



# Obesity Among Older Americans

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## Summary

Obesity, defined as abnormal accumulation of body fat, usually 20% or more over an individual's ideal body weight, is a serious and growing public health problem. The number and proportion of people who are obese have risen notably in recent decades; since the 1970s, the prevalence of obesity has more than doubled in the adult population. In 2003-2006, more than one in three adults (35.7%) were classified as obese. Overweight and obese people are more likely to have chronic health problems such as diabetes, high blood pressure, and arthritis. They also are at greater risk for developing heart disease, cancer, and Alzheimer's disease. Obesity-related health care costs in the United States were estimated to be 9.1% of total annual medical expenditures in 1998 and may have been as high as \$78.5 billion (\$92.6 billion in 2002 dollars). Nearly half of these costs are borne by public programs—Medicaid and Medicare.

Although Americans of all ages are increasingly overweight, policy makers and health care providers have tended to overlook the problem of obesity in middle-aged and elderly populations. Some physicians have neglected discussing the problem with older patients, believing it too late to encourage substantive changes in their health behavior, and the media have tended to focus on obesity among children, for whom excessive weight has been a rarity until recently.

Currently, nearly one in eight Americans (12.6%) is age 65 or older. This ratio is expected to jump to one in five (19.7%) by 2030, due in part to longer life expectancies and the aging of the baby boom generation. Because the highest rates of obesity are found among baby boomers, aged 44-62 in 2008, it is likely that the prevalence of obesity among older adults will continue to climb in coming decades as this population ages. By 2010, 37.4% of adults aged 65 and older are anticipated to be obese. If this trajectory continues unabated, it is projected that nearly half of the elderly population will be obese in 2030.

Increasing levels of obesity among the elderly will be a challenging policy issue at the state and federal levels, because excessive weight gain is associated with an array of chronic conditions, and because persons with multiple chronic illnesses generate more than 65% of all Medicare costs.

To help inform Congress about patterns of weight distribution among older Americans, as well as to describe potential future trends in elderly obesity, this report presents estimates of the prevalence of obesity for adults aged 65 and older. Racial disparities in obesity and differences across age and gender lines are discussed. In addition, regional variations are presented, including state-level obesity estimates for 1995, 1999, 2003, and 2007. The report concludes with a brief description of possible policy approaches to addressing the obesity epidemic that the United States is facing. This report will be updated as new data become available.

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## Introduction

Obesity is an abnormal accumulation of body fat, usually 20% or more, over an individual's ideal body weight. In recent years, obesity has become an increasing concern for public health officials and policy makers, as the number of obese Americans has increased significantly. Obesity increases mortality risk and is associated with serious chronic conditions, including cardiovascular disease, stroke, diabetes, a growing list of cancers, and, according to recent reports, Alzheimer's disease.<sup>1</sup> Moreover, excessive weight gain is a major cause of functional limitations among elderly individuals.<sup>2</sup> Obesity-related health care costs for adults in the United States were estimated to be 9.1% of total annual medical expenditures in 1998 and may have been as high as \$78.5 billion (\$92.6 billion in 2002 dollars).<sup>3</sup> Nearly half of these costs were borne by federal health care programs—Medicaid and Medicare. While the attention of policy makers has focused largely on the implications of obesity among children and adolescents, the effects of obesity on the health of older adults have been somewhat overlooked. This report examines the causes and consequences of obesity among older Americans, and includes a discussion of recent trends in obesity within this age group and disparities in body mass that exist across race, ethnicity, and gender lines. The report concludes by reviewing some of the policy implications associated with increasing rates of obesity among elderly Americans.

The number and proportion of older people who are obese have risen notably in recent decades. Since the 1970s, the prevalence<sup>4</sup> of obesity has more than doubled to 33.3% of the general adult population<sup>5</sup> and 30.1% of the elderly population.<sup>6</sup> The sharp increase in obesity is due to a confluence of factors, including technological advances that have lowered the costs of food, more sedentary forms of employment, and a decline in the amount of leisure time adults spend

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<sup>1</sup> Research studies supporting correlations between overweight, obesity, and a wide variety of chronic conditions are discussed in detail later in this report.

<sup>2</sup> Denise K. Houston, June Stevens, Jianwen Cai, and Miriam C. Morey, "Role of Weight History on Functional Limitations and Disability in Late Adulthood: The ARIC study," *Obesity Research*, vol. 13 (2005), pp. 1793-1802; Janet M. Friedmann, Tom Elasy, and Gordon L. Jensen, "The Relationship Between Body Mass Index and Self-Reported Functional Limitation Among Older Adults," *Journal of the American Geriatrics Society*, vol. 49, no. 4 (2001), pp. 398-403.

<sup>3</sup> Eric A. Finkelstein, Ian C. Fiebelkorn, and Guijing Wang, "National Medical Spending Attributable to Overweight and Obesity: How Much and Who Is Paying?" *Health Affairs*, Datawatch: The Costs of Obesity, Web Exclusive (May 14, 2003), <http://content.healthaffairs.org/cgi/content/full/hlthaff.w3.219v1/DC1>; Martha L. Daviglus et al., "Relation of Body Mass Index in Young Adulthood and Middle Age to Medicare Expenditures in Older Age," *Journal of the American Medical Association* (hereafter, *JAMA*), vol. 292, no. 22 (December 8, 2004), pp. 2743-2749.

<sup>4</sup> In epidemiology, the *prevalence* of a given disease is defined as the total number of cases of that disease in the population at a specific point in time. The *prevalence rate* is the prevalence divided by the number of individuals in the population, and is typically expressed as a percentage. This report, however, follows linguistic convention by using the term "prevalence" to refer to the *prevalence rate* of a condition.

<sup>5</sup> In this report, the term "general adult population" refers to persons between age 18 and 59, "middle age" individuals are 40-59, "near-elderly" are 60-64, and "elderly" are 65+. "Older population" or "older age persons" generically refers to people aged 50 or older.

<sup>6</sup> These estimates were provided by the National Health and Nutrition Examination Survey (NHANES), Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), Hyattsville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. See also, Alison A. Hedley et al., "Prevalence of Overweight and Obesity among U.S. Children, Adolescents, and Adults, 1999-2002," *JAMA*, vol. 291 (2004), pp. 2847-2850; Virginia W. Chang and Diane S. Lauderdale, "Income Disparities in Body Mass Index and Obesity in the United States, 1971-2002," *Archives of Internal Medicine*, vol. 165 (2005), pp. 2122-2128.

engaging in physical activity (e.g., walking, biking, swimming).<sup>7</sup> Eating patterns have also changed significantly, with Americans consuming on average 300 calories more per day in 2002 than in 1985.<sup>8</sup> In part, this may be explained by a 129% increase in per capita consumption of highly caloric, energy-dense corn syrup between 1980 and 2000.<sup>9</sup> The general trend toward a less nutritious diet coincides with a general shift toward eating out. In 1975, for instance, 25% of food spending went toward meals in restaurants; by 2004, individuals spent on average 44% of their food budget at restaurants or fast-food establishments.<sup>10</sup> As a result, fast-food<sup>11</sup> revenue has skyrocketed over the last three decades, increasing 24-fold (from \$6 billion to \$142 billion);<sup>12</sup> the number of fast-food restaurants in the United States has similarly increased, from 33,000 (in 1970) to 222,000 (in 2001).<sup>13</sup>

Policy makers are concerned about the spike of obesity among the elderly, but there may be even more reason to worry about the baby boom generation (born between 1946 and 1964, aged 44-62 in 2008), a large cohort that will soon join the ranks of Medicare beneficiaries. The highest rates of obesity among adults are found among baby boomers. For example, 40.1% of women in their 50s and early 60s are obese; among their male counterparts, the prevalence is 38.0%.<sup>14</sup> Such high rates of obesity have important implications because excessive weight gain is associated with an array of chronic conditions; among all program beneficiaries, persons with multiple chronic illnesses generate nearly two-thirds of all Medicare expenditures.

If trends persist and the baby boomers are unable to alter their current weight trajectories, projections suggest that more than 37% of the population aged 65 and older will be obese by 2010, thus constituting the heaviest generation of elderly persons in U.S. history.<sup>15</sup> If this trajectory continues unabated, it is projected that nearly half of the elderly population will be obese in 2030. Experts anticipate that this high level of obesity among older Americans will strain the country's economic well-being in several ways. First, obesity-related health problems will contribute to injuries, absenteeism, and decreases in overall productivity among working-age caregivers. Second, unprecedented levels of obesity and overweight among the elderly could hasten functional decline after age 65, possibly causing significant social, psychological, or financial hardships for senior citizens or their families. Finally, given that obesity is a major risk

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<sup>7</sup> David M. Cutler, Edward L. Glaeser, and Jesse M. Shapiro, "Why Have Americans Become More Obese?" *Journal of Economic Perspectives*, vol. 17, no. 3 (Fall 2003), pp. 93-118.

<sup>8</sup> Samara J. Nielsen and Barry M. Popkin, "Patterns and Trends in Food Portion Sizes, 1977-1998," *JAMA*, vol. 289 (2003), pp. 450-453; Judith J. Putnam, Jane Allshouse, and Linda S. Kantor, "U.S. per capita Food Supply Trends," *Food Review*, United States Department of Agriculture (Winter 2002), at <http://www.ers.usda.gov/publications/FoodReview/DEC2002/frvol25i3a.pdf>.

<sup>9</sup> Judith J. Putnam et al., "U.S. Food Supply Trends."

<sup>10</sup> Households, by contrast, spent between 34% and 39% of their food budgets in 2003-2004 on eating out. See Noel Blisard and Hayden Stewart, "Food Spending in American Households, 2003-04," *Economic Information Bulletin—23*, Economic Research Service, U.S. Department of Agriculture, March 2007.

<sup>11</sup> "Fast-food" is defined by *The Oxford Pocket Dictionary of Current English* (2009) as "food that can be prepared quickly and easily and is sold in restaurants and snack bars as a quick meal or to be taken out," <http://www.encyclopedia.com>, accessed February 20, 2009.

<sup>12</sup> Fast-food revenue statistics are available from the National Restaurant Association, <http://www.restaurant.org>.

<sup>13</sup> Jeffrey Levi, Laura M. Segal, and Chrissie Juliano, *F as in Fat: How Obesity Policies Are Failing in America 2006*, Washington, D.C.: Trust for America's Health, 2006.

<sup>14</sup> By contrast, age-adjusted obesity prevalence statistics for the 65-and-older population are as follows: women, 30.8%; men, 29.3%.

<sup>15</sup> David E. Arterburn, Paul K. Crane, and Sean D. Sullivan, "The Coming Epidemic of Obesity in Elderly Americans," *Journal of the American Geriatric Society*, vol. 52 (2004), pp. 1907-1912.

factor for costly and deadly conditions, including heart disease, stroke, cancer, and diabetes, public insurance programs such as Medicare are likely to face notable increases in costs as baby boomers become eligible for health care entitlements.<sup>16</sup>

## Factors Contributing to Increases in Obesity

Despite the scope and increasing severity of excessive body weight among Americans, no consensus has been reached about how to address the “obesity epidemic” in the United States. Public health officials have tended to emphasize messages of personal responsibility, orchestrating campaigns in public service announcements that focus on eating nutritious foods and engaging in physical activities. Sociologists and social epidemiologists, by contrast, have suggested that the recent rise in obesity is attributable to contextual factors such as increases in the amount of time spent watching television or using computers, or the lack of pedestrian-friendly infrastructure (e.g., sidewalks, bicycle paths, crosswalks). They also point to aspects of the sociocultural environment that may contribute to society’s expanding waistline. For instance, suburban sprawl has led to greater reliance on the automobile. “Single-use zoning” in housing developments has compounded matters by segregating residences from schools, retail stores, and recreational facilities.<sup>17</sup> By designing and building neighborhoods that are increasingly less “walkable,” urban planners and architects have helped reduce the average level of physical activity that Americans get each day.<sup>18</sup>

Obesity rates in the United States may also be related to the increasing number of women who entered the workforce in the waning decades of the 20<sup>th</sup> century.<sup>19</sup> This shift prompted many families both to rely on pre-packaged meals, or “frozen dinners,” and to start eating in restaurants more often. Research demonstrates that individuals consume larger portions and higher-calorie foods in restaurants than when they eat meals at home.<sup>20</sup> Over time, therefore, the increasing reliance on restaurants for meals may have had an impact on obesity rates.<sup>21</sup>

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<sup>16</sup> American Federation of Aging Research, “Boom, Boom, Boom: Obesity among Baby Boomers and Older Adults,” Washington, D.C.: AFAR, March 2005, paper prepared following *The Politics of Older Adult Obesity*, a conference held in Washington, D.C., on December 2, 2004.

<sup>17</sup> Single-use zoning started appearing in the 1920s in the United States. As increasing numbers of families acquired automobiles, it became possible to travel longer distances for shopping, entertainment, and work. Urban planners began to allow parcels of land to be set aside for one sole purpose. The single-use zoning of residential and commercial areas defines suburban life in the United States today: large tracts of housing, surrounded by large arterial roads to handle a significant volume of automobile traffic. Industrial areas and retail centers are typically tucked away from residences and schools; even single-family dwellings are often not proximate to apartment complexes.

<sup>18</sup> Andres Duany, Elizabeth Plater-Zyberk, and J. Speck, *Suburban Nation*, New York: North Point Press, 2000; D. Berrigan, R. Troiano, “The Association Between Urban Form and Physical Activity in U.S. Adults,” *American Journal of Preventive Medicine* (hereafter, *AJPM*), vol. 23, suppl. 2, pp. 74-79; S. Jandy et al., “How the Built Environment Affects Physical Activity,” *AJPM*, vol. 23, suppl. 2, pp. 64-73; C. Craig et al., “Exploring the Effect of the Environment on Physical Activity,” *AJPM*, vol. 23, suppl. 2, pp. 36-43.

<sup>19</sup> Shin-Yi Chou, Michael Grossman, and Henry Saffer, “An Economic Analysis of Adult Obesity: Results from the Behavioral Risk Factor Surveillance System,” *Journal of Health Economics*, vol. 23, no. 3 (Fall 2004), pp. 565-587.

<sup>20</sup> Lisa R. Young and Marion Nestle, “Portion Sizes in Dietary Assessment: Issues and Policy Implications,” *Nutrition Review*, vol. 53 (1995), pp. 149-158.

<sup>21</sup> Lisa R. Young and Marion Nestle, “The Contribution of Expanding Portion Sizes to the U.S. Obesity Epidemic,” *American Journal of Public Health* (hereafter, *AJPH*), vol. 92, no. 2 (2002), pp. 246-249.

Economists note that one reason obesity and overweight have seen disproportionate increases among low-income minorities is that fruits and vegetables are either prohibitively costly or simply inaccessible in their neighborhoods. Researchers have demonstrated, for instance, that African American communities have significantly fewer grocery stores than white neighborhoods.<sup>22</sup> This dearth of competition tends to drive up the costs of nutritious goods such as fresh fruit, thus encouraging the consumption of less-expensive, high-sugar snack foods.<sup>23</sup>

Finally, social scientists contend that an increase in the number of sedentary jobs, and sharp increases in television viewing, computer use, and video gaming, have led to a dramatic change in American lifestyles that has reduced individuals' daily energy expenditures, without promoting a commensurate reduction in caloric intake.<sup>24</sup>

## Defining Obesity in the Elderly Population

Obesity is defined as an unhealthy excess of body fat, which increases the risk of medical illness and premature mortality. Because accurate measures of body fat mass require sophisticated technologies<sup>25</sup> that are often available only in clinical settings, an approximation called the Body Mass Index (BMI) is used to screen and monitor overweight and obesity. BMI expresses the relationship of weight-to-height and correlates with the percentage of body fat a person carries.<sup>26</sup> It is calculated as body weight (in kilograms) divided by the square of height (in meters).<sup>27</sup> BMI is widely used and accepted as a simple method to categorize people as “healthy weight,” “overweight,” or “obese.”<sup>28</sup>

An adult with a BMI greater than or equal to 25.0 and less than 30.0 is considered “overweight”; persons with body mass indices of 30.0 or more are “obese.”<sup>29</sup> Both the CDC and the World Health Organization concur that these BMI thresholds are gender- and age-neutral despite distinct differences in body composition for men and women, young and old. **Table 1** illustrates BMIs for fairly common height-weight combinations. For example, an adult who is 5'10" and weighs between 174.0 and 208.9 pounds is overweight; at 209.0 pounds and above, he or she is classified as obese.

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<sup>22</sup> Kimberly Morland, S. Filomena, “Disparities in the availability of fruits and vegetables between racially segregated urban neighbourhoods,” *Public Health Nutrition*, vol. 10, no. 12 (December 2007), pp. 1481-9; M. P. Galvez et al., “Race and food store availability in an inner-city neighbourhood,” *Public Health Nutrition*, vol.11, no. 6 (June 2008), pp. 624-31; K.B. Morland, K.R. Evenson, “Obesity prevalence and the local food environment,” *Health and Place*, vol. 15, no. 2 (June 2009), pp.491-5.

<sup>23</sup> Jamy D. Ard et al., “The Impact of Cost on the Availability of Fruits and Vegetables in the Homes of Schoolchildren in Birmingham, Alabama,” *AJPH*, vol. 97, no. 2 (February 2007), pp. 367-372.

<sup>24</sup> Darius N. Lakdawalla and Tomas J. Philipson, “Technological Change and the Growth of Obesity,” NBER Working Paper no. 8946, Cambridge, MA: National Bureau of Economic Research, 2002.

<sup>25</sup> These technologies include dual energy X-ray absorptiometry (DEXA or DXA), Bod Pod® (a tool that relies on air displacement to determine body fat), and magnetic resonance imaging (MRI).

<sup>26</sup> Walter C. Willett, William H. Dietz, and Graham A. Colditz, “Guidelines for Healthy Weight,” *New England Journal of Medicine* (hereafter, *NEJM*), vol. 341 (1999), pp. 427-434.

<sup>27</sup> BMI may also be estimated using English, non-metric measures: BMI = [(Weight in pounds) / (Height in inches) x (Height in inches)] x 703.

<sup>28</sup> NHLBI Expert Panel, *Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults: Evidence Report*, NIH publication no. 02-4084, Bethesda, MD: NIH, 2002.

<sup>29</sup> Individuals with BMIs greater than or equal to 40.0 are said to be “extremely obese,” or “morbidly obese.”

Although BMI is proportional to the amount of body fat a person has, it is important to emphasize that BMI is an inexact measure. Some people (e.g., muscular athletes) may have a BMI that identifies them as overweight even though they do not have excess body fat. Conversely, in elderly adults, BMI measures may underestimate fatness because of age-related changes in body composition. For instance, when a person gets older, muscle mass naturally decreases, whereas abdominal and intramuscular fat increase.<sup>30</sup> As a result, the BMI formula may underestimate fatness in elderly individuals. On the other hand, loss of height resulting from vertebral compression (a problem commonly associated with aging) may lead to overestimates of body fat.<sup>31</sup>

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<sup>30</sup> Bernard Beaufre and Beatrice Morio, "Fat and Protein Redistribution with Aging: Metabolic Considerations," *European Journal of Clinical Nutrition*, vol. 54 supplement (2000), pp. S48-S53.

<sup>31</sup> As old people age, spinal vertebrae often "collapse" much like a sponge collapses under the pressure of one's hand. Over many years, spinal compression reduces the length of the spine and diminishes a person's height.

**Table I. Body Mass Index Chart**

Height	BMI													
	19	21	23	25	26	27	28	29	30	32	34	36	38	40
	Weight (lbs.)													
	Healthy			Overweight					Obese					
4'10"	91	100	110	119	124	129	134	138	143	153	162	172	181	191
5'0"	97	107	118	128	133	138	143	148	153	163	174	184	194	204
5'2"	104	115	126	136	142	147	153	158	164	175	186	196	207	218
5'4"	110	122	134	145	151	157	163	169	174	186	197	209	221	232
5'6"	118	130	142	155	161	167	173	179	186	198	210	223	235	247
5'8"	125	138	151	164	171	177	184	190	197	210	223	236	249	262
5'10"	132	146	160	174	181	188	195	202	209	222	236	250	264	278
6'0"	140	154	169	184	191	199	206	213	221	235	250	265	279	294
6'2"	148	163	179	194	202	210	218	225	233	249	264	280	295	311

**Source:** CRS adaption of chart from the National Heart, Lung, and Blood Institute, National Institutes of Health, available at [http://www.nhlbi.nih.gov/guidelines/obesity/bmi\\_tbl.pdf](http://www.nhlbi.nih.gov/guidelines/obesity/bmi_tbl.pdf).

Given these age-related changes, recent studies suggest that the ideal BMI for elderly people should be slightly higher than that for the young and middle-aged.<sup>32</sup> Statistics presented in this report, however, use the adult thresholds for overweight and obesity, because researchers have yet to establish and validate a different set of BMI standards for elderly persons.

## Risks of Obesity

Obesity can cause or exacerbate serious medical conditions as people age. Obese people are prone to arthritis, liver disease, gout, gallstones, and pulmonary difficulties, such as sleep apnea (the temporary cessation of breathing while asleep).<sup>33</sup> This section examines health conditions that obesity has been shown to cause or exacerbate. In particular, it discusses the links between obesity and type 2 diabetes, hypertension (high blood pressure), heart disease, and cancer. Because of these associations, according to the National Institutes of Health, obesity and overweight together are the second leading cause of preventable death in the United States, close behind tobacco use.<sup>34</sup> An estimated 300,000 deaths per year are due to obesity.

Obesity ranks as the nation's second-leading risk factor for mortality; in 2000, for instance, obesity was associated with 112,000 deaths, well behind smoking (435,000 deaths) but somewhat greater than alcohol consumption (85,000 deaths).<sup>35</sup>

While there is little disagreement about the fact that obesity increases an individual's risk of mortality, a December 2007 study concludes that being physically fit may mitigate some of the dangers associated with being fat.<sup>36</sup> The authors observed that fit individuals who were obese (defined as having a BMI of 30.0-34.9) had a lower risk of all-cause mortality than did unfit, healthy weight, or lean individuals. "Our data provide further evidence regarding the complex long-term relationship among fitness, body size, and survival. It may be possible to reduce all-cause death rates among older adults, including those who are obese, by promoting regular physical activity, such as brisk walking for 30 minutes or more on most days of the week (about 8 kcal/kg per week), which will keep most individuals out of the low-fitness category," they

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<sup>32</sup> Asefeh Heiat, "Impact of Age on Definition of Standards for Ideal Weight," *Preventive Cardiology*, vol. 6 (2003), pp. 104-107; Asefeh Heiat, Viola Vaccarino, and Harlan M. Krumholz, "An Evidence-Based Assessment of Federal Guidelines for Overweight and Obesity as They Apply to Elderly Persons," *Archives of Internal Medicine*, vol. 161 (2001), pp. 1194-1203.

<sup>33</sup> Ross Lazarus, David Sparrow, and Scott T. Weiss, "Effects of Obesity and Fat Distribution on Ventilatory Function: The Normative Aging Study," *Chest*, vol. 111, pp. 891-898.

<sup>34</sup> Katherine M. Flegal, Barry I. Graubard, and David F. Williamson, et al., "Excess Deaths Associated With Underweight, Overweight, and Obesity," *JAMA*, vol. 293, no. 15 (April 20, 2005), pp. 1861-1867.

<sup>35</sup> Previous estimates by the Centers for Disease Control and Prevention (CDC) had indicated that as many as 400,000 Americans die annually from causes related to excess body weight. For details, see Ali H. Mokdad et al., "Actual Causes of Death in the United States, 2000," *JAMA*, vol. 291 (2004), pp. 1238-1245. After this study's results were challenged on methodological grounds, the CDC acknowledged its error and revised its obesity-related mortality estimate to 365,000. Later, however, these findings were retracted entirely. The most recent estimates published regarding obesity-attributable deaths suggest that obesity kills about 112,000 Americans annually. See Flegal et al., "Excess Deaths Associated with Obesity," pp. 1861-1867.

<sup>36</sup> Xuemei Sui, Michael J. LaMonte, James N. Laditka, James W. Hardin, Nancy Chase, Steven P. Hooker, and Steven N. Blair, "Cardiorespiratory Fitness and Adiposity as Mortality Predictors in Older Adults," *JAMA*, vol. 298 (2007), no. 21, pp. 2507-2516.

concluded. “Enhancing functional capacity also should allow older adults to achieve a healthy lifestyle and to enjoy longer life in better health.”

## **Diabetes**

Diabetes, the seventh-leading cause of death among elderly Americans,<sup>37</sup> is a disease in which blood glucose levels are excessive. It is a serious chronic illness that may lead to numerous health complications, including heart disease, blindness, and kidney failure.<sup>38</sup>

Normally, the pancreas secretes a hormone called insulin, which facilitates the absorption of glucose by cells in our bodies. In type 1 diabetes, the immune system attacks and destroys the cells in the pancreas that produce insulin. In order to survive, type 1 individuals must intravenously inject insulin into their bloodstream every day.<sup>39</sup> By contrast, people with type 2 diabetes produce enough insulin, but their bodies do not use the insulin effectively, a condition called “insulin resistance.” Type 2 diabetes is most often associated with older age and physical inactivity.<sup>40</sup> Type 2 individuals must monitor their blood sugar levels carefully and watch their diets accordingly, though they do not necessarily need to self-administer insulin.

Obesity is known to induce insulin resistance. To compensate for insulin resistance, the pancreas produces even more insulin, which leads to a higher concentration of insulin in the blood stream. This situation may continue for years, but the pancreas is ultimately unable to maintain this high insulin output. At that point, blood sugar levels increase and type 2 diabetes is diagnosed. Extremely obese women (BMI $\geq$ 40.0) are 12 times more likely to have diabetes, and extremely obese men 8 times more likely, than their peers who maintain BMIs between 18.5 and 25.0 (“healthy weight”).<sup>41</sup>

About 90% of all people who develop non-insulin dependent diabetes (type 2) are overweight. It is not surprising, therefore, that the prevalence of type 2 diabetes has risen with recent increases

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<sup>37</sup> National Center for Health Statistics, *Health, United States, 2007 With Chartbook on Trends in the Health of Americans*. Hyattsville, Maryland, 2007. See also CRS Report RL34125, *Mortality of Americans Age 65 and Older: 1980 to 2004*, by Andrew R. Sommers.

<sup>38</sup> One in two diabetic individuals develops heart disease, and 67% of all amputees are diabetic. See Oscar H. Franco et al., “Associations of Diabetes Mellitus with Total Life Expectancy and Life Expectancy with and without Cardiovascular Disease,” *Archives of Internal Medicine*, vol. 167, no. 11 (2007), pp. 1145-1151.

<sup>39</sup> Type 1 diabetes, previously known as “juvenile-onset diabetes,” accounts for about 5% to 10% of all diagnosed cases of diabetes.

<sup>40</sup> Type 2 diabetes, previously known as “adult-onset diabetes,” accounts for about 90% to 95% of all diagnosed cases of diabetes. Persons with a family history of diabetes, a history of gestational diabetes, and with certain ethnic backgrounds may be at greater risk for developing this form of diabetes.

<sup>41</sup> Ruth E. Patterson et al., “A Comprehensive Examination of Health Conditions Associated with Obesity in Older Adults,” *AJPM*, vol. 27, no. 5 (December 2004), pp. 385-390.

in obesity.<sup>42</sup> In 2007, nearly one-in-four individuals aged 65 and older had been diagnosed with diabetes. This represents an increase of more than 35% in the past 15 years.<sup>43</sup>

Although researchers in the past have argued that insulin resistance could be a function of the aging process,<sup>44</sup> recent studies suggest that the decline in insulin sensitivity among people over age 50 is actually a result of abdominal obesity and physical inactivity.<sup>45</sup> Elderly persons, particularly women, who get moderate amounts of exercise and maintain a healthy weight are three times less likely to develop diabetes than peers whose poor nutrition or sedentary lifestyles promote weight gain.<sup>46</sup>

## Cardiovascular and Cerebrovascular Disease

The likelihood of developing cardiovascular conditions (e.g., heart disease) or experiencing cerebrovascular problems (e.g., stroke) rises steeply with increasing body fatness. Obesity is additionally a critical risk factor for developing hypertension—the medical term for high blood pressure (HBP). HBP makes the heart exert additional force to pump blood through the circulatory system.<sup>47</sup> This extra work increases the risk of heart attacks and strokes, as well as kidney failure. Severely hypertensive people may increase their chances of having a stroke 10-fold. HBP may also weaken the heart or harden and scar the arteries. While this type of damage happens naturally as people age, HBP accelerates the process among elderly individuals because it promotes atherosclerosis, the accumulation of cholesterol or plaque in the arteries.<sup>48</sup>

Data from longitudinal population studies suggest that obesity significantly increases the risk of cardiovascular disease in elderly men, but not necessarily in women. Among men over age 65, increased BMI is associated with an increase in new cases of coronary heart disease, fatal and nonfatal heart attacks, and cardiovascular disease mortality. For women, research findings on

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<sup>42</sup> Some researchers question whether diabetes rates are actually increasing sharply. A CDC epidemiologist, Katherine Flegal, for instance, argues that the overall age-adjusted proportion of the population that has diabetes has been largely stable since 1988. What has changed, she contends, is that the frequency with which people receive diagnoses of diabetes has increased significantly, thus creating a perception that diabetes is becoming epidemic. See also Edward W. Gregg et al., “Trends in the Prevalence and Ratio of Diagnosed to Undiagnosed Diabetes According to Obesity Levels in the U.S.,” *Diabetes Care*, vol. 27 (2004), pp. 2806-2812.

<sup>43</sup> NHANES data (1988-1994) suggest that the prevalence of diabetes among the elderly (age  $\geq$  65 years) between 1998-1994 was 18.9%. See Table 55, “Diabetes among adults 20 years of age and over, by sex, age, and race and Hispanic origin: United States, 1988–1994 and 2001–2004,” [http://www.cdc.gov/nchs/data/07.pdf](http://www.cdc.gov/nchs/data/hus/07.pdf).

<sup>44</sup> Annette M. Chang and Jeffrey B. Halter, “Aging and Insulin Secretion,” *American Journal of Physiology-Endocrinology and Metabolism*, vol. 284 (2003), pp. E7-E12.

<sup>45</sup> Steven M. Haffner, “Abdominal Obesity, Insulin Resistance, and Cardiovascular Risk in Pre-diabetes and Type 2 Diabetes,” *European Journal of Cardiology*, vol. 8, suppl. B (2006), pp. B20-B25.

<sup>46</sup> Frank B. Hu et al., “Television Watching and Other Sedentary Behaviors in Relation to Risk of Obesity and Type 2 Diabetes Mellitus in Women,” *JAMA*, vol. 289, no. 14 (2003), pp. 1785-1791.

<sup>47</sup> Hypertension is considered to be present when a person’s systolic blood pressure is consistently 140mmHg or greater, and/or their diastolic blood pressure is consistently 90mmHg or greater.

<sup>48</sup> Atherosclerosis is a chronic disease in which arterial walls thicken and harden, thus restricting blood circulation to one’s organs and tissues. It is in large part a response to the accumulation of deposits of plasma proteins (which carry cholesterol and triglycerides) within blood vessels. Although atherosclerosis develops with aging, it is exacerbated by hypertension and diabetes.

obesity and cardiovascular disease risk are mixed; some studies have demonstrated a correlation, whereas others have not.<sup>49</sup>

## Cancer

Obesity is also related to certain types of life-threatening cancers. In older adults, the correlation is particularly strong between obesity and cancer of the breast, colon, endometrium (lining of the uterus), pancreas, esophagus, and kidney.<sup>50</sup> Men who are obese are more likely than non-obese men to develop cancer of the colon, rectum, or prostate. Women who are obese are more likely to develop cancer of the gallbladder, uterus, cervix, or ovaries.

Researchers suggest that the link between obesity and cancer may involve a similar etiologic mechanism to the one that exists between obesity and diabetes.<sup>51</sup> As discussed above, obesity is known to induce insulin resistance. The high concentrations of insulin that are often present for years could potentially affect a person's likelihood of developing cancer. This is because a consistent characteristic of cancer cells is their ability to grow uncontrollably, and insulin is an important growth factor for body tissues that signals cells to proliferate. It is reasonable to hypothesize that in an insulin-resistant state, which may be induced by obesity, higher circulating levels of growth factors such as insulin could be critical to the initial development of cancer.<sup>52</sup>

## Physical Function

Obesity has important functional implications in the older population because it can exacerbate the age-related decline in physical function.<sup>53</sup> Various studies have shown that BMI and fat mass are positively related to disability.<sup>54</sup> Specifically, high BMI is associated with an increased risk of osteoarthritis (OA). A quantitative synthesis of research studies over the past 35 years showed a positive association between obesity and OA. Obese adults are 25% more likely than their non-obese peers to have OA of the hip joint, and 300 to 400% more likely to have OA in their knees.<sup>55</sup> This relationship is even stronger for adults age 65 and older. Elderly individuals who are obese

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<sup>49</sup> Debashish K. Dey and Lauren Lissner, "Obesity in 70-Year-Old Subjects as a Risk Factor for 15-year Coronary Heart Disease Incidence," *Obesity Research*, vol. 11 (2003), pp. 817-827; Aaron R. Folsom et al., "Associations of General and Abdominal Obesity with Multiple Health Outcomes in Older Women," *Archives of Internal Medicine*, vol. 160 (2000), pp. 2117-2128.

<sup>50</sup> Alicia Wolk et al., "A Prospective Study of Obesity and Cancer Risk," *Cancer Causes and Control*, vol. 12 (2001), pp. 13-21; Joanne M. Jordan et al., "The Role of Sociodemographic Factors, Obesity, and Knee Pain," *Arthritis Care Research*, vol. 9 (1996), pp. 273-278.

<sup>51</sup> Rachael Z. Stolzenberg-Solomon et al., "Insulin, Glucose, Insulin Resistance, and Pancreatic Cancer in Male Smokers," *JAMA*, vol. 294 (2005), pp. 2872-2878; Maurizio Trevisan et al., "Markers of Insulin Resistance and Colorectal Cancer Mortality," *Cancer Epidemiology Biomarkers & Prevention*, vol. 10 (2001), pp. 937-94.

<sup>52</sup> American Institute for Cancer Research, *Cancers, Food, Nutrition and the Prevention of Cancer: A Global Perspective* (Washington, D.C.: AICR, July 1997).

<sup>53</sup> Dennis T. Villareal et al., "Physical Frailty and Body Composition in Obese Elderly Men and Women," *Obesity Research*, vol. 12, (2004), pp. 913-920.

<sup>54</sup> Kenneth F. Ferraro et al., "Body Mass Index and Disability in Adulthood: A 20-year Panel Study," *AJPH*, vol. 92, no. 5 (2002), pp. 834-840.

<sup>55</sup> Richard N. Baumgartner et al., "Sarcopenic Obesity Predicts Instrumental Activities of Daily Living Disability in the Elderly," *Obesity Research*, vol. 12, no. 12 (December 2004), pp. 1995-2004.

are approximately 37% more likely to develop hip OA and as much as 10 times as likely to develop knee OA.<sup>56</sup>

## Alzheimer's Disease

Obesity has also been shown to correlate strongly with Alzheimer's disease.<sup>57</sup> A 2005 study estimated that relative to "healthy weight" persons, obese individuals had a 74% greater risk of developing dementia, and overweight persons had a 35% higher risk.<sup>58</sup> Moreover, Swedish researchers have concluded that every unit increase in body mass index after age 70 increases a woman's chance of developing Alzheimer's by 36%.<sup>59</sup>

While researchers have long suspected a link between Alzheimer's disease and diabetes, only recently have scientists demonstrated a correlation between these conditions. Two competing explanations have been offered for this association. Both hinge on the fact that overweight and insulin-resistant individuals produce excess insulin as their pancreas tries to reduce the body's blood sugar level. This extra insulin can provoke inflammation of blood vessels. One hypothesis is that swollen vessels in the brain may increase production of the protein beta-amyloid, which is an important component of the sticky plaques that accumulate in the brain and lead to the development of Alzheimer's disease. The notion that Alzheimer's may result when the brain is overwhelmed by insulin is supported by the results of recent research.<sup>60</sup>

## Effect of BMI on Mortality Risk at Various Ages

Researchers have found that among adults between the ages of 30 and 74, increased BMI is associated with an increase in the risk of death from all causes.<sup>61</sup> Indeed, a life-table analysis showed that 40-year-old nonsmokers, who have a BMI of at least 30.0, generally live six to seven fewer years than their "healthy weight" peers.<sup>62</sup>

However, the *relative* risk associated with increased BMI appears to decline with age. For example, among 30-to-44-year-olds, the increase in mortality risk among overweight and obese

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<sup>56</sup> David T. Felson, "Weight and osteoarthritis," *Journal of Rheumatology*, vol. 43 (1995), pp. 7-9.

<sup>57</sup> Susan Craft, "Insulin Resistance Syndrome and Alzheimer's Disease: Age- and Obesity-related Effects on Memory, Amyloid, and Inflammation," *Neurobiology of Aging*, vol. 26, supplement 1 (2005), pp. 65-69; S. Gandy, "The Role of Cerebral Amyloid  $\beta$  Accumulation in Common Forms of Alzheimer's Disease," *Journal of Clinical Evaluation*, vol. 115 (2005), pp. 1121-1129; Emmanuel C. Gorospe and Jatin K. Dave, "The Risk of Dementia with Increased Body Mass Index," *Age and Ageing*, vol. 36, no. 1 (2007), pp. 23-29; Miia Kivipelto et al., "Obesity and Vascular Risk Factors at Midlife and the Risk of Dementia and Alzheimer's Disease," *Archives of Neurology*, vol. 62, no. 10 (2005), pp. 1556-1560; George Razay, Anthea Vreugdenhil, and Gordon Wilcock, "Obesity, Abdominal Obesity and Alzheimer Disease," *Dementia and Geriatric Cognitive Disease*, vol. 22 (2006), pp. 173-176.

<sup>58</sup> Rachel Whitmer, Charles P. Quesenberry, Jr., and Kristine Yaffe, "Obesity in Middle Age and Future Risk of Dementia: A 27-year Longitudinal Population-based Study," *British Medical Journal*, vol. 62 (2005), pp. 1556-1560.

<sup>59</sup> Deborah Gustafson et al., "An 18-Year Follow-Up of Overweight and Risk of Alzheimer's Disease," *Archives of Internal Medicine*, vol. 163 (2003), pp. 1524-1528. This study's design did not include male subjects; therefore, no conclusions were reached about the impact of BMI on dementia among men.

<sup>60</sup> Colin Barras, "Excess Insulin May Be Bad for the Brain," *New Scientist* (July 28, 2007), p. 26.

<sup>61</sup> Eugenia E. Calle et al., "Body-Mass Index and Mortality in a Prospective Cohort of U.S. Adults," *NEJM*, vol. 341, no. 15 (October 1999), pp. 1097-1105.

<sup>62</sup> Anna Peeters et al., "Obesity in Adulthood and its Consequences for Life Expectancy: A Life-Table Analysis," *Annals of Internal Medicine*, vol. 138 (2003), pp. 24-32.

individuals relative to those of healthy weight was greater than the corresponding relative increase in risk among 65-to-74-year-olds with an elevated BMI. This observation is often misinterpreted as evidence that obesity is less harmful in older adults.<sup>63</sup> On the contrary, as individuals age, the effect of obesity on mortality is not less pronounced; it is simply less evident. Reasons for this obscuring are twofold. First, the mortality risk attributable to body mass loses prominence because so many other mortality risks become manifest as persons grow old. Second, it is more difficult to find an association between obesity and mortality after age 75 because many obese individuals have already died by that age, thus leaving behind persons who are healthier, leaner, or more resistant to potential health problems associated with high BMI values.<sup>64</sup>

## Prevalence of Obesity

In 2003-2006, 43.6% of Americans aged 60 and older were overweight, while 33.9% were obese.<sup>65</sup> This suggests that at least three out of every four senior citizens in the United States have a higher-than-recommended body mass index. **Table 2** details prevalence estimates for 2003-2006 of overweight, obesity, and extreme obesity for the adult population by racial/ethnic group. Data for three age subgroups are followed by statistics for the entire population aged 20 and above (see **Appendix A** for notes on the data sources and the methodology used to calculate the estimates presented in this report).

There is broad consensus in the scientific community that the level of obesity in the United States is unprecedented and epidemic.<sup>66</sup> However, expanding girth and bulging waistlines do not affect different racial and ethnic groups uniformly. Certain subsets of the population have been affected more seriously than others.<sup>67</sup> For instance, the prevalence of overweight, obesity, and extreme obesity among non-Hispanic blacks and Mexican Americans exceeds that of non-Hispanic whites in most age categories (see **Table 2**).

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<sup>63</sup> Jerome P. Kassirer and Marcia Angell, "Losing Weight—An Ill-Fated New Year's Resolution," *NEJM*, vol. 338 (1998), pp. 52-54.

<sup>64</sup> William B. Kannel, Tavia Gordon, and William P. Castelli, "Obesity, Lipids, and Glucose Intolerance: The Framingham Study," *American Journal of Clinical Nutrition*, vol. 32 (1979), pp. 1238-45; June Stevens et al., "The Effect of Age on the Association Between Body-Mass Index and Mortality," *NEJM*, vol. 338 (1998), pp. 1-7; JoAnn E. Manson et al., "Body Weight and Mortality among Women," *NEJM*, vol. 333 (1995), pp. 677-85.

<sup>65</sup> 26.9% of elderly individuals were "obese," with BMIs from 25.0 to 39.9; 3.9% were "extremely obese," with BMIs over 40.0. CRS compilation of NHANES 2003-2006 data.

<sup>66</sup> U.S. Department of Health and Human Services, *The Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity*, Rockville, MD: Office of the Surgeon General, 2001; World Health Organization, *Obesity: Preventing and Managing the Global Epidemic*, WHO Obesity Technical Report, Series 894, Geneva, Switzerland: WHO, 2000.

<sup>67</sup> Nicole Cossrow and Bonita Falkner, "Race/ethnic Issues in Obesity and Obesity-Related Comorbidities," *The Journal of Clinical Endocrinology & Metabolism*, vol. 89, no. 6 (2004), pp. 2590-2594.

**Table 2. Prevalence of Overweight, Obesity, and Extreme Obesity in Adults, by Age and Racial/Ethnic Group, 2003-2006**

	Non-Hispanic white	Non-Hispanic black	Mexican- American	All
<b>20-39 yrs.</b>				
Overweight <sup>a</sup>	28.4%	29.2%	39.0%	29.7%
Obese <sup>b</sup>	21.6	32.6	27.0	23.8
Extremely obese <sup>c</sup>	4.4	10.3	4.7	5.0
<b>Subtotal</b>	<b>54.5%</b>	<b>72.0%</b>	<b>70.7%</b>	<b>58.6%</b>
<b>40-59 yrs.</b>				
Overweight	35.8%	33.1%	40.0%	33.9%
Obese	32.4	34.6	34.3	32.0
Extremely obese	6.0	12.0	5.0	6.6
<b>Subtotal</b>	<b>71.5%</b>	<b>79.6%</b>	<b>79.2%</b>	<b>72.5%</b>
<b>60 yrs. or older</b>				
Overweight	40.2%	29.2%	40.1%	38.7%
Obese	27.3	40.1	32.8	28.2
Extremely obese	3.9	8.0	3.6	4.0
<b>Subtotal</b>	<b>71.4%</b>	<b>77.3%</b>	<b>75.4%</b>	<b>70.9%</b>
<b>All adults, 20 years or older</b>				
Overweight	32.9%	30.6%	39.6%	33.3%
Obese	26.9	35.1	30.9	27.9
Extremely obese	4.9	10.4	4.5	5.4
<b>Subtotal</b>	<b>64.7%</b>	<b>76.1%</b>	<b>75.0%</b>	<b>66.6%</b>

**Source:** CRS compilation of NHANES 2003-2006 data.

- a. Defined as BMI of 25.0-29.9.
- b. Defined as BMI of 30.0-39.9.
- c. Defined as BMI of 40.0 or greater.

**Table 3. Prevalence of Overweight, Obesity, and Extreme Obesity by Race & Gender: Adults, Age 60 and Older, 2003-2006**

	Non-Hispanic white		Non-Hispanic black		Mexican- American		All	
	Men	Women	Men	Women	Men	Women	Men	Women
Overweight	45.1%	36.3%	37.4%	23.7%	45.1%	35.8%	43.6%	34.7%
Obese	31.8	30.7	34.0	57.5	29.7	40.2	31.3	33.0
Extremely obese	2.9	4.7	—	12.2	—	5.4	2.6	5.1
<b>Subtotal</b>	<b>76.9%</b>	<b>67.0%</b>	<b>71.4%</b>	<b>81.2%</b>	<b>74.8%</b>	<b>75.9%</b>	<b>74.9%</b>	<b>67.7%</b>

**Source:** CRS compilation of NHANES 2003-2006 data.

**Note:** “—” does not meet standard of statistical reliability and precision, relative standard error > 40%.

Important gender disparities also exist in the proportion of Americans who are overweight or obese (see **Table 3**). Among Americans aged 60 or older, the percentage who are overweight is greater for men than women (43.6% versus 34.7%, respectively); the reverse is true for the prevalence of obesity (33.9% for men; 38.1% for women).<sup>68</sup> For this age group, obesity among blacks is far more common: 48.1% for non-Hispanic blacks, but 36.4% for Mexican-Americans and 31.2% for non-Hispanic whites (see **Table 2**).<sup>69</sup> Notably, the rate of extreme obesity is nearly twice as large for blacks (age 60 and older) as for whites or Mexican Americans. A number of socioeconomic explanations for this racial disparity have been offered by researchers. One is that limited access to healthy foods<sup>70</sup> and the related consumption of low cost, energy dense foods<sup>71</sup> has promoted obesity among minority populations.

A second possibility relates to educational achievement and general health literacy. Previous studies have shown that the prevalence of obesity declines with increases in education and income. For instance, conservative estimates<sup>72</sup> are that 26% of high school dropouts were obese in 2000, versus 22% of individuals with a high school diploma and 15% of college graduates.<sup>73</sup> It has also been shown that the prevalence of obesity is inversely related to income. As an example, 23% of white women with family incomes greater than 400% of the federal poverty level (FPL) were obese in 1999-2002, compared to an obesity rate of 40% among white women who were living in poverty (at or below the FPL).<sup>74</sup>

Within racial groups, differences in obesity by gender are evident. More non-Hispanic black and Mexican American women are overweight or obese than men. This is not the case, however, among non-Hispanic whites. Two possible reasons put forth as explanations for disproportionate levels of obesity among minority women are higher rates of binge eating<sup>75</sup> among both Hispanic and black women or differences in social and cultural norms related to weight control.<sup>76</sup>

<sup>68</sup> These statistics represent the proportion of the population that is either 'obese' (BMI of 30-0-39.9) or "extremely obese" (BMI  $\geq$  40.0).

<sup>69</sup> These statistics represent the proportion of the population that is either 'obese' (BMI of 30-0-39.9) or "extremely obese" (BMI  $\geq$  40.0).

<sup>70</sup> Nicole I. Larson, Mary T. Story, and Melissa C. Nelson, "Neighborhood environments: disparities in access to healthy foods in the U.S.," *American Journal of Preventive Medicine*, vol. 36, no. 1 (January 2009), pp. 74-81; R.W. Cotterill and Andrew W. Franklin, *The Urban Grocery Store Gap*, University of Connecticut, Department of Agricultural and Resource Economics, Food Marketing Policy Issue Paper No. 8, Storrs, CT, April 1995.

<sup>71</sup> Adam Drewnowski and S.E. Specter, "Poverty and obesity: the role of energy density and energy costs," *American Journal of Clinical Nutrition*, vol. 79, no. 1 (January 2004), pp. 6-16; Karen M. Jetter and Diana L. Cassady, "The availability and cost of healthier food alternatives," *American Journal of Preventive Medicine*, vol. 30, no. 1 (January 2006), pp. 38-44; Adam Drewnowski, "Obesity and the food environment: dietary energy density and diet costs," *American Journal of Preventive Medicine*, vol. 27, no. 3 Suppl (October 2004), pp. 154-162;

<sup>72</sup> These estimates are conservative because they rely on self-reported data.

<sup>73</sup> Mokdad et al., "Continuing Epidemic of Obesity," pp. 1195-1200.

<sup>74</sup> Analogous obesity figures for white males in 1999-2002 were 14% and 34%.

<sup>75</sup> P. Reagan and J. Hersch, "Influence of race, gender, and socioeconomic status on binge eating frequency in a population-based sample," *International Journal of Eating Disorders*, vol. 38, no. 3 (November 2005), pp. 252-256; Ruth H. Striegel-Moore et al., "Recurrent Binge Eating in Black American Women," *Archives of Family Medicine*, vol. 9 (2000), pp. 83-87; Marian L. Fitzgibbon et al., "Correlates of binge eating in Hispanic, Black, and White women," *International Journal of Eating Disorders*, vol. 24, no. 1 (December 1998), pp. 43 - 52.

<sup>76</sup> Shiriki K. Kumanyika, J.F. Wilson, and M. Guilford-Davenport, "Weight-Related Attitudes and Behaviors of Black Women," *Journal of the American Dietetic Association*, vol. 93 (1993), pp. 416-422.

## Obesity Trends

The prevalence of obesity in the United States has increased significantly for all age categories during the past 30 years.<sup>77</sup> **Figure 1** illustrates changes in the prevalence of obesity among elderly men and women since the mid-1970s. Between 1976-1980 and 2003-2006,<sup>78</sup> Americans aged 65-74 experienced significant increases in obesity; the prevalence among men increased from 13.2% to 33.0%, whereas women experienced an increase of nearly 15 percentage points during the same period, from 21.5% to 36.4%.<sup>79</sup> The steepest increases occurred in the 1990s, when obesity rose among all elderly individuals by a factor of nearly 50%. Between 2001-2002 and 2003-2006, a notable drop in obesity is evident for women aged 65-74. Researchers are still speculating about the cause(s) of this shift. One possibility, raised by William Dietz, Director of the CDC's Division of Nutrition, Physical Activity, and Obesity, is that women are taking the health threats associated with obesity somewhat more seriously than men and, upon retirement, they are modifying their eating habits or levels of physical activity accordingly.<sup>80</sup>

Another possible reason for the drop in obesity among women aged 65-74 is the increasing use of bariatric surgery in the United States. This surgery, which includes procedures such as gastric bypass and gastric banding, alters the gastrointestinal tract in a manner that limits the quantity of food a person is capable of ingesting.<sup>81</sup> Between 1998 and 2002, the use of bariatric surgery increased 450% in the United States, and more than four out of five persons who underwent the procedure were female.<sup>82</sup> Much of the overall increase in bariatric surgery was attributable to a 900% rise in number of operations performed on people aged 55 to 64. This group accounted for 11% of all bariatric surgeries in 2002.<sup>83</sup>

After 25 years of steady increases in the prevalence of obesity, the most recently released data from the Centers for Disease Control and Prevention suggest that obesity levels for men and women may be plateauing. Obesity statistics for adults in 2005-2006 were essentially unchanged from 2003-2004. This represents the first time since 1980 that obesity prevalence figures did not appreciably change from the previous two-year period.<sup>84</sup> While it is too early to tell whether this leveling off is an anomaly or a pattern that will hold, experts agree that it is a modest and encouraging achievement.

<sup>77</sup> Hedley et al., "Prevalence of Overweight and Obesity, 1999-2002," pp. 2847-2850; Flegal et al., "Overweight and Obesity in the United States," pp. 39-47; Robert J. Kuczmarski et al., "Increasing Prevalence of Overweight among U.S. Adults: The National Health and Nutrition Examination Surveys, 1960 to 1991," *JAMA*, vol. 272 (1994), pp. 205-211.

<sup>78</sup> Note that prior to 1999, the CDC released NHANES data only in multiyear blocks. The 2005-2006 data are the most recent NHANES data currently available.

<sup>79</sup> Note that these percentages are rounded to the nearest integer in **Figure 1**.

<sup>80</sup> Mike Stobbe, "More Kids, Men Getting Fat," Associated Press, April 4, 2006.

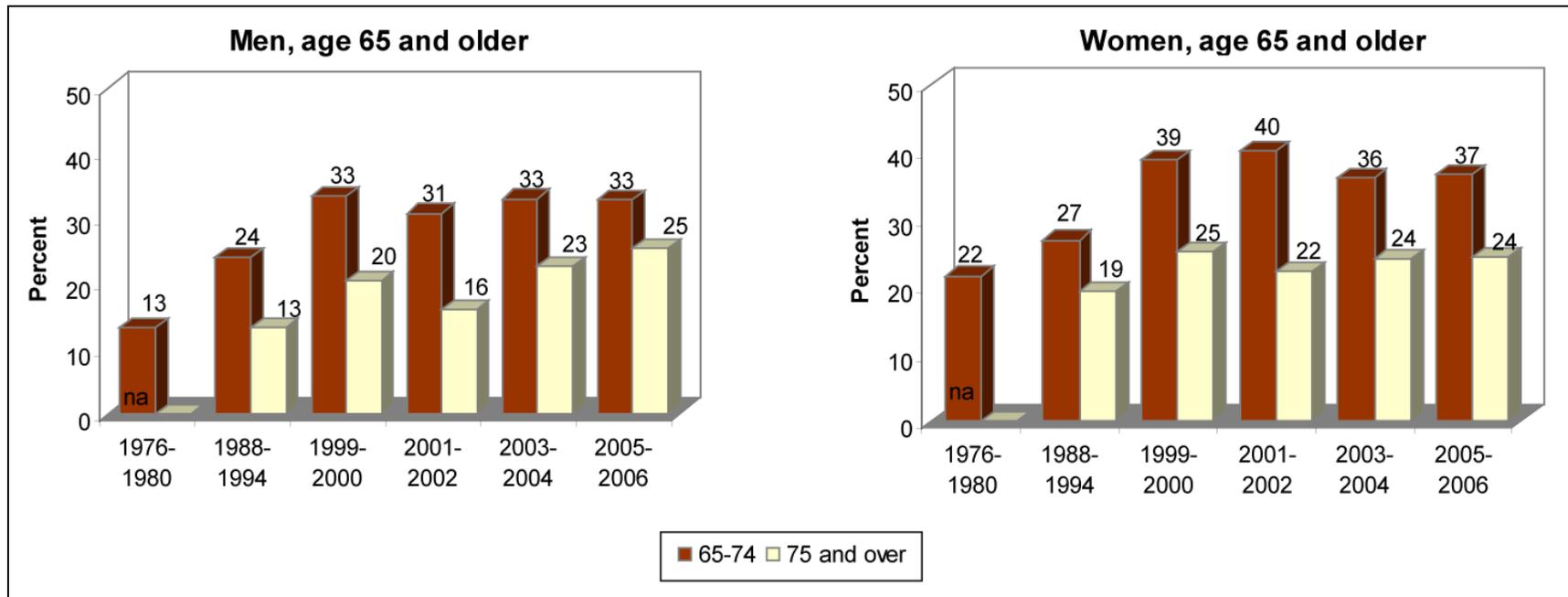
<sup>81</sup> Gastric bypass surgery reduces the stomach's size and bypasses part of the small intestine where food is absorbed. In gastric banding surgery, an inflatable band is placed around the upper part of the stomach, creating a small pouch, which helps restrict the amount of food eaten.

<sup>82</sup> William E. Encinosa, Didem M. Bernard, Claudia A. Steiner, and Chi-Chang Chen, "Use and Costs of Bariatric Surgery and Prescription Weight-Loss Medications," *Health Affairs*, vol. 24, no. 4 (July/August 2005), pp. 1039-1046.

<sup>83</sup> Encinosa et al., "Use and Costs of Bariatric Surgery," pp. 1039-1046.

<sup>84</sup> The slight differences for elderly men and women between 2003-2004 and 2005-2006 depicted in **Figure 1** are not statistically significant.

**Figure 1. Obesity Trends Among Elderly Americans, 1976-2006**



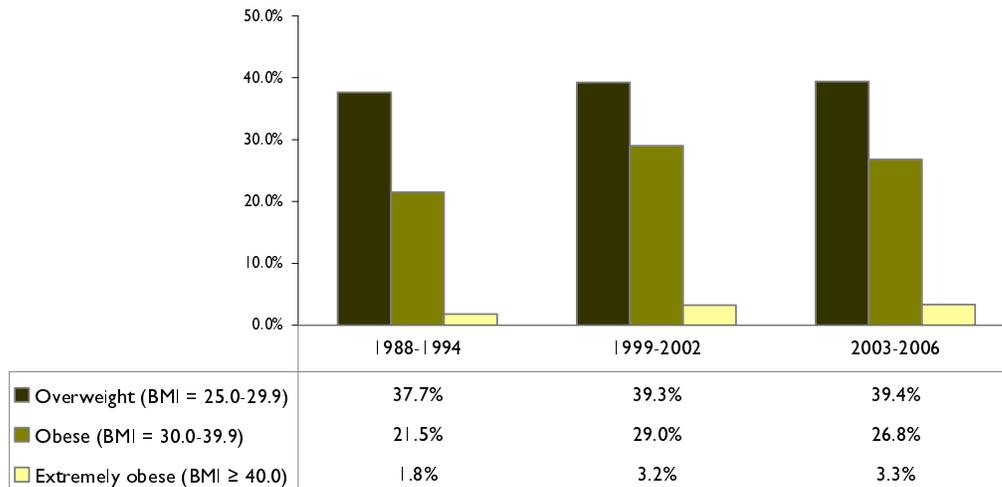
**Source:** Federal Interagency Forum on Aging-Related Statistics, *Older Americans 2008: Key Indicators of Well-Being*. Federal Interagency Forum on Aging-Related Statistics, Washington, DC: U.S. Government Printing Office, March 2008.

**Notes:** “na” means not available: data were not collected for the 75+ age category when the NHANES was first fielded (1976-1980). Data points in figures above are rounded to the nearest integer.

## Weight Distribution Dynamics

**Figure 2** shows the distribution of BMI scores among older men and women (aged 65 and older) in three time periods between 1988 and 2006. Specifically, **Figure 2** demonstrates that the prevalence of obesity and extreme obesity has increased in recent years. Between NHANES I (1988-1994) and NHANES III (2003-2006), the proportion of elderly individuals that was overweight rose just 1.7 percentage points, a relative increase of approximately 5%. By contrast, the ranks of the obese and the extremely obese swelled significantly (from 21.5% to 26.8% and from 1.8% to 3.3%, respectively). These changes represented a 25% jump in the fraction of elderly who were obese and an 83.3% rise in extreme obesity among individuals aged 65 and older. During the same period, percentage of the elderly with normal, or healthy, BMIs (18.0-24.9) dropped precipitously—by more than one-fifth (data not shown).

**Figure 2. Changes in Weight Distribution Among Persons Aged 65 and Older, 1988-2006**



**Source:** CRS compilation of NHANES data, 1988-2006.

Because the highest rates of obesity can be found among “early” baby boomers (aged 52-61 in 2008), followed closely by “late” boomers (aged 42-51 in 2008), obesity rates among the elderly are expected to rise within the next two decades as these individuals enter their retirement years. This is especially true for women, as the highest rates of obesity among women occur in their 50s. The current degree of obesity among boomers has significant implications for the care that these individuals are likely to require in coming years. It may also have policy ramifications, given that persons who are obese in middle-age are projected to incur twice as many medical expenses as Medicare beneficiaries as will their healthy weight peers.<sup>85</sup>

<sup>85</sup> Daviglus et al., “Relation of Body Mass Index to Medicare Expenditures,” pp. 2743-2749. This study estimated that individuals who were extremely obese as young adults have Medicare expenditures after age 65 of \$12,342 on average; by contrast, persons who were neither overweight nor obese early in life had Medicare expenditures that averaged \$6,224.

## Regional Variations in Obesity

**Table 4** provides annual estimates of the prevalence of obesity among elderly adults for each state from 1995 to 2007. States are listed alphabetically. In 2007, the states with the greatest prevalence of obesity among the elderly were Alaska (33.4%), Louisiana (29.9%), and Michigan (26.8%), followed closely by New York (25.4%), Maryland and Missouri (25.2%, respectively). The states with the lowest level of elderly obesity were Hawaii (14.8%), Arizona (17.7%), and Nevada (17.8%), then New Mexico (18.4%) and Maine (18.7%).

Since 1995, the prevalence of obesity among adults has increased in every state, for both sexes, and across all age, race, and socioeconomic groups. By 2007, 41 states had elderly obesity rates of 20% or more, compared with just 1 in 1994. During this 1995-2007 period, almost four out of five states saw obesity among elderly residents increase by more than 50% (see **Table 4**).<sup>86</sup> Twenty-three states experienced increases in excess of 70%. Oklahoma led the way, with obesity prevalence more than doubling among those aged 65 and older. **Figure 3** maps the prevalence of obesity at the state-level between 1996 and 2007.

While the highest prevalence of obesity in 1994 was evident in Alaska, followed by Southern rural states, including Louisiana and Alabama, the first states in the continental United States to have more than 20% of their adult populations qualify as obese were Iowa, Illinois, Wisconsin, and Michigan—all located in the Midwest (see **Table 4**). Although some researchers have suggested that these rates of obesity reflect differences in race/ethnicity, income inequality, or educational achievement, there is somewhat greater support for the theory that these regional trends in obesity are related to suburbanization.<sup>87</sup> High levels of suburban sprawl characterize the areas where obesity rates have climbed most steeply since 1994. Some studies suggest that low-density residential development fosters automobile dependency and discourages walking and bicycling.<sup>88</sup> That may explain in part why states like Iowa, Utah, and Michigan have seen large increases in obesity since the mid-1990s (see **Table 4**).

<sup>86</sup> It should be noted that this figure and the statistics depicted in **Figure 3** and presented in **Table 4** are conservative estimates of the prevalence of obesity, because they are based on BRFSS data, which is self-reported. Because survey respondents often underestimate their weight and overestimate their height, it is likely that the “true” level of obesity in each state is even higher than BRFSS data suggest.

<sup>87</sup> Roland Sturm and Deborah A. Cohen, “Suburban Sprawl and Physical and Mental Health,” *Public Health*, vol. 118, no. 7 (October 2004), pp. 488-496; Nicholas Freudenberg, Sandro Galea, and David Vlahov, “Beyond Urban Penalty and Urban Sprawl: Back to Living Conditions as the Focus of Urban Health,” *Journal of Community Health*, vol. 30, no. 1 (2005), pp. 1-11; Howard Frumkin, “Urban Sprawl and Public Health,” *Public Health Reports*, vol. 117 (2002), pp. 201-217; Susan L. Handy et al., “How the Built Environment Affects Physical Activity,” *AJPM*, vol. 23, no. 2 (2002), pp. 64-73.

<sup>88</sup> Russ Lopez, “Urban Sprawl and Risk for Being Overweight or Obese,” *AJPH*, vol. 94, no. 9 (September 2004), pp. 1574-1579; Reid Ewing et al., “Relationship between Urban Sprawl and Physical Activity, Obesity, and Morbidity,” *American Journal of Health Promotion*, vol. 18, no. 1 (2003), pp. 47-57; Barbara A. McCann and Reid Ewing, *Measuring the Health Effects of Sprawl*, Smart Growth America (SGA), Surface Transportation Project, Washington, D.C.: SGA, September 2003.

**Table 4. Prevalence of Obesity Among the Elderly (Age 65+), by State, 1995-2007**  
(percentage of elderly population characterized as “obese”)

State <sup>a</sup>	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Rank <sup>b</sup>	Absolute Increase (#)	Relative Increase (%)
														2007	1995-2007	1995-2007
Alabama	18.3	17.5	16.8	16.6	17.9	18.8	19.7	19.5	21.0	20.8	22.1	23.1	24.5	7	6.2	33.9
Alaska	24.0	24.3	23.2	22.7	23.5	25.0	24.2	24.0	22.6	25.2	24.8	25.6	33.4	1	9.4	39.2
Arizona	11.7	9.4	8.5	7.3	10.9	13.0	15.2	16.0	16.9	18.7	17.5	15.1	17.7	41	6.0	51.3
Arkansas	14.5	15.6	15.9	16.8	17.5	17.8	17.9	18.0	18.0	18.9	19.4	19.8	20.6	33	6.1	42.1
California	11.9	11.7	12.0	14.1	16.7	18.5	18.5	19.8	19.7	20.2	19.6	20.0	19.7	35	7.8	65.5
Colorado	10.0	11.3	12.6	13.3	14.1	14.5	14.3	13.6	13.4	14.0	15.5	17.9	16.3	42	6.3	63.0
Connecticut	9.9	11.4	14.1	14.8	15.4	15.2	16.5	18.1	18.3	18.4	18.4	19.4	19.1	37	9.2	92.9
Delaware	15.0	14.8	14.2	14.9	15.1	16.6	19.0	21.8	21.5	20.6	20.1	22.0	25.1	6	10.1	67.3
District of Columbia	19.0	18.9	18.7	16.2	18.2	19.2	21.6	23.5	22.7	22.3	20.8	22.4	23.9	11	4.9	25.8
Florida	12.3	13.6	14.1	14.6	14.9	15.6	16.3	18.1	18.5	19.1	18.8	9.1	20.6	33	8.3	67.5
Georgia	12.1	11.5	12.5	14.2	16.6	17.0	19.2	19.5	20.9	22.2	22.0	20.8	23.4	15	11.3	93.4
Hawaii	6.7	7.4	9.3	10.4	10.3	9.6	10.5	10.7	n/a	12.0	13.4	12.2	14.8	43	8.1	120.9
Idaho	14.6	15.4	15.7	16.3	16.1	17.0	16.7	18.5	19.6	20.6	20.5	21.3	21.0	31	6.4	43.8
Illinois	14.3	15.0	17.3	19.5	20.8	21.4	21.4	21.8	21.0	21.6	22.7	23.8	23.4	15	9.1	63.6
Indiana	16.2	17.6	16.8	17.4	19.1	20.7	21.6	21.4	20.8	22.1	23.4	25.7	25.1	6	8.9	54.9
Iowa	16.3	17.6	18.1	20.6	20.6	21.3	21.0	22.9	24.2	24.5	24.5	24.5	24.5	7	8.2	50.3
Kansas	12.5	14.0	14.3	16.3	16.8	18.8	19.1	19.0	18.9	19.4	20.5	20.9	22.8	21	10.3	82.4
Kentucky	13.1	14.4	14.9	16.8	16.7	17.9	18.9	19.8	20.0	20.5	21.0	21.0	21.1	30	8.0	61.1
Louisiana	19.3	19.0	18.3	17.6	19.2	21.1	23.1	22.5	22.8	24.2	25.3	24.2	29.9	2	10.6	54.9
Maine	13.0	12.2	13.2	14.0	15.0	15.7	16.1	18.4	19.7	19.7	19.6	20.1	18.7	38	5.7	43.8
Maryland	15.3	16.9	17.2	18.1	18.0	18.1	16.6	17.3	19.1	21.4	23.2	25.1	25.2	5	9.9	64.7
Massachusetts	12.0	12.7	12.8	13.9	15.0	15.8	16.9	17.5	18.3	17.6	17.9	19.4	19.5	36	7.5	62.5

State <sup>a</sup>	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Rank <sup>b</sup>	Absolute Increase (#)	Relative Increase (%)
														2007	1995-2007	1995-2007
Michigan	13.9	16.3	18.1	19.5	20.2	22.6	24.7	25.5	24.2	23.8	24.3	27.3	26.8	3	12.9	92.8
Minnesota	15.5	16.6	18.0	18.5	18.7	18.3	18.5	18.7	20.4	22.4	23.3	22.0	24.1	10	8.6	55.5
Mississippi	16.2	17.3	16.8	18.1	18.6	20.5	20.4	22.2	21.8	22.2	22.6	25.0	24.3	9	8.1	50.0
Missouri	13.9	14.7	15.8	17.7	17.5	18.6	18.8	19.7	20.0	20.5	22.4	24.3	25.2	5	11.3	81.3
Montana	12.7	13.2	14.3	15.0	16.4	17.0	16.1	16.1	16.2	18.4	19.3	20.1	20.9	32	8.2	64.6
Nebraska	14.6	14.9	16.1	18.7	19.1	19.4	18.9	20.3	21.3	22.3	23.9	25.3	22.2	25	7.6	52.1
Nevada	12.9	11.7	10.7	11.9	13.6	17.3	18.5	19.7	18.6	17.9	18.2	20.2	17.8	40	4.9	38.0
New Hampshire	15.6	15.1	15.4	12.9	13.6	15.1	16.9	18.3	18.2	19.7	20.6	21.4	21.6	28	6.0	38.5
New Jersey	12.4	14.9	15.2	17.4	18.0	19.5	18.4	19.1	19.2	20.9	21.7	23.9	23.2	17	10.8	87.1
New Mexico	10.4	10.3	10.9	12.1	12.3	13.9	14.7	15.5	15.3	15.5	15.6	16.3	18.4	39	8.0	76.9
New York	12.8	13.7	15.0	17.0	17.1	18.4	19.3	20.9	20.7	20.9	21.4	22.4	25.4	4	12.6	98.4
North Carolina	15.2	16.1	15.3	15.0	15.4	17.8	19.7	20.1	20.9	20.4	21.7	22.9	22.9	20	7.7	50.7
North Dakota	15.1	15.9	17.2	19.5	21.2	21.5	21.8	22.9	24.0	23.9	23.4	22.8	22.3	24	7.2	47.7
Ohio	17.1	16.8	17.4	18.0	19.5	20.3	21.6	22.8	22.7	22.0	22.8	24.6	23.4	15	6.3	36.8
Oklahoma	10.4	9.9	11.9	14.5	16.1	17.0	16.7	18.1	18.0	18.9	20.3	22.7	24.4	8	14.0	134.6
Oregon	12.6	13.6	13.1	15.1	16.3	17.6	16.7	17.2	17.7	18.8	19.3	20.7	23.3	16	10.7	84.9
Pennsylvania	15.6	15.9	16.3	18.6	19.2	20.5	20.9	22.3	23.0	23.2	23.0	21.2	24.5	7	8.9	57.1
Rhode Island	11.9	12.3	14.4	14.8	16.7	16.9	18.1	17.5	18.3	18.6	21.1	23.6	20.0	34	8.1	68.1
South Carolina	14.1	13.6	14.9	15.7	17.8	18.2	19.0	19.5	20.6	21.4	22.9	25.4	23.0	19	8.9	63.1
South Dakota	15.2	15.8	15.0	16.4	16.8	19.2	18.7	19.7	20.1	21.5	21.9	22.2	22.6	22	7.4	48.7
Tennessee	14.4	15.5	15.3	15.2	16.0	17.4	18.6	18.6	18.5	20.0	20.7	21.0	23.7	12	9.3	64.6
Texas	12.3	14.2	15.9	17.5	17.4	18.7	19.1	19.6	20.1	19.8	20.7	21.6	23.1	18	10.8	87.8
Utah	11.1	12.4	13.6	15.0	15.5	15.6	16.6	18.5	20.2	20.9	21.3	22.6	21.8	27	10.7	96.4
Vermont	12.3	14.7	15.2	17.1	18.1	19.0	19.0	18.2	17.9	18.0	18.7	19.7	21.9	26	9.6	78.0
Virginia	15.1	15.8	15.3	15.9	17.0	17.8	18.7	18.2	18.6	19.7	20.4	19.8	21.3	29	6.2	41.1

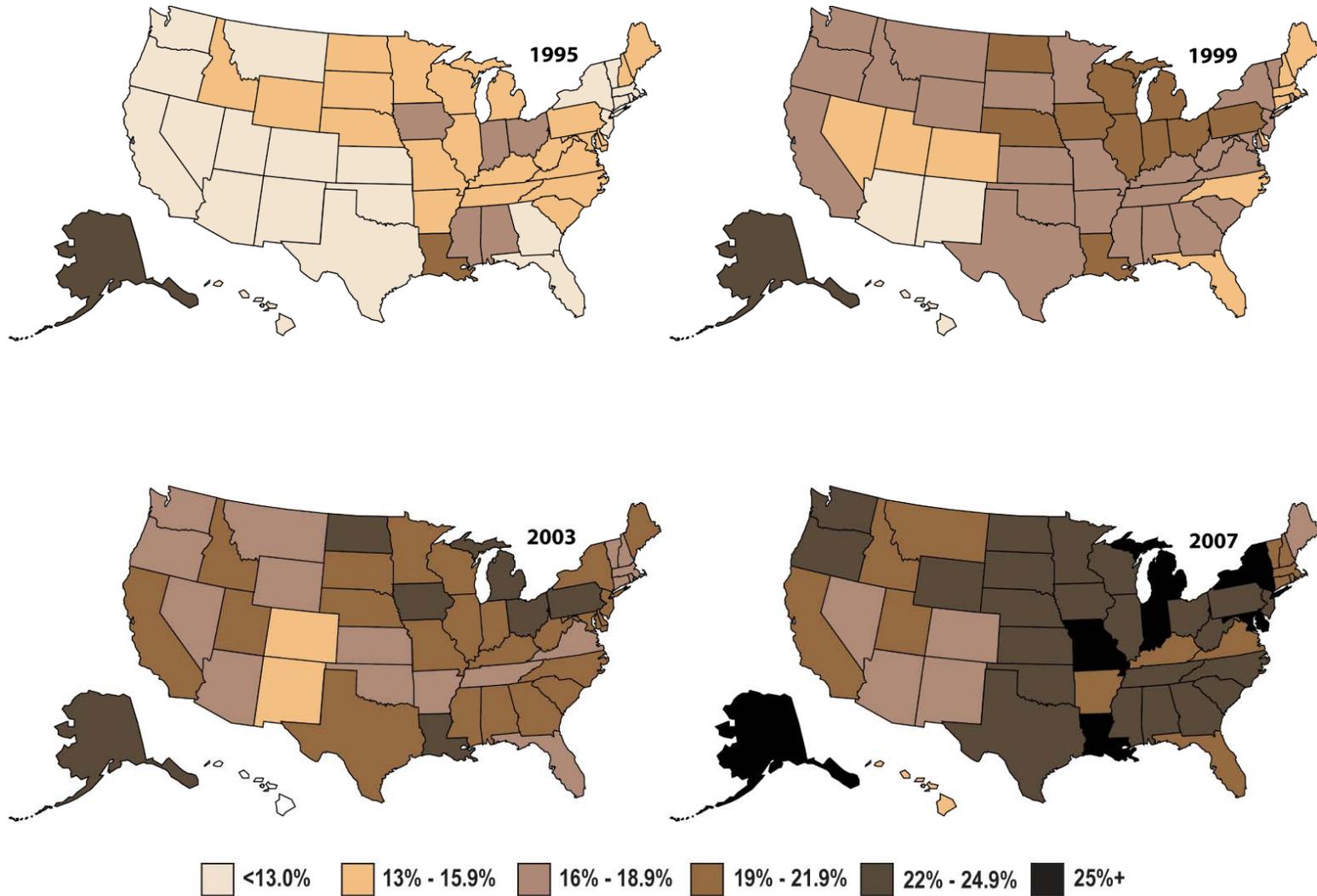
State <sup>a</sup>	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Rank <sup>b</sup>	Absolute Increase (#)	Relative Increase (%)
														2007	1995-2007	1995-2007
Washington	12.0	13.2	14.0	16.3	16.9	17.5	17.3	18.0	18.7	19.9	20.4	20.5	23.5	14	11.5	95.8
West Virginia	14.4	14.4	16.0	17.6	18.2	17.6	17.5	19.3	21.0	22.3	24.0	25.7	23.6	13	9.2	63.9
Wisconsin	15.4	15.5	18.4	19.7	21.5	21.2	21.2	21.5	21.9	24.2	24.4	22.7	24.3	9	8.9	57.8
Wyoming	13.3	13.4	15.5	16.5	17.1	17.1	16.2	17.8	18.7	20.9	20.2	18.5	22.5	23	9.2	69.2

**Source:** Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 1993-2004.

**Notes:** BRFSS data are released in overlapping two-year blocks (e.g., 1993-1995, 1994-1996, 1995-1997). In the table above, 1993-1995 data are labeled “1994” data, 1994-1996 data are labeled “1995,” and so on. 2007 data, however, are drawn only from the 2007 calendar year.

- a. States are listed alphabetically.
- b. “2007 Rank” reflects the overall prevalence of obesity for the 65-and-over population in 2007. The state with the greatest percentage of obese elderly persons has a rank of “1”; a “17” indicates the state with the 17<sup>th</sup>-highest prevalence of obesity among the elderly. Note that states with identical prevalence levels in 2007 receive identical rankings. For instance, Iowa, Alabama, and Pennsylvania all rank “7.”

**Figure 3. Prevalence of Obesity Among Adults Aged 65 and Older, 1995, 1999, 2003, 2007**



**Sources:** Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 1994-2007.

**Notes:** Obesity is defined as having a BMI $\geq$ 30, or about 30 lbs. overweight for a 5'4" person. See **Table 4** (above) for state-level obesity prevalence data, 1994-2007. No 2003 data is available for Hawaii.

## Policy Implications

Following the Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity in 2001, an array of government programs<sup>89</sup> was established to promote physical activity and improve general nutrition. Although public health officials have welcomed these programs, they urge nonetheless that more be done by health care providers, schools, and municipalities now that overweight and obesity are so commonplace in the United States.<sup>90</sup>

Their concerns reflect in part a growing consensus that obesity and overweight are social epidemics driven by contextual factors. Health economists have demonstrated that the prevalence of obesity is directly proportional to food prices and access to restaurants.<sup>91</sup> They also have shown that limited access to supermarkets contributes to the risk of obesity because larger supermarkets are more likely to carry healthy foods at affordable prices.<sup>92</sup> Finally, the influence of technology on how individuals spend their free time has contributed in important ways to reducing physical activity levels. Personal computers, cell phones, and the growing popularity of text messaging have all fostered sedentary behavior among Americans. While some people find these devices to be enjoyable or efficient, others note that individuals "pay" for this very utility by reducing the calories they would have expended by walking next door to talk with neighbors or by engaging in leisure-based exercise.

In an agricultural or industrial society, work is typically strenuous; in effect, the worker is "paid to exercise." Technological change, however, has raised the costs associated with expending calories, while at the same time lowering the cost of calorie intake by making food cheaper. Increasingly sedentary lifestyles, driven in large measure by the advent of the personal computer, have transformed physical exercise from a vocational activity to an activity that must occur during leisure time. In order to burn calories, therefore, people are increasingly forced to sacrifice "family time" or recreational pursuits to make the time to burn calories by exercising. Lakdawalla and Philipson summarize this dilemma, concluding that "the obesity epidemic in the U.S. is a result of two simple changes in incentives: the relative price of consuming a calorie has fallen over time, while the opportunity cost of burning a calorie has risen over time."<sup>93</sup>

The emerging literature that identifies significant associations between contextual factors and BMI/obesity is helping identify nonmedical policies that may help combat obesity among Americans. Some of these policy options include the following:

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<sup>89</sup> As examples, the CDC's Nutrition and Physical Activity Program to Prevent Obesity and Other Chronic Diseases works collaboratively with state health departments to implement and evaluate interventions that promote physical activity and foster improved diets. The CDC also sponsors the Coordinated School Health Program, which works with state education and health agencies to improve nutrition and increase the amount of exercise students get in school.

<sup>90</sup> U.S. Department of Health and Human Services (HHS), *The Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity*, Rockville, MD: HHS, Public Health Service, Office of the Surgeon General, 2001.

<sup>91</sup> Shin-Yi Chou et al., "An Economic Analysis of Adult Obesity," pp. 565-587; Roland Sturm and Ashlesha Datar, "Body Mass Index in Elementary School Children, Metropolitan Area Food Prices and Food Outlet Density," *Public Health*, vol. 119, no. 12 (December 2005), pp. 1059-1068.

<sup>92</sup> Richard E. Mantovani et al., *Authorized Food Retailer Characteristics Study, Technical Report IV*, U.S. Department of Agriculture, Food and Consumer Service, Office of Analysis and Evaluation, 1997; Chanjin Chung and Samuel L. Myers, Jr., "Do the Poor Pay More for Food?" *Journal of Consumer Affairs*, vol. 33, no. 2 (1999), pp. 276-296.

<sup>93</sup> Darius N. Lakdawalla and Tomas J. Philipson, "Technological Change and Obesity," 2002.

- Providing funding both to evaluate food availability problems, for instance limited access to fresh produce (e.g., fresh fruits and vegetables) and to make recommendations to address these deficiencies.
- Testing financial incentives for purchasing nutritious foods under the Food Stamp program, for instance by discounting the prices beneficiaries are charged for fruits and vegetables.
- Improving or encouraging the distribution and use of fresh produce in existing nutrition programs, such as congregate meal programs in senior centers, community centers, and adult day care centers.
- Requiring nutrition labels on fast-food packaging, or requiring restaurants to post calorie information on their menu boards.<sup>94</sup>
- Increasing financial assistance to farmers' markets (particularly those participating in the Seniors' Farmers' Market Nutrition Program) for the purposes of facilitating their ability to accept Electronic Benefits Transfer (EBT) cards from the Food Stamp Program.
- Taxing "junk food" to raise the costs of everything from hamburgers to tacos to sodas. Alternatively, lawmakers could consider regulating the use of certain food ingredients, such as corn syrup,<sup>95</sup> MSG (monosodium glutamate),<sup>96</sup> and trans fats (partially hydrogenated oil).<sup>97</sup>

A research study released in July 2007 analyzed just how "social" the obesity epidemic in the United States truly is. Nicholas Christakis and James Fowler reviewed 32 years of data for 12,067 adults who underwent repeated medical assessments as part of the Framingham Heart Study. The study results indicate that if one person becomes obese, those closely connected with him or her have a greater chance of becoming obese themselves. The authors suggest, therefore, that obesity is "socially contagious," spreading from person to person in a social network.<sup>98</sup> The greatest effect, the researchers point out, is seen not among family members or housemates, but among friends. Moreover, geography does not play a role.

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<sup>94</sup> In September 2007, California became the first state to require fast-food establishments to post this information on menus.

<sup>95</sup> Research indicates that high-fructose corn syrup may interfere with the heart's use of minerals like magnesium, copper, and chromium; it also has been linked to elevated blood cholesterol levels; finally, it may inhibit the ability of white blood cells to effectively fight infections or viruses. See Sharon S. Elliot et al., "Fructose, Weight Gain, and the Insulin Resistance Syndrome," *American Journal of Clinical Nutrition*, vol. 79 (April 2004), pp. 537-543.

<sup>96</sup> Monosodium glutamate (MSG) has been shown indirectly to cause obesity in lab animals by increasing appetite. For details: John W. Olney, "Brain Lesions, Obesity, and Other Disturbances in Mice Treated with Monosodium Glutamate," *Science*, vol. 165 (1969), pp. 719-271; John W. Olney, "Excitotoxins in Foods," *Neurobehavioral Toxicology and Teratology*, vol. 15, no. 3 (1994), pp. 535-544. A similar effect has not yet been observed in humans, but some researchers speculate that the increasing prevalence of obesity in the United States may relate to early exposure to food additives, such as MSG. See Michael Hermanussen et al., "Obesity, Voracity, and Short Stature: the Impact of Glutamate on the Regulation of Appetite," *European Journal of Clinical Nutrition*, vol. 60, no. 1 (2006), pp. 25-31.

<sup>97</sup> Trans fats are effective as preservatives, but they can cause significant lowering of HDL (good) cholesterol and a serious increase in LDL (bad) cholesterol. This may contribute to atherosclerosis (clogging of arteries), insulin resistance, or even type 2 diabetes.

<sup>98</sup> Nicholas A. Christakis and James H. Fowler, "The Spread of Obesity in a Large Social Network over 32 Years," *NEJM*, vol. 357, no. 4 (July 26, 2007), pp. 370-379.

Christakis and Fowler's social network theory of obesity has additional policy implications. They suggest that although people may directly influence each other's behaviors, the more significant mechanism is normative: "What appears to be happening is that a person becoming obese most likely causes a change of norms about what counts as an appropriate body size. People come to think that it is okay to be bigger since those around them are bigger, and this sensibility spreads." Altering the physical activity norms of an entire neighborhood through community-level interventions could have a snowball effect, both by altering the lifestyles of the proximate social network and by influencing the health behaviors of friends at risk of overweight who live far outside of the community.

From this perspective, policy makers may want to consider using the tools of urban planning to address the growing obesity crisis, including smart growth development of suburban areas and increased funding to improve local infrastructure (e.g., street lighting, better sidewalks, common green space, and better public transportation to facilitate the mobility of the citizenry). For the most part, these changes in land use policy would fall under the purview of local jurisdictions.

## Federal Efforts to Combat Obesity

Many federal departments and agencies administer obesity-related programs. These include nutrition counseling, health promotion campaigns, program evaluations, and quantitative studies of the causes and consequences of excessive weight gain.

Although obesity prevention efforts are housed primarily in the Department of Health and Human Services, a broad array of government policies affects the behavior patterns that determine levels of exercise and dietary patterns among the general populace. Agriculture regulations, for instance, heavily influence nutrition; housing and commerce policies influence where supermarkets are built and how accessible produce is, especially in low-income neighborhoods; and decisions about transportation infrastructure heavily influence levels of physical activity.

Currently, no effective framework across the government exists to organize and coordinate federal efforts to mitigate the growing problem of obesity in the United States. Although the Department of Health and Human Services takes credit for more than 300 obesity-related programs, and nearly every federal agency contends that it is engaged in countering the rising tide of obesity, many of these federal programs deal with obesity somewhat indirectly (see **Appendix B** below for examples of programs).<sup>99</sup> For instance, the Indian Health Service has a variety of diabetes programs, which indirectly address obesity by stressing the importance of counting calories and getting regular exercise.

In addition, the Food and Drug Administration (FDA) monitors and regulates food labeling requirements, and the Department of Agriculture administers an array of food and nutrition programs, such as the Food Stamp program. The degree to which food labeling or food stamps contribute to better nutrition, however, has been questioned by many experts, who assert that food

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<sup>99</sup> The National Academy of Sciences' Committee on Progress in Preventing Childhood Obesity has recommended that federal, state, and local governments each establish a high-level task force on childhood obesity prevention to identify priorities for action, coordinate public-sector efforts, and establish effective interdepartmental collaborations. See Jeffrey P. Koplan et al., eds., *Progress in Preventing Childhood Obesity: How Do We Measure Up?*, Washington D.C.: National Academy of Sciences, 2007, [http://www.nap.edu/catalog.php?record\\_id=11722#toc](http://www.nap.edu/catalog.php?record_id=11722#toc).

labeling is helpful only to people who have the knowledge and ability to determine what they can purchase that will be healthy, as well as an understanding of what could happen if they do not eat a nutritious diet. Some contend that food stamps are of limited use to people who do not have access to a wide range of healthful foods.<sup>100</sup> The rural poor, for example, may not have any large grocery stores near where they live or may not have transportation available to get to a grocery store with fresh produce. Finally, in this view, the food security programs may also be of limited benefit if beneficiaries lack adequate food preparation skills or have difficulty shopping for healthy food on a tight budget.

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<sup>100</sup> Food Research and Action Center (FRAC), *Food Stamp Access in Urban America: A City-by-City Snapshot*, September 2005 (Revised April 2006), Washington, D.C.: FRAC, at <http://www.frac.org>; Kimberly Morland, "Neighborhood Characteristics Associated with the Location of Food Stores and Food Service Places," *AJPM*, vol. 22, no. 1 (2002), pp. 23-29.

## Appendix A. Notes on Methodology

Data used in this report are drawn from the National Health and Nutrition Examination Study (NHANES) and the Behavioral Risk Factor Surveillance System (BRFSS) survey.

NHANES is conducted by the CDC's National Center for Health Statistics and is widely thought to have the most valid national obesity data available, as the survey includes an actual physical examination and does not rely on self-reporting. NHANES began in the early 1970s and has been conducted in four waves in the last three decades: 1971-1975, 1976-1980, and 1988-1994. Since 1999, NHANES data collection has become a continuous annual survey, with data being released for public use in two-year groupings. Each year, approximately 7,000 randomly selected residents across the United States from 15 different counties are visited and given the opportunity to participate in the latest NHANES.

BRFSS is the world's largest ongoing telephone health survey system, tracking health conditions and risk behaviors in the United States yearly since 1984. Conducted by the 50 state health departments, as well as those in the District of Columbia, Puerto Rico, Guam, and the U.S. Virgin Islands, with support from the CDC, BRFSS provides state-specific, self-reported information about issues such as asthma, diabetes, health care access, alcohol use, hypertension, obesity, cancer screening, nutrition and physical activity, tobacco use, and more.

Because this report relies on previously published cross-tabulations from NHANES and BRFSS, age groups have been predefined and may not be consistent. For instance, **Table 2** reports age-adjusted prevalence statistics for individuals "aged 60 and older" (e.g., **Table 2**), while other tables report obesity and overweight for "persons 65 and older." Whenever possible, finer age categories have been used (i.e., 55-64, 65-74, 75-84, and 85+).

## Appendix B. Selected Federal Obesity Programs

### Department of Health and Human Services (HHS)

#### Dietary Guidelines for Americans

The Department of Agriculture and the Department of HHS jointly issue The Dietary Guidelines for Americans<sup>101</sup> every five years. The Guidelines provide authoritative advice regarding people two years old and older about how good dietary habits can promote health and reduce risk for major chronic diseases. They serve as the basis for federal food and nutrition education programs.

#### “Calories Count” Initiative

The Food and Drug Administration (FDA), which oversees food labeling requirements, is using “calories count” as the message of its obesity campaign.<sup>102</sup> In essence, the FDA is focusing on caloric balance, stressing that “calories in must equal calories out.” To this end, the agency seeks to ensure that food labels display calories more prominently and use meaningful serving sizes. In addition, it is encouraging restaurants to provide nutritional information to consumers and increasing enforcement of the accuracy of food labeling. FDA is also working with other government agencies, industry organizations, and academic institutions on obesity research.

#### “Steps to a Healthier U.S.” Program

The primary goal of the Steps Program<sup>103</sup> is to foster physical activity and exercise among Americans. It also aims to mitigate problems associated with chronic illness. The CDC provides grants to communities to design and implement chronic disease prevention and health promotion activities that address obesity, diabetes, and asthma, as well as high-risk health behaviors, including sedentary lifestyle, poor nutrition, and tobacco use. Target populations include minorities, immigrants, low-income populations, people with disabilities, school-aged youth, and senior citizens.

#### “Control Your Diabetes. For Life” Campaign

The National Diabetes Education Program (NDEP), a collaborative program between the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) and the CDC, launched this national campaign<sup>104</sup> in September 2007 to inform patients and their health care providers about the strong relationship between diabetes and cardiovascular disease (CVD). While this effort on its face is not an obesity prevention program, its core messages include an emphasis on regular physical exercise, and its materials underscore the importance of a balanced, nutritious diet. NDEP’s goal is to get people with diabetes to understand the importance of

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<sup>101</sup> See <http://www.health.gov/dietaryguidelines/>.

<sup>102</sup> See <http://www.cfsan.fda.gov/~dms/nutrcal.html#calcount>.

<sup>103</sup> See <http://www.cdc.gov/steps/>.

<sup>104</sup> See [http://ndep.nih.gov/campaigns/ControlForLife/ControlForLife\\_index.htm](http://ndep.nih.gov/campaigns/ControlForLife/ControlForLife_index.htm).

controlling their “ABCs”—that is, their hemoglobin A1C, their Blood pressure, and their Cholesterol levels. Although this initiative is technically a diabetes program, it nevertheless is likely to mitigate problems with overweight and obesity.

### **Indian Health Service (IHS) National Diabetes Program**

The National Diabetes Program (NDP) promotes collaborative strategies for preventing diabetes and curbing the problem of obesity among IHS patients. The NDP includes a network of 19 Model Diabetes Programs. The NDP provides diabetes surveillance across Indian country; it also manages the *Special Diabetes Program for Indians* grant program with 318 grantees in 35 states.<sup>105</sup>

### **I Am Moving, I Am Learning**

The Administration for Children and Families in HHS sponsors “I Am Moving, I Am Learning” (IMIL). IMIL is a proactive approach for addressing childhood obesity in Head Start children; it seeks to increase moderate to vigorous physical activity every day and promote healthy food choices every day.<sup>106</sup>

### **Congregate Meal Programs for the Elderly**

The Administration on Aging in HHS awards funds for congregate nutrition services, home-delivered nutrition services, and nutrition services incentive grants to state agencies on aging.<sup>107</sup> Congregate meals programs operate in a variety of sites, such as senior centers, community centers, schools, and adult day care centers. The purpose of these programs is to reduce hunger and food insecurity and to promote the health and well-being of older individuals by helping them access health promotion services and delay the onset of adverse health conditions resulting from poor nutrition or sedentary behavior.<sup>108</sup>

Other offices within HHS, including the Health Resources and Services Administration (HRSA), the Indian Health Service, and the Surgeon General’s Office, independently manage obesity-related health promotion and education campaigns.

### **ACES—Active Community Environments**

The CDC's Active Community Environments Initiative (ACES) promotes walking, bicycling, and the development of accessible recreation facilities. It was developed in response to data from a variety of disciplines, including public health, urban design, and transportation planning. Data suggest characteristics of our communities such as proximity of facilities, street design, density of housing, availability of public transit and of pedestrian and bicycle facilities play a significant role in promoting or discouraging physical activity. Therefore, the CDC developed the ACES program to promote environmental and policy interventions that will encourage increased levels

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<sup>105</sup> See <http://www.ihs.gov/MedicalPrograms/Diabetes/HomeDocs/Resources/FactSheets/IHSDDTPOverview08.pdf>.

<sup>106</sup> See <http://eclkc.ohs.acf.hhs.gov/hslc/ecdh/Health/Nutrition/Nutrition%20Program%20Staff/IMIL>.

<sup>107</sup> See [http://www.aoa.gov/press/fact/alpha/fact\\_elderly\\_nutrition.asp](http://www.aoa.gov/press/fact/alpha/fact_elderly_nutrition.asp).

<sup>108</sup> See CRS Report RS21202, *Older Americans Act: Nutrition Services Program*, by Carol O’Shaughnessy.

of physical activity and improved public health. Specifically, ACES aims to facilitate the construction of pedestrian friendly environments, and; promote active forms of transportation like hiking and bicycling.<sup>109</sup>

## Department of Agriculture (USDA)

The USDA's Food and Nutrition Service administers a variety of programs that directly affect the nutrition of vulnerable segments of the population. These include the Food Stamp Program; the Special Supplemental Nutrition Program for Women, Infants and Children (WIC);<sup>110</sup> and the National School Lunch Program. Non-elderly women and children are the primary beneficiaries of the nutrition and obesity prevention initiatives that fall under the auspices of these programs.

### Supplemental Nutrition Assistance Program (SNAP)

The Supplemental Nutrition Assistance Program (SNAP), formerly known as the Food Stamp Program, is the largest federal nutrition program for low-income households. It is available to nearly anyone with low income and few resources. Eighty-four percent of all Food Stamp households in FY2006 contained an elderly or disabled person or a child, and these households received 89% of all benefits. The average monthly food stamp benefit for all participants in FY2008 was \$101.53 per person.<sup>111</sup>

Eligibility is based on income and assets available to the household, as well as household characteristics, namely, immigrant status and one's ability to work. Only legal immigrants are eligible for program benefits, most of whom must wait five years in legal status before qualifying for benefits. The Program requires able-bodied adults between 16 and 60 (with some exceptions) to register for work, to take part in employment/training programs referred by the food stamp office, and to accept or continue suitable employment. Benefits come to the household via electronic debit cards, known as Electronic Benefit Transfer (EBT) cards, which can be used in 162,000 approved retail stores nationwide to purchase food.<sup>112</sup>

### "Fit WIC" Program

In 1998, the USDA funded a five-year childhood obesity prevention initiative called "Fit WIC." The purpose of this effort was to examine how the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) could better respond to the issue of childhood obesity. The USDA recognized that WIC has widespread access to the population of young low-income children that is at greatest risk for obesity, and that reaching very young children is critical to the success of any obesity prevention strategy.<sup>113</sup>

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<sup>109</sup> See [http://www.cdc.gov/nccdphp/dnpa/physical/health\\_professionals/active\\_environments/aces.htm](http://www.cdc.gov/nccdphp/dnpa/physical/health_professionals/active_environments/aces.htm).

<sup>110</sup> See <http://www.fns.usda.gov/wic/>.

<sup>111</sup> FY2008 data are preliminary. In FY2007, the average monthly benefit was \$95.63 per person. For details, see [http://www.fns.usda.gov/pd/18SNAPavg\\$P\\$P.htm](http://www.fns.usda.gov/pd/18SNAPavg$P$P.htm).

<sup>112</sup> See CRS Report RL33307, *Child Nutrition and WIC Programs: Background and Recent Funding*, by Joe Richardson.

<sup>113</sup> The final report from the "Fit WIC" project describes the experiences of the five Fit WIC teams, their goals, outcomes, the lessons learned, and policy recommendations which stem from the project. It is available online at <http://www.fns.usda.gov/oane/MENU/Published/WIC/FILES/fitwic.pdf#xml=http://65.216.150.153/texis/search/> (continued...)

## **“Eat Smart. Play Hard”<sup>®</sup> Campaign**

Among current USDA initiatives are the “Eat Smart. Play Hard”<sup>®</sup> campaign<sup>114</sup> for schools, which features posters, stickers, and brochures that encourage healthy eating and physical exercise, and “5 A Day for Better Health Program,” which encourages fruit and vegetable consumption among Americans.<sup>115</sup>

## **National School Lunch Program**

Administered by the Food and Nutrition Service, this federally assisted meal program operates in over 97,700 public and non-profit private schools and residential childcare institutions.<sup>116</sup> Over 28 million children each school day are served nutritionally balanced, low-cost or free lunches. Since its inception, more than 180 billion lunches have been served. Congress expanded the program in 1998 to include reimbursement for snacks served to children through age 18 in after-school educational and enrichment programs.<sup>117</sup>

## **MyPyramid**

The original Food Guide Pyramid, released in 1992, was updated, revised, and renamed “MyPyramid” in 2005. MyPyramid’s daily food intake patterns identify amounts to consume from each food group and subgroup at a variety of energy levels.<sup>118</sup> The overall purpose of the revision was to improve its effectiveness in motivating consumers to make healthier food choices and to ensure that the USDA’s food guidance system reflected the latest nutritional science. To ensure that these patterns reflect the latest science, they were updated to meet all current nutrition standards through a technical research process.

## **Senior Farmers’ Market Nutrition Program (SFMNP)**

SFMNP awards grants to states, U.S. territories, and federally recognized Indian tribal governments to provide low-income seniors<sup>119</sup> with coupons that can be exchanged for fresh, unprepared, locally grown fruits, vegetables, and herbs from farmers’ markets, roadside stands, and community-supported agriculture programs.<sup>120</sup> The majority of the grant funds must be used

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pdfhi.txt?query=Fit+WIC&pr=FNS&order=r&cq=&id=4592d0fc17.

<sup>114</sup> See <http://www.fns.usda.gov/eatsmartplayhard/>.

<sup>115</sup> “5 A Day for Better Health” is a joint program with the National Cancer Institute and the CDC. See <http://www.fruitsandveggiesmatter.gov/>.

<sup>116</sup> See <http://www.fns.usda.gov/cnd/lunch/>.

<sup>117</sup> CRS Report RL33307, *Child Nutrition and WIC Programs: Background and Recent Funding*, by Joe Richardson

<sup>118</sup> See <http://www.mypyramid.gov/>.

<sup>119</sup> Low-income seniors, generally defined as individuals who are at least 60 years old and who have household incomes of not more than 185% of the federal poverty income guidelines (published each year by the Department of Health and Human Services), are the targeted recipients of SFMNP benefits.

<sup>120</sup> Certain foods are not eligible for purchase with SFMNP benefits; these include dried fruits or vegetables such as prunes (dried plums), raisins (dried grapes), sun-dried tomatoes, and dried chili peppers. Potted fruit or vegetable plants, potted or dried herbs, wild rice, nuts, honey, maple syrup, cider, and molasses are also not allowed.

to support the costs of the foods provided under this program; state agencies may use up to 10% of their grants to cover SFMNP administrative costs.

In 2006, these SFMNP provided products were available to 825,691 low-income seniors from 14,575 farmers at 2,911 farmers' markets, as well as 2,323 roadside stands and 260 community supported agriculture programs.

## **Department of the Interior**

In conjunction with HHS, USDA, and the Department of Defense, the Department of the Interior has established a Memorandum of Understanding to Promote Public Health and Recreation.<sup>121</sup> The goal of this program is to simultaneously promote physical activity and the use of public lands, such as national parks. As part of this effort, the National Park Service administers a matching federal grant program that helps states and municipalities acquire land to develop into public outdoor recreation areas.<sup>122</sup>

## **Department of Transportation**

The Federal Safe Routes to School Program offers a dedicated source of grant funding for infrastructure improvements (e.g., sidewalks, crosswalks, bicycle paths, street lighting) that encourage children to walk and bicycle to and from school.<sup>123</sup>

## **Department of Education**

Competitive grants for the design, modification, and expansion of physical education programs are available to elementary and secondary schools as part of the Department of Education's Carol M. White Physical Education Program.<sup>124</sup>

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<sup>121</sup> See [http://www.fhwa.dot.gov/environment/retrails/mou\\_pubhealth.htm](http://www.fhwa.dot.gov/environment/retrails/mou_pubhealth.htm).

<sup>122</sup> See <http://www.nps.gov/nts/memorandum2006.html>.

<sup>123</sup> See <http://safety.fhwa.dot.gov/saferoutes/>.

<sup>124</sup> See <http://www.ed.gov/programs/whitephysed/index.html>.