

# *Changes in Obesity Prevalence Among Women Aged 50 Years and Older*

*Results From the Behavioral Risk Factor Surveillance System, 1990-2000*

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Obesity is an important public health issue facing Americans of all ages. Behavioral Risk Factor Surveillance System data are used to illustrate the change in body mass index distribution in just one decade (1990-2000) in women aged  $\geq 50$ . The sample size ranged from 18,474 women  $\geq 50$  in 1990 to 45,820 in 2000. For women aged  $\geq 50$ , there is a slight decline in the prevalence of underweight (from 3.1% in 1990 to 2.4% in 2000) and a significant increase in obesity (from 14.4% to 21.7%). Not smoking, having less education, being in poor health, having diabetes, and not exercising are all associated with increased odds of being obese. Although factors significantly related to obesity in older women are consistent with those previously identified in younger women, the weight group distributions in older women differ. The physical and social influences of age and gender need to be incorporated into health promotion programs.

**Keywords:** *obesity; older women*

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*The rise in obesity prevalence* is now one of the most important public health challenges facing Americans of all ages (Department of Health and Human Services [DHHS] 2001). The Behavioral Risk Factor Surveillance System (BRFSS) has been used to illustrate the spread of obesity across the country among adults aged 18 years and older. Obesity prevalence increased significantly through the 1990s across all age groups, all racial groups, and both sexes (Mack and Ahluwalia 2003; Mokdad et al. 1999; Mokdad, Ford, et al. 2003; Pi-Sunyer and Xavier 2002). Data from the National Health and Nutrition Examination Survey (NHANES) also show an increase in the prevalence of

obesity between NHANES II (1976-1980) and NHANES III (1988-1994) (Flegal et al. 1998; Flegal and Troiano 2000) and data from NHANES IV (1999-2000) illustrate a continuation of the trend (Flegal et al. 2002). Although rates of obesity reported in the BRFSS are likely more conservative than those reported by NHANES (due to the difference between self-report and actual measurement by a health professional), both surveys illustrate the same trend. In particular, both data sets show that the prevalence of obesity increased among those aged 50 to 59 years (Flegal et al. 1998; Mokdad et al. 1999). Obesity prevalence is increasing even in adults aged 70 and older (Himes 2000; Mokdad et al. 1999). By 1999 to 2000, women in the oldest age groups had a higher prevalence of obesity than did men: 31.9% of women aged 70 to 79 years were obese compared to 28.9% of men of the same age, and 19.5% of women aged 80 years and older were obese compared to 9.6% of men of the same age (Flegal et al. 2002).

Public health initiatives are calling for increased awareness of the problems associated with obesity among the general public and for identifying mechanisms for reducing obesity and consequent risks to health and well-being (e.g., DHHS 2001). Obesity has been shown to be associated with advanced age-related macular degeneration (Seddon et al. 2003), arthritis/osteoarthritis (Centers for Disease Control [CDC] 2002; Karlson et al. 2003; Must et al. 1999), asthma (Ford, Mannino, Homa, et al. 2003; Ford, Mannino, Redd, et al. 2003), cancer (Calle et al. 2003; World Cancer Research Fund 1997), cardiovascular disease (Kannel 1997), diabetes mellitus (Black 2002; Carey et al. 1997; Must et al. 1999), disability (Ferraro et al. 2002; Oliveria et al. 1999; Peek and Coward 2000), functional limitations (Apovian et al. 2002; Davison et al. 2002; Himes 2000; Larsson and Mattsson 2001), hypertension (Nelson et al. 2002), and incontinence (Browne 2002). Along with the rise in obesity, the BRFSS has shown an increase in the prevalence of diabetes in the United States, which rose 30.9% in the 1990s for adults aged 50 to 59 years (Mokdad et al. 2000). High blood pressure is the most common condition related to overweight and obesity in both men and women, and its prevalence increases with increasing weight (Must et al. 1999). Although most Americans aged 65 years and older have at least one nutrition-related cardiovascular disease risk factor (e.g., diabetes mellitus, raised LDL cholesterol concentrations, or hypertension) having a higher body

mass index (BMI) increases the likelihood of having any or all three conditions (Erlinger, Pollack, and Appel 2000).

The effect of obesity in earlier adulthood may be felt decades later, decreasing life expectancy and increasing early mortality (Fontaine et al. 2003; Manson and Bassuk 2003; Peeters et al. 2003). Women who gained weight after the age of 18 years had a higher risk of coronary heart disease later in life than did those who maintained a steady weight (Arone 2002). Nonsmoking women who were overweight lost 3.3 years of life compared with their normal-weight counterparts, whereas nonsmoking obese women lost 7.1 years as a result of their obesity (Peeters et al. 2003).

Allison and colleagues (1999) estimated that the annual number of deaths attributable to obesity among adults in the United States is approximately 280,000 based on hazard ratios for all subjects and 325,000 based on hazard ratios for nonsmokers and never-smokers. By calculating years of life lost (the difference between the number of years a person would be expected to live if he or she was not obese and the number of years a person would be expected to live if obese), Fontaine and colleagues (2003) found that obesity reduces life expectancy, especially among young adults. The effect of overweight and obesity, however, differed among Black and White men and women of different age groups and races.

There is also a relationship between obesity and physical functioning. Obesity is related to both upper and lower body disability (Ferraro et al. 2002) and functional limitations (Davison et al. 2002). Data from the Longitudinal Study of Aging and the Assets and Health Dynamics of the Oldest Old Survey showed that obesity in older women is related to limitations in activities of daily living (ADL), a greater likelihood of reported disease, and decreased mobility (Himes 2000). Among community-dwelling adults with two or more chronic health conditions, obesity was a significant predictor of ADL disability development and had a strong effect on disability (Peek and Coward 2000). Among older adults with medication-controlled hypertension, obesity status was related to lower physical functioning and well-being (Anderson et al. 1997). Research has also shown that obese persons have worse quality of life. In particular, Ford and colleagues (2001) found that women with BMI  $\geq 20$  experience more unhealthy days than do men in the same BMI group.

The present study extends the literature in this area by focusing on one particularly at-risk group, women aged 50 years and older, who may experience a host of aging-related and obesity-related morbidities. Using data from the BRFSS, we illustrate the change in obesity prevalence for this age group in just one decade and the characteristics related to obesity in older women. The BRFSS is unique in that it allows for state-level analyses of risk factors for chronic diseases. We can thus examine the obesity epidemic in greater depth than in other surveys by tracking changes over time at the state and national levels in specific subpopulations and create risk models to determine associated factors. Finally, we also examine some of the existing literature to identify some potential interventions for this age group.

### *Method*

Data are from the 1990-2000 BRFSS. The BRFSS began in the mid-1980s in 15 states and today includes all states and the U.S. territories of Puerto Rico, Guam, and the Virgin Islands. The BRFSS uses a multistage cluster design based on random-digit dialing to select a representative sample of noninstitutionalized adults aged 18 years and older from each state. Questions are asked on a range of subjects concerned with the leading causes of morbidity and mortality, including cigarette smoking, alcohol consumption, physical activity, self-assessed health status, health insurance, diabetes, women's health, HIV/AIDS, and standard demographics. The survey is conducted by state health departments and all states use a standard core questionnaire. Each state can then supplement the core questionnaire with optional modules or add questions relevant to the state's health priorities (for questionnaires from 1991 to the present, go to <http://www.cdc.gov/brfss>). Detailed descriptions of the survey data are available elsewhere (Mokdad, Stroup, and Giles 2003; Nelson et al. 2001; Siegel et al. 1991).

Respondents were asked to report their height ("About how tall are you without shoes?") and weight ("How much do you weigh without shoes?"), and these were used to calculate BMI ( $\text{weight} \times 703 / \text{height}^2$ ). Respondents were grouped into categories of underweight (BMI < 18.5), normal weight (BMI of 18.5 to < 25.0), overweight (BMI of 25.0 to < 30.0), and obese (BMI  $\geq$  30). Respondents

were also asked the following question: "In the last 12 months, has a doctor, nurse, or other health professional given you advice about your weight?"

Respondents were asked standard demographic questions about their age, race, marital status, and education as well as questions about exercise, smoking, and general health status. Health status was assessed with the question "Would you say that in general your health is: excellent, very good, good, fair, or poor?"

All estimates presented are weighted by demographic characteristics and by selection probabilities so that the results are representative of persons aged 18 years and older. Sample size ranged from 18,474 women aged  $\geq 50$  years in 1990 to 45,820 in 2000. U.S. territories were excluded from the analyses.

Weighted prevalence estimates were calculated with SPSS (SPSS Inc., Chicago). Maps were made with MapInfo (MapInfo Inc., New York). SUDAAN (RTI, Research Triangle Park, NC) was used to calculate confidence intervals (CI) and create logistic regression models to account for the complex sampling design.

### *Results*

The change between 1990 and 2000 in obesity prevalence at the state level among women aged 50 years and older is illustrated in Figure 1. In 1990, the prevalence of obesity was more than 20% in only one state, Mississippi (20.1%; 95% CI = 15.6%-24.7%) and the District of Columbia (24.1%; 95% CI = 18.5%-29.7%). By 2000, however, 36 states (see Appendix A) and the District of Columbia had a prevalence of more than 20%.

In Figure 2, the prevalence of obesity in 2000 is compared between women aged 18 to 49 years and those aged 50 years and older. Older women were more likely to be obese than were younger women: 21.7% (95% CI = 21.0%-22.4%) of women aged 50 years and older were obese compared with 18.0% (95% CI = 17.5%-18.5%) of women aged 18 to 49 years. At the state level, the higher obesity prevalence among the older women was not confined to the southeast but occurred in most of the eastern United States.

Change between 1990 and 2000 in weight group distributions of both men and women aged 50 years and older are illustrated in Fig-

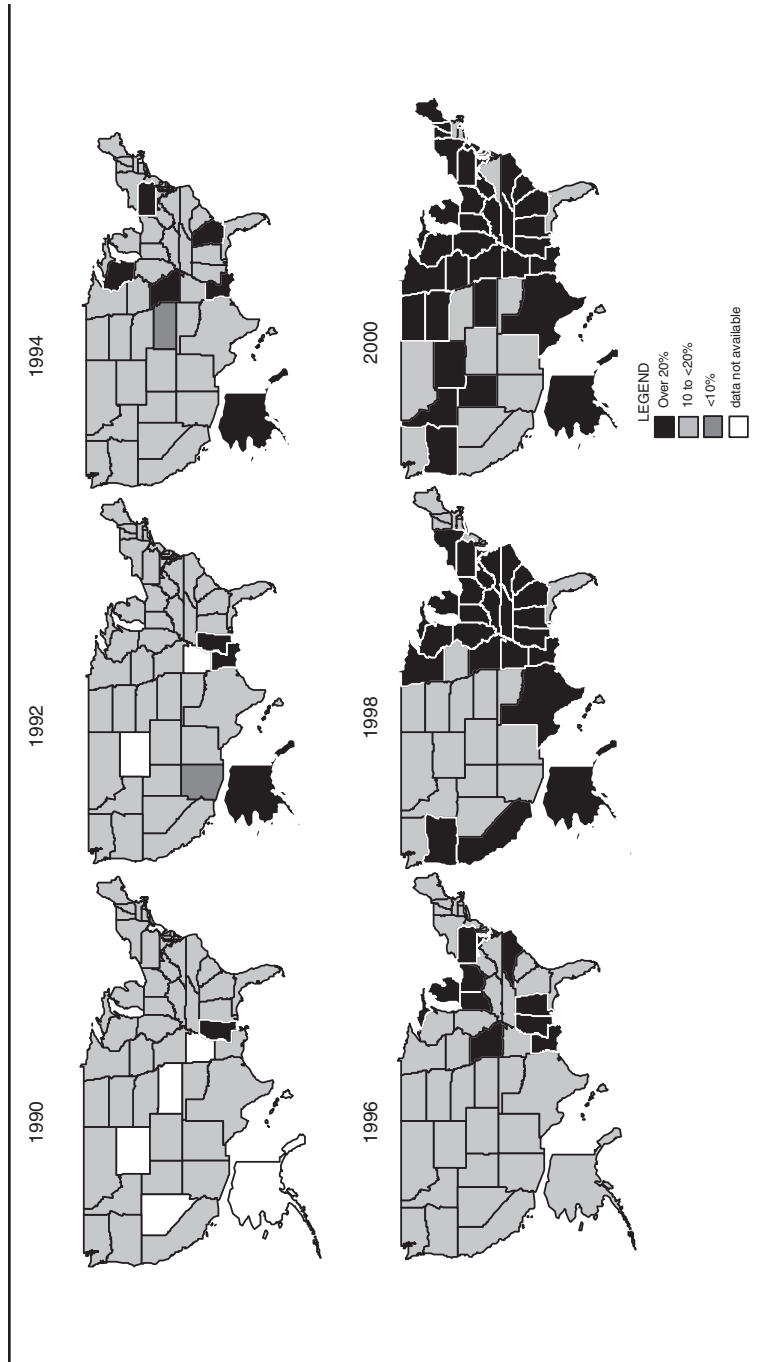
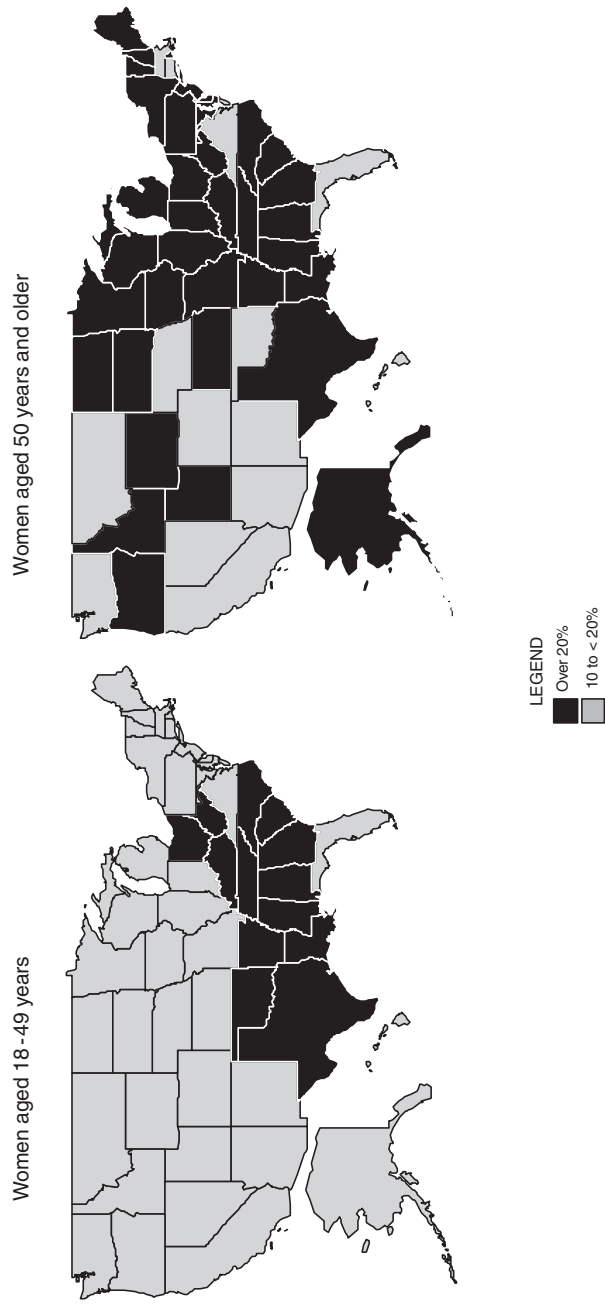


Figure 1: Change in Obesity Prevalence for Women Aged 50 Years or Older, 1990-2000 BRFSS



**Figure 2: Prevalence of Obesity for Women by Age Group, 2000 BRFSS**

ure 3. For women, the percentage of underweight declined slightly between 1990 and 2000 (from 3.1% [95% CI = 2.7%-3.5%] to 2.4% [95% CI = 2.2%-2.7%]), whereas the percentage of obesity increased fairly steadily (from 1990 = 14.4% [95% CI = 13.6%-15.3%] to 2000 = 21.7% [95% CI = 21.0%-22.4%]). There was a steady decrease in the percentage of normal weight (from 1990 = 50.1% [95% CI = 48.8%-51.3%] to 2000 = 42.9% [95% CI = 42.1%-43.7%]) and a somewhat constant distribution of overweight (1990 = 32.4% [95% CI = 31.2%-33.6%] 2000 = 32.9% [95% CI = 32.2%-33.7%]), such that these two lines began to converge.

The picture for men is different. More men than women were overweight in both 1990 and 2000 (47.2% [95% CI = 45.7%-48.6%] of men in 1990 were overweight and 48.0% [95% CI = 47.0%-49.0%] of men in 2000). A smaller percentage of men than women had a normal weight at both times (39.5% [95% CI = 38.1%-41.0%] of men in 1990 were in the normal weight group and 29.3% [95% CI = 28.4%-30.2%] of men in 2000). As in women, however, the percentage of normal weight in men decreased over time and the percentage of overweight increased slightly. Obesity prevalence rose dramatically in men from 12.3% [95% CI = 11.3%-13.3%] in 1990 to 21.7% [95% CI = 20.9%-22.6%] in 2000. The prevalence of underweight in men was very low and unchanging (1990 = 1.1% [95% CI = 0.8%-1.3%]; 2000 = 1.0% [95% CI = 0.8%-1.2%]).

In Figure 4, the analyses are refined by separating the women into three age groups: those aged 50 to 59, 60 to 69, and  $\geq 70$  years. This graph shows the change between 1990 and 2000 in obesity (the black lines) and underweight (the gray lines) prevalence. We confirm results of Himes (2000) in that even in the oldest age group, the prevalence of obesity rose during the 1990s (from 12.5% [95% CI = 11.3%-13.8%] in 1990 to 16.8% [95% CI = 15.8%-17.9%] in 2000). The prevalence of underweight, which rises with age, declined slightly over the time in the same group (from 5.5% [95% CI = 4.6%-6.4%] to 3.7% [95% CI = 3.2%-4.2%] in 2000).

Factors associated with being obese for women aged 50 to 69 years and 70 years and older are shown in Table 1. Smoking, higher levels of education, being in good health, not having diabetes, and exercising were all associated with lower odds of being obese. For both groups, the odds of being obese were significantly lower in current smokers than in those who had never smoked. Former smokers were not signif-

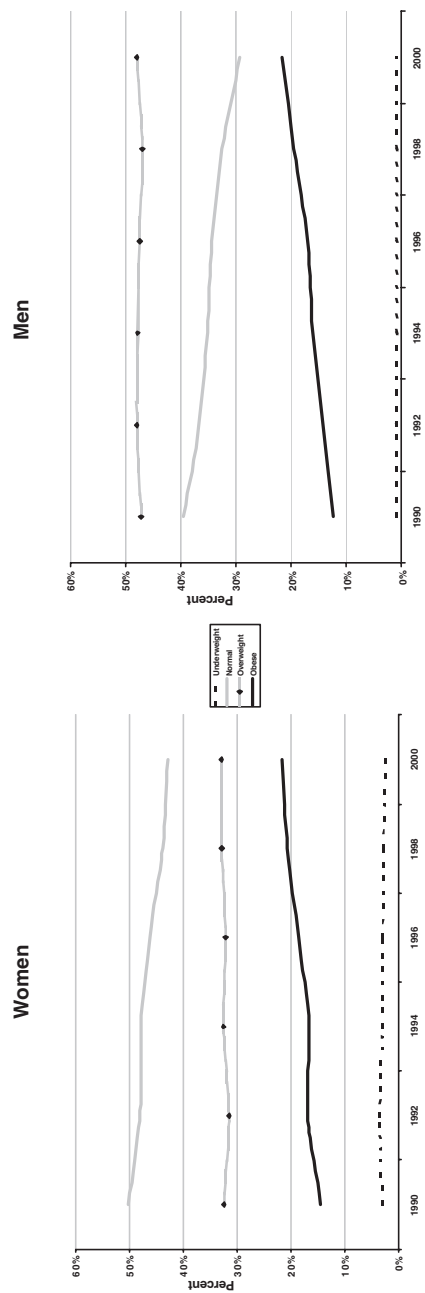
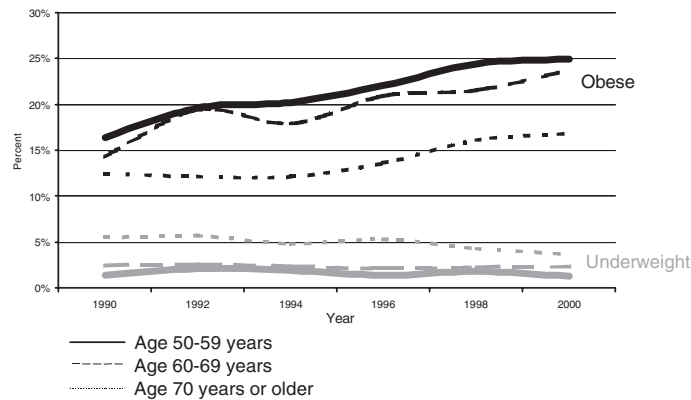


Figure 3: Trends in BMI Weight Group Distribution, Adults Aged 50 Years or Older by Gender, 1990-2000 BRFSS



**Figure 4: Trends in Underweight and Obese for Older Women by Age Group, 1990-2000 BRFSS**

icantly different from those who had never smoked. Black women in both groups were significantly more likely to be obese than were White women. Women with higher levels of education had significantly lower odds of being obese than did women with less than a high school education. Women in poor health had significantly higher odds of being obese than did women in excellent or very good health. The models for the two groups are different, most notably in terms of marital status. Married status was significant in the model for the 50- to 69-year-old group but not for the older group. For the women aged 50 to 69 years, not being married was associated with higher odds of being obese.

### *Discussion*

In 2000, the prevalence of obesity was higher among women aged 50 years and older than in the general female population. Overall, the prevalence of obesity among women aged 50 years and older increased 7.4% (from 14.4% to 21.7%) between 1990 and 2000. Obesity even increased among women aged 70 years and older.

In 2000, the prevalence of obesity among women aged 50 years and older was more than 20% in 36 states. That is more than double the number of states in which the prevalence of obesity was more than 20% among women aged younger than 50 years. Because the states

TABLE 1  
 Logistic Regression Models for Factors Associated With Obesity  
 by Age Group, Women Aged 50 Years and Older, BRFSS 2000

	<i>Women Aged 50-69 Years (n = 27,225)</i>		<i>Women Aged 70 years and Older (n = 14,683)</i>	
	<i>Odds Ratio</i>	<i>p Value</i>	<i>Odds Ratio</i>	<i>p Value</i>
Diabetes				
Yes, told has diabetes	2.55	0.000	2.19	0.000
No	Referent		Referent	
Health status				
Excellent/very good	Referent		Referent	
Good	1.76	0.000	1.29	0.018
Fair	2.17	0.000	1.46	0.001
Poor	2.03	0.000	1.39	0.018
Exercise				
Exercised in past month	0.55	0.000	0.64	0.000
Did not exercise in past month	Referent		Referent	
Smoking status				
Current smoker	0.49	0.000	0.42	0.000
Former smoker	0.99	0.960	1.14	0.129
Never smoked	Referent		Referent	
Race				
White	Referent		Referent	
Black	1.59	0.000	1.73	0.000
Hispanic	0.90	0.421	1.11	0.654
Other	0.43	0.000	0.57	0.088
Education				
Less than high school	Referent		Referent	
High school	0.79	0.003	0.69	0.000
Some college	0.82	0.025	0.52	0.000
College graduate	0.62	0.000	0.46	0.000
Marital status				
Married	Referent		Referent	
Not married	1.17	0.003	0.88	0.612

NOTE: BRFSS = Behavioral Risk Factor Surveillance System.

with a high prevalence of obesity in the older age group spanned the upper Midwest and most of the East Coast, the high proportions of older obese women could not be attributed to regional differences. Earlier illustrations of state-level data have assisted states in setting priorities for public health interventions (Mokdad et al. 1999). These figures clearly indicate that midlife and older women should be targeted for interventions aimed at appropriate weight loss.

The factors significantly related to obesity in older women were consistent with those previously identified in younger women (race, education, smoking, lack of exercise, and poor health). The weight distributions of older men and women differed. As in younger age groups, older men were more likely than older women to be overweight and less likely to be obese.

### *Limitations*

BRFSS data have generally been found to be reliable and valid (Nelson et al. 2001), and data quality has always been optimal (Mokdad, Stroup, et al. 2003). There is some slight underreporting of weight, but this does not appear to inject much bias into the data and tends to result in underestimates of obesity prevalence. There is also slight overreporting of height, which may be more common among those aged 60 years and older and may represent height lost as a result of osteoporosis. Trends, however, are very reliable. BMI is not a perfect measure of health. A muscular, fit person can fall into the overweight category. Nevertheless, at the aggregate level, the data have validity and are especially useful for measuring aggregate shifts in weight distribution. The BRFSS is a phone survey so there is bias toward households with phones, which tend to include healthy individuals (Ford 1998). The BRFSS is also a general population household survey that does not include institutions; thus, older adults in nursing homes and other types of living arrangements are not included. Finally, the data are collected monthly and are not longitudinal data. Therefore, we cannot track individuals as they age.

### *Implications for Intervention*

In addition to identifying obesity as an important public health issue for older women, it is necessary to develop strategies for intervention. Some starting points can be found in recent public health and gerontology literature. For example, in an overview of nutrition and health promotion programs for older adults, Chernoff (2001) concluded that health promotion activities targeted at diet and exercise patterns can have positive effects at any age. Older persons need to be

included in programs developed for modifying dietary behaviors, with special attention to the effects of aging. More research focused on developing “relevant, easy to adopt, and effective strategies” that can be used with older persons is needed (Chernoff 2001). Strategies developed to combat obesity should also improve physical health and functioning among older adults (Caruso et al. 2000; Clark et al. 1996).

A starting point for creating these strategies is to assess knowledge about diet and nutrition. Among Americans aged 35 to 75 years, Girois and colleagues (2001) found that women and those with higher levels of education were more nutrition- and health-conscious and motivated to make health-related changes than were men and those with lower education levels. Although the adults with higher educational levels were more likely to know about the relationship between diet and obesity (as well as cancer and heart disease), they did not recognize the connection between diet and diabetes or hypertension. In addition, knowing that certain dietary practices were healthier did not always translate into knowing which foods would help them achieve these goals: for example, knowing which foods were high in fat or fiber. Although overweight persons were more likely to recognize being overweight as important, they were no more likely to be more knowledgeable about what to do (Girois et al. 2001).

Although many types of health screenings have become standard in medical encounters, nutritional screenings and interventions are not as well-integrated as they should be (Chernoff 2001). Further investigation of physician-patient communication will be needed to achieve effective weight-loss results. Galuska et al. (1999) found that 50.7% of obese adults aged 50 to 59 years were given advice to lose weight. In the 2000 BRFSS, we found that of those who had seen a doctor in the past year for a routine checkup, 46.8% of obese women in their 50s, 41.1% of obese women in their 60s, and 29.4% of obese women aged 70 years and older were given advice from a physician, nurse, or other health practitioner to lose weight. Of women aged 50 to 59 years who were given advice to lose weight, 80% said that they were trying to do so. Of women aged 70 years and older who were given advice to lose weight, 48.6% said that they were trying to do so. Thus, it appears that persons given advice to lose weight by a health professional take that task to hand. Whether they are successful, however, is unclear.

One investigation of adults aged 25 to 74 years found that although having a usual physician had a positive effect on some health-promo-

tion activities (e.g., having preventive medical visits and reducing substance abuse behaviors), it did not significantly effect obesity or exercise (Ettner 1999). Among older adults, a short-term benefit was seen for exercise after a health-promotion program, but after 8 months, less than one third of the adults had maintained these health promotion behaviors (Haber et al. 2000). If older obese and overweight women can be motivated to engage in regular exercise, they can reduce their body weight and body fat (Irwin et al. 2003).

Some investigations have shed light on the influence of sex and race as well as age. One investigation of overweight and obese women aged 40 years and older (Anderson et al. 2002) found that about one half reported that they were satisfied or very satisfied with their body size. African American women were more likely to express being satisfied with their body than were non-Hispanic White women, and about 65% of the women were trying to lose weight, although these attempts decreased among older women. Another study of weight-related practices among adults in Missouri (Kabeer et al. 2001) showed that overweight women, especially African American women, were more likely to attempt weight loss than nonoverweight women. African American women, however, were less likely to participate in weight-loss practices and had more difficulty losing weight than did their White counterparts (Bril et al. 1991; Kumanyaka et al. 1991). Several explanations for these discrepancies have been offered (behavioral, cultural, or metabolic), but more is needed for dietary modification to be successful in all groups.

Interventions to promote healthy eating and physical activities have been outlined in the *Steps to a Healthier US* (DHHS 2003). Community-based programs to provide people with knowledge, skills, and attitudes should work with community organizations to assess the dietary and exercise habits of target populations. Interventions can then be identified and community resources invited to act in partnerships to establish interventions. To encourage individual changes, environmental changes should be put into place.

Recognition of the rising prevalence of obesity and the effect of overweight and obesity on midlife and older women is critical to public health education. Educational strategies to increase awareness among older women have yet to be widely developed and imple-

mented. The physical and social influences of age and gender need to be incorporated into health promotion programs and investigations of body image, weight reduction strategies, and maintenance of health behaviors. The data presented show that interventions are needed at all ages; the challenge for public health educators is to find effective age-appropriate programs to promote healthy aging.

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