ data regarding race and highest level of parental education were collected upon entering the study. Data collected annually included BMI by trained examiners, dietary intake from 3-day food records administered by dietetics professionals, and physical activity through the Habitual Activity Questionnaire. Breakfast was defined as any eating that occurred between 5 a.m. and 10 a.m. weekdays and 5 a.m. – 11 a.m. weekends. A model using the generalized estimating equations method was used to analyze the data.

The number of days breakfast was eaten tended to decrease with increasing age for all subjects. However, white girls reported eating breakfast more frequently than African American girls. Seventy-seven percent of white 9-year-old girls and 57 percent of African American girls ate breakfast on all 3 days, while 32 percent and 22 percent of 19-year-olds in each respective group ate breakfast all 3 days. Frequency of breakfast eating was found to be significantly associated with higher calcium and fiber intake. In one statistical model, after adjusting for site, race, age, and race-by-age and site-by-age interactions, breakfast eating frequency was a significant predictor of BMI: girls who ate breakfast more consistently had lower BMI. However, BMI was not a significant predictor in other statistical models.

- 2) **Albertson AM, Anderson GH, Crockett SJ, Goebel MT.** “Ready-to-Eat Cereal Consumption: Its Relationship with BMI and Nutrient Intake of Children Aged 4 to 12 Years.” *Journal of the American Dietetic Association* 2003;103:1613-1619.

The authors, researchers with The Bell Institute of Health and Nutrition, General Mills and the University of Toronto, examine the relationship between ready-to-eat cereal consumption and body mass index of a sample of 603 children aged 4 to 12 years. The researchers collected a 14 day self-reported food diary from each household in the study as well as height and weight measurements.

Children who consumed eight or more servings of cereal had lower mean BMIs than children who ate three or fewer servings in all age groups. Also, the

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proportion of children who were at risk for overweight or overweight was significantly lower among children who consumed the most cereal. A statistically significant inverse relationship was found to exist between the population at risk for being overweight and frequency of cereal consumption.

- 3) **Barton BA, Elderidge AL, Thompson D, Affenito SG, Striegel-Moore RH, Franko DL, Albertson AM, Crockett SJ. “The Relationship of Breakfast and Cereal Consumption to Nutrient Intake and Body Mass Index: the National Heart, Lung, and Blood Institute Growth and Health Study.” *Journal of the American Heart Association* 2005;105(9):1383-1389.**

The authors, researchers at Maryland Medical Research Institute, General Mills, Saint Joseph College, Wesleyan University and Northeastern University, describe changes in breakfast and cereal consumption of girls ages 9 to 19 years, and examine the association of breakfast and cereal intake with BMI and consumption of nutrients. They use data from the National Heart, Lung, and Blood Institute Growth and Health Study, a 9-year, longitudinal biracial cohort study with annual 3-day food records, with 2,379 girls (1,166 white and 1,213 black), ages 9 and 10 at baseline from California, Ohio and Washington, DC.

The authors analyzed three-day food records, height, weight, and age data. The researchers found that girls who consumed breakfast on each of the three days had lower BMIs than girls who skipped breakfast on all or most days. The same was true for girls who ate cereal. As girls grew older, BMI increased, but cereal eaters were leaner than girls who did not eat cereal, regardless of age.

- 4) **Bellisle F. “Effects of Diet on Behaviour and Cognition in Children.” *British Journal of Nutrition* 2004;92 (Suppl 2), S227-S232.**

The author presents a review of the literature on diet, behavior and cognitive function in children. The review looks at behavior and effects on cognition based on diet and at short-term vs. long-term effects of diet. She mentions attention-deficit/hyperactivity disorder as a condition that could be affected by intake of sugar or additives. She also reviews studies linking hyperactivity and sugar intake or the presence of food additives in the diet. According to one study, behavioral problems have been reported in thiamin-deficient adolescents with symptoms of irritability, aggressive behavior and personality changes.

She concludes that performance on demanding mental tasks improves following glucose ingestion, while easy tasks are not affected. Glucose improves attention and reaction to frustration in children, according to one study. The author stresses that, although omitting breakfast often interfered with cognition and learning, this effect was more pronounced in nutritionally at-risk children than in well-nourished children. Likewise, the author finds that it is possible to improve IQ scores in young people with micronutrient supplementation only if the subject has a poor diet. The clearest effects of nutritional manipulations on cognitive efficiency and behavior are obtained in young people with poor nutritional status.

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- 5) **Boutelle K, Neumark-Sztainer D, Story M, Resnick M. “Weight Control Behaviors Among Obese, Overweight, and Nonoverweight Adolescents.” *Journal of Pediatric Psychology* 2002;27:531-540.**

The authors, researchers at the University of Minnesota, evaluate weight control and other eating behaviors in obese, overweight and nonoverweight adolescents. A sample of 8,330 adolescents in grades 7, 9 and 11 in public schools in Connecticut participated in a survey of adolescent health in 1995-1996, The Voice of Connecticut Youth Survey (CYS). Researchers obtained data on height and weight and responses to questions about weight control behaviors, healthy eating behaviors, breakfast consumption and physical activity.

The prevalence of usual breakfast consumption was inversely related to overweight status. Overweight adolescents were less likely to eat breakfast than nonoverweight youths. Obese boys and girls and overweight boys were also less likely to eat breakfast than nonoverweight youths. More than half (53 percent) of the nonoverweight girls reported usually eating breakfast compared to only 43 percent of obese girls. In boys, 67 percent of nonoverweight boys usually ate breakfast while 57 percent of boys who were obese did the same and 59 percent of overweight boys ate breakfast regularly. Less than two-thirds of boys and less than half of the girls reported that they usually ate breakfast on a school day.

- 6) **Briefel R, Murphy M, Kung S, Devaney B: “Universal-Free School Breakfast Program Evaluation Design Project. Review of the Literature on Breakfast and Learning. Final Report.” Princeton, NJ, Mathematica Policy Research, USDA Contract No 53-3198-7-006, Dec. 1999.**

This report provides background information on the School Breakfast Program, and key features of a demonstration and evaluation mandated by the 1998 Child Nutrition Reauthorization Act of the effects of providing free breakfasts to all elementary school children. The numerous studies abstracted for the Universal-Free School Breakfast Program (USBP) Design Project Literature Review are included. These 61 studies are reviewed as they relate to (1) the link between nutrition and cognitive development of children, (2) the contribution of breakfast to children’s dietary intake and behavioral and cognitive development, and (3) the relationship between school breakfast, dietary status, and school performance and achievement.

The authors refer to recent studies which indicate a decline in breakfast consumption for children and adolescents over the past 25 years. In terms of socioeconomic characteristics, one-fourth of low-income children went to school without having had breakfast in one study. There was a consistent finding of studies that breakfast makes a significant contribution to nutrient intake over 24 hours; total daily intakes of food energy and other nutrients were significantly lower for children who did not consume breakfast. The evidence reviewed, in terms of cognitive effects, suggests that skipping breakfast interferes with cognition and learning, and that this effect is more pronounced in poorly nourished children. Existing research suggests that breakfast omission does affect the performance of specific cognitive tasks, particularly those involving memory.

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Mood, behavior, health status, and certain types of attention are also affected by skipping breakfast.

The authors cite many studies finding that universal school breakfast program participation is associated with higher rates of attendance and declines in tardiness. They mention mixed estimated effects of school breakfast participation on academic achievement, referring to studies where scores increased on the total test, but not subtests, or math scores improved where reading scores did not, and Jamaican studies that show a link between participation and cognitive functioning. A few studies also associate breakfast participation with children's psychosocial outcomes such as lower levels of anxiety, hyperactivity, childhood depression, and psychosocial dysfunction.

- 7) **Chandler AMK, Walker SP, Connolly K, Grantham-McGregor SM. "School Breakfast Improves Verbal Fluency in Undernourished Jamaican Children." *Journal of Nutrition* 1995;125(4): 894-900.**

The authors, researchers from the University of the West Indies and the University of Sheffield, examine the short-term effects of breakfast on children's cognitive functions. The subjects, 97 undernourished ( $\leq -1$  SD of reference) and 100 adequately nourished children in grades 3 and 4 in four rural Jamaican primary schools, were randomly assigned to a breakfast or placebo group. They were given four cognitive function tests. The four tests were of: visual search, digit span, verbal fluency, and speed of information processing. The digit span, a simple test of working memory, involves the immediate recall of strings of digits of increasing length. Verbal fluency refers to an individual's capacity to generate items from a specified semantic category. The task involves retrieving items from long-term memory. Heights and weights of each subject were measured, and each child completed a questionnaire to assess socioeconomic status.

After a few weeks, the treatments were reversed and the tests repeated as part of the study's cross-over design. Children in the breakfast group were given chocolate milk and a cheese sandwich while those in the placebo group received a quarter of an orange; the orange piece was not a true placebo, but acted as a control for any extra attention that the children given breakfast might receive. They were fed at 8:30 a.m. and testing was conducted from 9:00 a.m. to 12:00 p.m. by testers blind to each child's treatment and nutritional status. Undernourished children's performance improved significantly on a test of verbal fluency when they received breakfast, while that of the adequately nourished children did not change.

In the other three tests, children respond to visual or auditory stimuli. In the verbal fluency test, children must recall information, and this test also involves initiating and maintaining a mental process in the absence of any externally based organization. This means that the difference in the effect of school breakfast on verbal fluency scores may indicate that undernutrition has a primary effect on motivation.

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- 8) **Cohen B, Evers S, Manske S, Bercovitz K, Edward HG. “Smoking, Physical Activity and Breakfast Consumption among Secondary School Students in a Southwestern Ontario Community.” *Canadian Journal of Public Health* 2003;94:41-44.**

The authors, researchers from the University of Guelph and University of Waterloo, both in Ontario, Canada, investigate the prevalence of smoking, low levels of physical activity, and missing breakfast to see if these behaviors are related and if there are gender differences. A sample of 318 students in grades 9 through 12 in three schools in southwestern Ontario completed surveys administered by teachers in grade 10 English classes.

Less than half (42.8 percent) of the students ate breakfast every day, and missing breakfast was more common among girls (63.9 percent). Among boys, nearly twice as many non-smokers, 60.4 percent, ate breakfast than smokers, 31.9 percent. There was no difference in daily breakfast consumption between girls who smoked and girls who did not smoke. Students who ate breakfast daily were more likely to participate in physical activity three or more times a week than breakfast skippers.

A higher proportion of girls concerned about gaining weight were more likely to skip breakfast (70 percent) than girls who were not concerned (51 percent). Girls concerned about gaining weight were also less likely to engage in physical activity or smoke.

- 9) **Cook JT, Ohri-Vachaspati P, Kelly GL. “Evaluation of a Universally-Free School Breakfast Program Demonstration Project, Central Falls, Rhode Island.” Center on Hunger, Poverty and Nutrition Policy, Tufts University, Medford, MA, 1996.**

Tufts University researchers prepare a “rapid assessment” evaluation to examine whether the shift from the regular School Breakfast Program to the Universally-Free School Breakfast Program, entitled “Operation Breakfast,” had an effect on school breakfast participation, morning nutrient intake, absenteeism and tardiness.

Using a sample of 225 students in grades Pre-K through 6 in Central Falls, RI, school district, and a control group sample of 225 students from Providence, RI, schools, they obtained data from interviews, school attendance and tardiness records, and nutrient content of breakfasts.

They found that participation in school breakfast increased nearly 60 percent among Central Falls students compared to the control group after the universally-free program was implemented, and the proportion of children in poor families participating increased 71 percent.

Tardiness rates declined significantly in intervention schools. The proportion of children chronically tardy (tardy on more than 10 percent of days) decreased by 67 percent in treatment schools, and increased by 50 percent in control schools. The proportion of children not eating breakfast declined by 36 percent in intervention schools after implementation of the universally-free program.

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**10) Cueto S. “Breakfast and Dietary Balance: the enKid Study, Breakfast and Performance.” *Public Health Nutrition* 2001;4(6A):1429-1431.**

This review analyzes studies examining the effect of breakfast consumption on energy availability, nutritional status, school attendance and performance. The author suggests that the effect of fasting on academic performance is not the same for each child, but depends on the child’s nutritional status.

Breakfast consumption had a short-term effect in improving selected learning skills, especially work memory. School breakfast programs had a positive effect on the nutritional status of children, on school attendance and, most likely, on dropout rates, according to studies conducted in Jamaica, Peru and the United States – Baltimore and Philadelphia. However, it was not enough that students have better nutritional status and they attend school. Apparently all students having school breakfast were in a better condition to perform at school, but whether this benefit can definitely be obtained depended on the school environment (well-illuminated, aired rooms; enough space; adequate teaching; etc.)

The effect of breakfast consumption on school performance depended on the interaction between the program, student characteristics, and school organization. Unless the school setting guaranteed a minimum quality standard, the benefits of breakfast consumption were not evident in performance in complex areas like language or math.

**11) Fiore H, Travis S, Whalen A, Auinger P, Ryan S. “Potentially Protective Factors Associated with Healthful Body Mass Index in Adolescents with Obese and Nonobese Parents: A Secondary Data Analysis of the Third National Health and Nutrition Examination Survey, 1988-1994.” *Journal of the American Dietetic Association* 2006;106:55-64.**

The authors, researchers from the University of Rochester and Yale School of Medicine, use data from a sample of 1,890 adolescents ages 12-16 from the Third National Health and Nutrition Examination Survey, 1988-1994 (NHANES III), to identify potentially protective factors against obesity in adolescents with and without obese parents. The data included height, weight, a 24-hour dietary recall, frequency of breakfast consumption, physical and lifestyle characteristics, arithmetic and reading tests, and parental BMI. Bivariate analyses were used to examine the association between variables using SPSS and SUDAAN software.

The researchers found from data analysis that adolescents eating breakfast every day had healthful BMIs (between the  $\geq 15^{\text{th}}$  and  $< 85^{\text{th}}$  percentile of study participants) when compared with those eating breakfast rarely. In addition, adolescents with one or two obese parents who ate breakfast some days or every day were significantly more likely to have healthful BMIs than those who ate breakfast rarely. This study examined these associations using a large nationally representative sample, allowing the results to be applicable to more people.

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**12) Gleason P, Sutor C. “Food for Thought: Children’s Diets in the 1990s.”  
Mathematica Policy Research, Inc.: Princeton, NJ. March 2001.**

The authors, a senior researcher at Mathematica Policy Research, Inc, and a nutrition policy consultant in Northfield, Vermont, summarize two studies of children’s nutrition conducted by Mathematica Policy Research, Inc., for the Food and Nutrition Service of the USDA using the 1989-1991 and 1994-1996 Continuing Survey of Food Intakes by Individuals (CSFII). The goal of the policy brief was to describe the diets of school-age children in the mid-1990s, examine relationships between their participation in the school meal programs and dietary intake, and examine changes in their intake between 1989-1991 and 1994-1996. The analysis used data for more than 5,000 children ages six to 18 who completed the CSFII dietary intake interviews in either period.

The authors found that children consumed too much dietary fat and sodium, and a large proportion of their food energy came from added sugars. Children who ate a school lunch got 15 percent of their lunch calories from saturated fat and 13 percent from added sugars. Those who did not eat a school lunch got 11 percent of their lunch calories from saturated fat but got 23 percent from added sugars.

Most children consumed enough vitamins and minerals, but many children were at risk of inadequate intakes of vitamins A and E, zinc, folate, and magnesium. Most children ate fewer than the Food Guide Pyramid - recommended three servings of vegetables, two servings of fruit, and two servings of meat or meat alternates. However, those who participated in both school breakfast and lunch programs came closer to meeting the “five-a-day” goal for fruit and vegetable consumption, with 4.5 servings a day, than nonparticipants, with 3.8 servings a day. In terms of beverage consumption, students who ate a school lunch drank about three times as much milk at lunchtime, but only half as much soda as those who did not eat a school lunch.

**13) Grantham-McGregor S, Chang S, Walker S. “Evaluation of School Feeding Programs: Some Jamaican Examples.” *American Journal of Clinical Nutrition* 1998;67(4) 785S-789S. (See #7 for related findings.)**

The authors, researchers from the Centre for International Child Health, University of London, and University of the West Indies, test the hypothesis that a daily school breakfast can improve children’s academic achievement. The subjects in the sample, 100 undernourished and 100 adequately nourished 8-11 year-old schoolchildren in grades 3 and 4 from four rural Jamaican schools, were randomly assigned to receive breakfast or a slice of orange as a placebo for one week. Two weeks later the treatment was reversed for one week in this crossover study. All subjects were given four cognitive function tests: visual search, digit-span forwards (which measures auditory working memory), categoric fluency (which measures an individual’s capacity to generate items from a specific category, for example naming as many items as possible from two sets: animals and things to eat), and speed of decision making. Classroom behavior was also observed in 60 undernourished and 60 adequately nourished children after

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treatment or placebo where talking, moving without permission, answering the teacher's questions, and time spent paying attention were recorded.

The undernourished children performed better after they received breakfast, significantly so on the categoric fluency test, while adequately nourished children had no change in scores. Overall there were no effects of treatment on classroom behavior in the schools. However, in one school, the children's attention to a task increased significantly with breakfast, while attention at other schools did not change significantly. In two other schools, behavior deteriorated significantly with breakfast and children were less attentive to set tasks. The researchers note that the facilities were different at each school; the school that saw improvement in classroom behavior had the best facilities while the two that saw a decline had less space and more crowded rooms. Cognitive function improved in the undernourished children when they received breakfast, but not in the adequately nourished children. The authors hypothesize that undernourished children's cognitive function improves with breakfast, but changes in behavior seem to depend on the school structure and facilities.

- 14) Gross SM, Bronner Y, Welch C, Dewberry-Moore N, Paige DM. "Breakfast and Lunch Meal Skipping Patterns among Fourth-Grade Children from Selected Public Schools in Urban, Suburban, and Rural Maryland." *Journal of the American Dietetic Association* 2004;104(3):420-3.**

The researchers, from Morgan State University, Johns Hopkins University, and Fox Chase Cancer Center, describe breakfast and lunch consumption patterns in a sample of 540 fourth-grade public school children from 16 Maryland public schools in rural, suburban and urban regions using an in-classroom questionnaire in which they reported the number of days per week they ate breakfast and/or lunch. Seventeen percent of the students reported skipping breakfast at least three times per week. Urban students (27 percent) were more than twice as likely to skip breakfast as suburban (8 percent) and rural (13 percent) students.

- 15) Jacoby E, Cueto S, Pollitt E. "Benefits of a School Breakfast Program among Andean Children in Huaraz, Peru." *Food and Nutrition Bulletin* 1996;17:54-64.**

The authors, researchers from University of California at Davis and the Instituto de Investigación Nutricional, Lima, Perú, conduct a randomized, controlled trial to measure the short-term impact of school breakfast on diet, attendance, and cognition in schoolchildren from 10 rural schools in Huaraz, Peru, in grades 4 and 5. Each school was randomly assigned to a treatment or control group. The data showed increased dietary intakes of energy, protein, and iron, as well as improved rates of attendance and performance on a vocabulary test. The study was an effectiveness trial, conducted under the 'real-world' conditions of the school setting. The researchers used a 24-hour recall method to determine dietary intake, records from teachers on attendance, and six tests, three on cognitive processes and three on complex mental abilities. Data was also collected on socio-economic status and individual characteristics of the child.

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Eating breakfast had a significant positive effect on vocabulary test performance, and among the students in the treatment group, weight was positively associated with improved vocabulary test scores. Attendance increased among treatment schools, and declined among control schools with a statistically significant inter-group difference. Because of its effects on attendance, it is possible to infer that the breakfast program could be an incentive to keep children in school, a major problem in the educational system in Peru.

- 16) Jones SJ, Jahns L, Laraia BA, Haughton B. “Lower Risk of Overweight in School-aged Food Insecure Girls Who Participate in Food Assistance: Results from the Panel Study of Income Dynamics Child Development Supplement. *Archives of Pediatric and Adolescent Medicine* 2003;157:780-84.**

The authors, researchers from the University of Tennessee and University of North Carolina at Chapel Hill, use data from the 1997 Panel Study of Income Dynamics Child Development Supplement (PSID CDS), to compare 5 to 12 year-old children, in terms of gender, prevalence of overweight (BMI  $\geq$  85<sup>th</sup> percentile), food insecurity status, and participation in food assistance programs. In the sample of 772 low-income families with at least one child meeting age and BMI requirements, Stata software was used to calculate prevalence of risk of overweight as compared to food security status and food assistance participation. Girls in food insecure households had significantly reduced odds (68 percent) of being at risk of overweight if they participated in school lunch and breakfast programs.

- 17) Kleinman RE, Hall S, Green H, Korzec-Ramirez D, Patton K, Pagano ME, Murphy JM. “Diet, Breakfast, and Academic Performance in Children.” *Annals of Nutrition & Metabolism* 2002;46(suppl 1):24-30.**

The authors, researchers from Harvard Medical School, Massachusetts General Hospital, Boston Public Schools, Project Bread/The Walk for Hunger, and Brown University, test whether nutrient intake and academic and psychosocial functioning improve after the start of a universal-free school breakfast program (USBP). They gather nutrition, school breakfast participation, hunger status and academic grade information from 97 students in grades 4 to 6 in Boston public schools for one week before and one week after a 6 month implementation of universal-free school breakfast program. They found improved math scores, attendance, nutritional status, behavior and psychosocial functioning, and increased participation, especially for students deemed ‘at nutritional risk’ by a hunger status questionnaire.

- 18) Mahoney CR, Taylor HA, Kanarek RB, Samuel P. “Effect of Breakfast Consumption on Cognitive Processes in Elementary School Children.” *Physiology & Behavior* 2005;85:635-645.**

Studying the relationship between breakfast composition and cognitive performance in elementary school children, the authors, researchers at Tufts University and the Quaker Oats Company, conducted two experiments to examine how instant oatmeal, ready-to-eat cereal and no breakfast affect American

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children's cognition. Subjects received either oatmeal, ready-to-eat cereal or no breakfast one day a week for four weeks after filling out a mini-questionnaire. Their parents were instructed not to feed the children after 10:00 p.m. the night before and reminded by phone call not to provide breakfast in the morning. Experimenters blind to the breakfast conditions administered tests in spatial memory, short-term memory, visual perception, visual attention, and auditory attention.

In the trial with 15 male and 15 female middle class, 9-11 year-olds in the United States, both genders showed enhanced spatial memory and girls had improved short-term memory after consuming oatmeal. In the second trial, 15 male and 15 female middle class, 6-8 year-olds in the United States, boys and girls had better spatial memory and auditory attention and girls showed better short-term memory after an oatmeal breakfast. Performance in visual perception and spatial memory tasks was significantly better after consuming either breakfast than no breakfast at all.

**19) McLaughlin JE, Bernstein LS, Crepinsek MK, Daft LM, Murphy JM. "Evaluation of the School Breakfast Program Pilot Project: Findings from the First Year of Implementation." U.S. Department of Agriculture, Food and Nutrition Service 2002. Report No. CN-02-SBP.**

This was a congressionally mandated study to assess the implementation and impact of a three-year universal-free breakfast demonstration. The study sample included 153 schools: 79 treatment schools and 74 control schools with a total of 4,290 children, grades 2-6, with 30 students per school. The schools were in six school districts in Alabama, Arizona, California, Idaho, Kansas and Mississippi and included urban and rural schools with varying family income levels.

Outcome variables included rate of participation, skipping breakfast, consuming a nutritionally substantive breakfast, participation of breakfast in classrooms vs. in the cafeteria, as well as academic performance, attendance, tardiness, prevalence of overweight, behavior, and nutrient intake. Data was collected through in-person interviews with students to obtain 24-hour dietary recall, breakfast intake, source, pattern attitudes, participation and plate waste. Cognitive function tests were administered, including Stimulus Discrimination, Digit Span, and Verbal Fluency. Height and weight measurements, in-person interviews with parents, questionnaires completed by teachers, and school records were also collected. Federal nutrition standards for breakfast were maintained for each school, but each treatment school was free to determine what would be served for breakfast as well as how, when, and where it would be served.

School breakfast participation increased significantly more in treatment schools than in control schools, by 17 percentage points (from 19 to 36 percent) as opposed to 1 percentage point (from 19 to 20 percent). Participation increased by 33 percentage points in one school district in treatment schools where students ate breakfast in the classroom. When breakfast was defined as providing at least 10 percent of the RDA for food energy and food from two different food groups, treatment school students were significantly more likely than controls to consume breakfast. No significant differences were found for any of the cognitive tests, nor

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were impacts discovered from a Pediatric Symptom Checklist (PSC). There were no significant effects in attendance or tardiness rates; however, attendance levels were very high before implementation, with 95-96 percent across treatment and control schools. On the Conners' Teachers Rating Scale, there was a significant decrease in oppositional scores for students in the treatment schools. On this scale, individuals scoring high are more likely to break rules and have problems with persons in authority, and are more easily annoyed and angered than most individuals their own age. Treatment school students and parents were significantly more likely to have positive attitudes towards breakfast than students and their parents at control schools.

Among 'changers,' students who increased school breakfast participation by at least 40 percentage points, attendance increased significantly, tardiness decreased significantly, and the students and parents generally had more positive attitudes toward school breakfast.

**20) Meyers A, Sampson AE, Weitzman M, Rogers BL, Kayne H. "School Breakfast Program and School Performance." *American Journal of Diseases of Children* 1989;143:1234-39.**

The authors, researchers at Boston City Hospital, Boston University School of Medicine, Tufts University School of Nutrition, and Boston University School of Public Health, study changes in scores on standardized achievement tests, The Comprehensive Test of Basic Skills (CTBS) and rates of absence and tardiness after the School Breakfast Program (SBP) is implemented in schools.

In Lawrence, MA public schools, the school breakfast program began at the start of the second semester of the 1986-1987 school year and standardized achievement tests were administered annually. In this school system, 71 percent of the children were low-income and eligible for free or reduced-price school meals. Of these children, 58 percent were Hispanic, 37 percent white non-Hispanic, 2 percent black, and 2 percent Asian. Six of the school district's 16 elementary schools were chosen for the study. All children in grades 3 through 6 were considered eligible for the study if they qualified for free or reduced price lunch, were registered in the Lawrence public schools, and had parental consent. Attendance at school breakfast was monitored for one week to determine participation; students were classified as participants if they attended school breakfast at least 60 percent of days of the week, nonparticipants if they did not attend breakfast on any days, and the remaining children were excluded from the study. The CTBS scores of academic achievement were obtained and attendance and tardiness data were collected from school records. Of the 1023 children in the study sample, 335 (33 percent) were school breakfast participants.

Increases in CTBS total scores after implementation of the School Breakfast Program were significantly greater for school breakfast participants. Tardiness rates decreased significantly for participants and increased for nonparticipants. Absence rates were significantly lower for school breakfast participants after implementation of the School Breakfast Program. The authors find that participation in school breakfast by low-income children has a significant

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association with improvement in standardized achievement test scores and rates of absence and tardiness.

**21) Miller G, Forgac T, Cline T, McBean L. “Breakfast Benefits Children in the US and Abroad.” *Journal of the American College of Nutrition* 1998;17:4-6.**

This editorial briefly gives a recapitulation of studies relating to breakfast and calcium and other nutrient consumption as well as ability to learn. The authors refer to studies saying that participating in the School Breakfast Program not only improves total daily nutrient intake and nutritional status, but also enhances students’ ability to learn. They also relate that hungry children, regardless of income or socioeconomic status, face difficulties learning. They find that children who eat breakfast make fewer errors on standardized achievement tests, improve in attendance and attention, and are tardy less often. Furthermore, missing breakfast reduces children’s speed and accuracy of information retrieval and memory. The authors conclude that the availability of breakfast for all U.S. students would be instrumental in improving their nutrient status and academic performance.

**22) Murphy JM, Wehler CA, Pagano ME, Little M, Kleinman RF, Jellinek MS. “Relationship Between Hunger and Psychosocial Functioning in Low-Income American Children.” *Journal of the American Academy of Child & Adolescent Psychiatry* 1998;37:163-170.**

The authors, researchers with the Child Psychiatry Service, Massachusetts General Hospital, Boston, the Community Childhood Hunger Identification Project, and Harvard Medical School, interview 200 low-income public school students with permission of their parents to examine the relationship between food insufficiency and hunger and psychosocial functioning. Looking at the results from the Pediatric Symptom Checklist (PSC), Child Behavior Checklist (CBCL) and the Conners Teacher Rating Scale-39 (CTRS-39), and school records, the researchers found that hungry and at-risk for hunger children were absent, late, hyperactive and had behavioral and attention problems more often than non-hungry children

**23) Murphy JM, Pagano M, Nachmani J, Sperling P, Kane S, Kleinman R. “The Relationship of School Breakfast to Psychosocial and Academic Functioning: Cross-sectional and Longitudinal Observations in an Inner-City Sample.” *Archives of Pediatric and Adolescent Medicine* 1998;152:899-907.**

The authors, researchers from Massachusetts General Hospital, Harvard Medical School, Northwestern University, Philadelphia School District and Baltimore Public Schools, conduct interviews and collect school breakfast participation and school records information before and four months after a universally free breakfast program is implemented. The goal is to determine if there is a relationship between school breakfast program participation and psychosocial and academic functioning. The Children’s Depression Inventory questionnaire and the Revised Children’s Manifest Anxiety Scale are used to determine depressive and anxiety symptoms respectively. Parents complete the

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Pediatric Symptom Checklist questionnaire to identify children with psychosocial dysfunction and teachers use the Conners' Teacher Rating Scale-39 to assess hyperactivity. From this study involving 133 students in grades 3 through 6 or 8 in the initial sample and 110 in the second interview, the researchers found strong evidence for a relationship between school breakfast participation and academic performance in terms of math grades, attendance and punctuality, as well as psychosocial functioning regarding anxiety level and hyperactivity.

**24) Murphy JM et. al. "Maryland Meals for Achievement Year III Final Report." Massachusetts General Hospital, Boston, MA, 2001.**

This report provides an evaluation of the third year of the Maryland Meals for Achievement (MMFA) program, encompassing 55 schools in Maryland that served breakfast free to all students in the classroom. The evaluation includes monitoring and assessing the program's relationship to academic outcomes, student behavior, and the learning environment. To measure academic outcomes, school-wide averages of Maryland School Performance Assessment Program (MSPAP) scores, attendance records and other information from school principals are used.

The report finds that participation in school breakfast increased nearly threefold from 27 percent to 72 percent. Surveys completed by more than 90 percent of teaching and non-teaching staff revealed that high percentages (80 percent or more) believed that classroom and learning environments had improved as a result of the breakfast program. Staff members also believed that the program led to decreased numbers of behavior problems in schools.

There were no statistically significant differences in standardized test scores between implementation schools and control schools. However, implementation schools did show larger increases in standardized test scores than control schools.

**25) Murphy JM, Pagano M, Bishop SJ. "Impact of a Universally Free, In-Classroom School Breakfast Program on Achievement: Results from the Abell Foundation's Baltimore Breakfast Challenge Program." Massachusetts General Hospital, Boston, MA, 2001.**

Researchers examine data and scores were examined for 31 schools in Baltimore that participated in an in-classroom breakfast program for at least two years and a comparison group of 17 schools about to begin universal breakfast programs the next fall.

The relationship between breakfast program status and standardized test scores (Maryland State Pupil Assessment Project (MSPAP) scores), School Performance Index (SPI) scores, and attendance are assessed. Data are analyzed using Oneway and Multiple Analysis of Variance tests.

Universal school breakfast schools had significantly higher attendance following implementation of the free breakfast program. There was no significant difference in *actual* MSPAP or SPI scores between universal free breakfast and comparison schools. However, schools with free breakfast had significantly greater positive *changes* in academic performance scores than comparison schools.

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Schools that provided breakfast without charge for three years improved significantly more in attendance than both comparison schools and schools that participated in the program for two years.

**26) Murphy JM, Pagano ME, Patton K, Hall S, Marinaccio J, Kleinman R. “The Boston Public Schools Universal Breakfast Program: Final Evaluation Report.” Massachusetts General Hospital, Boston, MA, 2000.**

The authors, researchers at Massachusetts General Hospital and Harvard Medical School, conduct a final evaluation report of the impact of Boston Public Schools’ Universal Breakfast Program on breakfast participation rates, overall satisfaction, and academic and health outcomes. In December 1998, 14 elementary and middle schools in Boston started the Universal Breakfast Program (UBP). The researchers survey 1044 students, parents and school staff to measure overall satisfaction. Interviews were conducted with 97 students and their parents to assess the impact of the program on hunger, nutrition status and emotional functioning. Official student records were used for student grades and absence and tardiness rates. Data from the Boston Public School’s Department of School Food Services records were gathered to measure changes in school breakfast participation rates. The participation and attendance rates were gathered from one week prior to the start of the universal breakfast program and another week after the program had been in place for about six months. The Community Childhood Hunger Identification Project (CCHIP) was used to assess the hunger status of students, 24-hour dietary recalls were used for nutritional assessments, and the Pediatric Symptom Checklist (PSC) and Pediatric Symptom Checklist Youth Self-Report (PSC-Y) were used to measure emotional functioning. Students were considered to be at nutritional risk if they were consuming 50 percent or less of the Recommended Dietary Allowance of two or more major nutrients and/or 50 percent or less of the RDA for energy.

Researchers found that, before universal breakfast was implemented, about one quarter of the students were hungry or at risk for hunger and about one-third were at moderate or serious nutritional risk.

Increased school breakfast participation was associated with improved nutrition status, academic achievement, and math grades, as well as reduced symptoms of hunger, absence and tardiness rates, and fewer emotional or behavioral problems. Students who increased their school breakfast participation rates were two to three times more likely to show an improvement in nutritional status than students whose participation stayed the same or declined. Among the school staff, nearly 60 percent reported a positive change in student behavior and 63 percent reported an improvement in student attentiveness.

School-wide averages on the Massachusetts Comprehensive Assessment System (MCAS) increased three points more in the schools participating in universally free breakfast programs over matched comparison schools. School breakfast participation increased more than 30 percent after the first year of implementation and remained at that rate. The participation rate increased 100 percent in the three schools that implemented a classroom-based approach to serving breakfast. Students who were nutritionally at-risk had significantly lower

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grade point averages, more symptoms of emotional/behavioral problems, and experiences of hunger than better nourished children. More than half of nutritionally at-risk students and two thirds of hungry children prior to universal breakfast implementation increased their participation in school breakfast. These same students who improved their nutritional status also had significantly larger improvements in school attendance and psychological functioning, decreases in hunger, and improvements in math grades, than students who did not improve their nutritional status.

**27) Murphy JM, Drake JE, Weineke KM. “Academics & Breakfast Connection Pilot: Final Report on New York’s Classroom Breakfast Project.” Nutrition Consortium of New York State. Albany, New York. July 2005.**

This report evaluates 20 schools in upstate New York implementing the Academics & Breakfast Connection (ABC) Pilot in which they served breakfast to all students at no charge, regardless of income, and students consumed their meals in the classroom setting.

Each school designed its own plan for implementing classroom breakfast. Meals were delivered to classrooms in 11 schools; students got meals from a cafeteria line and then took them to classrooms in two schools; students picked up breakfasts at hallway stations in three schools; and four schools used a combination of methods, with one school delivering breakfast to younger students and using a cafeteria line for older students. The schools also differed in menu planning, with some serving both hot and cold meals and some serving only hot or cold meals. To evaluate the program, data were collected on breakfast program participation rates, absence rates, tardiness rates, disciplinary referrals, and visits to the school nurse. Teachers and principals also completed surveys on the effect and impact they perceived from the program.

After schools implemented the pilot program school breakfast participation more than doubled, increasing from 23 percent to 58 percent. Tardiness and disciplinary office referrals decreased significantly. Absence rates and visits to the school nurse also declined, although not reaching statistical significance. Of the principals of the schools involved in the pilot program, 100 percent believed that the pilot made an important contribution to the education process, and 87 percent reported that they believed the pilot program contributed to improvements in academic performance. Nearly 80 percent of teachers at participating schools also thought that the pilot made an important contribution to the education process, 72 percent reported that the pilot did not interfere with teaching, and 85 percent reported fewer complaints of hunger from students. Seventy-nine percent of the teachers supported continuation of the pilot program and 75 percent of the principals reported plans to continue the pilot into the next school year. The authors of the study conclude that classroom breakfast works and that the pilot program resulted in decreased hunger and improvements in factors critical to student learning such as tardiness and disciplinary referral rates.

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- 28) Nicklas TA, Bao W, Webber LS, Berenson GS “Breakfast Consumption Affects Adequacy of Total Daily Intake in Children.” *Journal of the American Dietetic Association* 1993; 93(8):886-891 .**

The authors, researchers from Tulane University Medical Center, School of Public Health and Tropical Medicine, compared daily nutrient intakes of children eating breakfast at home, school, or not at all, using data from the Bogalusa Heart Study. For a sample size of 467 ten-year-old students, 24-hour dietary interviews were conducted and the sample was divided into three groups of children who ate breakfast: at home (41 percent), at school (43 percent), or not at all (16 percent). The 24-hour dietary recall was analyzed using the Extended Table of Nutrient Values (ETNV) and then with the Statistical Analysis System.

The highest percentage of breakfast skipping (24 percent) occurred in black girls. Children who consumed breakfast at school had significantly higher mean daily intakes of energy and protein. A higher percentage of children who skipped breakfast did not obtain two-thirds of the RDA for vitamins A, E, D, and B<sub>6</sub>, as well as other minerals studied. The authors conclude that school breakfasts could play a role in correcting some of the dietary inadequacies of school-age children.

- 29) Nicklas TA, Morales M, Linares A, Yang SJ, Baranowski T, De Moor C, Berenson G. “Children’s Meal Patterns Have Changed over a 21-Year Period: The Bogalusa Heart Study.” *Journal of the American Dietetic Association* 2004;104:753-761.**

The authors, researchers at Baylor College of Medicine, University of Houston-Downtown, Houston, TX, University of Texas, and Tulane School of Public Health and Tropical Medicine, analyze children’s meal patterns over two decades. Dietary intake data were collected from 1,584 10-year old children in Bogalusa, LA, from 1973-1994. One 24-hour dietary recall was collected on each child who participated in one of seven cross-sectional surveys.

From 1973 to 1978, there was a significant increase in the percentage of children who skipped breakfast, from 8 percent to 30 percent. The percentages of children skipping breakfast were significant for each gender and ethnic group. When the National School Breakfast Program was introduced in 1981, the proportion of children skipping breakfast declined to 13 percent.

- 30) Pollitt E, Matthews R. “Breakfast and Cognition: An Integrative Summary.” *American Journal of Clinical Nutrition* 1998;67(4):804S-813S.**

The authors of this review of the literature, researchers from the University of California Davis and R. Matthews & Associates, evaluate research design, cognitive functions, scholastic achievement and school attendance, breakfast composition, size and timing and research data. They compare experimental research designs which control for the potential effect of confounders such as the timing and composition of the evening and breakfast meals, duration of fasting, compliance to fasting, and motor activity of the subjects, recommending randomized, controlled crossover designs within this scheme to further minimize intersubject variability by exposing the same subjects to both breakfast and fasting periods. The other studies they examine employ a quasi-experimental

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design, which has some of the features of an experimental design, but does not control for all potentially confounding factors. They determine that, theoretically, breakfast may affect brain function and cognitive test performance by two biological mechanisms, one involving metabolic changes associated with fuel and nutrient supply to the central nervous system, the other involving the changes breakfast may have on nutritional intake and status which could affect cognition. They point to studies focusing on breakfast omission that have found diminished speed and accuracy on tests of visual and auditory short-term memory, immediate recall, delayed recall, recognition memory, and spatial memory. In areas unrelated to memory, breakfast omission was associated with lower performance in a visual discrimination of competing stimuli, a verbal fluency test, and arithmetic tasks.

In terms of academic improvement, three studies reported improved scores on some scholastic tests given in schools participating in a breakfast program. These included improvements in combined scores of language, reading, and math in U.S. low-income students, arithmetic in rural Jamaican schoolchildren, and vocabulary scores in undernourished Peruvian children. In all three studies, participation in the school breakfast program significantly increased school attendance.

Looking at other breakfast components, no change in cognitive performance was observed in a comparison of a cooked compared with a cereal-and-toast breakfast. Breakfast size, or the energy load of the breakfast meal, can play a role, however, as shown in one study where a breakfast which provided 25 percent of the average daily requirements for energy improved performance on a creativity test, compared with children consuming a breakfast with less than 10 percent of daily energy requirements. (Wyon et al. (44)) In terms of timing, one study found that students who ate breakfast 30 minutes before cognitive testing had significantly higher overall cognitive scores than those who did not eat breakfast or ate it at home. (Vaisman et al. (41))

**31) Pollitt E. “Does Breakfast Make a Difference in School?” *Journal of the American Dietetic Association* 1995;95(10):1134-39.**

This literature review by a University of California Davis researcher examines articles between 1978 and 1995 that test the effects of breakfast on cognition and school performance. The author proposes that two biological mechanisms that operate simultaneously underlie the effects of breakfast on cognitive function: short-term metabolic changes associated with the immediate supply of energy and nutrients to the brain, and the sustained contributions of breakfast to a person’s health status over time. The second mechanism is especially relevant for children who are undernourished.

The author refers to studies where nutritionally at-risk children improved their performance on cognitive tests when they ate breakfast; where consuming breakfast improved students’ performance in spatial memory and immediate recall; where the School Breakfast Program made a difference as to whether children ate breakfast at all; and where eating breakfast had significant effects on arithmetic test scores and school attendance.

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He finds that in children who are nutritionally at-risk (defined by clinical history and anthropometry), skipping breakfast alters brain function and has adverse effects on cognition, particularly in the speed and accuracy of information retrieval in working memory. These consequences were especially true for children lacking iron, while it is unclear whether similar consequences exist for well-nourished children.

**32) Pollitt E, Leibel RL, Greenfield D. "Brief Fasting, Stress, and Cognition in Children." *American Journal of Clinical Nutrition* 1981;34:1526-1533.**

The authors, researchers at the University of Texas, Rockefeller University and University of Miami, attempt to determine the effects of skipping breakfast on speed and accuracy of response in a problem-solving situation, on sustained attention, and on memory in 9 to 11 year old, well-nourished, middle class children. Twenty-two girls and 12 boys were admitted twice, at about 7 day intervals, to the Clinical Research Center at the Massachusetts Institute for Technology where dinner was served and the next morning half of the sample was served breakfast (BR) and the other half received no breakfast (NBR). Breakfast consisted of waffles and syrup, margarine, orange juice and milk. The children were given cognitive tests, including: the Matching Familiar Figure Test (MFFT), the Continuous Performance Task (CPT), the Hagen Central-incidental Task (HCI), and the Peabody Picture Vocabulary Test (PPVT), which was used to compare IQ as a possible moderating variable. Blood samples were taken from each child the night before the treatment or control and after the tests.

In the memory test, there was a statistically significant difference in the last recall item of the series; the subjects who skipped breakfast performed better. There was a significant association between IQ and MFFT error. For subjects with IQs below the median, the number of errors increased from the breakfast to the no breakfast condition. However, for those subjects with IQs above the median the mean number of errors dropped slightly from breakfast to no breakfast. Subjects whose glucose values fell from the breakfast to the no breakfast condition were likely to have an increase in the number of errors in the MFFT.

Fasting had an adverse effect on the accuracy of responses in problem solving, but it had a beneficial effect on immediate recall in short-term memory. Both effects are explained by a heightened arousal level associated with the brief experimental fast.

**33) Pollitt E, Cueto S, Jacoby ER. "Fasting and Cognition in Well- and Undernourished Schoolchildren: A Review of Three Experimental Studies." *American Journal of Clinical Nutrition* 1998;67(4):779S-784S.**

The authors, researchers at the University of California Davis and Instituto de Investigación Nutricional, Lima, Perú, tested a hypothesis that an extended fast (overnight and morning, skipping breakfast) interferes with attention and working memory processes. In this blinded study, with a well-nourished American group, and with low income -- with and without nutritional risk-- Peruvian groups, 9-11 year old subjects ate dinner and were randomly assigned to a breakfast or placebo

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group for experiment 1 and to the reverse for experiment 2. The American children completed the Matching Familiar Figures Test and the Hagen Central Incidental Test. Three paper and pencil tests: number discrimination, Peabody Picture Vocabulary Test, and the Raven Progressive Matrices, and three computerized tests (Simple Reaction Time, Stimulus Discrimination, and Sternberg Memory Search Test) were administered to the Peruvian children. Blood samples were also drawn to determine glucose concentrations. U.S. subjects performed better on the matching figures test when given breakfast and for Peruvian children, fasting delayed response time on the stimulus discrimination test. In general, nutritionally at-risk children were more affected by not eating breakfast.

- 34) Powell CA, Walker SP, Chang SM, Grantham-McGregor SM. “Nutrition and Education: a Randomized Trial of the Effects of Breakfast in Rural Primary School Children.” *American Journal of Clinical Nutrition* 1998;68:873-9.**

The authors, researchers from the University of the West Indies, Kingston, Jamaica, randomly assigned 407 undernourished children and 407 adequately nourished children to a breakfast or control group. With a goal of determining the effect of providing a school breakfast on attendance, nutritional status and academic achievement, their randomized and controlled feeding trial showed that eating breakfast improves attendance and achievement in arithmetic.

- 35) Rampersaud GC, Pereira MA, Girard BL, Adams J, Metz J. “Breakfast Habits, Nutritional Status, Body Weight, and Academic Performance in Children and Adolescents.” *Journal of the American Dietetic Association* 2005;105:743-760.**

In this review of the literature, the authors, researchers at the University of Florida, University of Minnesota, Wheat Foods Council, and Cornell Medical College analyze and summarize the results of 47 studies (from 1970-2004) concerning associations between breakfast consumption and nutritional adequacy, body weight, and academic performance. Breakfast eaters tend to have more adequate nutrient intakes, are less likely to be overweight, and have improved cognitive function in terms of memory, test grades, and school attendance. They find that some studies provide evidence that the BMIs of children or adolescents who skip breakfast are higher than those who consume breakfast. They discuss a study in which consuming a school breakfast 30 minutes before testing was helpful to recall. Children at nutritional risk especially benefited from eating breakfast. Observational studies included in the review show a beneficial effect of breakfast consumption on test scores, grades, attendance, and punctuality.

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- 36) Reddan J, Wahlstrom K, Reicks M. “Children’s Perceived Benefits and Barriers in Relation to Eating Breakfast in Schools with or without Universal School Breakfast.” *Journal of Nutrition Education and Behavior*. 2002;34:47-52.**

The authors, researchers at the University of Minnesota, use a teacher-administered survey at the end of a three-year pilot program to identify and compare perceived benefits and barriers related to breakfast consumption and concerns about weight among children in schools with or without universal school breakfast programs. Surveys were given to 1,442 students in grades 4 through 6 in six universal breakfast pilot schools and four control schools.

In the survey, 70 percent of all children reported that they very often think eating breakfast is important, and 23 percent indicated that they sometimes think eating breakfast is important. These findings parallel those of breakfast eating frequency with 74 percent and 26 percent indicating that they very often or sometimes eat breakfast, respectively.

Reported breakfast eating differed significantly by gender and age; girls were less likely to report eating breakfast very often (67 percent) compared with boys (80 percent), and sixth-grade children were less likely to report eating breakfast very often (68 percent) compared with fourth-grade children (78 percent). More than half (60 percent) of the children perceived that eating breakfast provides benefits of increased energy and ability to pay attention in school. Common perceptions of barriers to eating breakfast were lack of time and not being hungry in the morning. Other factors, such as not having food at home, worrying about breakfast making them fat, or not wanting others to see them eat in the cafeteria were not important barriers for many children. Compared with boys, girls were more likely to report that they skip breakfast because it might make them fat. The authors conclude that, given the tendency to use skipping breakfast as a weight-related behavior by children and adolescents, and that food choice behaviors track into adulthood, it is important for nutrition educators to promote eating breakfast at home or school as a routine part of the day for all children.

- 37) Rogers PJ. “How Important is Breakfast?” *British Journal of Nutrition* 1997;78:197-198.**

This short commentary on articles from 1995 and 1997 relates associations between breakfast, diet and cognitive effects. The author concludes that increasing the consumption of breakfast is more likely than not to be beneficial, especially in populations where greater numbers of children are nutritionally at-risk.

- 38) Siega-Riz AM, Popkin BM, Carson T. “Trends in Breakfast Consumption for Children in the United States from 1965-1991. *American Journal of Clinical Nutrition*. 1998;67(suppl):748S-756S.**

The authors, University of North Carolina at Chapel Hill researchers conducting the study with support from the Kellogg Company, examined breakfast consumption patterns and trends by pooling samples from the Nationwide Food Consumption Surveys of 1965 and 1977-1978 and the 1989-

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1991 Continuing Survey of Food Intakes by Individuals. They found a significant decline in breakfast consumption between 1965 and 1991, for all age groups, but particularly for older adolescents 15-18 years old. The greatest decline was among adolescent girls, who dropped 19.7 percentage points from 84.4 percent in 1965 to 64.7 percent in 1991, meaning that less than two-thirds of girls aged 15-18 were eating breakfast by the 1990s.

**39) Simeon DT, Grantham-McGregor S. “Effects of Missing Breakfast on the Cognitive Function of School Children of Differing Nutritional Status.” *American Journal of Clinical Nutrition* 1989;49:646-53**

The authors, researchers at the University of the West Indies, investigated the effect of missing breakfast on the cognitive functions of stunted children –those whose heights were below -2 standard deviations of the National Center for Health Statistics (NCHS) standards; previously severely malnourished children – who had been admitted to the University Hospital of the West Indies for severe malnutrition during the first two years of life; and nonstunted controls – whose heights were above -1 standard deviation of the NCHS standards.

Ninety students, divided into three groups of 30 were admitted to a special research ward where they ate dinner and at 8:00 a.m. the next day were randomly given a standard breakfast or a cup of tea representing no breakfast. Treatment was reversed the following day. At 11:00 a.m. they were given a battery of cognitive tests by testers blind to their breakfast status, including arithmetic – involving mental arithmetic problems and digit span (which involves the immediate recall of increasingly longer strings of digits read aloud); the coding subtest of the Wechsler Intelligence Scale for Children – in which children have to substitute symbols for numbers as quickly as possible; comprehension subtests of the Clinical Evaluation of Language Functions in fluency – involving naming as many items as possible in two different categories – and listening – in which short stories are read aloud and children answer questions about them; the Matching Familiar Figures Test (MFFT) – in which children are presented two cards and must identify which of the pictures on the second card is exactly like the one on the first card; and Hagen’s Central-Incidental task (HCI) – for which children look at various cards and then have to remember which objects or animals were on the cards.

The previously severely malnourished and the stunted groups behaved similarly when they missed breakfast and were combined and compared with the control group for tests. The children in this combined group scored significantly lower on tests of fluency, arithmetic, digit-span-backwards, and digit-span-forward and were less efficient in the matching figures tests when they had no breakfast. These tests correspond to generation of ideas and motivation, visual short-term memory, auditory short-term memory with an immediate processing component, and efficiency of problem solving. The children in the combined group were adversely affected in a number of cognitive functions when they missed breakfast, while the control group was not adversely affect in any of the cognitive tests when breakfast was omitted. Therefore, missing breakfast could be a serious contributor to poor school achievement in undernourished children.

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- 40) Taras H. “Nutrition and Student Performance at School.” *The Journal of School Health* 2005;75(6):199-213.**

This review of 18 articles describes effects on school-aged children of eating or not eating breakfast. Many studies find that children are more likely to attend school and be on time when a school breakfast program exists. Positive effects are consistently found among severely undernourished populations. Improved functions include verbal fluency, arithmetic, tests of attention, memory, creativity, physical endurance, and general tests of academic achievement and cognitive functioning.

- 41) Vaisman N, Voet H, Akivis A, Vakil E. “Effects of Breakfast Timing on the Cognitive Functions of Elementary School Students.” *Archives of Pediatric and Adolescent Medicine* 1996 150:1089-1092.**

The authors, researchers at Hebrew University, Jerusalem, and Bar Ilan University, Israel, study the effect of breakfast timing on selected cognitive functions of elementary school students. The researchers conducted a 2-week randomized control intervention trial for the 569 subjects, ages 11 to 13 years, from five elementary schools. Subjects also completed a questionnaire about food intake. There were two tests: 491 subjects completed test 1; 5033 subjects completed test 2; and 430 subjects completed both tests. Each subject who was tested twice took two versions of the Rey Auditory-Verbal Learning Test, logical memory subtest of the revised Wechsler Memory Scale, and the Benton Visual Retention Test. In the first test, subjects were tested in the second hour of school, between 8:55 and 9:35 a.m. After the first test, two thirds of the subjects started a 14 day program where they ate sugared cornflakes and milk every morning between 8:00 and 8:20 a.m. The other third were controls.

In the first test, on immediate recall, children who ate breakfast on the test day scored significantly higher than those who did not eat breakfast. In the second test, there were 322 subjects who ate breakfast and 181 control subjects. After 15 days, children who ate breakfast at school scored notably higher on most of the tests than did children who ate breakfast at home or did not eat breakfast. There were statistically significant differences between children who ate breakfast at school and those who ate at home or not at all, in best learning, mean learning, retroactive interference, delayed recall, recognition, temporal order, story and picture.

- 42) Wesnes KA, Pincock C, Richardson D, Helm G, Hails S. “Breakfast Reduces Declines in Attention and Memory over the Morning in Schoolchildren.” *Appetite* 2003;41(3):329-31.**

The authors, researchers at Cognitive Drug Research Ltd, DPRNutrition, Cereal Partners, and Reading Scientific Services Ltd, all in the United Kingdom, test the mental performance of 29 schoolchildren, 15 girls and 14 boys, following one of two cereal breakfasts, glucose drink or no breakfast, in a randomized, cross-over study. For five consecutive days, the children, aged 9-16, visit a laboratory where they complete computerized tests to assess attention, working

**ANNOTATED BIBLIOGRAPHY**  
**Research on the Impacts of Breakfast on Children and Adolescents**

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memory and episodic memory through various word and picture presentation, recall and recognition tasks, in addition to others. They are randomly given one of the four breakfast options and complete the computerized tests four more times.

Two of the cognitive assessment factors – attention and episodic memory – showed significant changes with treatment. In six of the seven contributing measures for these two factors, participants declined in their performance significantly more after no breakfast or a glucose drink than if they had eaten cereal.

**43) Wilson NC, Parnell WR, Wohlers M, Shirley P. “Eating Breakfast and its Impact on Children’s Daily Diet.” *Nutrition & Dietetics* 2006;63:15-20.**

The authors, researchers at the University of Otago, New Zealand, describe the impact of eating breakfast on the nutrient intakes of 3,275 New Zealand children aged 5-14 years. Using the 2002 National Children’s Nutrition Survey (CNS02) in which nutrient intake and breakfast consumption were determined using 24-hour dietary recalls, children who consumed at least one item between 6 and 9 a.m. were considered breakfast eaters and all others were considered non-breakfast eaters. The New Zealand Index of Deprivation was used as an index of socioeconomic status. Weight status and BMI were determined from height and weight measurements. The statistical software package STATA was used for all data analyses.

In total, 84 percent of the children reported eating breakfast, though younger children were more likely to eat breakfast than older children. Breakfast eaters had significantly higher intakes of protein, dietary fiber, and folate than did non-breakfast eaters. Breakfast cereal was the most common breakfast choice (57 percent).

**44) Wyon D, Abrahamsson L, Jartelius M, Fletcher R. “An Experimental Study of the Effects of Energy Intake at Breakfast on the Test Performance of 10 Year-Old Children in School.” *International Journal of Food Science and Nutrition* 1997;48(1):5-12.**

The authors, researchers at the National Institute of Occupational Health, Copenhagen, Denmark, Uppsala University in Sweden, and the Kellogg Company of Great Britain, examined the effects of energy intake at breakfast on school performance in almost 200 10-year old students in ten classes at five different schools. Over the course of four days, each student was randomly provided with a low or high energy breakfast, meaning 832 kcal vs. 197 kcal for boys, and 567 kcal vs. 147 kcal for girls, each day, with all uneaten food returned. An interviewer, blind to breakfast type, obtained a 24-hour recall from each child. Performance assessments were administered to the students by teachers blind to the treatment condition. Eating a high energy breakfast was strongly associated with improved performance on the creativity test, addition and number checking, and voluntary endurance in the initial warm-up exercise. Energy intake at breakfast had no significant effect on energy intake at school lunch. Fewer children reported feeling badly, and self-estimates of hunger were lower after consuming a high energy breakfast.

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- 45) Zullig K, Ubbes VA, Pyle J, Valois RF. “Self-Reported Weight Perceptions, Dieting Behavior, and Breakfast Eating Among High School Adolescents.” *Journal of School Health* 2006;76(3):87-92.**

The authors, researchers at Miami University, Oxford, OH, and the University of South Carolina, Columbia, SC, explore the relationships between breakfast eating, weight perceptions, and dieting behavior in 4597 public high school adolescents in South Carolina using the Centers for Disease Control and Prevention Youth Risk Behavior Survey (YRBS). Schools were randomly selected and the students in the 71 schools chosen were each given a questionnaire in which they were asked about their breakfast habits over the previous five days. Results were obtained and analyzed for four race and gender groups: white females, black females, white males, and black males. The data were analyzed using SAS-callable Survey Data Analysis (SUDAAN), taking into account the weighting as well as the clustering within schools and classes nested within schools. The independent variables analyzed in this study were: self-perceptions of weight (overweight/underweight), current weight goal (trying to lose/gain weight), dieted to lose weight (past 30 days), took diet pills to lose weight (past 30 days), and vomited or took laxatives to lose weight (past 30 days).

Approximately 42 percent of the study sample reported not eating breakfast during the past five school days. More than half of the study participants reported perceptions of being overweight. For white females, there were significant associations between not eating breakfast and having self-perceptions of overweight, dieted to lose weight, fasted to lose weight, and vomited or took laxatives to lose weight. For black females, there was only a significant association between not eating breakfast and having fasted to lose weight. Among both white and black males, skipping breakfast was significantly associated with having self-perceptions as overweight, trying to lose weight, eating fewer calories to lose weight, fasted to lose weight, and took diet pills to lose weight. These results indicate that adolescents who engage in poor dietary practices with negative weight perceptions may be more likely to skip breakfast.



# CHILD NUTRITION FACT SHEET

Food Research & Action Center

1875 Connecticut Ave. NW, Suite 540

Washington, DC 20009

## ***BREAKFAST FOR LEARNING***

### ***Recent scientific research on the link between children's nutrition and academic performance***

“What we find particularly exciting is that this [school breakfast] is a relatively simple intervention that can significantly improve children's academic performance and psychological well-being.”

*J. Michael Murphy, EdD, School Breakfast Program researcher,  
Massachusetts General Hospital and Harvard Medical School*

### **Missing breakfast and experiencing hunger impair children's ability to learn**

- Children who skip breakfast are less able to distinguish among similar images, show increased errors, and have slower memory recall.<sup>1,2</sup>
- Children experiencing hunger have lower math scores and are more likely to have to repeat a grade.<sup>3</sup>
- Behavioral, emotional and academic problems are more prevalent among children with hunger.<sup>4</sup>
- Children experiencing hunger are more likely to be hyperactive, absent and tardy, in addition to having behavioral and attention problems more often than other children.<sup>5</sup>
- Children who are undernourished score lower on cognitive tests when they miss breakfast.<sup>6,7</sup>
- Teens experiencing hunger are more likely to have been suspended from school, have difficulty getting along with other children, and have no friends.<sup>8</sup>
- Children with hunger are more likely to have repeated a grade, received special education services, or received mental health counseling, than low-income children who do not experience hunger.<sup>9</sup>

### **Eating breakfast at school helps children perform better**

- Children who eat a complete breakfast, versus a partial one, make fewer mistakes and work faster in math and number checking tests.<sup>10</sup>
- Children who eat breakfast at school – closer to class and test-taking time – perform better on standardized tests than those who skip breakfast or eat breakfast at home.<sup>11</sup>
- Providing breakfast to mildly undernourished students at school improves their speed and memory in cognitive tests.<sup>12,13</sup>
- Children who eat breakfast show improved cognitive function, attention, and memory.<sup>14</sup>
- Participating in school breakfast is associated with improved math grades, attendance and punctuality.<sup>15,16</sup>
- Children perform better on tests of vocabulary and matching figures after eating breakfast.<sup>17,18</sup>
- Consuming breakfast improves children's performance on demanding mental tasks and reaction to frustration.<sup>19</sup>

## **School breakfast improves student behavior and learning environments**

- Schools that provide breakfast in the classroom to all students show decreases in tardiness and suspensions as well as improved student behavior and attentiveness.<sup>20, 21</sup>
- Providing students with breakfast in the classroom setting is associated with lower tardy rates and fewer disciplinary office referrals.<sup>22</sup>
- School breakfast programs can lower absence and tardiness rates and improve standardized achievement test scores.<sup>23</sup>

## **Universal school breakfast programs yield positive results**

- Children who participate in universal school breakfast have lower rates of absence and tardiness.<sup>24, 25</sup>
- Schools that provide universal school breakfast have higher breakfast participation, especially when breakfast is served in the classroom, and students who significantly increase their breakfast participation are more frequently on time and in attendance.<sup>26</sup>
- Schools providing all students with free breakfast have greater positive changes in academic performance.<sup>27</sup>

## **Breakfast can improve children's diets**

- Children who eat breakfast tend to have more adequate nutrient intakes than children who do not.<sup>28</sup>
- By eating breakfast, students also get more of important nutrients, vitamins and minerals such as calcium, dietary fiber, folate and protein.<sup>29,30</sup>
- A higher percentage of children who skip breakfast do not meet two-thirds of the Recommended Dietary Allowance (RDA) for vitamins A, E, D, and B<sub>6</sub>.<sup>31</sup>

## **Breakfast may reduce obesity risk**

- Adolescents who eat breakfast tend to have a lower body mass index (BMI); higher BMIs can indicate overweight and obesity.<sup>32</sup>
- Girls who eat breakfast are more likely to have a lower BMI than girls who skip breakfast.<sup>33</sup>
- Adolescents with one or two obese parents who eat breakfast every day are more likely to have BMIs within a healthy range than those who tend to skip breakfast.<sup>34</sup>
- Low-income elementary school girls who participate in the School Breakfast, School Lunch, or Food Stamp Programs, or any combination of these programs, have significantly less risk of being overweight.<sup>35</sup>

## **Beliefs about breakfast can influence participation**

- Girls often skip breakfast because they believe it might make them fat and are concerned about gaining weight.<sup>36, 37</sup>
- Adolescents who skip breakfast are significantly more likely to have fasted to lose weight.<sup>38</sup>
- Children report that they believe eating breakfast increases their energy and ability to pay attention in school.<sup>39</sup>

## ***Breakfast for Learning***

### ***Endnotes***

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## Students Succeed with School Meals

# What's on the Menu?

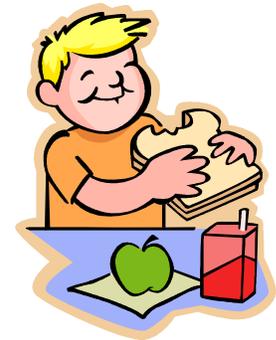
School lunches are an excellent source of protein, vitamins A and C, calcium, and iron. They are low in fat, sodium (salt) and sugar. School breakfast gives children one quarter of what they need each day. School lunch gives them one third of what they need. A child who eats both school breakfast and lunch gets more than half of the protein, vitamins A and C, calcium, and iron that he or she needs for the whole day. Check out the details below.

Nutrient	Breakfast	Lunch
Calories	483	645
Protein (g)	6.7	8.9
Calcium (mg)	200	267
Iron (mg)	2.5	3.3
Vitamin A (RE)	158.4	211
Vitamin C (mg)	11.3	12
Total calories from fat	≤ 30%	≤ 30%
Total calories from saturated fat	≤ 10%	≤ 10%

**Without a doubt, school meals are the healthy, low-cost choice.** School meals meet the Dietary Guidelines for Americans. In fact, research shows that students who eat school lunch eat less fat than students who bring their lunch from home. Students who eat school lunch eat more fruits, vegetables and drink more milk. They are less likely to drink soda and fruit drinks. Students who eat school meals are more likely to be at a healthy weight.

Each school meal is some combination of a meat/meat alternate, bread/grain, fruit/vegetable and milk. Check out the list below to get an idea of the foods you can expect to see on school menus.

Foods/Menus Items	What to Expect
Meat/Meat Alternatives	Lean cuts of meat, skinless chicken (baked or grilled - not fried); vegetarian (meatless) entrées; legumes (dried peas and beans); low fat cold cuts; low fat cheeses, cheese products and yogurt.
Fruits and Vegetables	More fruits and/or vegetables are offered daily. They may be canned, frozen, fresh or dried. The preparation methods used most often are baking, roasting, broiling, boiling and steaming. Frying is kept at a minimum. Dark green, deep yellow or orange fruits or vegetables are offered more often. Vegetables are not seasoned with butter or other fat.
Breads/Grains	Look for more whole grain bread, pasta, rice or cereal. Whole grain or enriched breads are served without butter.
Milk	All milk choices are 1% or less fat, including flavored milks like chocolate.
Other Changes	Foods are baked, roasted, broiled boiled or steamed. Frying is very limited. There are limits on fat, sodium and sugar.



# What's for School Breakfast?

Most North Carolina schools serve breakfast every school day including a choice of entrée, fruit or 100% fruit juice, and low fat or fat free milk. Meals served as part of the School Breakfast Program provide one-fourth or more of the daily recommended levels for key nutrients that children need for growth and development.

Nutrient	Breakfast
Calories	483
Protein (g)	6.7
Calcium (mg)	200
Iron (mg)	2.5
Vitamin A (RE)	158.4
Vitamin C (mg)	11.3
Total calories from fat	≤ 30%
Total calories from saturated fat	≤ 10%

## School breakfast is a healthy, convenient choice for families.

Students who eat breakfast are able to pay attention longer, demonstrate better behavior in the classroom, have improved attendance and less tardiness, and make fewer trips to the school nurse. School meals meet the Dietary Guidelines for Americans. School breakfasts are an excellent source of protein, vitamins A and C, calcium, and iron. They are low in fat, sodium (salt) and sugar.

Each school meal is a combination of a meat/meat alternate, bread/grain, fruit/vegetable and milk. Check out the list below to get an idea of the foods you can expect to see on school menus.

Foods/Menu Items	What to Expect
Meat/Meat Alternatives	Lean cuts of meat, skinless chicken (baked or grilled - not fried); vegetarian (meatless) entrées; legumes (peas and beans); low fat cold cuts; low fat cheese, cheese products and yogurt
Fruits and Vegetables	More fruits and/or vegetables are offered daily. They may be fresh, canned, frozen or dried. The preparation methods used most often are baking, roasting, broiling, boiling and steaming. Frying is kept at a minimum. Dark green, deep yellow or orange fruits or vegetables are offered more often. Vegetables are not seasoned with butter or other fat.
Breads/Grains	Look for more whole grain bread, pasta, rice or cereal. Whole grain or enriched breads are served without butter.
Milk	All milk choices are 1% or less fat, including flavored milks like chocolate.



# Calories

Energy makes things go and grow. For example, electricity is a form of energy that makes a lamp work. Gas produces energy to make a car go. Dogs eat dog food to make them go. Fish eat fish food to make them go. Foods have six different kinds of nutrients in them. The nutrients are protein, carbohydrates, fat, vitamins, minerals, and water. Energy or calories are only found in protein, fat and carbohydrates. Both protein and carbohydrates provide four calories per gram. Fat has more energy and provides nine calories per gram. Food gives people energy. We measure energy in calories.

Calories are the potential energy the body can receive from a food. Our bodies use food for energy to maintain all body functions both voluntary and involuntary; in other words, to move, act, grow and mend from an injury.

# Carbohydrates

Carbohydrates are organic molecules constructed in the ratio (CH<sub>2</sub>O) in a variety of lengths and shapes. Carbohydrates are the body's preferred source of energy; the other potential energy sources being proteins and fats. Carbohydrates are broken down in the body into sugars, starches and fiber. The sugars are known as simple carbohydrates, and the starches and fiber are known as complex carbohydrates.

## Function

Carbohydrates perform three important functions in the body:

- Supply energy
- Supply fiber
- Aid in the digestion of fats

Monosaccharides	Disaccharides	Polysaccharides
<p><i>Monosaccharides</i> are the simplest form of carbohydrates. The monosaccharides are glucose, galactose, and fructose. Sugars and starches are broken down in the body into the simple sugar glucose. Glucose is the major sugar found in the bloodstream and supplies energy for the body. Some body tissues, such as red blood cells and parts of the brain, are able to get energy only from glucose. Fructose is found in honey and fruits and is known as the sweetest of the sugars. Galactose is not found in nature, but it is one of the two monosaccharides available after the breakdown of lactose (milk sugar).</p>	<p><i>Disaccharides</i> are formed when two monosaccharides are joined together. They are broken down into their monosaccharide components during digestion. The disaccharides are sucrose, maltose, and lactose. Sucrose (glucose + fructose) is found in white, refined table sugar, brown sugar, confectioner's sugar, cane sugar, beet sugar, molasses, and maple syrup. Maltose (glucose + glucose) is malt sugar which is found in sprouting cereal grains. Lactose (glucose + galactose) is milk sugar and is found only in milk.</p>	<p><i>Polysaccharides</i> are the complex carbohydrates often consisting of very long chains of glucose monomers. They include starch, cellulose and glycogen. Starch is the most abundant polysaccharide and is an important storage form of energy in plants. Starch can be found in roots (such as potatoes), legumes, grains, and vegetables, but must be broken down into glucose by the body before it can be utilized. Cellulose is the fibrous material found in plants, such as the strings in celery, and is commonly referred to as fiber or roughage. Cellulose cannot be digested by humans. Sources of cellulose include vegetables, fruits, and whole grain cereals. Glycogen, also known as animal starch, is the storage form of carbohydrates found in the liver and muscles. Glycogen in the liver is easily broken down into blood glucose, and muscle glycogen supplies glucose for muscle use. This is especially important during periods of intense exercise.</p>

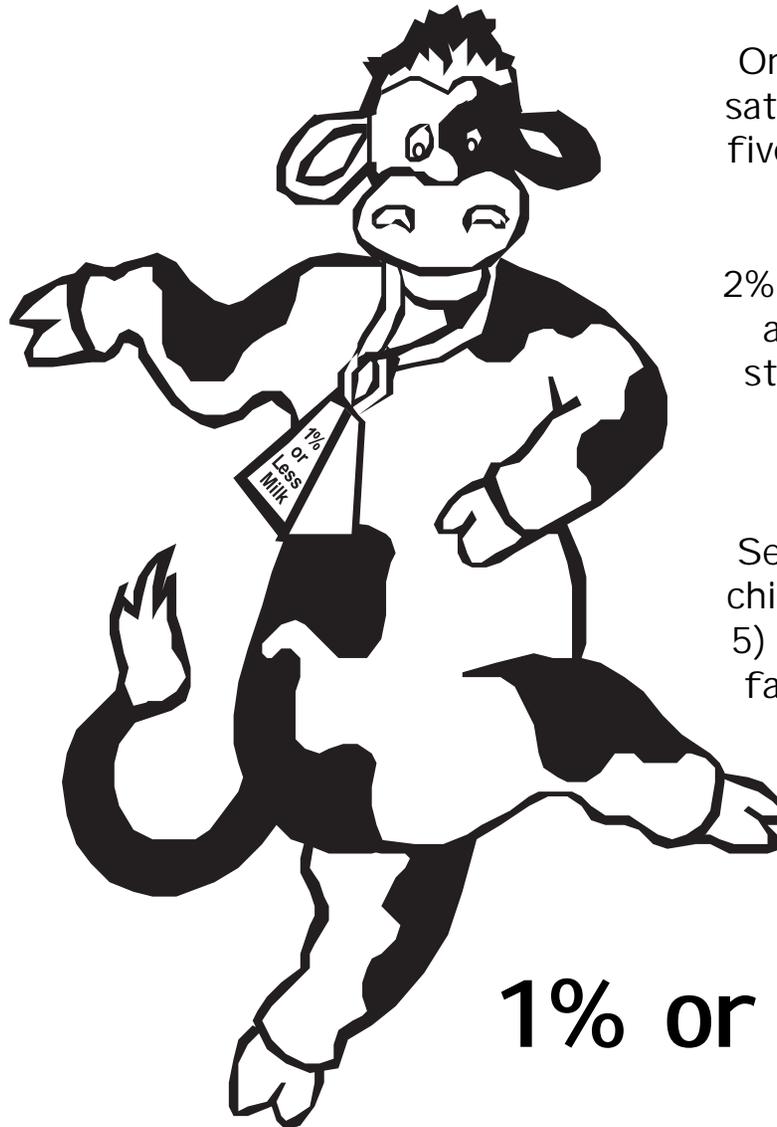
**Forty-five to sixty-five percent of calories should come from complex carbohydrates. Preferred carbohydrate sources include vegetables, fruits, grains and grain products, legumes, and dairy products. Current recommendations suggest half of all grain and grain products consumed should be whole grains.**

# Cut the Fat: Moovve to 1% or Less

Fat-free (skim) and 1% milk have all the protein, calcium and vitamins found in whole milk, but have little or no fat.

Nine out of 10 people like the taste of ice cold 1% or fat-free (skim) milk in blind taste tests.

Heart disease may not show up until adulthood. But the early stages, caused by too much saturated fat, can be seen in kids as young as ten years old.



One cup of whole milk has a lot of saturated fat - the same amount as five strips of bacon or a candy bar.

2% milk is not low-fat. One cup has as much saturated fat as three strips of bacon. Only 1% and fat-free are low-fat milks.

Serving 1% milk instead of 2% for children in child care (for ages 2 to 5) would cut out a lot of saturated fat from diets during those three years.

## 1% or Less. Yes.



*Adapted from CSPI 1% or Less Campaign materials*

State of North Carolina • Michael F. Easley, Governor  
Department of Health and Human Services • Carmen Hooker Odom, Secretary  
Division of Public Health • Women's and Children's Health Section • Nutrition Services Branch

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# Fats

Fats are semisolid, energy-filled organic macromolecules found in animal and plant tissues. The term lipid is often used interchangeably with the term fat, but it is also used to describe a larger group that includes fats (solids, semisolids at room temperature), oils (liquids at room temperature), and fat-related substances. The major form of fat in the body and in foods is known as triglycerol or triglyceride.

Triglycerides are organic compounds containing a glycerol backbone and three attached fatty acid chains. Other forms of fat in the body include sterols, a class of fats consisting of fused carbon rings without fatty acid chains, and phospholipids (such as lecithin). Steroids include cholesterol, Vitamin D, and sex hormones (estrogen and testosterone).

## Functions of fat in the body include:

- provide energy
- transport and absorb fat-soluble vitamins
- cushion vital organs in the body
- important part of the membranes of cells
- supply essential fatty acids
- add flavor to foods
- satisfy the appetite by delaying hunger
- insulate the body
- serve as protection for nerves and blood vessels

Fatty acid chains are classified as saturated, monounsaturated, or polyunsaturated depending on the number of double bonds they possess. Every time a double bond is formed, one of the hydrogen molecules is removed and a tiny bend or kink forms in the chain. The more saturated the fat, the fewer kinks it has, the more closely the molecules can pack, and the more solid it is at room temperature.

- **Saturated fats** have no double bonds and the most hydrogen. Saturated fats are found in animal meats, butter, chocolate, egg yolks, lard, coconut and palm oil (the only saturated oils), and many other foods. The Dietary Guidelines for Americans suggest that 10% or fewer of calories should come from saturated fat.
- **Monounsaturated fats** have one double bond and less hydrogen than saturated fats. Example sources include canola, olive, and sunflower oils, and nuts.
- **Polyunsaturated fats** have multiple double bonds and even less hydrogen than monounsaturated fats. Polyunsaturated fats can be found in soybean, corn, and safflower oil, walnuts, and flaxseeds.

**Trans fats** are a special category of fats. Trans fats occur naturally in small amounts in meat and dairy foods, but the majority of trans fats in the American diet come from hydrogenation. When liquid oils are hydrogenated, treated with hydrogen to become semi-solid or solid fats, trans fats can be created. Trans fats are most commonly found in vegetable shortening, hard (stick) margarine, and manufactured foods such as crackers, cookies and baked goods. Consumption of trans fats should be limited, as they have been linked to an increased risk in coronary heart disease.

**Children ages 4 to 18 years should receive between 25 and 35% of their calories from fat; adults should receive between 20 and 35% of their calories from fat.**

# Fiber

Dietary fiber is a type of carbohydrate consisting of the parts of a plant that cannot be digested. There are two categories of fiber: soluble and insoluble. Soluble fiber is dissolved in water and may help control diabetes and lower blood pressure in some people. Soluble fiber is found in some fruits, beans, and oat bran. Insoluble fiber is not able to be dissolved in water and therefore has different functions from soluble fiber. Insoluble fiber helps move food through the digestive tract. It aids in the prevention of colon and rectal cancer, helps to control diverticulosis, and helps prevent constipation. Diverticulosis is caused when bulging pockets form on the intestinal wall and can become inflamed. Sources of insoluble fiber are fruits, vegetables, wheat bran, whole wheat, and some beans.

## Function

Fiber has a number of functions in the digestive system:

- Because fiber cannot be absorbed, it essentially contributes no calories to the diet. It can give a feeling of fullness in the stomach, without adding extra calories.
- Fiber slows the emptying of food from the small intestine. Because sugars in the food are not moving through your digestive system so quickly, fiber has a positive effect on blood glucose levels.
- Fiber can interfere with the absorption of fats and cholesterol. By sweeping the fats out of the body, fiber can help lower blood cholesterol levels.

Many types of beans (black, navy, kidney, pinto, lima, etc.) are very high in fiber. Bran and shredded wheat cereals are also good fiber sources. Many fruits and vegetables, including sweet and plain potatoes, pears, peas, berries (raspberries, blackberries), pumpkin, spinach, apples, bananas, oranges, and broccoli, are good sources of fiber. Additionally, some foods you might not expect – such as almonds, soybeans, and tomato paste – also provide fiber to the diet.

# Food Labels: Nutrient Content Claims

The Nutrition Labeling and Education Act of 1990 (NLEA) permits the use of label claims that characterize the level of a nutrient in a food made in accordance with the U.S. Food and Drug Administration's (FDA) authorizing regulations. Nutrient content claims describe the level of a nutrient or dietary substance in the product, or they compare the level of a nutrient in a food to that of another food.

**Free:** This term means that a product contains no amount of, or only trivial or "physiologically inconsequential" amounts of, one or more of these components: fat, saturated fat, cholesterol, sodium, sugars, and calories. For example, "calorie-free" means fewer than 5 calories per serving, and "sugar-free" and "fat-free" both mean less than 0.5 g per serving. Synonyms for "free" include "without," "no" and "zero." A synonym for fat-free milk is "skim".

**Low:** This term can be used on foods that can be eaten frequently without exceeding dietary guidelines for one or more of these components: fat, saturated fat, cholesterol, sodium, and calories. Thus, descriptors are defined as follows:

- low-fat: 3 g or less per serving
- low-saturated fat: 1 g or less per serving
- low-sodium: 140 mg or less per serving
- very low sodium: 35 mg or less per serving
- low-cholesterol: 20 mg or less and 2 g or less of saturated fat per serving
- low-calorie: 40 calories or less per serving

Synonyms for low include "little," "few," "low source of," and "contains a small amount of."

The % Daily Value is a general guide to help you link nutrients in food to their contribution to your total daily diet. It can help you determine if a food is high or low in a nutrient. A % Daily Value of 5% or less is low.

**Lean and extra lean:** These terms can be used to describe the fat content of meat, poultry, seafood, and game meats.

- lean: less than 10 g fat, 4.5 g or less saturated fat, and less than 95 mg cholesterol per serving and per 100 g
- extra lean: less than 5 g fat, less than 2 g saturated fat, and less than 95 mg cholesterol per serving and per 100 g

**High:** This term can be used if the food contains 20 percent or more of the Daily Value for a particular nutrient in a serving.

**Good source:** This term means that one serving of a food contains 10 to 19 percent of the Daily Value for a particular nutrient.

**Reduced:** This term means that a nutritionally altered product contains at least 25 percent less of a nutrient or of calories than the regular, or reference, product. However, a reduced claim can't be made on a product if its reference food already meets the requirement for a "low" claim.

**Less:** This term means that a food, whether altered or not, contains 25 percent less of a nutrient or of calories than the reference food. For example, pretzels that have 25 percent less fat than potato chips could carry a "less" claim. "Fewer" is an acceptable synonym.

**Light:** This descriptor can mean two things. First, that a nutritionally altered product contains one-third fewer calories or half the fat of the reference food. If the food derives 50 percent or more of its calories from fat, the reduction must be 50 percent of the fat. Second, that the sodium content of a low-calorie, low-fat food has been reduced by 50 percent. In addition, "light in sodium" may be used on food in which the sodium content has been reduced by at least 50 percent. The term "light" still can be used to

describe such properties as texture and color, as long as the label explains the intent--for example, "light brown sugar" and "light and fluffy."

**More:** This term means that a serving of food, whether altered or not, contains a nutrient that is at least 10 percent of the Daily Value more than the reference food. The 10 percent of Daily Value also applies to "fortified," "enriched" and "added" "extra and plus" claims, but in those cases, the food must be altered. Alternative spelling of these descriptive terms and their synonyms is allowed--for example, "hi" and "lo"--as long as the alternatives are not misleading.

**Healthy:** A "healthy" food must be low in fat and saturated fat and contain limited amounts of cholesterol and sodium. In addition, if it's a single-item food, it must provide at least 10 percent of one or more of vitamins A or C, iron, calcium, protein, or fiber. Exempt from this "10-percent" rule are certain raw, canned and frozen fruits and vegetables and certain cereal-grain products. These foods can be labeled "healthy," if they do not contain ingredients that change the nutritional profile, and, in the case of enriched grain products, conform to standards of identity, which call for certain required ingredients. If it's a meal-type product, such as frozen entrees and multi-course frozen dinners, it must provide 10 percent of two or three of these vitamins or minerals or of protein or fiber, in addition to meeting the other criteria. The sodium content cannot exceed 360 mg per serving for individual foods and 480 mg per serving for meal-type products.

## OTHER DEFINITIONS

**Percent fat free:** A product bearing this claim must be a low-fat or a fat-free product. In addition, the claim must accurately reflect the amount of fat present in 100 g of the food. Thus, if a food contains 2.5 g fat per 50 g, the claim must be "95 percent fat free." Implied: These types of claims are prohibited when they wrongfully imply that a food contains or does not contain a meaningful level of a nutrient. For example, a product claiming to be made with an ingredient known to be a source of fiber (such as "made with oat bran") is not allowed unless the product contains enough of that ingredient (for example, oat bran) to meet the definition for "good source" of fiber. As another example, a claim that a product contains "no tropical oils" is allowed--but only on foods that are "low" in saturated fat because consumers have come to equate tropical oils with high saturated fat.

**Meals and main dishes:** Claims that a meal or main dish is "free" of a nutrient, such as sodium or cholesterol, must meet the same requirements as those for individual foods. Other claims can be used under special circumstances. For example, "low-calorie" means the meal or main dish contains 120 calories or less per 100 g. "Low-sodium" means the food has 140 mg or less per 100 g. "Low-cholesterol" means the food contains 20 mg cholesterol or less per 100 g and no more than 2 g saturated fat. "Light" means the meal or main dish is low-fat or low-calorie.

**Standardized foods:** Any nutrient content claim, such as "reduced fat," "low calorie," and "light," may be used in conjunction with a standardized term if the new product has been specifically formulated to meet FDA's criteria for that claim, if the product is not nutritionally inferior to the traditional standardized food, and the new product complies with certain compositional requirements set by FDA. A new product bearing a claim also must have performance characteristics similar to the referenced traditional standardized food. If the product doesn't, and the differences materially limit the product's use, its label must state the differences (for example, not recommended for baking) to inform consumers.

**Natural:** From a food science perspective, it is difficult to define a food product that is 'natural' because the food has probably been processed and is no longer the product of the earth. That said, FDA has not developed a definition for use of the term natural or its derivatives. However, the agency has not objected to the use of the term if the food does not contain added color, artificial flavors, or synthetic substances.

**Reference Amount Customarily Consumed:** The Nutrition Labeling and Education Act of 1990 defines serving size as an amount customarily consumed which is expressed in a common household measure that is appropriate to the food.

# Food Labels: Health Claims

The Nutrition Labeling and Education Act (NLEA) of 1990, the Dietary Supplement Act of 1992, and the Dietary Supplement Health and Education Act of 1994 (DSHEA), provide for health claims used on labels that characterize a relationship between a food, a food component, dietary ingredient, or dietary supplement and risk of a disease, provided the claims meet certain criteria and are authorized by an FDA regulation. FDA authorizes these types of health claims based on an extensive review of the scientific literature, generally as a result of the submission of a health claim petition, using the significant scientific agreement standard to determine that the nutrient/disease relationship is well established.

Claims for relationships between a nutrient or a food and the risk of a disease or health-related condition can be made in several ways: through third-party references (such as the National Cancer Institute), statements, symbols (such as a heart), and vignettes or descriptions. Whatever the case, the claim must meet the requirements for authorized health claims--for example, they cannot state the degree of risk reduction and can only use "may" or "might" in discussing the nutrient or food-disease relationship. And they must state that other factors play a role in that disease. The claims also must be phrased so consumers can understand the relationship between the nutrient and the disease and the nutrient's importance in relationship to a daily diet. The allowed nutrient-disease relationship claims and rules for their use are:

**Calcium and osteoporosis:** To carry this claim, a food must contain 20 percent or more of the Daily Value for calcium (200 mg) per serving, have a calcium content that equals or exceeds the food's content of phosphorus, and contain a form of calcium that can be readily absorbed and used by the body. The claim must name the target group most in need of adequate calcium intakes (that is, teens and young adult white and Asian women) and state the need for exercise and a healthy diet. A product that contains 40 percent or more of the Daily Value for calcium must state on the label that a total dietary intake greater than 200 percent of the Daily Value for calcium (that is, 2,000 mg or more) has no further known benefit.

**Fat and cancer:** To carry this claim, a food must meet the nutrient content claim requirements for "low-fat" or, if fish and game meats, for "extra lean."

**Saturated fat and cholesterol and coronary heart disease (CHD):** This claim may be used if the food meets the definitions for the nutrient content claim "low saturated fat," "low-cholesterol," and "low-fat," or, if fish and game meats, for "extra lean." It may mention the link between reduced risk of CHD and lower saturated fat and cholesterol intakes to lower blood cholesterol levels.

**Fiber containing grain products, fruits and vegetables and cancer:** To carry this claim, a food must be or must contain a grain product, fruit or vegetable and meet the nutrient content claim requirements for "low-fat," and, without fortification, be a "good source" of dietary fiber.

**Fruits, vegetables and grain products that contain fiber and risk of CHD:** To carry this claim, a food must be or must contain fruits, vegetables and grain products. It also must meet the nutrient content claim requirements for "low saturated fat," "low-cholesterol," and "low-fat" and contain, without fortification, at least 0.6 g soluble fiber per serving.

**Sodium and hypertension (high blood pressure):** To carry this claim, a food must meet the nutrient content claim requirements for "low-sodium."

**Fruits and vegetables and cancer:** This claim may be made for fruits and vegetables that meet the nutrient content claim requirements for "low-fat" and that, without fortification, for "good source" of at least one of the following: dietary fiber or vitamins A or C. This claim relates diets low in fat and rich in fruits and vegetables (and thus vitamins A and C and dietary fiber) to reduced cancer risk. FDA authorized this claim in place of an antioxidant vitamin and cancer claim.

**Folic acid and neural tube defects:** Folic acid and neural tube defects: This claim is allowed on dietary supplements that contain sufficient folate and on conventional foods that are naturally good sources of folate, as long as they do not provide more than 100 percent of the Daily Value for vitamin A, as retinol or preformed vitamin A, or vitamin D. A sample claim is "healthful diets with adequate folate may reduce a woman's risk of having a child with a brain or spinal cord defect."

**Dietary sugar alcohols and dental caries (cavities):** This claim applies to food products, such as candy or gum, containing the sugar alcohols xylitol, sorbitol, mannitol, maltitol, isomalt, lactitol, hydrogenated starch hydrolysates, hydrogenated glucose syrups, or a combination of any of these. If the food also contains a fermentable carbohydrate, such as sugar, the food cannot lower the pH of plaque in the mouth below 5.7. Besides the food ingredient's relationship to dental caries, the claim also must state that frequent between meal consumption of foods high in sugars and starches promote tooth decay. A shortened claim is allowed on food packages with less than 15 square inches of labeling surface area.

**Soluble fiber from certain foods, such as whole oats and psyllium seed husk, and heart disease:** This claim must state that the fiber also needs to be part of a diet low in saturated fat and cholesterol, and the food must provide sufficient soluble fiber. The amount of soluble fiber in a serving of the food must be listed on the Nutrition Facts panel.

**Soy protein and risk of coronary heart disease (CHD):**

This claim specifies the daily dietary intake levels of soy protein associated with a reduced risk coronary heart disease (CHD). The claim must specify the amount of soy protein in a serving of the food. Sample claims include, "25 grams of soy protein a day, as part of a diet low in saturated fat and cholesterol, may reduce the risk of heart disease. A serving of [name of food] supplies \_\_\_ grams of soy protein." and "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."

**Plant sterol/stanol esters and risk of coronary heart disease (CHD):**

The claim may be used on spreads and salad dressings that contain at least 0.65 g plant sterol esters per reference amount customarily consumed (RACC), or on spreads, salad dressings, snack bars, and dietary supplements that contain at least 1.7 g plant stanol esters per RACC. The foods must be low in saturated fat and low in cholesterol, and spreads and salad dressings that exceed 13 g fat per 50 g must bear the statement "see nutrition information for fat content". Salad dressings are exempted from the minimum 10% Daily Value nutrient requirement. Model claim statements are "Foods containing at least 0.65 gram per serving of vegetable oil sterol esters, eaten twice a day with meals for a daily total intake of at least 1.3 grams, as part of a diet low in saturated fat and cholesterol, may reduce the risk of heart disease. A serving of [name of food] supplies \_\_\_ grams of vegetable oil sterol esters." or "Diets low in saturated fat and cholesterol that include two servings of foods that provide a daily total of at least 3.4 grams of plant stanol esters in two meals may reduce the risk of heart disease. A serving of [name of food] supplies \_\_\_ grams of plant stanol esters."

# FDA Modernization Act (FDAMA) Claims

Under the provisions of the Food and Drug Administration Modernization Act of 1997 (FDAMA), a manufacturer may submit to FDA a notification of a health claim based on an authoritative statement from an appropriate federal agency or the National Academy of Sciences (NAS). If FDA does not act to prohibit or modify such a claim within 120 days of receipt of the notification, the claim may be used. The following are approved claims as such:

## **Whole grain foods and risk of heart disease and certain cancers:**

This claim may be used for foods that are low in fat and contain 51 percent or more whole grain ingredients by weight per reference amount customarily consumed (RACC) and dietary fiber content of at least:

- 3.0 g per RACC of 55 g
- 2.8 g per RACC of 50 g
- 2.5 g per RACC of 45 g
- 1.7 g per RACC of 35 g

The required wording for the claim is "Diets rich in whole grain foods and other plant foods and low in total fat, saturated fat, and cholesterol may reduce the risk of heart disease and some cancers."

## **Whole grain foods with moderate fat content and heart disease:**

The claim may be used for foods that contain a minimum of 51% whole grains (using dietary fiber as a marker), meet the regulatory definitions for low saturated fat and low cholesterol (contain 1 gram or less of saturated fat and 20 milligrams or less of cholesterol per RACC), bear quantitative trans fat labeling, and contain less than 6.5 grams total fat and 0.5 gram or less trans fat per reference amount customarily consumed (RACC). The claim language is "Diets rich in whole grain foods and other plant foods, and low in saturated fat and cholesterol, may help reduce the risk of heart disease."

## **Potassium and the risk of high blood pressure and stroke:**

This claim may be used for foods that are a good source of potassium (contain 10 percent or more of the Daily Value for potassium) and be low in sodium. Therefore, qualifying foods must have at least 350 mg of potassium per reference amount customarily consumed (RACC), and 140 mg or less of sodium per RACC. In addition, qualifying foods also must be low in fat, low in saturated fat, and low in cholesterol. Therefore, qualifying foods must contain 3 g or less of total fat per RACC, 1 g or less of saturated fat per RACC, and not more than 15 percent of calories from saturated fat. They also must contain 20 mg or less of cholesterol per RACC. The required wording for the claim is "Diets containing foods that are a good source of potassium and that are low in sodium may reduce the risk of high blood pressure and stroke."

## **Fluoridated water and reduced risk of dental carries:**

The claim may be used for bottled water meeting the specified standards of identity and quality, containing greater than 0.6 and up to 1.0 mg/L total fluoride, and meeting all general requirements for health claims with the exception of minimum nutrient contribution. The claim language is: "Drinking fluoridated water may reduce the risk of [dental caries or tooth decay]." In addition, the health claim is not intended for use on bottled water products specifically marketed for use by infants.

## **Saturated fat, cholesterol, and trans fat and reduced risk of heart disease:**

This claim may be used for foods that contain 1 gram or less of saturated fat and 20 milligrams or less of cholesterol per reference amount customarily consumed (RACC), contain less than 0.5 g of trans fat per RACC or must meet any FDA definition of "low" trans fat if a definition is established, contain less than 6.5 grams of total fat per RACC, and meet all general health claim requirements and minimum nutrient contribution requirements for health claims. The general health claim requirements include, in part, a requirement that the food must not exceed 480 mg of sodium per RACC. The exact wording of the claim is: "Diets low in saturated fat and cholesterol, and as low as possible in trans fat, may reduce the risk of heart disease."

**Choline containing foods:**

Foods or dietary supplement products may provide on their labeling the following nutrient content claims to characterize the level of choline: "Good source of choline," "Contains choline," "Provides choline," "Excellent source of choline," "Rich in choline," and "High in choline." These claims would include one of the following statements "Contains [X mg] choline per serving, which is [X%] of the Daily Value for choline (550 mg)," or "Contains [X%] of the Daily Value for choline per serving. The Daily Value for choline is 550 mg." The area within the brackets would be filled in with the specific percentages of the Daily Value (DV) and milligram amounts of choline in the product.

Foods or dietary supplement products may also provide on their labeling the following relative nutrient content claims: "Added choline," "More choline," "Enriched with choline," "Fortified with choline," "Extra choline," and "Plus choline." The relative claims would also include the statements "[Percentage 10% or greater] more of the Daily Value for choline per serving than [reference food]. This product contains [X mg] choline per serving which is [X%] of the Daily Value for choline (550 mg). [Reference food] contains [X mg] choline per serving." The area within the brackets would be filled in with the specific percentages of the Daily Value and milligram amounts of choline in the product and a description of the reference food.

# Qualified Health Claims

FDA's 2003 Consumer Health Information for Better Nutrition Initiative provides for the use of qualified health claims when there is emerging evidence for a relationship between a food, food component, or dietary supplement and reduced risk of a disease or health-related condition. In this case, the evidence is not well enough established to meet the significant scientific agreement standard required for FDA to issue an authorizing regulation. Qualifying language is included as part of the claim to indicate that the evidence supporting the claim is limited. FDA uses its enforcement discretion for qualified health claims after evaluating and ranking the quality and strength of the totality of the scientific evidence. Although FDA's "enforcement discretion" letters are issued to the petitioner requesting the qualified health claim, the qualified claims are available for use on any food or dietary supplement product meeting the enforcement discretion conditions specified in the letter. FDA has prepared a guide on interim procedures for qualified health claims and on the ranking of the strength of evidence supporting a qualified claim. Qualified health claim petitions that are submitted to FDA are available for public review and comment. A summary of the qualified health claims authorized by FDA may be found at [www.fda.gov/Food/LabelingNutrition/LabelClaims/QualifiedHealthClaims/ucm073992.htm](http://www.fda.gov/Food/LabelingNutrition/LabelClaims/QualifiedHealthClaims/ucm073992.htm).

Adapted from U.S. Food and Drug Administration, Claims That Can Be Made for Conventional Foods and Dietary Supplements, [www.fda.gov/Food/LabelingNutrition/LabelClaims/ucm111447](http://www.fda.gov/Food/LabelingNutrition/LabelClaims/ucm111447)

# Minerals

Minerals are inorganic substances necessary for building bones, tissues, and other compounds as well as for regulating body processes. Minerals found in large amounts in the body or those with high daily intake requirements (at least 100 milligrams per day) are called macrominerals. Macrominerals include calcium, phosphorus, magnesium, sodium, potassium, and chloride.

## Function

Minerals perform a number of functions in the body:

- Calcium is used to make the bones and teeth
- Iron is used to make the hemoglobin in red blood cells
- Minerals become part of tissue structure, like in bone and teeth
- Minerals help maintain acid-base balance, to keep the body pH neutral
- Minerals help regulate body processes, such as in enzyme systems
- Minerals function in nerve impulse transmission and muscle contraction
- Minerals help release energy from food

Macromineral	Function	Sources
Calcium	Needed for bone rigidity, blood clotting, muscle contraction, normal nerve function; Just because an individual eats food containing calcium does not mean that the body absorbs the calcium. Factors that increase calcium absorption include: an overall balanced diet; intake of vitamins C and D; intake of certain amino acids Factors that decrease calcium absorption include: vitamin D deficiency; fat malabsorption; eating large amounts of fiber; lack of exercise; stress; lactose deficiency or lactose intolerance	Milk and dairy products, soft-boned fish, calcium-fortified orange juice, leafy dark green vegetables, and broccoli.
Phosphorus	Helps build strong bones and teeth, important in cell membranes, a significant factor in energy production and storage, and in maintaining pH levels in the body	Dairy products, meat, eggs, fish, lentils, almonds
Magnesium	Metabolism of carbohydrates and fats; synthesis of DNA, RNA, enzymes; structure of bone, cell membranes; movement of potassium and calcium	Green leafy vegetables, nuts, whole grains, meat, fish, dairy products
Sodium, Chloride, Potassium	These three work together to regulate: the flow of fluids in the body, help regulate nervous system, regulate muscle function (including the heart), regulate nutrient absorption in the cells	Sodium and chloride are found together in table salt, and in foods with added salt (processed meats, butter, etc.). Potassium is found in meat, milk, bananas, leafy green vegetables, citrus fruits.

Minerals found in small amounts in the body are called trace elements or microminerals. Trace elements that appear to be needed by the body include: arsenic, boron, chromium, copper, fluoride, iodine, iron, manganese, molybdenum, nickel, selenium, silicon, vanadium, and zinc. We know they are needed because of the results of animal studies; when the elements are completely removed from the diets of laboratory animals, the animals begin to show ill effects. However, some of these elements are needed in such small amounts that scientists are still trying to determine their exact functions within the body. Please see below for more information about some of the best researched microminerals.

Micromineral	Function	Sources
Chromium	Maintains normal glucose uptake into cells; helps insulin bind to cells	Meat, poultry, fish, some cereals
Copper	Necessary for the formation of hemoglobin and melanin.	Organ meats, seafood, bran products, cocoa products, nuts.
Fluoride	Prevents dental caries (decay); stimulates bone formation	Fluoridated drinking water, dental products; tea, marine fish
Iodine	Required by the thyroid gland for hormone creation	Iodized salt; marine fish, seaweed
Iron	Component of hemoglobin (oxygen-carrying protein in the blood) and cytochrome.	Meat, poultry, eggs (heme sources; more readily absorbed); leafy green vegetables, fortified bread and grain products, dried fruit (non-heme).
Manganese	Involved in bone formation, metabolism of carbohydrates, protein	Nuts, legumes, whole grains, tea
Molybdenum	Helps enzymes break down amino acids	Legumes, grain products, nuts
Selenium	Defends against oxidation; regulates thyroid hormones	Seafood, organ meats, grains and plants grown in selenium-rich soil
Zinc	Involved in protein and DNA synthesis; metabolism; part of many enzymes	Fortified cereal, red meat, oysters, herring

# Protein

Without protein, the human body would not be able to survive. Protein performs four very important functions.

## Function

The body uses protein for:

- Growth and repair of new and damaged tissues. Skin, muscles, hair, finger nails, and blood clots are all made of protein.
- Regulating all body functions through the actions of enzymes, hormones, and other functional molecules.
- Transporting other nutrients and oxygen throughout the body.
- Supplying energy when adequate amounts are not supplied by carbohydrates and fat. Providing immune system defenses; antibodies are made of proteins.

Protein is an organic macromolecule comprised of compounds called amino acids. Amino acids are often referred to as the building blocks of protein. They consist of an amino group ( $\text{H}_2\text{N}-$ ), a carboxyl group ( $-\text{COOH}$ ), a hydrogen ( $-\text{H}$ ), and what is called a "side group" (usually denoted chemically as "R") attached to a central carbon atom. There are 22 different amino acids; they differ by the type of "R" group attached.

Thirteen of the 22 amino acids can be manufactured by the body. The remaining nine amino acids – often called essential amino acids – must be supplied by the diet. People in developing countries may suffer from diet-related diseases and other health problems because of the shortage of protein foods.

Protein foods that supply all nine of the essential amino acids are called complete proteins. Foods that supply only some of the nine essential amino acids are called incomplete proteins. Two incomplete protein foods can be eaten together to form a complete protein source. Most generally, animal proteins are complete protein sources and plant proteins are incomplete protein sources. However, animal proteins also provide more fat and calories than plant proteins. It is a wise dietary practice to consume combinations of plant proteins to fulfill some of the body's need for complete proteins. Some examples of combining incomplete proteins to form complete proteins are:

- Legumes (dried beans, lentils, split peas) and rice
- Pinto beans and corn tortillas
- Peanut butter sandwich (peanuts are a legume).

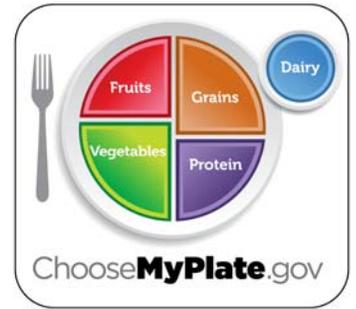
The amino acids are joined together by peptide bonds to form polypeptides. A protein consists of one or more of the polypeptide chains. Enzymes are globular proteins that catalyze chemical reactions within the body. For enzymes and all proteins, shape determines function – and the shape is determined by the sequence of the different amino acids.

Denaturation is the disruption of the bonds and the three-dimensional shape of a protein. This is often accomplished by changes in pH or temperature. To see denaturation in process, cook an egg white. The visible differences (moving from translucent to opaque, from watery to rubbery) are due to protein denaturation caused by heat.

**It is recommended for adults that 10-35% of calories come from protein; for teenagers and children over the age of four, it is recommended that 10-30% of calories come from protein. Additional protein is needed by women during times of pregnancy and lactation. People should consult the Dietary Reference Intake charts for their gender and age group for specific protein requirements.**

# Teaching MyPlate

MyPlate is one way for people to understand how to eat healthfully. MyPlate colorfully illustrates the five food groups using a familiar mealtime visual – a place setting. Here's what the colors stand for:



- orange - grains
- green - vegetables
- red - fruits
- blue - dairy
- purple - protein foods

After nearly 20 years, the U.S. Department of Agriculture (USDA) changed the pyramid-shaped food guide symbol to the current icon, MyPlate, in June 2011. The new icon was developed in order to:

- Better reflect updates to the USDA food patterns for the 2010 Dietary Guidelines for Americans,
- Grab consumers' attention with a new visual cue that is linked to food,
- Serve as a reminder for healthy eating rather than to provide specific messages (instead, these messages can be found in the Dietary Guidelines for Americans), and
- Continue the concept of a personalized approach to dietary guidance as introduced with the last food guidance system, MyPyramid.

When teaching about MyPlate, it is important to know that you may continue to use existing MyPyramid educational materials. This is because the information about what and how much to eat has not changed. Also, the ChooseMyPlate.gov website contains much of the same information that was available on MyPyramid.gov. Note that some sections have been updated to reflect the 2010 Dietary Guidelines.

## MyPlate Speaks

Let's look at some of the healthy reminders this new icon is trying to send:

**Build a healthy plate.** Before you eat, think about what goes on your plate or in your cup or bowl. Key actions:

- Make half your plate fruits and vegetables.
- Switch to fat free (skim) or low fat (1%) milk.
- Make at least half your grains whole grains.
- Vary your protein food choices.

**Cut back on foods high in solid fats, added sugars, and salt.** Added sugars and fats load foods with extra calories you don't need. Too much sodium may increase your blood pressure. Key actions:

- Choose foods and drinks with little or no added sugars.
- Drink water instead of sugary drinks.
- Compare salt (sodium) sodium in foods like soup, bread and frozen meals – and choose the foods with lower numbers.
- Eat fewer foods that are high in solid fats\*. Instead, eat foods made with oils, such as canola oil, corn oil, olive oil, peanut oil, and tub (soft) margarine, for example.

\* Examples of solid fats include beef, pork, and chicken fat; butter, cream, and milk fat; coconut, palm and palm kernel oils; hydrogenated oil; partially-hydrogenated oil; shortening; and stick margarine.

Adapted from: [www.kidshealth.org](http://www.kidshealth.org) and [www.choosemyplate.gov](http://www.choosemyplate.gov)



**Eat the right amount of calories for you.** Everyone has a personal calorie limit. Staying within yours can help you get to or maintain a healthy weight. People who are successful at managing their weight have found ways to keep track of how much they eat in a day, even if they don't count every calorie. Key actions:

- Enjoy your food, but eat less.
- Avoid oversized portions.
- Cook more often at home, where *you* are in control of what's in your food.
- When eating out, choose lower calorie menu options.
- Write down what you eat to keep track of how much you eat.
- For adults: If you drink alcoholic beverages, do so sensibly – limit to 1 drink a day for women or to 2 drinks a day for men.

**Tip:**

Don't forget to use food labels. They are a great tool for making smart food choices quickly and easily!

**Be physically active your way.** Pick activities that you like and start by doing what you can, at least 10 minutes at a time. Every bit adds up, and the health benefits increase as you spend more time being active.

## How Much Do I Need to Eat?

Everyone wants to know how much they should eat to stay healthy. It's a tricky question, though. It depends on your age, whether you're a girl or a boy, and how active you are. Kids who are more active burn more calories, so they need more calories. But we can give you some ideas about how much you need from each food group.

## Grains

Bread, cereal, rice, pasta, oatmeal, pancakes and tortillas are some foods in the grain group. Foods in the grains group give our bodies and our brains energy we need to move and think. Grain servings are measured in ounce equivalents. Ounce equivalents are just another way of showing a serving size. Here are ounce equivalents for common grain foods. An ounce equivalent equals:

- 1 piece of bread
- ½ cup of cooked cereal, like oatmeal
- ½ cup of rice or pasta
- 1 cup of cold cereal

This is how many grain ounce equivalents kids need each day:

- 4- to 8-year-olds need 4-5 ounce equivalents each day
- 9- to 13-year-old girls need 5 ounce equivalents each day
- 9- to 13-year-old boys need 6 ounce equivalents each day

To make at least half your grains whole, choose 100% whole grains most often, such as 100% wheat bread, brown rice and oatmeal.

## Vegetables

Of course, you need your vegetables, especially those dark green and orange ones. Vegetables are all different colors and provide us with lots of vitamins, minerals and fiber. Our bodies use these vitamins, minerals and fiber to keep us healthy and give us energy. They also can help protect us from getting sick. It's important to eat vegetables of all different colors so we can get as much of the good stuff as possible. But how much is enough? Vegetable servings are measured in cups. This is how many vegetables kids need each day:

- 4- to 8-year-olds need 1½ cups of veggies each day

- 9- to 13-year-old girls need 2 cups of veggies each day
- 9- to 13-year-old boys need 2½ cups of veggies each day

## Fruits

Sweet, juicy fruit is definitely part of a healthy diet. Just like vegetables, fruits are all different colors and provide us with lots of vitamins, minerals and fiber. Our bodies use these vitamins, minerals and fiber to keep us healthy and give us energy. They also can help protect us from getting sick. It's important to eat fruits of all different colors so we can get as much of the good stuff as possible. But how much is enough? Fruit servings are measured in cups. This is how many fruits kids need each day:

- 4- to 8-year-olds need 1-1½ cups of fruit each day
- 9- to 13-year-old girls need 1½ cups of fruit each day
- 9- to 13-year-old boys need 1½ cups of fruit each day

## Dairy

Milk, smoothies, yogurt, cheese, ice cream and cottage cheese are some of the foods in this group. Dairy products give us calcium and protein and help make our teeth and bones strong. Dairy products are measured in cups. This is how much dairy kids need each day:

- 4- to 8-year-olds need 1-2 cups of milk (or another calcium-rich food) each day
- 9- to 13-year-old girls need 3 cups of milk (or another calcium-rich food) each day
- 9- to 13-year-old boys need 3 cups of milk (or another calcium-rich food) each day

If you want something other than milk, you can substitute yogurt, cheese, or calcium-fortified orange juice, just to name a few.

## Protein Foods

Foods in this group contain protein, iron and lots of other important nutrients. Meats, like beef and pork, are in this group. Fish, chicken, eggs, dried beans and peas, nuts and seeds are also in this group. Like grains, these foods are measured in ounce equivalents. An ounce equivalent of this group would be:

- 1 ounce of meat, poultry, or fish
- ¼ cup cooked dry beans
- 1 egg
- 1 tablespoon of peanut butter
- a small handful of nuts or seeds

This is how many meat ounce equivalents kids need each day:

- 4- to 8-year-olds need 3-4 ounce equivalents each day
- 9- to 13-year-old girls need 5 ounce equivalents each day
- 9- to 13-year-old boys need 5 ounce equivalents each day

## Find Your Balance between Food and Fun

Move more. Do something active every day – you are an important role model. You can run, walk the dog, play, swim, ride your bike, dance, rollerblade or even climb the stairs. It all counts! Kids should aim for at least 60 minutes every day.

# Vitamins

Vitamins are organic compounds necessary for normal growth, maintenance of health and reproduction. There are 13 vitamins currently identified as essential for maintaining good health; the body cannot survive without them.

## Function

Vitamins help the body convert carbohydrates and fat into energy and assist in the formation of bones and tissues. Vitamins are either fat-soluble or water-soluble. Fat-soluble vitamins cannot be dissolved in water, so they are stored in the body fat until they are transported to the cells by the blood. Because these vitamins can accumulate in the body, it is especially important for a person's regular daily nutrient intake of fat soluble vitamins not to exceed the Tolerable Upper Intake Levels (UL). Water-soluble vitamins are easily dissolved by water and therefore are not significantly stored by the body. Water-soluble vitamins must be replenished frequently.

Fat-Soluble Vitamin Alternative Names	Description	Sources
Vitamin A Retinol Beta-carotene (a precursor)	Responsible for night and color vision, growth of bones and teeth, immune function, maintenance of epithelial tissues, and embryonic development. Excessive amounts of certain forms of Vitamin A (found in some skin medications) can cause fetal abnormalities.	Dark green and dark yellow vegetables, yellow fruits, egg yolks, whole milk, liver, and fish oils.
Vitamin D Calciferol	Important for the normal growth and development of bones and teeth. Aids in the absorption and utilization of calcium and phosphorus. With exposure to the sun, the body is able to make its own Vitamin D.	Egg yolks, liver, fish liver oils, fortified cereals, and fortified milk.

Vitamin E  
Tocopherol

Protects cells from oxidation and is important in cell membranes. Oxidation is a chemical change that occurs as a result of exposure to oxygen. When blood cells or tissue cells are exposed to oxygen, the resulting chemical change causes a weakening of the cell walls and thus damages the tissues. Vitamin E is most effective in protecting the red blood cells in the lungs and the cells of the lung tissue because of their continuous exposure to oxygen.

Vegetable oils, whole grains, nuts and seeds, liver, fish oils, and green leafy vegetables (spinach, kale, etc.).

Vitamin K

Necessary for protein synthesis involved in blood clotting and other body processes.

Green vegetables (leafy vegetables, broccoli, Brussels sprouts), cabbage, plant oils, margarine. Can be produced by bacteria in the gastrointestinal tract.

Water-Soluble Vitamin Alternative Names	Description	Sources
B1 Thiamin Aneurin	Helps the body breakdown carbohydrates and release energy from food. It is necessary for cell respiration, promotion of normal appetite and digestion, and maintenance of a healthy nervous system. Thiamin is heat sensitive and is easily leached into the cooking liquid.	Enriched or fortified whole grain products, green leafy vegetables, legumes, and pork.
B2 Riboflavin	Important for the breakdown of foods and the release of energy (oxidation-reduction reactions). Riboflavin is easily destroyed by exposure to light, especially sunlight.	Fortified cereals and bread products, eggs, fish, organ meats, and milk.
B3 Niacin Nicotinic acid	Helps cells convert food into energy, and is important in the nervous and digestive systems.	Lean meats, poultry, fish, nuts, enriched or fortified bread products and cereals, eggs, and dairy products.

Folate  
Folic acid  
Folacin

Necessary for the body to produce normal red blood cells and for amino acids and nucleic acid metabolism. Key in preventing neural tube defects, such as spina bifida, during pregnancy.

Dark leafy green vegetables, enriched grain and cereal products, yeast.

Biotin

Essential in the metabolism of fats and amino acids.

Liver and eggs are important sources of biotin; it is also found in baker's yeast, and legumes.

B5  
Pantothenic acid

Aids in the metabolism of fats and the formation of cholesterol and hormones.

Eggs, milk, whole-grain products, sweet potatoes, and lean beef.

B6  
Pyridoxine

Important in maintaining nervous tissue function and muscle cells, DNA and RNA production, and the metabolism of carbohydrates, proteins, and fats.

Sources include poultry, fish, fortified whole grain cereals, and lentils.

B12  
Cobalamin  
Cyanocobalamin

Important in red blood cell formation, nucleic acid metabolism and the prevention of pernicious anemia.

Animal products (meat, fish, poultry, milk), fortified cereals.

Vitamin C  
Ascorbic acid

Aids in the formation of collagen, the healing of wounds, and the absorption of iron and calcium. Vitamin C is also an important antioxidant.

Sources include citrus fruits, parsley, broccoli, green and red peppers, and tomatoes.

Research continues into the role vitamins and minerals play in preventing chronic disease and in maintaining health and wellness. The **Dietary Reference Intakes** serve as guidelines for determining the amounts of nutrients that a person needs each day.

## What are “oils”?

Oils are fats that are liquid at room temperature, like the vegetable oils used in cooking. Oils come from many different plants and from fish. Some common oils are:

- canola oil
- corn oil
- cottonseed oil
- olive oil
- safflower oil
- soybean oil
- sunflower oil
- peanut oil

Some oils are used mainly as flavorings, such as walnut oil and sesame oil. A number of foods are naturally high in oils, like:

- nuts
- olives
- some fish
- avocados

Foods that are mainly oil include mayonnaise, certain salad dressings and soft (tub or squeeze) margarine with no *trans* fats. Check the Nutrition Facts label to find margarines with 0 grams of *trans* fat.

Most oils are high in monounsaturated or polyunsaturated fats, and low in saturated fats. Oils from plant sources (vegetable and nut oils) do not contain any cholesterol. In fact, no foods from plant sources contain cholesterol.

A few plant oils, however, including coconut oil and palm kernel oil, are high in saturated fats and for nutritional purposes should be considered solid fats.

Solid fats come from many animal foods and can also be made from vegetable oils through a process called hydrogenation. Some common solid fats are:

- butter, cream, and milk fat
- beef fat (tallow, suet)
- chicken fat
- pork fat (lard)
- stick margarine
- shortening

## How are oils different from solid fats?

All fats and oils are a mixture of saturated fatty acids and unsaturated fatty acids. Solid fats contain more **saturated fats** and/or ***trans* fats** than oils. Oils contain more monounsaturated (MUFA) and polyunsaturated (PUFA) fats. Saturated fats, *trans* fats, and cholesterol tend to raise “bad” (LDL) cholesterol levels in the blood, which in turn increases the risk for heart disease. To lower risk for heart disease, cut back on foods containing saturated fats, *trans* fats and cholesterol.

## Why is it important to consume oils?

Most of the fats you eat should be polyunsaturated (PUFA) or monounsaturated (MUFA) fats. Oils are the major source of MUFAs and PUFAs in the diet. PUFAs contain some fatty acids that are necessary for health, called “essential fatty acids.” Because oils contain these essential fatty acids, there is an allowance for oils in an overall healthy diet.

The MUFAs and PUFAs found in fish, nuts, and vegetable oils do not raise LDL (“bad”) cholesterol levels in the blood. In addition to the essential fatty acids they contain, oils are the major source of vitamin E in typical American diets.

While consuming some oil is needed for health, oils still contain calories. In fact, oils and solid fats both contain about 120 calories per Tablespoon. Eating an amount of oils and/or



solid fats beyond what is essential for good health provides “empty calories.” Therefore, the amount of oil consumed needs to be limited to balance total calorie intake. The Nutrition Facts label provides information to help you make smart choices.

## How much is my allowance for oils?

Most Americans consume enough oil in the foods they eat, such as:

- nuts
- fish
- cooking oil
- salad dressings

A person’s allowance for oils depends on age, sex, and level of physical activity. Daily allowances are shown in the chart.

<b>Children</b>	2-3 years old	3 teaspoons
	4-8 years old	4 teaspoons
<b>Girls</b>	9-13 years old	5 teaspoons
	14-18 years old	5 teaspoons
<b>Boys</b>	9-13 years old	5 teaspoons
	14-18 years old	6 teaspoons
<b>Women</b>	19-30 years old	6 teaspoons
	31-50 years old	5 teaspoons
	51+ years old	5 teaspoons
<b>Men</b>	19-30 years old	7 teaspoons
	31-50 years old	6 teaspoons
	51+ years old	6 teaspoons

## How do I count the oils I eat?

The chart below gives a quick guide to the amount of oils in some commonly eaten foods:

	Amount of Food	Amount of Oil	Calories from Oil	Total Calories
	Each/Ounce/ Tablespoon	Teaspoons/ grams	Approximate calories	Approximate calories
<b>Oils:</b>				
Vegetable oils (such as canola, corn, cottonseed, olive, peanut, safflower, soybean, and sunflower)	1 Tbsp	3 tsp/14 g	120	120
<b>Foods rich in oils:</b>				
Margarine, soft ( <i>trans</i> fat free)	1 Tbsp	2½ tsp/11 g	100	100
Mayonnaise	1 Tbsp	2½ tsp/11 g	100	100
Mayonnaise-type salad dressing	1 Tbsp	1 tsp/5 g	45	55
Italian dressing	2 Tbsp	2 tsp/8 g	75	85
Thousand Island dressing	2 Tbsp	2½ tsp/11 g	100	120
Olives, ripe, canned	4 large	½ tsp/ 2 g	15	20
Avocado*	½ med	3 tsp/15 g	130	160
Peanut butter*	2 T	4 tsp/ 16 g	140	190
Peanuts, dry roasted*	1 oz	3 tsp/14 g	120	165
Mixed nuts, dry roasted*	1 oz	3 tsp/15 g	130	170
Cashews, dry roasted*	1 oz	3 tsp/13 g	115	165
Almonds, dry roasted*	1 oz	3 tsp/15 g	130	170
Hazelnuts*	1 oz	4 tsp/18 g	160	185
Sunflower seeds*	1 oz	3 tsp/14 g	120	165

\*Avocados are part of the fruit group, while nuts and seeds are part of the protein foods group.

## What foods are in the dairy group?

All fluid milk products and many foods made from milk are part of the dairy group. Foods made from milk that retain their calcium content are part of the group, while foods made from milk that have little to no calcium, such as cream cheese, cream, and butter, are not. Some commonly eaten foods from the dairy group include:



### Milk\*

*All fluid milk:*  
fat free (skim)  
low fat (1%)  
reduced fat (2%)  
whole milk  
lactose reduced  
lactose free

*Flavored milks:*  
chocolate  
strawberry

### Milk-based desserts\*

puddings made with milk  
ice milk  
frozen yogurt  
ice cream

### \*Selection Tips

Choose fat free or low fat milk and yogurt more often than cheese. Milk and yogurt have more potassium and less sodium than most cheeses. If you choose milk or yogurt that is not fat free, or cheese that is not low fat, the extra fat calories are considered “empty calories”.

If sweetened milk products are chosen (flavored milk, yogurt, drinkable yogurt, or desserts), the added sugars contribute calories that are also considered “empty calories”.

For those who are lactose intolerant, lactose free and lower lactose products are available. These include hard cheeses and yogurt. Also, enzyme preparations can be added to milk to lower the lactose content. Calcium-fortified foods and beverages such as soy beverages or orange juice may provide calcium, but may not provide the other nutrients found in milk and milk products.

## Health benefits and nutrients

Consuming dairy foods provides health benefits. People who have diets rich in dairy foods can reduce their risk of low bone mass throughout the lifecycle. Foods in the dairy group provide nutrients that are vital for health and body maintenance. These nutrients include calcium, potassium, vitamin D and protein.

### Health benefits

- Diets rich in dairy foods may reduce the risk of osteoporosis because of their bone-building effect.
- The intake of dairy foods is especially important to bone health during childhood and adolescence when bone mass is being built.
- Diets that include dairy foods tend to have a higher overall nutritional quality.



### Nutrients

- Calcium is used for building bones and teeth and in maintaining bone mass. Dairy products are the primary source of calcium in American diets. Diets that provide 3 cups (or the equivalent) of dairy products per day can improve bone mass.
- Diets rich in potassium may help maintain healthy blood pressure. Dairy foods, especially yogurt and fluid milk, provide potassium.
- Vitamin D functions in the body to maintain proper levels of calcium and phosphorous, thereby helping to build and maintain bones. Milk that is fortified with vitamin D is a good source of this nutrient. Other sources include vitamin D-fortified yogurt and vitamin D-fortified ready-to-eat breakfast cereals.

- Dairy products that are consumed in their low fat or fat free forms provide little or no solid fat.

## Why is it important to make fat free or low fat choices from the dairy group?

Choosing foods from the dairy group that are high in saturated fats and cholesterol can have health implications. Diets high in saturated fats raise “bad” (LDL) cholesterol levels in the blood. High LDL cholesterol, in turn, increases the risk for coronary heart disease. Many cheeses, whole milk, and products made from them are high in saturated fat. To help keep blood cholesterol levels healthy, limit the amount of these foods. In addition, a high intake of fats makes it difficult to avoid consuming “empty calories”.

## How much food from the dairy group is needed daily?

The amount of food needed each day from the dairy group depends on age. Recommended daily amounts are shown in the chart below:

<b>Children</b>	2-3 years old	2 cups
	4-8 years old	2 cups
<b>Girls</b>	9-13 years old	3 cups
	14-18 years old	3 cups
<b>Boys</b>	9-13 years old	3 cups
	14-18 years old	3 cups
<b>Women</b>	19-30 years old	3 cups
	31-50 years old	3 cups
	51+ years old	3 cups
<b>Men</b>	19-30 years old	3 cups
	31-50 years old	3 cups
	51+ years old	3 cups

## What counts as 1 cup in the dairy group?

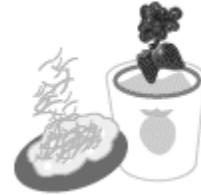
In general, 1 cup of milk or yogurt, 1½ ounces of natural cheese, or 2 ounces of processed cheese are considered 1 cup from the dairy group. The chart below lists specific amounts that count as 1 cup:

	Amount that counts as 1 cup in the dairy group	Common portions and cup
<b>Milk</b> <i>[choose fat free or low fat milk most often]</i>	1 cup 1 half-pint container ½ cup evaporated milk	
<b>Yogurt</b> <i>[choose fat free or low fat yogurt most often]</i>	1 regular container (8 fluid ounces)  1 cup	1 small container (6 ounces) = ¾ cup  1 snack size container (4 ounces) = ½ cup
<b>Cheese</b> <i>[choose low fat cheeses most often]</i>	1½ ounces hard cheese (cheddar, mozzarella, Swiss, parmesan) ½ cup shredded cheese  2 ounces processed cheese (American) ½ cup ricotta cheese  2 cups cottage cheese	1 slice of hard cheese is equivalent to ½ cup milk  1 slice of processed cheese is equivalent to ⅓ cup milk  ½ cup cottage cheese is equivalent to ¼ cup milk
<b>Milk-based desserts</b> <i>[choose fat free or low fat types most often]</i>	1 cup pudding made with milk 1 cup frozen yogurt  1½ cups ice cream	   1 scoop ice cream is equivalent to ⅓ cup milk

## Tips for making wise choices

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- Include milk as a beverage at meals. Choose fat free or low fat milk.
- If you usually drink whole milk, gradually switch to fat free milk to lower saturated fat and calories. Try reduced fat (2%), then low fat (1%), and finally fat free (skim).
- If you drink cappuccinos or lattes, ask for them with fat free (skim) milk.
- Add fat free or low fat milk to oatmeal and hot cereals instead of water.
- Use fat free or low fat milk when making condensed cream soups (such as cream of tomato).
- Have fat free or low fat yogurt as a snack.
- Make a dip for fruits or vegetables from yogurt.
- Make fruit and yogurt smoothies in the blender.
- For dessert, make chocolate or butterscotch pudding with fat free or low fat milk.
- Top cut-up fruit with flavored yogurt for a quick dessert.
- Occasionally, top casseroles, soups, stews, or vegetables with shredded, low fat cheese.
- Top a baked potato with fat free or low fat yogurt.



### Keep it safe to eat

- Avoid raw (unpasteurized) milk or any products made from unpasteurized milk.
- Refrigerate perishable foods promptly and defrost foods properly. Refrigerate or freeze perishables, prepared food and leftovers as soon as possible. If food has been left at temperatures between 40° and 140° F for more than two hours, throw it away, even though it may look and smell good.
- Separate raw, cooked and ready-to-eat foods.

### For those who choose not to consume dairy foods

- If you avoid milk because of lactose intolerance, the most reliable way to get the health benefits of milk is to choose lactose reduced or low lactose alternatives within the dairy group, such as cheese, yogurt, or lactase treated milk, or to consume the enzyme lactase before consuming milk products.
- Calcium choices for those who do not consume milk products include:
  - Calcium-fortified juices, cereals, breads, soy beverages, or rice beverages
  - Canned fish (sardines, salmon with bones) soybeans and other soy products (soy-based beverages, soy yogurt, tempeh), some dried beans, and some leafy greens (collard and turnip greens, kale, bok choy). The amount of calcium that can be absorbed from these foods varies.

## What foods are in the fruit group?

Any fruit or 100% fruit juice count as part of the fruit group. Fruits may be fresh, canned, frozen, or dried, and may be whole, cut-up, or pureed. Some commonly eaten fruits are:

Apples  
Apricots  
Avocado  
Bananas

*Berries:*  
strawberries  
blueberries  
raspberries  
cherries

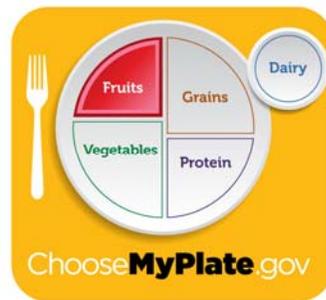
Grapefruit  
Grapes  
Kiwi fruit  
Lemons  
Limes  
Mangoes

*Melons:*  
cantaloupe  
honeydew  
watermelon

*Mixed fruits:*  
fruit cocktail

Nectarines  
Oranges  
Peaches  
Pears  
Papaya  
Pineapple  
Plums  
Prunes  
Raisins  
Tangerines

*100% Fruit juice:*  
orange  
apple  
grape  
grapefruit



## Why is it important to eat fruit?

Eating fruit provides health benefits. People who eat more fruits and vegetables as part of an overall healthy diet are likely to have a reduced risk of some chronic diseases. Fruits provide nutrients vital for health and body maintenance.

### Health benefits

- Eating a diet rich in fruits and vegetables as part of an overall healthy diet may reduce risk for:
  - Stroke, coronary heart disease and other cardiovascular diseases,
  - Type 2 diabetes, and
  - Certain cancers, such as mouth, stomach, and colorectal cancer,
- Because of their potassium content, eating fruits and vegetables as part of an overall healthy diet may help prevent bone loss and the development of kidney stones.
- Since fruits are low in calories per cup when compared to many other foods, eating fruits may be useful in lowering overall daily calorie intake.

### Nutrients

- Most fruits are naturally low in fat, sodium, and calories. None have cholesterol.
- Fruits are important sources of many nutrients, including potassium, dietary fiber, vitamin C and folate (folic acid).
- Diets rich in potassium may help to maintain healthy blood pressure. Fruit sources of potassium include bananas, prunes and prune juice, dried peaches and apricots, cantaloupe, honeydew melon, and orange juice.
- Dietary fiber from fruits, as part of an overall healthy diet, helps reduce blood cholesterol levels and may lower risk of heart disease. Fiber is important for proper bowel function. It helps reduce constipation and diverticulosis. Fiber-containing foods such as fruits help provide a feeling of fullness with fewer calories. *Whole or cut-up fruits are sources of dietary fiber; fruit juices contain little or no fiber.*
- Vitamin C is important for growth and repair of all body tissues, helps heal cuts and wounds, and keeps teeth and gums healthy.
- Folate (folic acid) helps the body form red blood cells. Women of childbearing age who may become pregnant and those in the first trimester of pregnancy should consume adequate folate, including

folic acid from fortified foods or supplements. This reduces the risk of neural tube defects, spina bifida and anencephaly during fetal development.

## How much fruit is needed daily?

The amount of fruit needed each day depends on age, sex, and level of physical activity. Recommended daily amounts are shown in the chart below.

<b>Children</b>	2-3 years old	1 cup
	4-8 years old	1 to 1½ cups
<b>Girls</b>	9-13 years old	1 ½ cups
	14-18 years old	1½ cups
<b>Boys</b>	9-13 years old	1½ cups
	14-18 years old	2 cups
<b>Women</b>	19-30 years old	2 cups
	31-50 years old	1½ cups
	51+ years old	1½ cups
<b>Men</b>	19-30 years old	2 cups
	31-50 years old	2 cups
	51+ years old	2 cups

## What counts as a cup of fruit?

In general, 1 cup of fruit, 1 cup of 100% fruit juice, or ½ cup of dried fruit are considered 1 cup from the fruit group.

## Tips to help you eat fruits

### In general:

- Keep a bowl of whole fruit on the table, counter or in the refrigerator.
- Refrigerate cut-up fruit to store for later.
- Buy fresh fruits in season when they may be less expensive and at their peak flavor.
- Buy fruits that are dried, frozen, and canned (in water or juice) as well as fresh, so that you always have a supply on hand.
- Consider convenience when shopping. Buy pre-cut packages of fruit (such as melon or pineapple chunks) for a healthy snack in seconds. Choose packaged fruits that do not have added sugars.
- Make half your plate fruits and vegetables.

### For the best nutritional value:

- Make most of your choices whole or cut-up fruit rather than juice for the benefits dietary fiber provides.
- Vary your fruit choices. Fruits differ in nutrient content. Especially go for red and orange varieties.
- Select fruits with more potassium often, such as bananas, prunes and prune juice, dried peaches and apricots, cantaloupe, honeydew melon and orange juice.
- When choosing canned fruits, select fruit canned in 100% fruit juice or water rather than syrup.

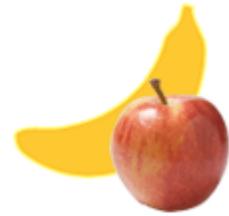
### At meals:

- At breakfast, top your cereal with bananas or peaches, add blueberries to pancakes, drink 100% orange or grapefruit juice. Or, try a fruit mixed with low fat or fat free yogurt.
- At lunch, pack a tangerine, banana or grapes to eat, or choose fruits from a salad bar. Individual containers of fruits like peaches or applesauce are easy and convenient.
- At dinner, add crushed pineapple to coleslaw, or include mandarin oranges or grapes in a tossed salad.
- Make a Waldorf salad, with apples, celery, walnuts and dressing.
- Try meat dishes that incorporate fruit, such as chicken with apricots or mango chutney.
- Add fruits, like pineapple or peaches, to kabobs as part of a grilled meal.
- For dessert, have baked apples, pears or a fruit salad.



### As snacks:

- Cut-up fruit makes a great snack. Either cut them yourself or buy pre-cut packages of fruit pieces like pineapples or melons. Or, try whole fresh berries or grapes.
- Dried fruits also make a great snack. They are easy to carry and store well.
- Keep a package of dried fruit in your desk or bag. Some fruits that are available dried include apricots, apples, pineapple, bananas, cherries, figs, dates, cranberries, blueberries, prunes (dried plums) and raisins (dried grapes).
- As a snack, spread peanut butter on apple slices or top frozen yogurt with berries or slices of kiwi fruit.
- Frozen juice bars (100% juice) make healthy alternatives to high fat snacks.



### Make fruit more appealing:

- Many fruits taste great with a dip or dressing. Try low fat yogurt or pudding as a dip for fruits like strawberries or melons.
- Make a fruit smoothie by blending fat free or low fat milk or yogurt with fresh or frozen fruit. Try bananas, peaches, strawberries, or other berries.
- Try applesauce as a fat free substitute for some of the oil when baking cakes.
- Try different textures of fruits. For example, apples are crunchy, bananas are smooth and creamy, and oranges are juicy.
- For fresh fruit salads, mix apples, bananas or pears with acidic fruits, like oranges, pineapple or lemon juice, to keep them from turning brown.



### Fruit tips for children:

- Set a good example for children by eating fruit everyday with meals or as snacks.
- Offer children a choice of fruits for lunch.
- Depending on their age, children can help shop for, clean, peel, or cut up fruits.
- While shopping, allow children to pick out a new fruit to try later at home.
- Decorate plates or serving dishes with fruit slices.
- Top off a bowl of cereal with some berries. Or, make a smiley face with sliced bananas for eyes, raisins for a nose, and an orange slice for a mouth.
- Offer raisins or other dried fruits instead of candy.
- Make fruit kabobs using pineapple chunks, bananas, grapes and berries.
- Pack a juice box (100% juice) in children's lunches instead of soda or other sugar-sweetened beverages.
- Choose fruit options, such as sliced apples, mixed fruit cup, or 100% fruit juice that are available in some fast food restaurants.
- Offer fruit pieces and 100% fruit juice to children. There is often little fruit in "fruit-flavored" beverages or chewy fruit snacks.



### Keep it safe:

- Wash fruits before preparing or eating them. Under clean, running water, rub fruits briskly with your hands to remove dirt and surface microorganisms. Dry after washing.
- Keep fruits separate from raw meat, poultry and seafood while shopping, preparing or storing.



## What foods are in the grains group?

Any food made from wheat, rice, oats, cornmeal, barley or another cereal grain is a grain product. Bread, pasta, oatmeal, breakfast cereals, tortillas and grits are examples of grain products.

Grains are divided into 2 subgroups, **whole grains** and **refined grains**.

Whole grains contain the entire grain kernel -- the bran, germ, and endosperm. Examples include:

- whole wheat flour
- bulgur (cracked wheat)
- oatmeal
- whole cornmeal
- brown rice

Refined grains have been milled, a process that removes the bran and germ. This is done to give grains a finer texture and improve their shelf life, but it also removes dietary fiber, iron and many B vitamins. Some examples of refined grain products are:

- white flour
- degermed cornmeal
- white bread
- white rice

Most refined grains are *enriched*. This means certain B vitamins (thiamin, riboflavin, niacin, folic acid) and iron are added back after processing. Fiber is not added back to enriched grains. Check the ingredient list on refined grain products to make sure that the word "enriched" is included in the grain name. Some food products are made from mixtures of whole grains and refined grains. Some commonly eaten grain products are:

### Whole grains:

brown rice  
buckwheat  
bulgur (cracked wheat)  
oatmeal  
popcorn

### Ready-to-eat breakfast cereals:

whole wheat cereal flakes  
muesli

whole grain barley  
whole grain cornmeal  
whole rye  
whole wheat bread  
whole wheat crackers  
whole wheat pasta  
whole wheat sandwich buns and rolls  
whole wheat tortillas  
wild rice

### Less common whole grains:

amaranth  
millet  
quinoa  
sorghum  
triticale

### Refined grains:

cornbread\*  
corn tortillas\*  
couscous\*  
crackers\*  
flour tortillas\*  
grits  
noodles\*

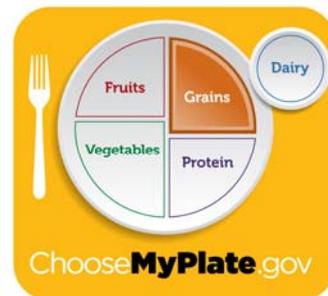
*Pasta\**  
spaghetti  
macaroni

pitas\*  
pretzels

### Ready-to-eat breakfast cereals:

corn flakes

white bread  
white sandwich buns and rolls  
white rice



## Why is it important to eat grains, especially whole grains?

Eating grains, especially whole grains, provides health benefits. People who eat whole grains as part of a healthy diet have a reduced risk of some chronic diseases. Grains provide many nutrients that are vital for the health and maintenance of our bodies.

### Health benefits

- Consuming foods rich in fiber, such as whole grains, as part of a healthy diet, reduces the risk of coronary heart disease and common gastrointestinal issues, such as constipation and diverticulosis.
- Eating at least 3 ounce equivalents a day of whole grains may help with weight management.
- Eating grains fortified with folate before and during pregnancy helps prevent neural tube defects during fetal development.

### Nutrients

Grains are important sources of many nutrients, including dietary fiber, several B vitamins (thiamin, riboflavin, niacin, and folate), and minerals (iron, magnesium, and selenium).

- Dietary fiber from whole grains, as part of an overall healthy diet, helps reduce blood cholesterol levels and may lower risk of heart disease. Fiber is important for proper bowel function. It helps reduce constipation and diverticulosis. Fiber-containing foods such as whole grains help provide a feeling of fullness with fewer calories. Unlike whole grains, most refined (processed) grains contain little fiber.
- B vitamins (thiamin, riboflavin, niacin, and folate) play a key role in metabolism. They help the body release energy from protein, fat, and carbohydrates. B vitamins are also essential for a healthy nervous system. Many refined grains are enriched with these B vitamins.
- Folate (folic acid), another B vitamin, helps the body form red blood cells. Women of childbearing age who may become pregnant and those in the first trimester of pregnancy should consume adequate folate, including folic acid from fortified foods or supplements. This reduces the risk of neural tube defects, spina bifida, and anencephaly during fetal development.
- Iron is used to carry oxygen in the blood. Many teenage girls and women in their childbearing years have iron-deficiency anemia. They should eat foods high in heme-iron (meats) or eat other iron-containing foods along with foods rich in vitamin C, which can improve absorption of non-heme iron. Whole and enriched, refined grain products are major sources of non-heme iron in American diets.
- Whole grains are sources of magnesium and selenium. Magnesium is a mineral used in building bones and releasing energy from muscles. Selenium protects cells from oxidation. It is also important for a healthy immune system.

## How many grain foods are needed daily?

The amount of grains you need to eat depends on your age, sex, and level of physical activity. Recommended daily amounts are listed in the chart below. Most Americans consume enough grains, but not enough whole grains. At least half of all grains eaten should be whole grains.

		Daily Recommendation*	Daily Minimum Amount of Whole Grains
<b>Children</b>	2-3 years old	3 ounce equivalents	1½ ounce equivalents
	4-8 years old	4-5 ounce equivalents	2-2½ ounce equivalents
<b>Girls</b>	9-13 years old	5 ounce equivalents	3 ounce equivalents
	14-18 years old	6 ounce equivalents	3 ounce equivalents
<b>Boys</b>	9-13 years old	6 ounce equivalents	3 ounce equivalents
	14-18 years old	7 ounce equivalents	3½ ounce equivalents
<b>Women</b>	19-30 years old	6 ounce equivalents	3 ounce equivalents
	31-50 years old	6 ounce equivalents	3 ounce equivalents
	51+ years old	5 ounce equivalents	3 ounce equivalents
<b>Men</b>	19-30 years old	8 ounce equivalents	4 ounce equivalents
	31-50 years old	7 ounce equivalents	3½ ounce equivalents
	51+ years old	6 ounce equivalents	3 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.

## What counts as an ounce equivalent of grains?

In general, 1 slice of bread, 1 cup of ready-to-eat cereal, or ½ cup of cooked rice, cooked pasta, or cooked cereal can be considered a 1-ounce equivalent from the grains group. The chart below lists specific amounts that count as a 1-ounce equivalent of grains. In some cases the number of ounce equivalents for common portions is also shown.

		Amount that counts as 1 ounce equivalent of grains	Common portions and ounce equivalents
<b>Bagels</b>	WG*: whole wheat RG*: plain, egg	1 "mini" bagel	1 large bagel = 4 ounce equivalents
<b>Biscuits</b>	(baking powder/ buttermilk—RG*)	1 small (2" diameter)	1 large (3" diameter) = 2 ounce equivalents
<b>Breads</b>	WG*: 100% whole wheat RG*: white, wheat, French, sourdough	1 regular slice 1 small slice French 4 snack-size slices rye bread	2 regular slices = 2 ounce equivalents
<b>Bulgur</b>	cracked wheat (WG*)	½ cup cooked	
<b>Cornbread</b>	(RG*)	1 small piece (2½" x 1¼" x 1¼")	1 medium piece (2½" x 2½" x 1¼") = 2 ounce equivalents
<b>Crackers</b>	WG*: 100% whole wheat, rye RG*: saltines, snack crackers	5 whole wheat crackers 2 rye crispbreads 7 square or round crackers	
<b>English muffins</b>	WG*: whole wheat RG*: plain, raisin	½ muffin	1 muffin = 2 ounce equivalents
<b>Muffins</b>	WG*: whole wheat RG*: bran, corn, plain	1 small (2½" diameter)	1 large (3 ½" diameter) = 3 ounce equivalents
<b>Oatmeal</b>	(WG)	½ cup cooked 1 packet instant 1 ounce dry (regular or quick)	
<b>Pancakes</b>	WG*: whole wheat, buckwheat RG*: buttermilk, plain	1 pancake (4 ½" diameter) 2 small pancakes (3" diameter)	3 pancakes (4 ½" diameter) = 3 ounce equivalents
<b>Popcorn</b>	(WG*)	3 cups, popped	1 microwave bag, popped = 4 ounce equivalents
<b>Ready-to-eat breakfast cereal</b>	WG*: toasted oat, whole wheat flakes RG*: corn flakes, puffed rice	1 cup flakes or rounds 1 ¼ cup puffed	
<b>Rice</b>	WG*: brown, wild RG*: enriched, white, polished	½ cup cooked 1 ounce dry	1 cup cooked = 2 ounce equivalents
<b>Pasta-- spaghetti, macaroni, noodles</b>	WG*: whole wheat RG*: enriched, durum	½ cup cooked 1 ounce dry	1 cup cooked = 2 ounce equivalents
<b>Tortillas</b>	WG*: whole wheat, whole grain corn RG*: Flour, corn	1 small flour tortilla (6" diameter) 1 corn tortilla (6" diameter)	1 large tortilla (12" diameter) = 4 ounce equivalents

\*WG = whole grains, RG = refined grains. This is shown when products are available both in whole grain and refined grain forms.

## Tips to help you eat whole grains

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### At Meals:

- To eat more whole grains, substitute a whole grain product for a refined product – such as eating whole wheat bread instead of white bread or brown rice instead of white rice. It's important to *substitute* the whole grain product for the refined one, rather than *adding* the whole grain product.
- For a change, try brown rice or whole wheat pasta. Try brown rice stuffing in baked green peppers or tomatoes and whole wheat macaroni in macaroni and cheese.
- Use whole grains in mixed dishes, such as barley in vegetable soup or stews and bulgur wheat in casserole or stir-fries.
- Create a whole grain pilaf with a mixture of barley, wild rice, brown rice, broth and spices. For a special touch, stir in toasted nuts or chopped dried fruit.
- Experiment by substituting whole wheat or oat flour for up to half of the flour in pancake, waffle, muffin or other flour-based recipes. They may need a bit more leavening.
- Use whole grain bread or cracker crumbs in meatloaf.
- Try rolled oats or a crushed, unsweetened whole grain cereal as breading for baked chicken, fish, veal cutlets, or eggplant parmesan.
- Try an unsweetened, whole grain ready-to-eat cereal as croutons in salad or in place of crackers with soup.
- Freeze leftover cooked brown rice, bulgur or barley. Heat and serve it later as a quick side dish.



### As Snacks:

- Snack on ready-to-eat, whole grain cereals such as toasted oat cereal.
- Add whole grain flour or oatmeal when making cookies or other baked treats.
- Try a whole grain snack chip, such as baked tortilla chips.
- Popcorn, a whole grain, can be a healthy snack with little or no added salt and butter.



### What to Look for on the Food Label:

- Choose foods that name one of the following whole grain ingredients *first* on the label's ingredient list:

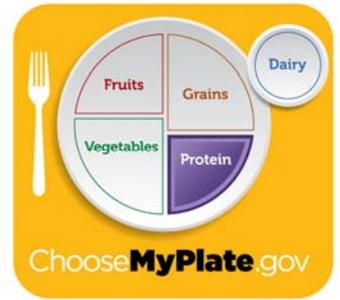
"brown rice"	"whole oats"
"bulgur"	"whole rye"
"graham flour"	"whole wheat"
"oatmeal"	"wild rice"
"whole grain corn"	
- Foods labeled with the words "multigrain," "stone ground," "100% wheat," "cracked wheat," "seven grain," or "bran" are usually *not* whole grain products.
- Color is not an indication of a whole grain. Bread can be brown because of molasses or other added ingredients. Read the ingredient list to see if it is a whole grain.
- Use the Nutrition Facts label and choose products with a higher percent Daily Value (% DV) for fiber. The % DV for fiber is a good clue about the amount of whole grain in the product.
- Read the food label's ingredient list. Look for terms that indicate added sugars (sucrose, high fructose corn syrup, honey, and molasses) and oils (partially-hydrogenated vegetable oils) that add extra calories. Choose foods with fewer added sugars, fats, or oils.
- Most sodium in the food supply comes from packaged foods. Similar packaged foods can vary widely in sodium content, including breads. Use the Nutrition Facts label to choose foods with a lower % DV for sodium. Foods with less than 140 mg sodium per serving can be labeled as low sodium foods. Claims such as "low in sodium" or "very low in sodium" on the front of the food label can help you identify foods that contain less salt (or sodium).

### Whole Grain Tips for Children

- Set a good example for children by eating whole grains with meals or as snacks.
- Let children select and help prepare a whole grain side dish.
- Teach older children to read the ingredient list on cereals or snack food packages and choose those with whole grains at the top of the list.

## What foods are in the protein foods group?

All foods made from meat, poultry, fish, dry beans or peas, eggs, nuts, and seeds are considered part of this group. Dry beans and peas are part of this group as well as the vegetable group. Most meat and poultry choices should be lean or low fat. Fish, nuts, and seeds contain healthy oils, so choose these foods frequently instead of meat or poultry. Some commonly eaten choices in the protein foods group, with selection tips, are:



### Meats\*

*Lean cuts of:*

beef  
ham  
lamb  
pork  
veal

*Game meats:*

bison  
rabbit  
venison

*Lean ground meats:*

beef  
pork  
lamb

Lean luncheon meats

*Organ meats:*

liver  
giblets

### Poultry\*

chicken  
duck  
goose  
turkey  
ground chicken and turkey

### Eggs\*

chicken eggs  
duck eggs

### Dry beans and peas:

black beans  
black-eyed peas  
chickpeas (garbanzo beans)  
falafel  
kidney beans  
lentils  
lima beans (mature)  
navy beans  
pinto beans  
soy beans  
split peas  
tofu (bean curd made from soy beans)  
white beans

*Bean burgers:*

garden burgers  
veggie burgers

tempeh

texturized vegetable protein (TVP)

### Nuts & seeds\*

almonds  
cashews  
hazelnuts (filberts)  
mixed nuts  
peanuts  
peanut butter  
pecans  
pistachios  
pumpkin seeds  
sesame seeds  
sunflower seeds  
walnuts

### Fish\*

*Finfish such as:*

catfish  
cod  
flounder  
haddock  
halibut  
herring  
mackerel  
pollock  
porgy  
salmon  
sea bass  
snapper  
swordfish  
trout  
tuna

*Shellfish such as:*

clams  
crab  
crayfish  
lobster  
mussels  
octopus  
oysters  
scallops  
squid (calamari)  
shrimp

*Canned fish such as:*

anchovies  
clams  
tuna  
sardines

### \*Selection Tips

Choose lean or low fat meat and poultry. If higher fat choices are made, such as regular ground beef (75 to 80% lean) or chicken with skin, the calories from the extra fat are considered "empty calories".

If solid fat is added in cooking, such as frying chicken in shortening or frying eggs in butter or stick margarine, the calories from the added fat are also considered "empty calories".

Select fish rich in omega-3 fatty acids, such as salmon, trout, and herring, more often.

Liver and other organ meats are high in cholesterol. Egg yolks are also high in cholesterol, but egg whites are cholesterol free.

Processed meats such as ham, sausage, frankfurters, and luncheon or deli meats have added sodium. Check the ingredient and Nutrition Facts label to help limit sodium intake. Fresh chicken, turkey, and pork that have been enhanced with a salt-containing solution also have added sodium.

Check the product label for statements such as "self-basting" or "contains up to \_\_\_% of \_\_\_", which mean that a sodium-containing solution has been added to the product.

Sunflower seeds, almonds, and hazelnuts (filberts) are the richest sources of vitamin E in this food group. To help meet vitamin E recommendations, make these your nut and seed choices more often.

## How much is needed daily from the protein foods group?

The amount of food you need to eat from the protein foods group depends on age, sex and level of physical activity. Most Americans eat enough food from this group, but need to make leaner and more varied choices. Recommended daily amounts are shown in the chart below.

<b>Children</b>	2-3 years old	2 ounce equivalents**
	4-8 years old	3-4 ounce equivalents**
<b>Girls</b>	9-13 years old	5 ounce equivalents**
	14-18 years old	5 ounce equivalents**
<b>Boys</b>	9-13 years old	5 ounce equivalents**
	14-18 years old	6 ounce equivalents**
<b>Women</b>	19-30 years old	5½ ounce equivalents**
	31-50 years old	5 ounce equivalents**
	51+ years old	5 ounce equivalents**
<b>Men</b>	19-30 years old	6½ ounce equivalents**
	31-50 years old	6 ounce equivalents**
	51+ years old	5½ 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.

## What counts as an ounce equivalent in the protein foods group?

In general, 1 ounce of meat, poultry or fish, ¼ cup cooked dry beans, 1 egg, 1 Tablespoon of peanut butter, or ½ ounce of nuts or seeds is considered a 1-ounce equivalent from the protein foods group. The chart below lists specific amounts that count as 1-ounce equivalents:

	<b>Amount that counts as a 1-ounce equivalent</b>	<b>Common portions and ounce equivalents</b>
<b>Meats</b>	1 ounce cooked lean beef	1 small steak (eye of round, filet) = 3½ to 4 ounce equivalents
	1 ounce cooked lean pork or ham	1 small lean hamburger = 2 to 3 ounce equivalents
<b>Poultry</b>	1 ounce cooked chicken or turkey, without skin	1 small chicken breast half = 3 ounce equivalents
	1 sandwich slice of turkey (4½ x 2½ x ⅛")	½ Cornish game hen = 4 ounce equivalents
<b>Fish</b>	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
<b>Eggs</b>	1 egg	
<b>Nuts and seeds</b>	½ ounce of nuts (12 almonds, 24 pistachios, 7 walnut halves)	1 ounce of nuts or seeds = 2 ounce equivalents
	½ ounce of seeds (pumpkin, sunflower or squash seeds, hulled, roasted)	
	1 Tablespoon of peanut butter or almond butter	

<b>Dry beans and peas</b>	¼ cup of cooked dry beans (such as black, kidney, pinto, or white beans)	1 cup split pea soup = 2 ounce equivalents
	¼ cup of cooked dry peas (such as chickpeas, cowpeas, lentils, or split peas)	1 cup lentil soup = 2 ounce equivalents
	¼ cup of baked beans, refried beans	1 cup bean soup = 2 ounce equivalents
	¼ cup (about 2 ounces) of tofu	1 soy or bean burger patty = 2 ounce equivalents
	1 ounce tempeh, cooked	
	¼ cup roasted soybeans	
	1 falafel patty (2 ¼", 4 ounces)	
	2 Tablespoons of hummus	

## Tips to help you make wise choices from the protein foods group

### Go lean with protein:

- Start with a lean choice:
  - The leanest beef cuts include round steaks and roasts (round eye, top round, bottom round, round tip), top loin, top sirloin, and chuck shoulder and arm roasts.
  - The leanest pork choices include pork loin, tenderloin, center loin, and ham.
  - Choose extra lean ground beef. The label should say at least "90% lean." You may be able to find ground beef that is 93% or 95% lean.
  - Buy skinless chicken parts, or take off the skin before cooking.
  - Boneless skinless chicken breasts and turkey cutlets are the leanest poultry choices.
  - Choose lean turkey, roast beef, ham, or low fat luncheon meats for sandwiches instead of luncheon meats with more fat, such as regular bologna or salami.
  - Overall, think small when it comes to meat portions. Get the flavor you crave, but in a smaller portion.
- Keep it lean:
  - Trim away all of the visible fat from meats and poultry before cooking.
  - Broil, grill, roast, poach, or boil meat, poultry, or fish instead of frying.
  - Drain off any fat that appears during cooking.
  - Skip or limit the breading on meat, poultry, or fish. Breading adds fat and calories. It will also cause the food to soak up more fat during frying.
  - Prepare dry beans and peas without added fats.
  - Choose and prepare foods without high fat sauces or gravies.



### Vary your protein choices:

- Twice a week, make seafood the protein on your plate. Look for fish rich in omega-3 fatty acids, such as salmon, trout, and herring. Some ideas are:
  - Salmon steak or filet
  - Canned salmon
  - Grilled or baked trout
- Eat beans, which are a *natural* source of fiber and protein. Some choices are:
  - Chili with kidney or pinto beans
  - Stir-fried tofu
  - Split pea, lentil, minestrone, or white bean soups
  - Baked beans
  - Black bean enchiladas
  - Garbanzo or kidney beans on a chef's salad
  - Rice and beans
  - Veggie burgers or garden burgers
  - Hummus (chickpeas) spread on pita bread



- Choose nuts as a snack, on salads, or in main dishes. Use nuts to replace meat or poultry, not in addition to these items:
  - Use pine nuts in pesto sauce for pasta.
  - Add slivered almonds to steamed vegetables.
  - Add toasted peanuts or cashews to a vegetable stir-fry instead of meat.
  - Sprinkle a few nuts on top of low fat ice cream or frozen yogurt.
  - Add walnuts or pecans to a green salad instead of cheese or meat.
- Have an egg. One a day, on average, doesn't increase risk for heart disease, so make eggs part of your weekly choices. Only the egg yolk contains cholesterol and saturated fat, so have as many egg whites as you want.

**What to look for on the Food Label:**

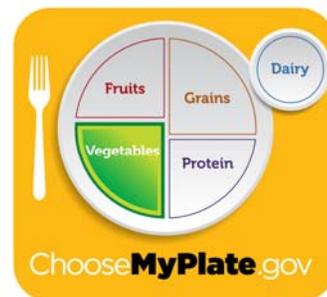
- Check the Nutrition Facts label for the saturated fat, *trans* fat, cholesterol, and sodium content of packaged foods.
  - Processed meats such as hams, sausages, frankfurters, and luncheon or deli meats have added sodium. Check the ingredient and Nutrition Facts label to help limit sodium intake.
  - Fresh chicken, turkey, and pork that have been enhanced with a salt-containing solution also have added sodium. Check the product label for statements such as "self-basting" or "contains up to \_\_\_% of \_\_\_."
  - Lower fat versions of many processed meats are available. Look on the Nutrition Facts label to choose products with less fat and saturated fat.

**Keep it safe to eat:**

- Separate raw, cooked and ready-to-eat foods.
- Do not wash or rinse meat or poultry.
- Wash cutting boards, knives, utensils and counter tops in hot soapy water after preparing each food item and before going on to the next one.
- Store raw meat, poultry and seafood on the bottom shelf of the refrigerator so juices don't drip onto other foods.
- Cook foods to a safe temperature to kill microorganisms. Use a meat thermometer, which measures the internal temperature of cooked meat and poultry, to make sure that the meat is cooked all the way through.
- Chill (refrigerate) perishable food promptly and defrost foods properly. Refrigerate or freeze perishables, prepared food and leftovers within two hours.
- Plan ahead to defrost foods. Never defrost food on the kitchen counter at room temperature. Thaw food by placing it in the refrigerator, submerging air-tight packaged food in cold tap water, or defrosting on a plate in the microwave.
- Avoid raw or partially cooked eggs or foods containing raw eggs and raw or undercooked meat and poultry.
- Women who may become pregnant, pregnant women, nursing mothers, and young children should avoid some types of fish and eat types lower in mercury. See [www.cfsan.fda.gov/~dms/admehg3.html](http://www.cfsan.fda.gov/~dms/admehg3.html) or call 1-888-SAFEFOOD for more information.

## What foods are in the vegetable group?

Any vegetable or 100% vegetable juice is part of the vegetable group. Vegetables may be raw or cooked; fresh, frozen, canned, or dried/dehydrated; and may be whole, cut-up, or mashed. Vegetables are organized into 5 subgroups based on their nutrient content. Some commonly eaten vegetables in each subgroup are:



### Dark green vegetables

bok choy  
broccoli  
collard greens  
dark green leafy lettuce  
kale  
mesclun  
mustard greens  
romaine lettuce  
spinach  
turnip greens  
watercress

### Orange vegetables

acorn squash  
butternut squash  
carrots  
hubbard squash  
pumpkin  
sweet potatoes

### Dry beans and peas

black beans  
black-eyed peas  
garbanzo beans (chickpeas)  
kidney beans  
lentils  
lima beans (mature)  
navy beans  
pinto beans  
soy beans  
split peas  
tofu (bean curd made from soybeans)  
white beans

### Starchy vegetables

corn  
green peas  
lima beans (green)  
potatoes

### Other vegetables

artichokes  
asparagus  
bean sprouts  
beets  
Brussels sprouts  
cabbage  
cauliflower  
celery  
cucumbers  
eggplant  
green beans  
green or red peppers  
iceberg (head) lettuce  
mushrooms  
okra  
onions  
parsnips  
tomatoes  
tomato juice  
vegetable juice  
turnips  
wax beans  
zucchini

## Why is it important to eat vegetables?

Eating vegetables provides health benefits. People who eat more fruits and vegetables as part of an overall healthy diet are likely to have a reduced risk of some chronic diseases. Vegetables provide nutrients vital for health and body maintenance.

### Health benefits

- Eating a diet rich in fruits and vegetables as part of an overall healthy diet may reduce risk for:
  - Stroke, coronary heart disease and other cardiovascular diseases,
  - Type 2 diabetes, and
  - Certain cancers, such as mouth, stomach, and colorectal cancer,
- Because of their potassium content, eating fruits and vegetables as part of an overall healthy diet may help prevent bone loss and the development of kidney stones.
- Since vegetables are low in calories per cup when compared to many other foods, eating vegetables may be useful in lowering overall daily calorie intake.

### Nutrients

- Most vegetables are naturally low in fat and calories. None have cholesterol. (Sauces and seasonings may add fat, calories and/or cholesterol, however.)
- Vegetables are important sources of many nutrients, including potassium, dietary fiber, folate (folic acid), vitamin A, vitamin E and vitamin C.
- Diets rich in potassium may help maintain healthy blood pressure. Vegetable sources of potassium include sweet potatoes, white potatoes, white beans, tomato products (paste, sauce, and juice), beet greens, soybeans, lima beans, winter squash, spinach, lentils, kidney beans and split peas.
- Dietary fiber from vegetables, as part of an overall healthy diet, helps reduce blood cholesterol levels and may lower risk for heart disease. Fiber is important for proper bowel function. It helps

reduce constipation and diverticulosis. Fiber-containing foods such as vegetables help provide a feeling of fullness with fewer calories.

- Folate (folic acid) helps the body form red blood cells. Women of childbearing age who may become pregnant and those in the first trimester of pregnancy should consume adequate folate, including folic acid from fortified foods or supplements. This reduces the risk of neural tube defects, spina bifida and anencephaly during fetal development.
- Vitamin A keeps eyes and skin healthy and helps to protect against infections.
- Vitamin E helps protect vitamin A and essential fatty acids from cell oxidation.
- Vitamin C helps heal cuts and wounds and keeps teeth and gums healthy. Vitamin C aids in iron absorption.

## How many vegetables are needed daily or weekly?

A variety of vegetables should be selected from among the different vegetable subgroups. It is not necessary to eat vegetables from each subgroup daily. However, over a week's time, try to consume the amounts listed for each subgroup as a way to reach your daily intake recommendation. The amount of vegetables you need to eat depends on age, sex and level of physical activity. Recommended total daily amounts are shown in the chart below.

<b>Children</b>	2-3 years old	1 cup
	4-8 years old	1½ cups
<b>Girls</b>	9-13 years old	2 cups
	14-18 years old	2½ cups
<b>Boys</b>	9-13 years old	2½ cups
	14-18 years old	3 cups
<b>Women</b>	19-30 years old	2½ cups
	31-50 years old	2½ cups
	51+ years old	2 cups
<b>Men</b>	19-30 years old	3 cups
	31-50 years old	3 cups
	51+ years old	2½ cups

## What counts as a cup of vegetables?

In general, 1 cup of raw or cooked vegetables, 1 cup 100% vegetable juice, or 2 cups of raw leafy greens are each considered 1 cup from the vegetable group.

## Tips to help you eat vegetables

### In general:

- Buy fresh vegetables in season. They cost less and are likely to be at their peak flavor.
- Stock up on frozen vegetables for quick and easy cooking in the microwave.
- Buy vegetables that are easy to prepare. Pick up pre-washed bags of salad greens and add baby carrots or grape tomatoes for a salad in minutes. Buy packages of baby carrots or celery sticks for quick snacks.
- Use a microwave to quickly steam vegetables. White or sweet potatoes can be cooked quickly this way.
- Vary your veggie choices to keep meals interesting.
- Try crunchy vegetables, raw or lightly steamed.
- Make half your plate fruits and vegetables.

### For the best nutritional value:

- Most often, choose red, orange and dark green vegetables, such as red peppers, carrots and broccoli.
- Select vegetables with more potassium often, such as sweet potatoes, white potatoes, white beans, tomato products (paste, sauce, and juice), beet greens, soybeans, lima beans, winter squash, spinach, lentils, kidney beans, and split peas.
- Sauces or seasonings can add calories, fat, and sodium to vegetables. Use the Nutrition Facts label to compare the calories and % Daily Value for fat and sodium in plain and seasoned vegetables.

- Prepare more foods with fresh ingredients in order to lower sodium intake. Most sodium in the food supply comes from packaged or processed foods.
- Buy canned vegetables labeled “no salt added”. If you want to add a little salt, it will likely be less than the amount in the regular canned product.

#### At meals:

- Plan some meals around a vegetable main dish, such as a vegetable stir-fry or soup. Then, add other foods to complement it.
- Try a main dish salad for lunch. Go light on the salad dressing.
- Include a green salad with your dinner every night.
- Shred carrots or zucchini into meatloaf, casseroles, quick breads and muffins.
- Include chopped vegetables in pasta sauce or lasagna.



- Order a veggie pizza with toppings like mushrooms, green peppers, and onions, and ask for extra veggies.
- Use pureed, cooked vegetables such as potatoes to thicken stews, soups and gravies. These add flavor, nutrients, and texture.
- Add vegetable kabobs as part of a grilled meal. Try tomatoes, mushrooms, green peppers and onions.



#### Make vegetables more appealing:

- Many vegetables taste great with a dip or dressing. Try a low fat salad dressing with raw broccoli, red and green peppers, celery sticks or cauliflower.
- Add color to salads by adding baby carrots, shredded red cabbage or spinach leaves. Include in-season vegetables for variety through the year.
- Include cooked dry beans or peas in flavorful mixed dishes, such as chili or minestrone soup.
- Decorate plates or serving dishes with vegetable slices.
- Keep a bowl of cut-up vegetables in a see-through container in the refrigerator. Carrot and celery sticks are traditional, but consider broccoli florettes, cucumber slices or red or green pepper strips.



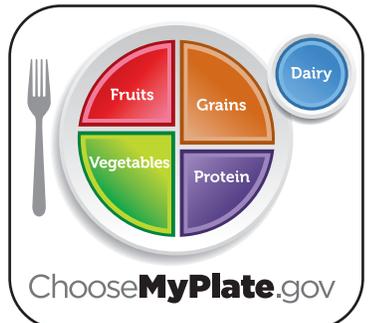
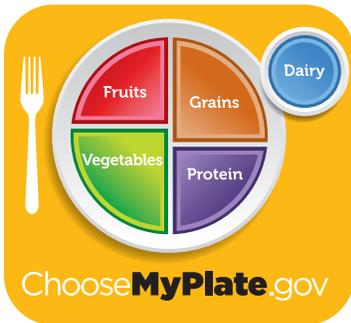
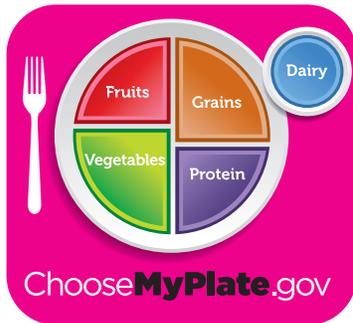
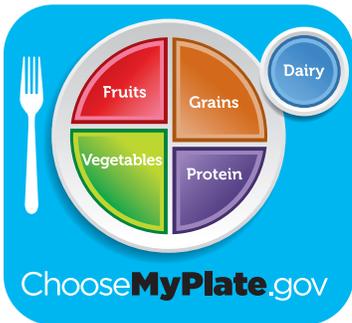
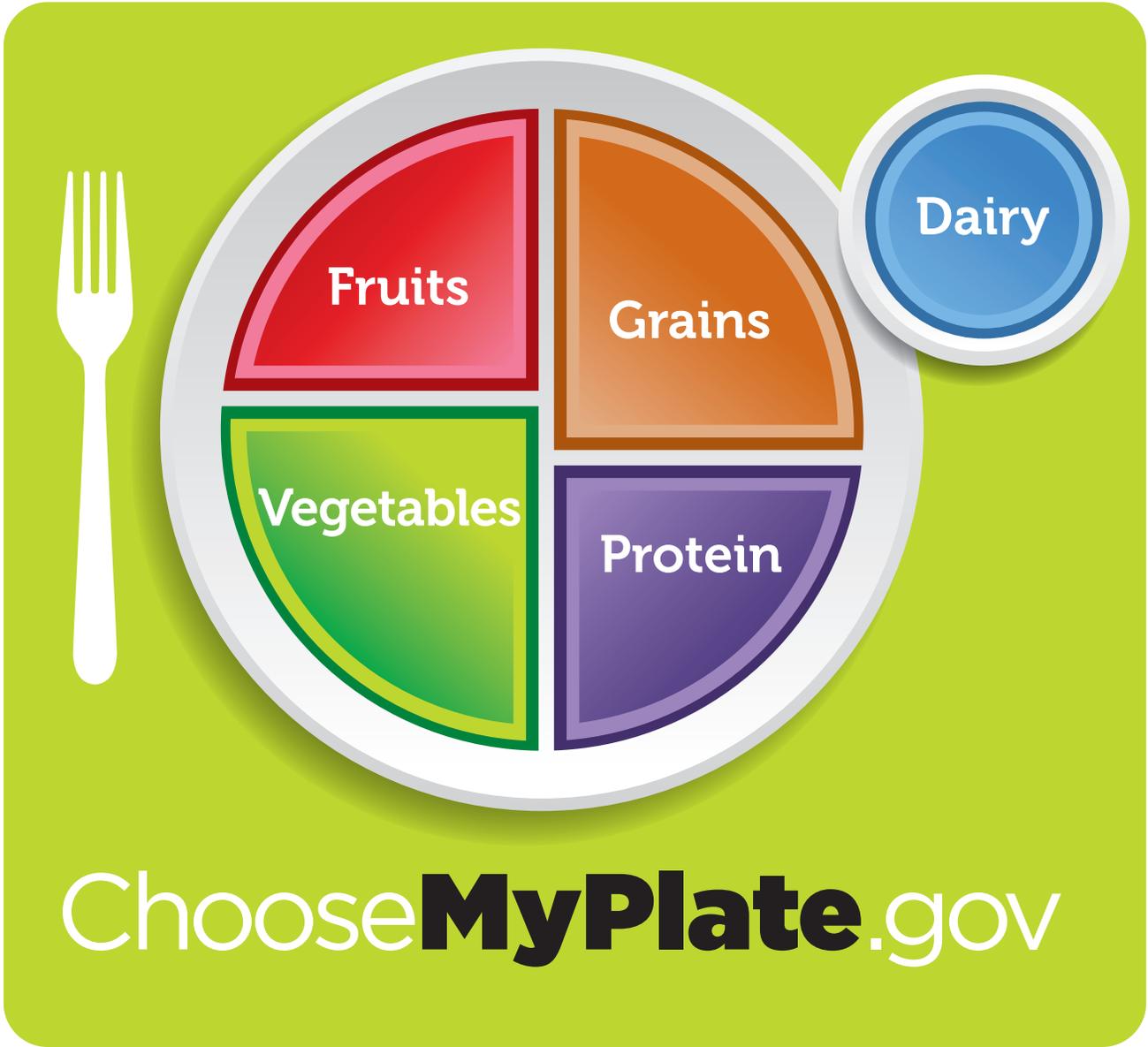
#### Vegetable tips for children:

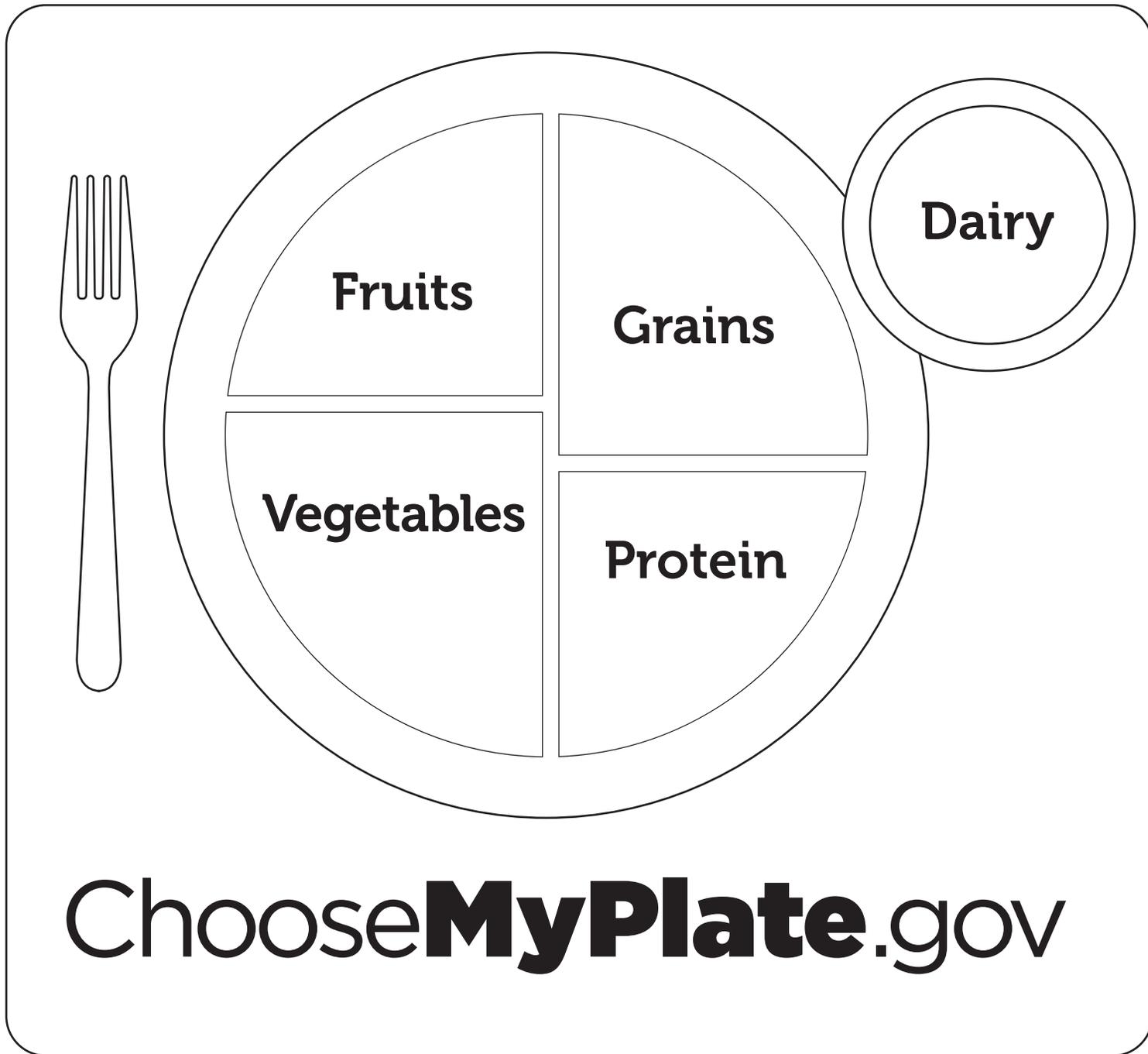
- Set a good example for children by eating vegetables with meals and as snacks.
- Let children decide on the dinner vegetables or what goes into salads.
- Depending on their age, children can help shop for, clean, peel, or cut up vegetables.
- While shopping, allow children to pick a new vegetable to try later at home.
- Use cut-up vegetables as part of afternoon snacks.
- Children often prefer foods served separately. So, rather than serving mixed vegetables, try serving two vegetables separately.



#### Keep it safe:

- Wash vegetables before preparing or eating them. Under clean, running water, rub vegetables briskly with your hands to remove dirt and surface microorganisms. Dry after washing.
- Keep vegetables separate from raw meat, poultry and seafood while shopping, preparing or storing.







## **Dietary Guidelines 2010 Selected Messages for Consumers**

Take action on the Dietary Guidelines by making changes in these three areas.

Choose steps that work for you and start today.

### ***Balancing Calories***

- Enjoy your food, but eat less.
- Avoid oversized portions.

### ***Foods to Increase***

- Make half your plate fruits and vegetables.
- Switch to fat-free or low-fat (1%) milk.

### ***Foods to Reduce***

- Compare sodium in foods like soup, bread, and frozen meals—and choose the foods with lower numbers.
- Drink water instead of sugary drinks.

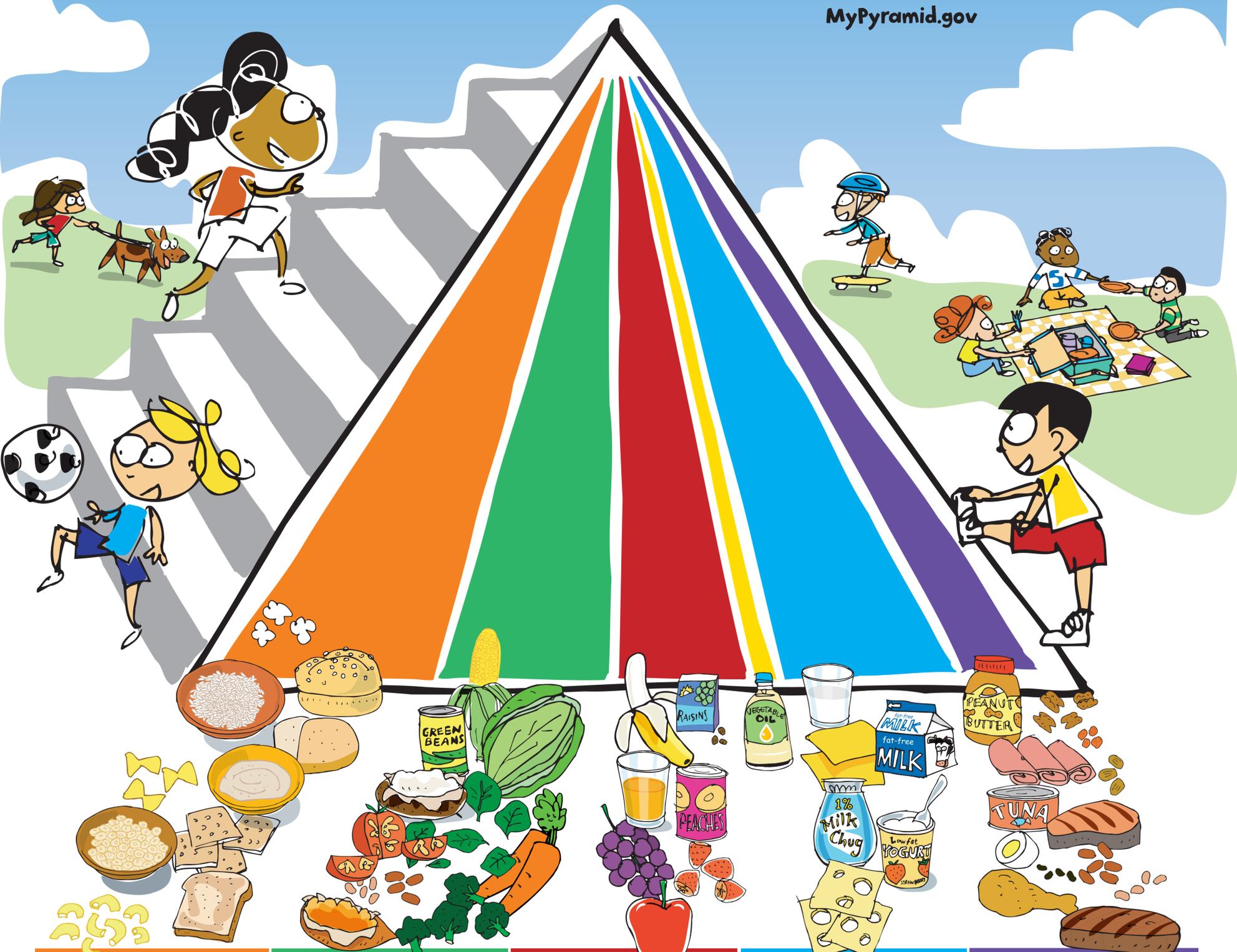


# MyPyramid

For Kids

Eat Right. Exercise. Have Fun.

MyPyramid.gov



## Grains

Make half your grains whole

Start smart with breakfast. Look for whole-grain cereals.

Just because bread is brown doesn't mean it's whole-grain. Search the ingredients list to make sure the first word is "whole" (like "whole wheat").

## Vegetables

Vary your veggies

Color your plate with all kinds of great-tasting veggies.

What's green and orange and tastes good? Veggies! Go dark green with broccoli and spinach, or try orange ones like carrots and sweet potatoes.

## Fruits

Focus on fruits

Fruits are nature's treats – sweet and delicious.

Go easy on juice and make sure it's 100%.

## Milk

Get your calcium-rich foods

Move to the milk group to get your calcium. Calcium builds strong bones.

Look at the carton or container to make sure your milk, yogurt, or cheese is lowfat or fat-free.

## Meat & Beans

Go lean with protein

Eat lean or lowfat meat, chicken, turkey, and fish. Ask for it baked, broiled, or grilled – not fried.

It's nutty, but true. Nuts, seeds, peas, and beans are all great sources of protein, too.

For an 1,800-calorie diet, you need the amounts below from each food group. To find the amounts that are right for you, go to MyPyramid.gov.

Eat 6 oz. every day; at least half should be whole

Eat 2 1/2 cups every day

Eat 1 1/2 cups every day

Get 3 cups every day; for kids ages 2 to 8, it's 2 cups

Eat 5 oz. every day

**Oils** Oils are not a food group, but you need some for good health. Get your oils from fish, nuts, and liquid oils such as corn oil, soybean oil, and canola oil.

**Find your balance between food and fun**

- Move more. Aim for at least 60 minutes everyday, or most days.
- Walk, dance, bike, rollerblade – it all counts. How great is that!

**Fats and sugars – know your limits**

- Get your fat facts and sugar smarts from the Nutrition Facts label.
- Limit solid fats as well as foods that contain them.
- Choose food and beverages low in added sugars and other caloric sweeteners.



U.S. Department of Agriculture  
Food and Nutrition Service  
September 2005  
FNS-381

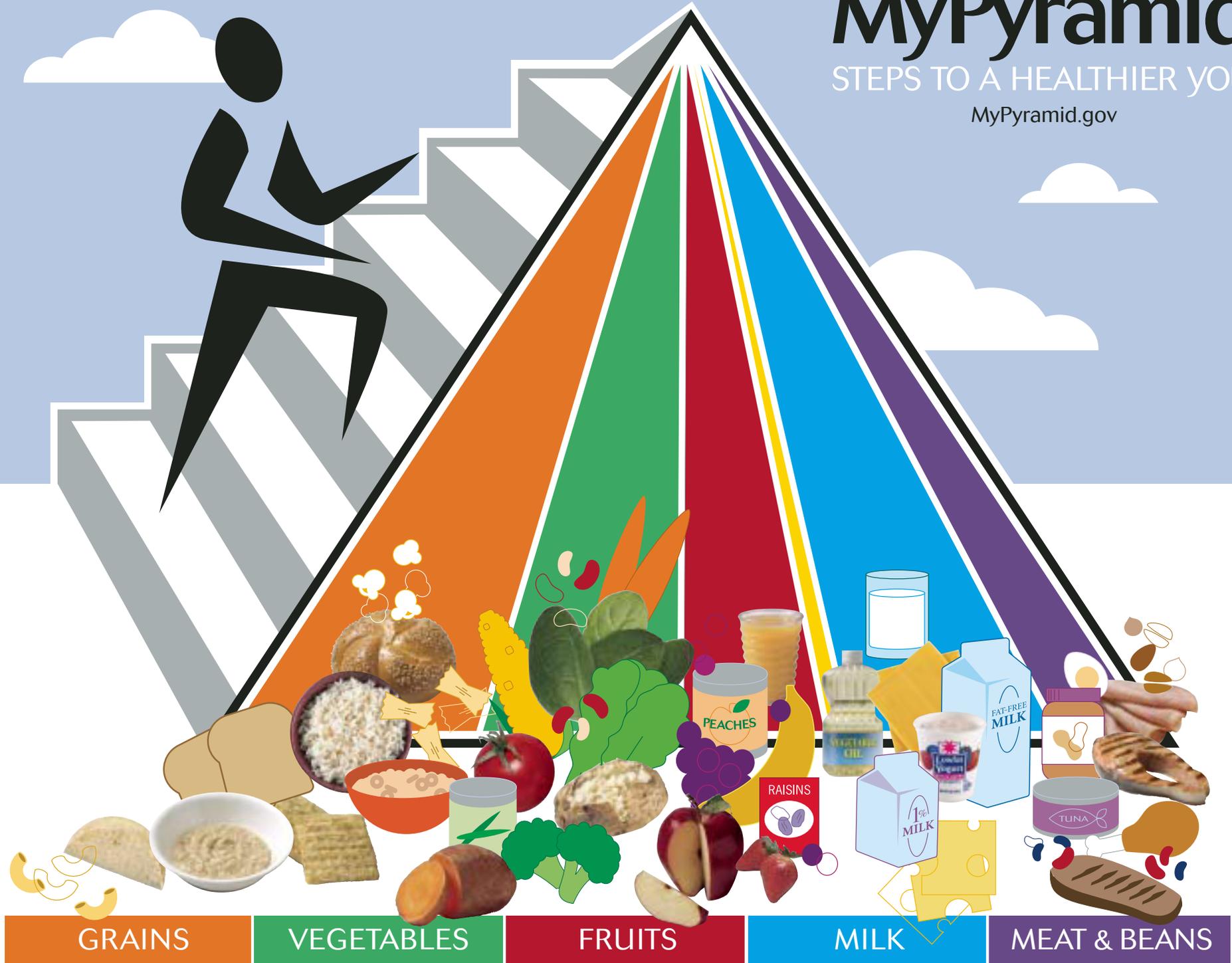


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# MyPyramid

STEPS TO A HEALTHIER YOU

MyPyramid.gov



GRAINS

VEGETABLES

FRUITS

MILK

MEAT & BEANS

<b>GRAINS</b> Make half your grains whole	<b>VEGETABLES</b> Vary your veggies	<b>FRUITS</b> Focus on fruits	<b>MILK</b> Get your calcium-rich foods	<b>MEAT &amp; BEANS</b> Go lean with protein
<p>Eat at least 3 oz. of whole-grain cereals, breads, crackers, rice, or pasta every day</p> <p>1 oz. is about 1 slice of bread, about 1 cup of breakfast cereal, or 1/2 cup of cooked rice, cereal, or pasta</p>	<p>Eat more dark-green veggies like broccoli, spinach, and other dark leafy greens</p> <p>Eat more orange vegetables like carrots and sweetpotatoes</p> <p>Eat more dry beans and peas like pinto beans, kidney beans, and lentils</p>	<p>Eat a variety of fruit</p> <p>Choose fresh, frozen, canned, or dried fruit</p> <p>Go easy on fruit juices</p>	<p>Go low-fat or fat-free when you choose milk, yogurt, and other milk products</p> <p>If you don't or can't consume milk, choose lactose-free products or other calcium sources such as fortified foods and beverages</p>	<p>Choose low-fat or lean meats and poultry</p> <p>Bake it, broil it, or grill it</p> <p>Vary your protein routine – choose more fish, beans, peas, nuts, and seeds</p>

For a 2,000-calorie diet, you need the amounts below from each food group. To find the amounts that are right for you, go to [MyPyramid.gov](http://MyPyramid.gov).

Eat 6 oz. every day	Eat 2 1/2 cups every day	Eat 2 cups every day	Get 3 cups every day; for kids aged 2 to 8, it's 2	Eat 5 1/2 oz. every day
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### Find your balance between food and physical activity

- Be sure to stay within your daily calorie needs.
- Be physically active for at least 30 minutes most days of the week.
- About 60 minutes a day of physical activity may be needed to prevent weight gain.
- For sustaining weight loss, at least 60 to 90 minutes a day of physical activity may be required.
- Children and teenagers should be physically active for 60 minutes every day, or most days.



### Know the limits on fats, sugars, and salt (sodium)

- Make most of your fat sources from fish, nuts, and vegetable oils.
- Limit solid fats like butter, stick margarine, shortening, and lard, as well as foods that contain these.
- Check the Nutrition Facts label to keep saturated fats, *trans* fats, and sodium low.
- Choose food and beverages low in added sugars. Added sugars contribute calories with few, if any, nutrients.




U.S. Department of Agriculture  
 Center for Nutrition Policy and Promotion  
 April 2005  
 CNPP-15



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Eating healthier and  
feeling better using the

# Nutrition Facts Label

U.S. Department of Health and Human Services  
U.S. Department of Agriculture  
[www.healthierus.gov/dietaryguidelines](http://www.healthierus.gov/dietaryguidelines)

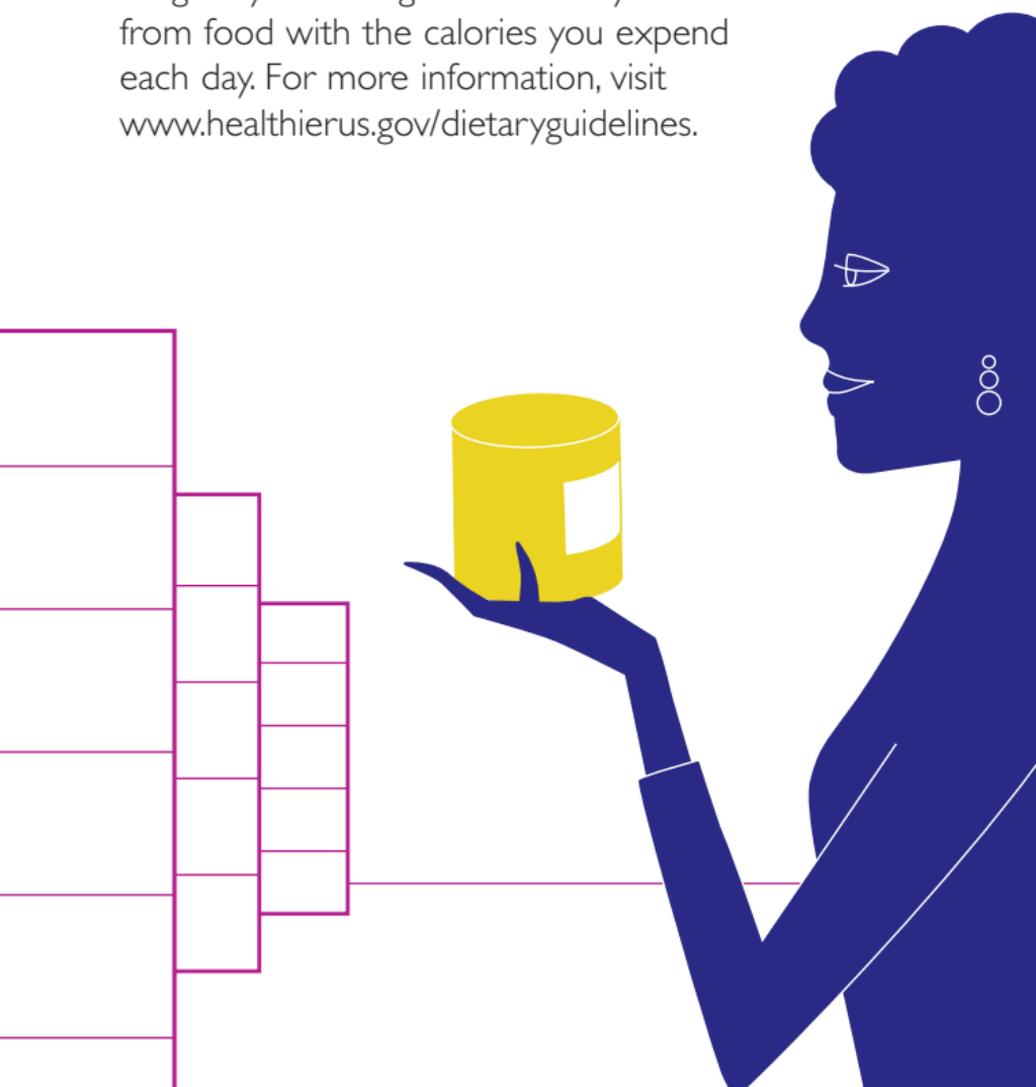
## THE RIGHT TOOL TO BALANCE YOUR DIET

You probably already use the Nutrition Facts label in some way—maybe to check calories, fat or sodium content. But, the more familiar you are with the information, the more you'll want to use it daily to ensure you're eating a healthy, balanced diet.

Use the label when you shop, as you plan your meals, and as you cook each day. The label makes it easy to determine the amounts of nutrients you're getting and to compare one product to another.

Strive for a diet that emphasizes fruits, vegetables, whole grains, and fat-free or low-fat milk and milk products. Include lean meats, poultry, fish, beans, and nuts. Choose foods that are low in saturated fats, *trans* fats, cholesterol, salt, and added sugar.

Regular physical activity is important for your overall health and fitness. It also helps you control body weight by balancing the calories you take in from food with the calories you expend each day. For more information, visit [www.healthierus.gov/dietaryguidelines](http://www.healthierus.gov/dietaryguidelines).



# USE THE NUTRITION FACTS LABEL TO EAT HEALTHIER

## Check the serving size and number of servings.

- The Nutrition Facts Label information is based on ONE serving, but many packages contain more. Look at the serving size and how many servings you are actually consuming. If you double the servings you eat, you double the calories and nutrients, including the % DVs.
- When you compare calories and nutrients between brands, check to see if the serving size is the same.

## Calories count, so pay attention to the amount.

- This is where you'll find the number of calories per serving and the calories from fat in each serving.
- Fat-free doesn't mean calorie-free. Lower fat items may have as many calories as full-fat versions.
- If the label lists that 1 serving equals 3 cookies and 100 calories, and you eat 6 cookies, you've eaten 2 servings, or twice the number of calories and fat.

## Look for foods that are rich in these nutrients.

- Use the label not only to limit fat and sodium, but also to increase nutrients that promote good health and may protect you from disease.
- Some Americans don't get enough vitamins A and C, potassium, calcium, and iron, so choose the brand with the higher % DV for these nutrients.
- Get the most nutrition for your calories—compare the calories to the nutrients you would be getting to make a healthier food choice.

# Nutrition Facts

Serving Size 1 cup (228g)  
Servings Per Container 2

## Amount Per Serving

**Calories** 250    **Calories from Fat** 110

**% Daily Value\***

**Total Fat** 12g    18%

Saturated Fat 3g    15%

Trans Fat 3g

**Cholesterol** 30mg    10%

**Sodium** 470mg    20%

**Potassium** 700mg    20%

**Total Carbohydrate** 31g    10%

Dietary Fiber 0g    0%

Sugars 5g

**Protein** 5g

Vitamin A    4%

Vitamin C    2%

Calcium    20%

Iron    4%

\* Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

		Calories: 2,000	2,500
Total fat	Less than	65g	80g
Sat fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

## The % Daily Value is a key to a balanced diet.

The % DV is a general guide to help you link nutrients in a serving of food to their contribution to your total daily diet. It can help you determine if a food is high or low in a nutrient—5% or less is low, 20% or more is high. You can use the % DV to make dietary trade-offs with other foods throughout the day. The \* is a reminder that the % DV is based on a 2,000-calorie diet. You may need more or less, but the % DV is still a helpful gauge.

## Know your fats and reduce sodium for your health.

- To help reduce your risk of heart disease, use the label to select foods that are lowest in saturated fat, trans fat and cholesterol.
- Trans fat doesn't have a % DV, but consume as little as possible because it increases your risk of heart disease.
- The % DV for total fat includes all different kinds of fats.
- To help lower blood cholesterol, replace saturated and trans fats with monounsaturated and polyunsaturated fats found in fish, nuts, and liquid vegetable oils.
- Limit sodium to help reduce your risk of high blood pressure.

## Reach for healthy, wholesome carbohydrates.

- Fiber and sugars are types of carbohydrates. Healthy sources, like fruits, vegetables, beans, and whole grains, can reduce the risk of heart disease and improve digestive functioning.
- Whole grain foods can't always be identified by color or name, such as multi-grain or wheat. Look for the "whole" grain listed first in the ingredient list, such as whole wheat, brown rice, or whole oats.
- There isn't a % DV for sugar, but you can compare the sugar content in grams among products.
- Limit foods with added sugars (sucrose, glucose, fructose, corn or maple syrup), which add calories but not other nutrients, such as vitamins and minerals. Make sure that added sugars are not one of the first few items in the ingredients list.

## For protein, choose foods that are lower in fat.

- Most Americans get plenty of protein, but not always from the healthiest sources.
- When choosing a food for its protein content, such as meat, poultry, dry beans, milk and milk products, make choices that are lean, low-fat, or fat free.



# Benefits of Breakfast



Eating breakfast can help improve math, reading, and standardized test scores.<sup>i ii iii</sup>

Children who eat breakfast are more likely to behave better in school and get along with their peers than those who do not.<sup>iv v</sup>

Breakfast helps children pay attention, perform problem-solving tasks, and improves memory.<sup>vi vii</sup>

Children who eat school breakfast are likely to have fewer absences and incidents of tardiness than those who do not.<sup>viii</sup>

By eating breakfast, students get more of important nutrients, vitamins and minerals such as calcium, dietary fiber, folate and protein.<sup>ix x</sup>

Studies have shown that children who eat breakfast on a regular basis are less likely to be overweight.<sup>xi xii xiii</sup>

Eating breakfast as a child is important for establishing healthy habits for later in life.

Schools that provide breakfast in the classroom to all students have shown decreases in tardiness and suspensions as well as improved student behavior and attentiveness.<sup>xiv xv</sup>

What you eat for breakfast can have an impact on learning. One study showed that eating breakfast food high in fiber and low in sugar for breakfast helped students sustain the cognitive effects of breakfast.<sup>xvi</sup>

School Breakfast provides  $\frac{1}{4}$  the recommended amounts of protein, calcium, iron, vitamin A, and vitamin C for the day.<sup>xvii</sup>

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- <sup>i</sup> Rampersaud GC, Pereira MA, Girard BL, Adams J, Metz J, et al. Breakfast habits, nutritional status, body weight, and academic performance in children and adolescents. *J Am Diet Assoc.* 2005 May;105(5):743-60
- <sup>ii</sup> Murphy JM, Pagano M, Nachmani J, Sperling P, Kane S, Kleinman R. "The Relationship of School Breakfast to Psychosocial and Academic Functioning: Cross-sectional and longitudinal observations in an inner-city sample." *Archives of Pediatric and Adolescent Medicine* 1998; 152:899-907.
- <sup>iii</sup> Alaimo K, Olson CM, Frongillo EA Jr. "Food Insufficiency and American School-Aged Children's Cognitive, Academic and Psychosocial Development." *Pediatrics* 2001; 108(1):44-53.
- <sup>iv</sup> Benton D, Maconie A, Williams C The influence of the glycaemic load of breakfast on the behaviour of children in school. *Physiol Behav.* 2007 Nov 23;92(4):717-24. Epub 2007 May 31
- <sup>v</sup> Alaimo K, Olson CM, Frongillo EA Jr. "Food Insufficiency and American School-Aged Children's Cognitive, Academic and Psychosocial Development." *Pediatrics* 2001; 108(1):44-53.
- <sup>vi</sup> Wesnes KA, Pincock C, Richardson D, Helm G, Hails S. "Breakfast reduces declines in attention and memory over the morning in schoolchildren." *Appetite* 2003;41(3):329-31.
- <sup>vii</sup> Dye L, Blundell JE. Functional foods: psychological and behavioral functions. *Br J Nutr* 2002;88 (Suppl 2):S187-211.
- <sup>viii</sup> Murphy JM. "Academics & Breakfast Connection Pilot: Final Report on New York's Classroom Breakfast Project." Nutrition Consortium of NY State. Albany, NY. July 2005
- <sup>ix</sup> Affenito SG, Thompson DR, Barton BA, Franko DL, Daniels SR, Obarzanek E, Schreiber GB, Striegel-Moore. "Breakfast Consumption by African-American and White Adolescent Girls Correlates Positively with Calcium and Fiber Intake and Negatively with Body Mass Index." *Journal of the American Dietetic Association* 2005; 105:938-945.
- <sup>x</sup> Wilson NC, Parnell WR, Wohlers M, Shirley P. "Eating breakfast and its impact on children's daily diet." *Nutrition & Dietetics* 2006; 63:15-20.
- <sup>xi</sup> Breakfast Eating and Weight Change in a 5-Year Prospective Analysis of Adolescents: Project EAT (Eating Among Teens) Maureen T. Timlin, Mark A. Pereira, Mary Story, and Dianne Neumark-Sztainer *Pediatrics* 2008; 121: e638-e645
- <sup>xii</sup> American Dietetic Association. Childhood Overweight Evidence Analysis Project: updated 2006. Available at: [www.adaevidencelibrary.com/topic.cfm?cat=1046](http://www.adaevidencelibrary.com/topic.cfm?cat=1046).
- <sup>xiii</sup> Dubois L, Girard M, Potvin Kent M, Farmer A, Tatone-Tokuda F Breakfast skipping is associated with differences in meal patterns, macronutrient intakes and overweight among pre-school children *Public Health Nutr.* 2008 Mar 18:1-10
- <sup>xiv</sup> Murphy JM, Pagano ME, Patton K, Hall S, Marinaccio J, Kleinman R. "The Boston Public Schools Universal Breakfast Program; Final Evaluation Report." Massachusetts General Hospital, Boston, MA, 2000.
- <sup>xv</sup> Murphy JM et. al. "Maryland Meals for Achievement Year III Final Report." Massachusetts General Hospital, Boston, MA, 2001.
- <sup>xvi</sup> Caroline R. Mahoney, Holly A. Taylor, Robin B. Kanarek, Priscilla Samuel. Effect of breakfast composition on cognitive processes in elementary school children. *Physiology and Behavior* 85 (2005) 635-645
- <sup>xvii</sup> Section 9(f)(2)(B)(ii), Richard B Russell National School Lunch Act.

# MyPlate and MyPyramid...

## Can they be used together?



If you've been wondering how to teach nutrition using MyPlate instead of MyPyramid, you are not alone. A lot of educators are asking if they can use MyPlate along with their existing MyPyramid educational materials.

**The short answer is: YES, continue to use any lessons or materials you have found to be good teaching tools for your audience.**

A large number of educational materials based on MyPyramid are available and in use. These materials can be used in conjunction with the new MyPlate icon. Here's why:

- The information about what and how much to eat has not changed—both MyPyramid and MyPlate are illustrations that are based on the same food groups and recommendations about what and how much to eat.
- The [ChooseMyPlate.gov](http://ChooseMyPlate.gov) website contains much of the same information that was available on [MyPyramid.gov](http://MyPyramid.gov). Note that some sections of the website have been updated to reflect the 2010 Dietary Guidelines, and other sections continue to be updated. Look for a completely redesigned website and new interactive tools in the fall of 2011!

How can you incorporate the new and popular MyPlate icon into your lessons or materials? Try using MyPlate to generate interest and prompt your audience to think about what they actually put on their plates.

For example, you can use the following materials now available on [www.ChooseMyPlate.gov](http://www.ChooseMyPlate.gov). Click on the News and Media tab:

- **Coloring sheets**—use them to encourage children to illustrate their own plates or what they think is a healthy plate.
- **Downloadable images of MyPlate**—display and ask your audience to “rate their plate” and discuss ways to improve their choices.

Then, use your existing lessons or materials to “dig deeper”—to help guide discussion and answer questions.

Over time, lessons and materials will be developed or updated to incorporate the MyPlate icon. The information and messages in these materials may be very similar to current materials. As noted above, the content will only need to change to update it for the 2010 Dietary Guidelines.





June 2000; Updated July 2003 and November 2004

# How to Understand and Use the Nutrition Facts Label

[PDF format](#) | [Food Label video](#)

- [The Nutrition Facts Panel - An Overview](#)
- [The Serving Size](#)
- [Calories \(and Calories from Fat\)](#)
- [The Nutrients: How Much?](#)
- [Understanding the Footnote](#)
- [How the Daily Values \(DV\) Relate to the %DVs](#)
- [The Percent Daily Value \(%DV\)](#)
- [Quick Guide to %DV](#)
- [Nutrients With a %DV but No Weight Listed - Spotlight on Calcium](#)
- [Nutrients Without a %DV: \*Trans\* Fats, Protein, and Sugars](#)

People look at food labels for different reasons. But whatever the reason, many consumers would like to know how to use this information more effectively and easily. The following label-building skills are intended to make it easier for you to use nutrition labels to make quick, informed food choices that contribute to a healthy diet.

## The Nutrition Facts Label - An Overview:

The information in the main or top section (see #1-4 and #6 on the sample nutrition label below), can vary with each food product; it contains product-specific information (serving size, calories, and nutrient information). The bottom part (see #5 on the sample label below) contains a footnote with Daily Values (DVs) for 2,000 and 2,500 calorie diets. This footnote provides recommended dietary information for important nutrients, including fats, sodium and fiber. The footnote is found only on larger packages and does not change from product to product.

In the following Nutrition Facts label we have colored certain sections to help you focus on those areas that will be explained in detail. You will not see these colors on the food labels on products you purchase.

Sample label for  
Macaroni & Cheese

1 **Start Here** →

2 **Check Calories**

3 **Limit these Nutrients**

4 **Get Enough of these Nutrients**

5 **Footnote**

# Nutrition Facts

Serving Size 1 cup (228g)  
Servings Per Container 2

**Amount Per Serving**  
**Calories** 250      **Calories from Fat** 110

	% Daily Value*
<b>Total Fat</b> 12g	18%
Saturated Fat 3g	15%
<i>Trans</i> Fat 3g	
<b>Cholesterol</b> 30mg	10%
<b>Sodium</b> 470mg	20%
<b>Total Carbohydrate</b> 31g	10%
Dietary Fiber 0g	0%
Sugars 5g	
<b>Protein</b> 5g	
Vitamin A	4%
Vitamin C	2%
Calcium	20%
Iron	4%

6

**Quick Guide to % DV**

• 5% or less is Low

• 20% or more is High

\* Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

## 1 The Serving Size

Serving Size 1 cup (228g)  
Servings Per Container 2

(#1 on sample label):

The first place to start when you look at the Nutrition Facts label is the serving size and the number of servings in the package. Serving sizes are standardized to make it easier to compare similar foods; they are provided in familiar units, such as cups or pieces, followed by the metric amount, e.g., the number of grams.

The size of the serving on the food package influences the number of calories and all the nutrient amounts listed on the top part of the label. **Pay attention to the serving size, especially how many servings there are in the food package. Then ask yourself, "How many servings am I consuming"?** (e.g., 1/2 serving, 1 serving, or more) In the sample label, one serving of macaroni and cheese equals one cup. If you ate the whole package, you would eat **two** cups. That doubles the calories and other nutrient numbers, including the %Daily Values as shown in the sample label.

Example				
	Single Serving	%DV	Double Serving	%DV
Serving Size	1 cup (228g)		2 cups (456g)	
Calories	250		500	
Calories from Fat	110		220	
Total Fat	12g	18%	24g	36%
Trans Fat	1.5g		3g	
Saturated Fat	3g	15%	6g	30%
Cholesterol	30mg	10%	60mg	20%
Sodium	470mg	20%	940mg	40%
Total Carbohydrate	31g	10%	62g	20%
Dietary Fiber	0g	0%	0g	0%
Sugars	5g		10g	
Protein	5g		10g	
Vitamin A		4%		8%
Vitamin C		2%		4%
Calcium		20%		40%
Iron		4%		8%

## 2 Calories (and Calories from Fat)

Calories provide a measure of how much energy you get from a serving of this food. Many Americans consume more calories than they need without meeting recommended intakes for a number of nutrients. The calorie section of the label can help you manage your weight (i.e., gain, lose, or maintain.) **Remember: the number of servings you consume determines the number of calories you actually eat (your portion amount).**

Amount Per Serving	
Calories	250
Calories from Fat	110

(#2 on sample label):

In the example, there are 250 calories in one serving of this macaroni and cheese. How many calories from fat are there in ONE serving? Answer: 110 calories, which means almost half the calories in a single serving come from fat. What if you ate the whole package content? Then, you would consume two servings, or 500 calories, and 220 would come from fat.

The **General Guide to Calories** provides a general reference for calories when you look at a Nutrition Facts label. This guide is based on a 2,000 calorie diet.

**General Guide to Calories**

- 40 Calories is low
- 100 Calories is moderate
- 400 Calories or more is high

**Eating too many calories per day is linked to overweight and obesity.**

**3 4 The Nutrients: How Much?**

(#3 and 4 on sample label):

Look at the top of the nutrient section in the sample label. It shows you some key nutrients that impact on your health and separates them into two main groups:

**Limit These Nutrients**

<b>Total Fat</b> 12g	<b>18%</b>
Saturated Fat 3g	15%
Trans Fat 3g	
<b>Cholesterol</b> 30mg	<b>10%</b>
<b>Sodium</b> 470mg	<b>20%</b>

(#3 on sample label):

The nutrients listed first are the ones Americans generally eat in adequate amounts, or even too much. They are identified in yellow as **Limit these Nutrients**. Eating too much fat, saturated fat, *trans* fat, cholesterol, or sodium may increase your risk of certain chronic diseases, like heart disease, some cancers, or high blood pressure.

**Important: Health experts recommend that you keep your intake of saturated fat, *trans* fat and cholesterol as low as possible as part of a nutritionally balanced diet.**

**Get Enough of These**

Dietary Fiber 0g	0%
Vitamin A	4%
Vitamin C	2%
Calcium	20%
Iron	4%

(#4 on sample label):

Most Americans don't get enough dietary fiber, vitamin A, vitamin C, calcium, and iron in their diets. They are identified in blue as **Get Enough of these Nutrients**. Eating enough of these nutrients can improve your health and help reduce the risk of some diseases and conditions. For example, getting enough calcium may reduce the risk of osteoporosis, a condition that results in brittle bones as one ages (see [calcium section below](#)). Eating a diet high in dietary fiber promotes

healthy bowel function. Additionally, a diet rich in fruits, vegetables, and grain products that contain dietary fiber, particularly soluble fiber, and low in saturated fat and cholesterol may reduce the risk of heart disease.

**Remember: You can use the Nutrition Facts label not only to help *limit* those nutrients you want to cut back on but also to *increase* those nutrients you need to consume in greater amounts.**

## 5 Understanding the Footnote on the Bottom of the Nutrition Facts Label

\* Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

(#5 on sample label)

Note the \* used after the heading "%Daily Value" on the Nutrition Facts label. It refers to the Footnote in the lower part of the nutrition label, which tells you "%DVs are based on a 2,000 calorie diet". This statement must be on all food labels. But the remaining information in the full footnote may not be on the package if the size of the label is too small. When the full footnote does appear, it will always be the same. It doesn't change from product to product, because it shows recommended dietary advice for all Americans--it is not about a specific food

product.

Look at the amounts circled in red in the footnote--these are the Daily Values (DV) for each nutrient listed and are based on public health experts' advice. DVs are recommended levels of intakes. DVs in the footnote are based on a 2,000 or 2,500 calorie diet. Note how the DVs for some nutrients change, while others (for cholesterol and sodium) remain the same for both calorie amounts.

### How the Daily Values Relate to the %DVs

Look at the example below for another way to see how the Daily Values (DVs) relate to the %DVs and dietary guidance. For each nutrient listed there is a DV, a %DV, and dietary advice or a goal. If you follow this dietary advice, you will stay within public health experts' recommended upper or lower limits for the nutrients listed, based on a 2,000 calorie daily diet.

Nutrient	DV	%DV	Goal
Total Fat	65g	= 100%DV	Less than
Sat Fat	20g	= 100%DV	Less than
Cholesterol	300mg	= 100%DV	Less than
Sodium	2400mg	= 100%DV	Less than
Total Carbohydrate	300g	= 100%DV	At least
Dietary Fiber	25g	= 100%DV	At least

### Upper Limit - Eat "Less than"...

The nutrients that have "upper daily limits" are listed first on the footnote of larger labels and on the example above. Upper limits means it is recommended that you stay below - eat "less than" - the Daily Value nutrient amounts listed per day. For example, the DV for Saturated fat (in the yellow section) is 20g. This amount is 100% DV for this nutrient. What is the goal or dietary advice? To eat "less than" 20 g or 100%DV for the day.

### Lower Limit - Eat "At least"...

Now look at the section in blue where dietary fiber is listed. The DV for dietary fiber is 25g, which is 100% DV. This means it is recommended that you eat "at least" this amount of dietary fiber per day.

The DV for Total Carbohydrate (section in white) is 300g or 100%DV. This amount is recommended for a balanced daily diet that is based on 2,000 calories, but can vary, depending on your daily intake of fat and protein.

Now let's look at the %DVs.

% Daily Value*	
	18%
	15%
	10%
	20%
	10%
	0%
	4%
	2%
	20%
	4%

## 6 The Percent Daily Value (%DV):

The % Daily Values (%DVs) are based on the Daily Value recommendations for key nutrients but only for a 2,000 calorie daily diet--not 2,500 calories. You, like most people, may not know how many calories you consume in a day. But you can still use the %DV as a frame of reference whether or not you consume more or less than 2,000 calories.

The %DV helps you determine if a serving of food is high or low in a nutrient. Note: a few nutrients, like *trans* fat, do not have a %DV--they will be discussed later.

Do you need to know how to calculate percentages to use the %DV? No, the label (the %DV) does the math for you. It helps you interpret the numbers (grams and milligrams) by putting them all on the same scale for the day (0-100%DV). The %DV column doesn't add up vertically to 100%. Instead each nutrient is based on 100% of the daily requirements for that nutrient (for a 2,000 calorie diet). This way you can tell high from low and know which nutrients contribute a lot, or a little, to your **daily** recommended allowance (upper or lower).

### Quick Guide to %DV:

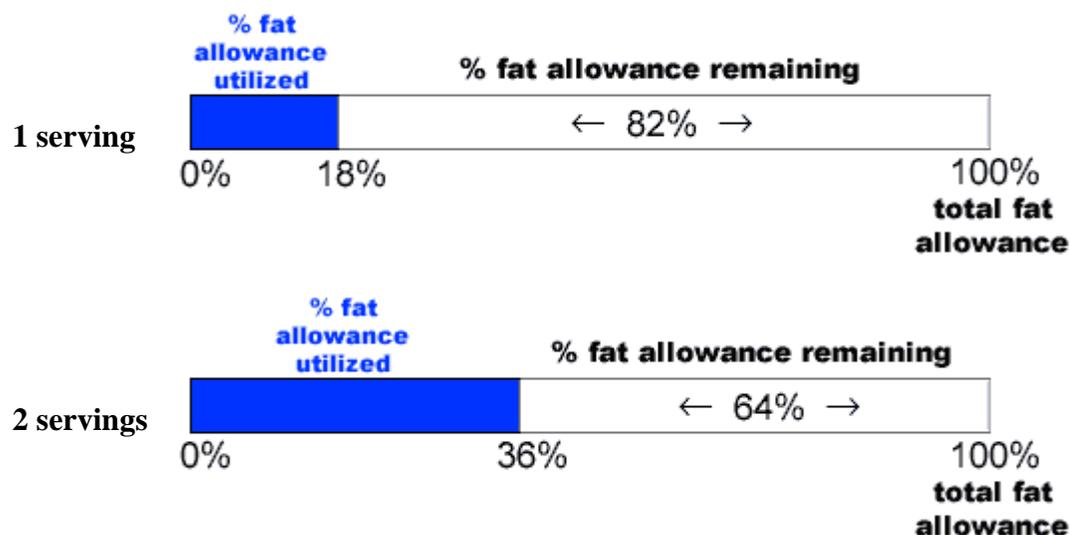
	% Daily Value*
<b>Total Fat</b> 12g	18%
Saturated Fat 3g	15%
Trans Fat 3g	
<b>Cholesterol</b> 30mg	10%
<b>Sodium</b> 470mg	20%
<b>Total Carbohydrate</b> 31g	10%
Dietary Fiber 0g	0%
Sugars 5g	
<b>Protein</b> 5g	
Vitamin A	4%
Vitamin C	2%
Calcium	20%
Iron	4%

#### 5%DV or less is low and 20%DV or more is high

(#6 on sample label):

This guide tells you that **5%DV or less is low** for all nutrients, those you want to limit (e.g., fat, saturated fat, cholesterol, and sodium), or for those that you want to consume in greater amounts (fiber, calcium, etc). As the **Quick Guide** shows, **20%DV or more is high** for all nutrients.

*Example:* Look at the amount of Total Fat in one serving listed on the sample nutrition label. Is 18%DV contributing a lot or a little to your fat limit of 100% DV? Check the **Quick Guide to %DV**. 18%DV, which is below 20%DV, is not yet high, but what if you ate the whole package (two servings)? You would double that amount, eating 36% of your daily allowance for Total Fat. Coming from just one food, that amount leaves you with 64% of your fat allowance (100%-36%=64%) for *all* of the other foods you eat that day, snacks and drinks included.



## Using the %DV for:

**Comparisons:** The %DV also makes it easy for you to make comparisons. You can compare one product or brand to a similar product. Just make sure the serving sizes are similar, especially the weight (e.g. gram, milligram, ounces) of each product. It's easy to see which foods are higher or lower in nutrients because the serving sizes are generally consistent for similar types of foods, (see the [comparison example](#) at the end) except in a few cases like cereals.

**Nutrient Content Claims:** Use the %DV to help you quickly distinguish one claim from another, such as "reduced fat" vs. "light" or "nonfat." Just compare the %DVs for Total Fat in each food product to see which one is higher or lower in that nutrient--**there is no need to memorize definitions.** This works when comparing all nutrient content claims, e.g., less, light, low, free, more, high, etc.

**Dietary Trade-Offs:** You can **use the %DV to help you make dietary trade-offs** with other foods throughout the day. You don't have to give up a favorite food to eat a healthy diet. When a food you like is high in fat, balance it with foods that are low in fat at other times of the day. Also, pay attention to how much you eat so that the **total** amount of fat for the day stays below 100%DV.

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## Nutrients With a %DV but No Weight Listed - Spotlight on Calcium:

**Calcium:** Look at the %DV for calcium on food packages so you know how much one serving contributes to the *total amount you need* per day. Remember, a food with 20%DV or more contributes a lot of calcium to your daily total, while one with 5% DV or less contributes a little.

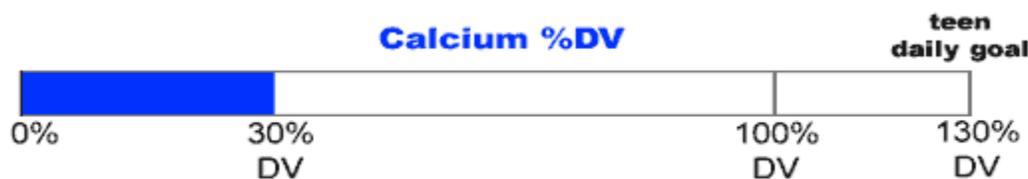
Experts advise adult consumers to consume adequate amounts of calcium, that is, 1,000mg or 100%DV in a daily 2,000 calorie diet. This advice is often given in milligrams (mg), but the Nutrition Facts label **only** lists a % DV for calcium.

For certain populations, they advise that adolescents, especially girls, consume 1,300mg (130%DV) and post-menopausal women consume 1,200mg (120%DV) of calcium daily. The DV for calcium on food labels is 1,000mg.

**Don't be fooled** -- always check the label for calcium because you can't make assumptions about the amount of calcium in specific food categories. Example: the amount of calcium in milk, whether skim or whole, is generally the same per serving, whereas the amount of calcium in the same size yogurt container (8oz) can vary from 20-45 %DV.

Nutrition Facts	
Serving Size 1 cup (236ml)	
Servings Per Container 1	
Amount Per Serving	
<b>Calories</b> 80	Calories from Fat 0
% Daily Value*	
<b>Total Fat</b> 0g	0%
Saturated Fat 0g	0%
Trans Fat 0g	
<b>Cholesterol</b> Less than 5mg	0%
<b>Sodium</b> 120mg	5%
<b>Total Carbohydrate</b> 11g	4%
Dietary Fiber 0g	0%
Sugars 11g	
<b>Protein</b> 9g	17%
Vitamin A 10%	Vitamin C 4%
Calcium 30%	Iron 0% • Vitamin D 25%

\*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:



Equivalencies	
30% DV	= 300mg calcium = one cup of milk
100% DV	= 1,000mg calcium
130% DV	= 1,300mg calcium

## Nutrients Without a %DV: *Trans* Fats, Protein, and Sugars:

Note that *Trans* fat, Sugars and, Protein do not list a %DV on the Nutrition Facts label.

**Trans Fat:** Experts could not provide a reference value for *trans* fat nor any other information that FDA believes is sufficient to establish a Daily Value or %DV. Scientific reports link *trans* fat (and saturated fat) with raising blood LDL ("bad") cholesterol levels, both of which increase your risk of coronary heart disease, a leading cause of death in the US.

**Important: Health experts recommend that you keep your intake of saturated fat, *trans* fat and cholesterol as low as possible as part of a nutritionally balanced diet.**

**Protein:** A %DV is required to be listed if a claim is made for protein, such as "high in protein". Otherwise, unless the food is meant for use by infants and children under 4 years old, none is needed.

Current scientific evidence indicates that protein intake is not a public health concern for adults and children over 4 years of age.

**Sugars:** No daily reference value has been established for sugars because no recommendations have been made for the total amount to eat in a day. Keep in mind, the sugars listed on the Nutrition Facts label include naturally occurring sugars (like those in fruit and milk) as well as those added to a food or drink. Check the ingredient list for specifics on added sugars.

Take a look at the Nutrition Facts label for the two yogurt examples. The plain yogurt on the left has 10g of sugars, while the fruit yogurt on the right has 44g of sugars in one serving.

Now look below at the ingredient lists for the two yogurts. Ingredients are listed in descending order of weight (from most to least). Note that no added sugars or sweeteners are in the list of ingredients for the plain yogurt, yet 10g of sugars were listed on the Nutrition Facts label. This is because there are no added sugars in plain yogurt, only naturally occurring sugars (lactose in the milk).

**Plain Yogurt** - contains no added sugars

INGREDIENTS: CULTURED PASTEURIZED GRADE A NONFAT MILK, WHEY PROTEIN CONCENTRATE, PECTIN, CARRAGEENAN.

**Fruit Yogurt** - contains added sugars

INGREDIENTS: CULTURED GRADE A REDUCED FAT MILK, APPLES, HIGH FRUCTOSE CORN SYRUP, CINNAMON, NUTMEG, NATURAL FLAVORS, AND PECTIN. CONTAINS ACTIVE YOGURT AND L. ACIDOPHILUS CULTURES.

Plain Yogurt	
Nutrition Facts	
Serving Size 1 container (226g)	
Amount Per Serving	
<b>Calories</b> 110	Calories from Fat 0
% Daily Value*	
<b>Total Fat</b> 0g	0 %
Saturated Fat 0g	0 %
<i>Trans</i> Fat 0g	
<b>Cholesterol</b> Less than 5mg	1 %
<b>Sodium</b> 160mg	7 %
<b>Total Carbohydrate</b> 15g	5 %
Dietary Fiber 0g	0 %
Sugars 10g	
<b>Protein</b> 13g	
Vitamin A 0 %	Vitamin C 4 %
Calcium 45 %	Iron 0 %

Fruit Yogurt	
Nutrition Facts	
Serving Size 1 container (227g)	
Amount Per Serving	
<b>Calories</b> 240	Calories from Fat 25
% Daily Value*	
<b>Total Fat</b> 3g	4 %
Saturated Fat 1.5g	9 %
<i>Trans</i> Fat 0g	
<b>Cholesterol</b> 15mg	5 %
<b>Sodium</b> 140mg	6 %
<b>Total Carbohydrate</b> 46g	15 %
Dietary Fiber Less than 1g	3 %
Sugars 44g	
<b>Protein</b> 9g	
Vitamin A 2 %	Vitamin C 4 %
Calcium 35 %	Iron 0 %

If you are concerned about your intake of sugars, make sure that added sugars are not listed as one of the first few ingredients. Other names for added sugars include: corn syrup, high-fructose corn syrup, fruit juice concentrate, maltose, dextrose, sucrose, honey, and maple syrup.

**To limit nutrients that have no %DV, like *trans* fat and sugars, compare the labels of similar products and choose the food with the lowest amount.**

**Comparison Example**

Below are two kinds of milk- one is "Reduced Fat," the other is "Nonfat" milk. Each serving size is one cup. Which has more calories and more saturated fat? Which one has more calcium?

**REDUCED FAT MILK**  
2% Milkfat

<b>Nutrition Facts</b>		
Serving Size 1 cup (236ml)		
Servings Per Container 1		
Amount Per Serving		
<b>Calories</b> 120	Calories from Fat 45	
% Daily Value*		
<b>Total Fat</b> 5g		<b>8%</b>
Saturated Fat 3g		<b>15%</b>
<i>Trans</i> Fat 0g		
<b>Cholesterol</b> 20mg		<b>7%</b>
<b>Sodium</b> 120mg		<b>5%</b>
<b>Total Carbohydrate</b> 11g		<b>4%</b>
Dietary Fiber 0g		<b>0%</b>
Sugars 11g		
<b>Protein</b> 9g		<b>17%</b>
Vitamin A 10% • Vitamin C 4%		
Calcium 30% • Iron 0% • Vitamin D 25%		
<small>*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:</small>		

**NONFAT MILK**

<b>Nutrition Facts</b>		
Serving Size 1 cup (236ml)		
Servings Per Container 1		
Amount Per Serving		
<b>Calories</b> 80	Calories from Fat 0	
% Daily Value*		
<b>Total Fat</b> 0g		<b>0%</b>
Saturated Fat 0g		<b>0%</b>
<i>Trans</i> Fat 0g		
<b>Cholesterol</b> Less than 5mg		<b>0%</b>
<b>Sodium</b> 120mg		<b>5%</b>
<b>Total Carbohydrate</b> 11g		<b>4%</b>
Dietary Fiber 0g		<b>0%</b>
Sugars 11g		
<b>Protein</b> 9g		<b>17%</b>
Vitamin A 10% • Vitamin C 4%		
Calcium 30% • Iron 0% • Vitamin D 25%		
<small>*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:</small>		

Answer: As you can see, they both have the same amount of calcium, but the nonfat milk has no saturated fat and has 40 calories less per serving than the reduced fat milk.

This document was issued in June 2000 and updated July 2003 and November 2004.

For more recent information on Food Labeling

See <http://www.cfsan.fda.gov/label.html>