

# Nutrition

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**Definition:** Nutrition is the process of absorbing nutrients from food and processing them in the body to keep healthy or to grow. Human nutrition is influenced by what a person chooses to eat as well as the social, economic, and cultural factors that determine those choices. Poor nutrition results from an inadequate or inappropriate dietary intake. Measures of poor nutrition include inadequate intake of fruits and vegetables, low breastfeeding rates, and high food insecurity rates.

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## Summary

**A nutritious diet can reduce major risk factors for chronic disease such as obesity, high blood pressure, and high blood cholesterol. Poor nutrition has the potential to affect the growth, development, and health status of all people. Pregnant women, infants, children, and older people are especially vulnerable.**

**A nutritious diet includes eating adequate amounts of fruit and vegetables. In 2005, about a quarter of Washington State adults reported eating fruits and vegetables five or more *times* each day. Because people are likely to eat more than one serving at one time, about half of Washington adults meet recommendations for eating at least five *servings* daily.<sup>1</sup> Women and older adults were more likely than others to eat fruits and vegetables five or more times daily.**

**For most babies, breast milk provides the best early nutrition. In 2005, 90% of Washington mothers started breastfeeding their newborn infants; 71% were still breastfeeding two months later. But in 2004, only 43% of mothers in Washington State's Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) program were still breastfeeding their infants at six months. Efforts to increase breastfeeding should be broad-based and include both health care providers and the community.**

**Not having enough food contributes to inadequate nutrition. In 2003, nearly 10% of Washington adults reported concern about having enough food in the past month.**

**To choose a nutritious diet, an affordable supply of health-promoting foods must be available. Individual food choices are made within a family and community context and**

**are influenced by the environment and by public policies.**

## Introduction

Poor dietary practices contribute substantially to preventable illness and premature death in the United States. Nutrition affects health at all stages of life, from fetal development to health and well-being among older people. Nutritional factors are associated with heart disease, stroke, high blood pressure, some types of cancer, osteoporosis, obesity, and diabetes mellitus.<sup>2,3,4</sup>

This report assesses nutritional adequacy in Washington State in three areas: fruit and vegetable intake, breastfeeding, and food insecurity. Other dietary factors, such as adequate intake of whole grains and calcium and low intake of saturated and trans-fats are important in preventing chronic disease.<sup>5</sup> No state-level data are available to look at those factors, however.

## Fruit and Vegetable Intake

In the 2005 Washington Behavioral Risk Factor Surveillance System (BRFSS), the [age-adjusted](#) percent of adults who reported eating fruits and vegetables five or more times a day was 26% ( $\pm 1\%$ ). The age-adjusted and non-age-adjusted percents were similar. Because people often eat more than one serving of fruits and vegetables at a given time, about half of Washington adults are likely to eat five or more servings of fruits and vegetables daily.<sup>1</sup> The BRFSS found the percent of adults in Washington who ate fruits and vegetables five or more times daily remained constant from 1994 to 2005. Similarly, there was no change in the share of adults eating fruits and vegetables five or more times a day in the United States (24% in 2005).

The 2005 U.S. Dietary Guidelines for Americans recommend eating sufficient amounts of fruits and vegetables within caloric needs rather than the previous recommendation of five servings for all

calorie levels. For example, the Dietary Guidelines recommend five and a half cups of fruits and vegetables (about nine servings) for a 2000-calorie diet.<sup>6</sup> The BRFSS is not able to measure intake of fruits and vegetables relative to caloric need.

**Year 2010 Goals**

The national *Healthy People* goal for 2010 is that at least 50% of the population eats at least three servings of vegetables each day. One of these servings should be a dark green or deep yellow vegetable. In Washington in 2003 and 2005 combined, 27% ( $\pm 1\%$ ) said they ate vegetables three or more times per day, which means that about 54% eat three or more servings per day. Another 2010 goal is that at least 75% of the population eats two or more servings of fruit daily. In Washington, 34% ( $\pm 1\%$ ) said they ate fruit two or more times per day, which translates to about 68% who eat two or more servings per day. Washington appears to have met the HP2010 goal for eating enough vegetables, but it has not yet met the goal for eating enough fruit.

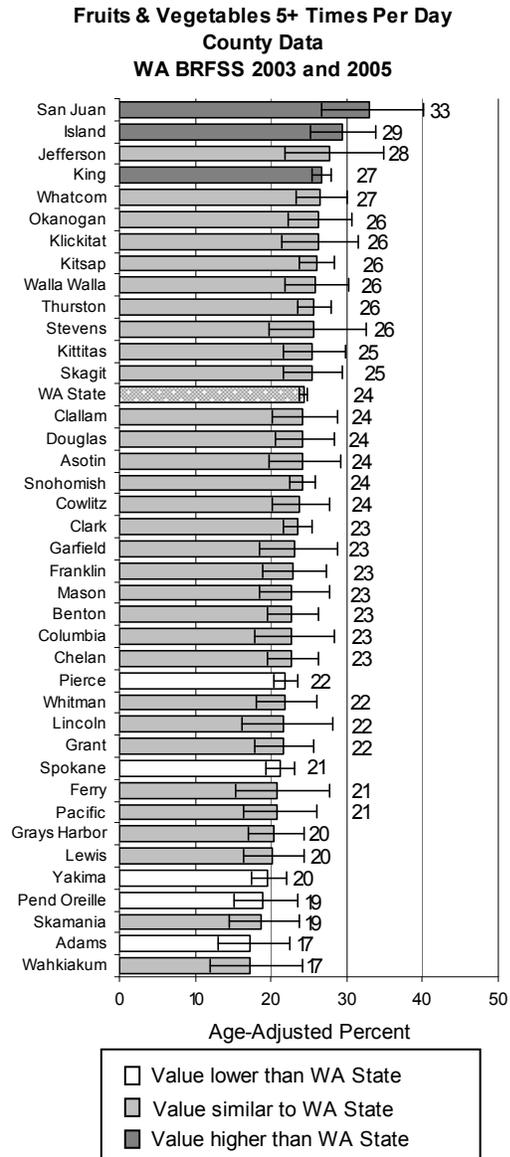
**Geographic Variation**

Based on Washington BRFSS data for 2003 and 2005 combined, the age-adjusted percent of adults who reported eating fruits and vegetables five or more times each day ranged from 33% ( $\pm 7\%$ ) in San Juan County to 17% ( $\pm 5-7\%$ ) in Adams and Wahkiakum counties. San Juan, Island, and King counties had higher rates of adults eating fruits and vegetables five or more times each day than the state average, 24% ( $\pm 5\%$ ); Pierce, Spokane, Yakima, Pend Orielle, and Adams counties had rates lower than the state.

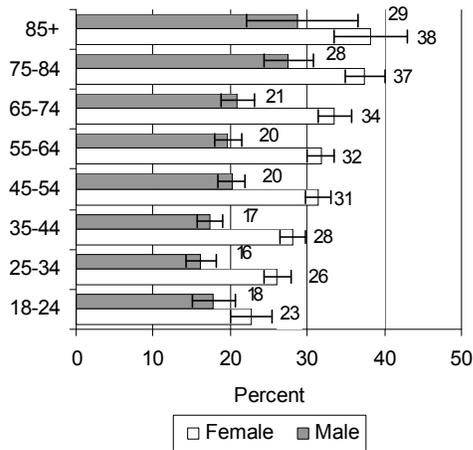
**Age and Gender**

The Washington BRFSS for 2003 and 2005 combined found that women were more likely than men to report eating fruits and vegetables five or more times a day (29%  $\pm 1\%$  and 19%  $\pm 1\%$ , respectively). Eating fruits and vegetables five or more times a day increased with age; for each age group, the percentages were higher among women than men. The relationships with age and gender remained after accounting for race, Hispanic origin, education, and income. (See chart on the following page.)

On the 2006 Washington Healthy Youth Survey, 30%, 25%, and 22% ( $\pm 2\%$ ) of 8<sup>th</sup>, 10<sup>th</sup>, and 12<sup>th</sup> graders reported eating fruits and vegetables five or more times a day. Unlike adults, boys generally reported eating more fruits and vegetables than did girls.

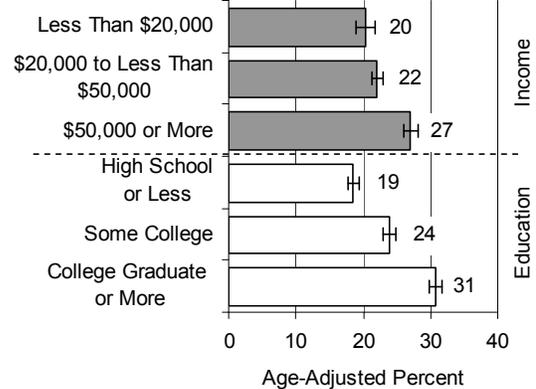


**Fruits & Vegetables 5+ Times Per Day  
Age and Gender  
WA BRFSS 2003 and 2005**



after accounting for each other and for gender, race, Hispanic origin, and age.

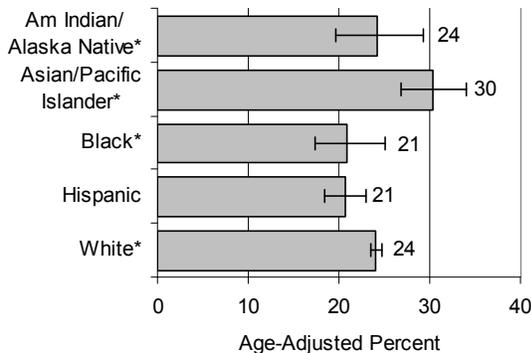
**Fruits & Vegetables 5+ Times Per Day  
Annual Household Income and Education  
WA BRFSS 2003 and 2005**



### Race and Hispanic Origin

Age-adjusted Washington BRFSS data from 2003 and 2005 combined showed that compared to whites, Asian and Pacific Islanders were most likely and blacks and people of Hispanic origin least likely to report eating fruits and vegetables five or more times daily. There were, however, no differences by race or Hispanic origin after accounting for gender, education, income, and age.

**Fruits & Vegetables 5+ Times Per Day  
Race and Hispanic Origin  
WA BRFSS 2003 and 2005**



### Health Effects

Eating fruits and vegetables within recommended levels has many positive health effects.<sup>6</sup> Adequate consumption of fruits and vegetables might prevent cancer in the mouth, pharynx, larynx, esophagus, lung, stomach, colon, rectum, bladder, and cervix.<sup>7</sup> Eating fruits and vegetables might also reduce the risk of coronary heart disease, stroke and hypertension; prevent cataract formation; promote respiratory health; and prevent diverticulosis.<sup>8,9,10,11</sup>

Eating low-energy dense foods, such as fruits and vegetables, might protect against obesity. Foods with low-energy density have fewer calories per weight than foods with high-energy density. Foods naturally high in fat and foods with added fat, such as fried foods, have high-energy density.<sup>12,13</sup>

### Barriers and Motivations

Consumers are motivated to purchase foods that taste good, cost less, and are convenient.<sup>14</sup> Barriers to eating fruits and vegetables mentioned in several studies, including one of the general population of adults in Washington, were cost, time and effort to prepare food, availability, and personal and family preference.<sup>15,16,17,18</sup> In general, low-energy dense foods cost more than high-energy dense foods.<sup>19</sup>

### Income and Education

Survey data from the 2003 and 2005 Washington BRFSS combined showed that as educational level increased, the percent of adults eating fruits and vegetables five or more times each day also increased. A similar pattern was noted for annual household income. The patterns for income and education remained

Because food choices are made within family, social, and cultural contexts, barriers to and motivations for eating fruits and vegetables vary among people in different groups. For instance, one study found that African American men were motivated to eat fruit by knowing the positive health benefits and having positive social norms. External motivators, such as health insurance benefits or gym

memberships, influenced eating vegetables for these men. A barrier to eating vegetables was a preference for higher calorie and fat foods.<sup>20</sup> In another study, not knowing the health benefits of eating fruits and vegetables was a barrier for young adults.<sup>21</sup>

## **Intervention Strategies**

**Low-income populations.** Each year, U.S. Department of Agriculture nutrition assistance programs reach one in five Americans. These programs support nutrition education and activities that promote healthy eating for low-income individuals. Several programs for clients participating in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) are effective in increasing fruit and vegetable intake. Nutrition education that encourages fruit and vegetable intake in this population increases knowledge and consumption. In one study, combining nutrition education with coupons for fruits and vegetables had the biggest effect on increasing consumption.<sup>22</sup> The WIC and Senior Farmers' Market programs issue vouchers to participants to purchase fresh produce at certified farmers' markets. One study showed that 90% of WIC participants who received vouchers for fresh fruit and vegetables used them.<sup>23</sup> In addition, multifaceted, culturally appropriate nutrition education programs targeted toward WIC participants can result in increased consumption of fruits and vegetables.<sup>24</sup> An innovative pilot program in Seattle found that delivering fresh farmers' market produce to the homes of low-income seniors significantly increased consumption of fruits and vegetables among homebound seniors.<sup>25</sup>

The Basic Food Program is Washington's food stamp program. Basic Foods Nutrition Education programs work in 36 Washington State counties to provide nutrition education and skill-building opportunities that Basic Food Program clients need to purchase and prepare fruits and vegetables. The impact of this program on increasing fruit and vegetable intake has not been evaluated.

**Educational and multi-component programs.** The use of peer educators in the workplace led to modest increases in fruit and vegetable consumption among minority workers and workers in lower socioeconomic groups.<sup>26, 27</sup> Family-focused interventions designed to create supportive home environments<sup>28</sup> and peer

education<sup>26</sup> have also been successful in increasing fruit and vegetable consumption. Body and Soul, a multi-component program in African American churches involves peer counseling, skill building, church activities, and education. Evaluation six months after the program began showed increased fruit and vegetable consumption.<sup>29</sup>

School-based behavior change programs that involve family and community seem to be more effective than those that stay within the boundary of the school.<sup>30</sup> Interventions that have resulted in positive behavior change among school children include the following components: they last 12 months or more; provide increased access to fruits and vegetables; involve teacher training, peer leadership, leadership and encouragement from foodservice personnel; and involve family and community.<sup>31</sup>

**Marketing campaigns.** Health communications and marketing campaigns using billboards, in-store sales, and targeted consumer coupons have been successful in increasing sales of fruits and vegetables in retail stores.<sup>32</sup> A mass media campaign promoting fruit and vegetable consumption to an urban African American population improved attitudes toward eating fruits and vegetables but did not change behaviors.<sup>33</sup>

**Policy and environment.** Increasing the availability and affordability of fruits and vegetables in schools, communities, and workplaces are promising strategies to increase fruit and vegetable consumption. These programs need more research on effectiveness.<sup>34</sup> Schools and possibly worksites can price fruits and vegetables relatively cheaply to increase consumption of these items in vending machines.<sup>35</sup> Changing organizational policy is an innovative way to promote consumption through increased access. For instance, a policy to include more fruits in snacks in 44 after-school programs resulted in an increased number of fruit servings on the menus.<sup>36</sup>

## **Breastfeeding**

Data from the Washington Pregnancy Risk Assessment and Monitoring System (PRAMS) for 2005 indicate that 93% ( $\pm 2\%$ ) of new mothers began breastfeeding their newborns. At one and two months after birth, breastfeeding rates decreased to 83% ( $\pm 3\%$ ) and 75% ( $\pm 3\%$ ), respectively. Of the 19 states that reported PRAMS data in 2003, Washington and Alaska had the highest rates of breastfeeding one and two months after birth.<sup>37</sup> Breastfeeding initiation rates increased slightly in

Washington from 2000 to 2005. Rates at two months after birth, however, remained stable.

### **Year 2010 Goals**

The *Healthy People 2010* goal is to have 75% of mothers start breastfeeding. Based on PRAMS data from 2004, Washington has met this goal. Another goal is that 50% of mothers continue breastfeeding until their babies are five to six months old. There are no data on the percent of all mothers in Washington who breastfeed their babies for five to six months. But the Washington WIC program, which serves low-income mothers, reports 43% of participants were breastfeeding their six-month-old infants in 2004. National survey results have shown consistently lower breastfeeding rates at six months among WIC mothers compared to non-WIC mothers.<sup>38</sup> Thus, there is indirect evidence that Washington might also have met this goal.

### **Race and Ethnicity**

PRAMS data for 2003–2005 combined indicated that American Indian and black mothers in Washington were less likely to begin breastfeeding their newborns than Asian and Pacific Islander and white mothers (American Indian and Alaska Natives: 83%  $\pm$ 4%; black: 86%  $\pm$ 3%; Asian and Pacific Islanders: 93%  $\pm$ 3%; and whites: 92%  $\pm$ 2%). National data from the 2005 National Immunization Survey showed that American Indians and Alaska Natives and African Americans were less likely than whites to breastfeed their infants.<sup>39</sup> Taking maternal education and other socioeconomic variables into account reduced some of these disparities, however.<sup>40</sup>

### **Health Effects**

Breastfeeding improves the infant's potential for growth and development and reduces the incidence or severity of a variety of infectious diseases. Studies show breast milk might protect against sudden infant death syndrome, insulin-dependent diabetes mellitus, leukemia and lymphoma, overweight and obesity, high blood cholesterol, and asthma. Duration of breastfeeding is associated with slightly improved cognitive development, even after controlling for confounding factors such as maternal education and income.<sup>41</sup>

Breastfeeding can also provide health benefits for the mother including postpartum weight loss, less postpartum bleeding, increased child

spacing, possible reduction in hip fracture and osteoporosis, and reduced risk of ovarian cancer and pre-menopausal breast cancer.<sup>41</sup> Infants and mothers experience the greatest health benefits when they follow the recommendation of the American Academy of Pediatrics that mothers exclusively breastfeed their infants for approximately the first six months of life and continue breastfeeding for at least the first year.<sup>41</sup>

### **High Risk Populations**

Washington mothers receiving Medicaid and unmarried mothers are less likely to begin breastfeeding and less likely to continue breastfeeding for more than two months. In addition, mothers younger than 20 years old are less likely than older mothers to continue breastfeeding. National data show similar patterns of breastfeeding among these populations.<sup>39</sup>

### **Intervention Strategies**

Public health efforts to improve breastfeeding practices should be broad-based and include community members as well as health care providers. Intervention strategies recommended by the U.S. Centers for Disease Control and Prevention focus on maternity care practices, increased support for breastfeeding in the workplace and in child care settings, peer support programs, educating mothers to change behaviors and attitudes, professional support for new mothers, and media and social marketing programs to influence social norms.<sup>42</sup> For many women, the decision of whether to breastfeed is made during pregnancy. The early decision influences both whether the mother begins breastfeeding and how long she continues.<sup>43</sup> Reports of successful peer counseling interventions with low-income women indicate that coordination among WIC, prenatal care, and maternal-newborn care is essential.<sup>44</sup> Other studies have provided evidence that baby-friendly hospital practices influence whether mothers begin and continue breastfeeding.<sup>45,46</sup> Breastfeeding instruction in the hospital increases success, while providing mothers with formula decreases breastfeeding success.<sup>47</sup> Successful interventions to increase breastfeeding also need to consider the woman's age, social position, and culture, all of which influence beginning and continuing breastfeeding.<sup>48,49,50</sup>

### **Food Insecurity**

The U. S. Department of Agriculture (USDA) defines food insecurity as having difficulty providing enough food for all household members due to lack of

money and other resources. The USDA estimates for 2003-2005 combined indicate that about 11% of Washington households were food insecure. That is, there were days in which household members had to eat smaller portions, skip meals, or eat less nutritious foods because of lack of money and other resources. Food insecurity might be decreasing in Washington. The USDA surveys for 2000-2002 and 1996-1998 show food insecurity for 12% and 13% of Washington households, respectively. In 2005, the percent of food insecure households in Washington dropped to 11%, the same as the national share.<sup>51</sup>

The 2003 Washington BRFSS included questions on food insecurity. According to that survey, 9% ( $\pm 1\%$ ) of Washington adults cut meal size or skipped meals in the past 12 months because they did not have enough money for food, 15% ( $\pm 1\%$ ) said they ran out of food before the end of the month, and 5% ( $\pm 1\%$ ) went hungry or did not eat because they did not have enough money for food.

### Year 2010 Goals

The *Healthy People 2010* goal is for 94% of all households to be food secure at all times. Yet according to data from the USDA survey for 2003-2005 combined, only 89% ( $\pm 1\%$ ) of Washington households were food secure during the past year. Based on data beginning in 1996-1998, Washington's rate of change is too slow to meet the goal.

### **Health Effects**

The nutritional and health consequences of food insecurity include malnutrition, lower overall health status, increased risk of chronic disease, poor diabetes and chronic disease management, psychosocial dysfunction, anxiety and depression, and decreased quality of life.<sup>52,53,54,55</sup> Food insecurity is associated with overweight in adult women.<sup>56</sup> Food-insufficient adults had lower calcium intakes and lower intakes of dairy, fruits, and vegetables than those who were food sufficient.<sup>57</sup> Food-insecure women and adolescents ate fewer fruits and vegetables, and food-insecure children reported eating fewer vegetables and eggs than their food-secure counterparts.<sup>53</sup> The most recent USDA Economic Research Services report concluded that children, especially younger ones, are usually shielded from disrupted eating patterns and reduced food intake even when

resources are inadequate to provide food for the entire family.<sup>51</sup> Children who are hungry or have insufficient food also have educational, behavioral and health problems, such as frequent colds, ear infections, anemia, asthma, and frequent headaches.<sup>58,59,60,61</sup>

### **Barriers and Motivations**

A barrier to being food secure is not participating in food assistance programs. Reasons for non-participation include not knowing about the programs or criteria for participation, difficult application procedures, lack of these programs in some communities, and a sense of stigma associated with the programs.<sup>62</sup> Participation in these programs does not ensure food security, however. For example, there is evidence that households participating in the Basic Food Program are food insecure toward the end of the month and that people receiving fewer Basic Food Program benefits are more likely to run out of food than those who receive more.<sup>63,64</sup>

### **Other Measures of Impact and Burden**

The percentage of Washington State residents who qualify for the Basic Food Program<sup>65</sup> and for child nutrition programs has been increasingly steadily. For example, in 2000, 31% of school children were eligible for free and reduced-price school meals; in 2005, 38% were eligible.<sup>66</sup>

### **High Risk Populations**

Washington BRFSS data from 2003 indicated that adults ages 18-24 were at highest risk for food insecurity (14%  $\pm 4\%$ ), and adults ages 65 and older were at the lowest risk (2%  $\pm 1\%$ ). Women were more likely to report food insecurity than men (11%  $\pm 1$  and 7%  $\pm 1\%$ , respectively). BRFSS data also showed that lower income was associated with more food insecurity and hunger. Data from 2003 indicated that 25% ( $\pm 3\%$ ) of adults with annual household incomes less than \$20,000 reported cutting portions or skipping meals because there was not enough money for food. In contrast, only 10% ( $\pm 2\%$ ) of adults with annual household incomes between \$20,000 and \$49,999 and 2% ( $\pm 1\%$ ) with incomes of \$50,000 or more reported food insecurity. Similarly, those who did not complete college were more likely to be food insecure than those with a college education. Differences by age, gender, income, and education remained when assessing these factors all together, but income was by far the most important. The association between income and food insecurity has been observed at

the national level, although it is not a perfect relationship. Events that stress households, such as job loss, increases in household size, or loss of Basic Food Program eligibility, are important predictors of food insecurity.<sup>64</sup>

## **Intervention Strategies**

Food assistance programs, such as the Basic Food Program, WIC, National School Breakfast and Lunch, Commodities, Emergency Food Assistance, and community-based food banks, have succeeded in increasing access to food for many people with low incomes. Given the strong relationship between food insecurity, income, and education, public policies and programs that lessen poverty and increase education might also reduce food insecurity. (See Social Determinants of Health.)<sup>62</sup>

**See Related Chapters:** [Obesity and Overweight](#) and sections on [Chronic Disease](#) and [Maternal and Child Health](#).

**Data Sources** (For additional detail, see [Appendix B](#))

Washington Behavioral Risk Factor Surveillance System (BRFSS), 1994-2005.

Breastfeeding data: The Pregnancy Risk Assessment Monitoring System (PRAMS), 2003-2005.

### **For More Information**

Physical Activity and Nutrition Section, Washington State Department of Health, (360) 236-3755.

Washington State Department of Health, Nutrition and Physical Activity website:  
[www.doh.wa.gov/cfh/nutritionpa](http://www.doh.wa.gov/cfh/nutritionpa) .

U.S. Department of Agriculture nutrition information for consumers and professionals, [www.nutrition.gov](http://www.nutrition.gov) .

U.S. Centers for Disease Control and Prevention, Division of Nutrition and Physical Activity, [www.cdc.gov/nccdphp/dnpa/](http://www.cdc.gov/nccdphp/dnpa/) .

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