

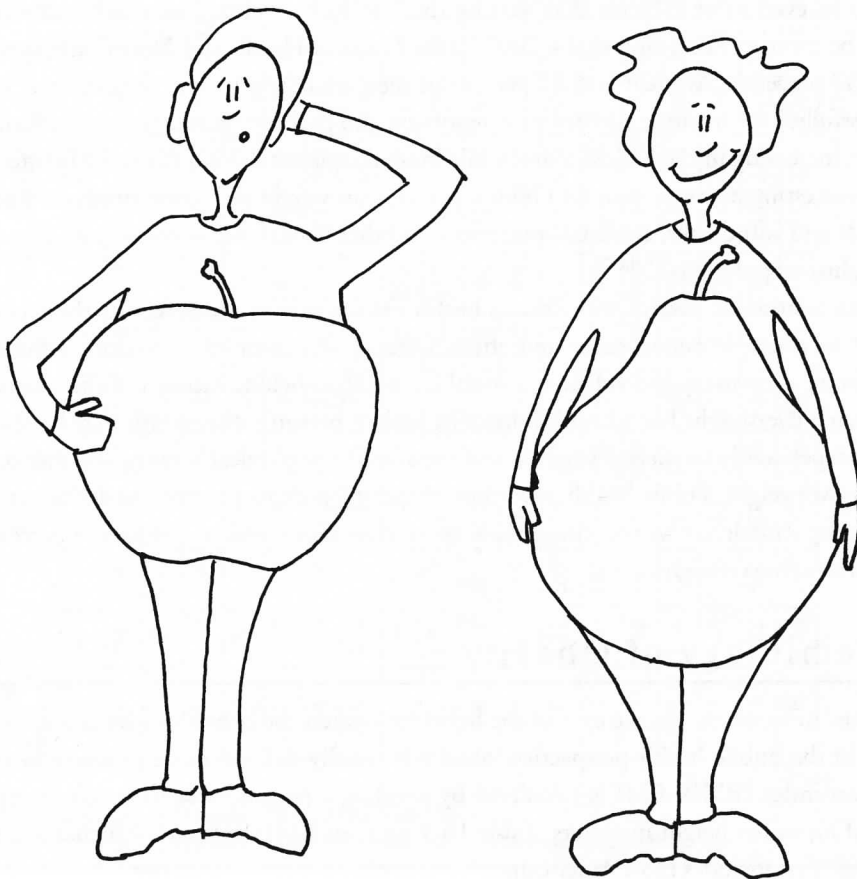
INTRODUCTION TO Public Health

Third Edition



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Public Health Enemy Number Two and Growing: Poor Diet and Physical Inactivity



Pear-Shaped is Healthier

Throughout evolutionary history, humans had to exert a great deal of physical activity to obtain their food. Only over the past century has a substantial and increasing percentage of the population had access to an excess of food with no need to exercise. The consequence of this imbalance has been that Americans are becoming fatter, an exceedingly unhealthy trend. Today, poor diet and physical inactivity have been ranked second among the factors identified as leading actual causes of death in the United States, although the analysis is controversial as discussed in Chapter 13 (see Table 13-3).

Many studies have shown that weighing too much increases people's risk of cardiovascular disease, diabetes, most kinds of cancer, and a variety of other diseases. Thus, it is in the interest of public health to reduce the prevalence of overweight and obesity, which in 2005–2006 affected about 73 percent of the adult population.¹ Getting people to lose weight, however, seems to be even more difficult than getting them to quit smoking, although many of them want to be thinner. According to the 2005–2006 National Health and Nutrition Examination Survey, 57 percent of women and 37 percent of men are trying to lose weight, most of them unsuccessfully.² An Institute of Medicine report on the problem states, "It is paradoxical that obesity is increasing in the United States while more people are dieting than ever before, spending, by one estimate, more than \$33 billion per year on weight-reduction products (including diet foods and soft drinks, artificial sweeteners, and diet books) and services (e.g., fitness clubs and weight-loss programs)."^{3(p.27)}

The association of obesity with certain health risks is easy to measure, but the relationship may not be a simple one of cause and effect. Obesity is a complex condition, influenced by genes as well as by many individual and social factors that include eating and exercise patterns. While being overweight has a health impact in itself, a person's disease risk may be also be affected independently by dietary patterns and the amount of physical activity, whether or not he or she is overweight. Public health advocates, therefore, seek to promote healthier eating patterns among Americans, to encourage them to exercise more, and to reduce the percentage of people who are overweight.

Epidemiology of Obesity

Obesity is, to an extent, in the eyes of the beholder—often the beholder who is looking in the mirror. In the public health perspective, obesity is usually defined more precisely in terms of body-mass index (BMI). BMI is calculated by dividing a person's weight in kilograms by the square of his or her height in meters. Table 16-1 presents BMIs in terms of inches and pounds for a range that includes most Americans.

Table 16-1 Body Mass Index Table

BMI	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Height (inches)	Body Weight (pounds)																
58	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167
59	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173
60	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179
61	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185
62	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191
63	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197
64	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204
65	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210
66	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216
67	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223
68	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230
69	128	135	142	149	155	162	169	176	182	189	196	203	209	216	222	230	236
70	132	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243
71	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250
72	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258
73	144	151	159	166	174	182	189	197	204	212	219	227	235	242	250	257	265
74	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272
75	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	279
76	156	164	172	180	189	197	205	213	221	230	238	246	254	263	271	279	287

Source: National Institutes of Health, "Body Mass Index Table."

www.nhlbi.nih.gov/guidelines/obesity/bmi_tbl.htm (Accessed November 8, 2009).

Most studies show that weight-associated health risks begin to appear at a BMI of about 25, and rise more significantly above 30, with the risks increasing in proportion to the severity of an individual's obesity. The National Institutes of Health and the Centers for Disease Control and Prevention (CDC) have agreed on a definition of overweight as a BMI between 25 and 29.9 and obesity as a BMI of 30 or greater.⁴ Using this definition, 71.6 percent of men and 61.2 percent of women 20 years of age and older were found to be overweight or obese in the National Health and Nutrition Examination Survey (NHANES) conducted between 2003 and 2006.⁵ Obesity had a prevalence of 33.1 percent in men and 35.2 percent in women.

The prevalence of overweight and obesity has increased dramatically over the past three decades, as shown in Figures 16-1 and 16-2. There are significant racial differences in the prevalence of overweight among women: 80.5 percent of nonpregnant black women are overweight, compared with 57.4 percent of white women. Black men and white men are equally likely to be overweight: 70.0 percent of black men compared with 70.1 percent of white men.⁵ The health effects of overweight and obesity are less marked among blacks. The optimal BMI has been calculated to be 23 to 25 for whites, while it is 23 to 30 for blacks.⁶ The risks of excess weight are known to be higher for Asian populations; so the BMI cutoffs recommended by the World Health Organization are lower for them.⁷ Due to insufficient data, it has not been possible to calculate ideal weights in other ethnic groups, including Mexican Americans, who are known to have a high prevalence of obesity. Overweight increases with age, as seen in Figures 16-1 and 16-2, but declines in the age group 75 years and older as discussed in Chapter 28.

Socioeconomic status has a significant influence on the prevalence of obesity. College graduates of both sexes are thinner than men and women with fewer years of education. The difference is especially significant among females: those with less than 12 years of education are nearly twice as likely to be overweight than female college graduates. Similarly, poorer women are much more likely to be overweight than wealthier women; the prevalence of obesity in men does not vary much with income.⁸

The greater prevalence of obesity in black women compared to white women doubtless contributes to poorer health among blacks. As discussed in Chapter 14, rates of cardiovascular disease and diabetes are higher in blacks than in whites, and an unhealthy diet is likely to be part of the problem. Many Hispanics and American Indians are also overweight, accounting for high rates of diabetes among these groups.

While being fat is bad for people's health, the distribution of fat on the body makes a difference. Obesity researchers distinguish between apple-shaped people and pear-shaped people, and they have found health risks to be greater for those shaped like apples. People who gain weight in the abdominal area, as men usually do, have a higher risk of cardiovascular disease and diabetes than people who gain weight in the hips and buttocks—a pattern more common

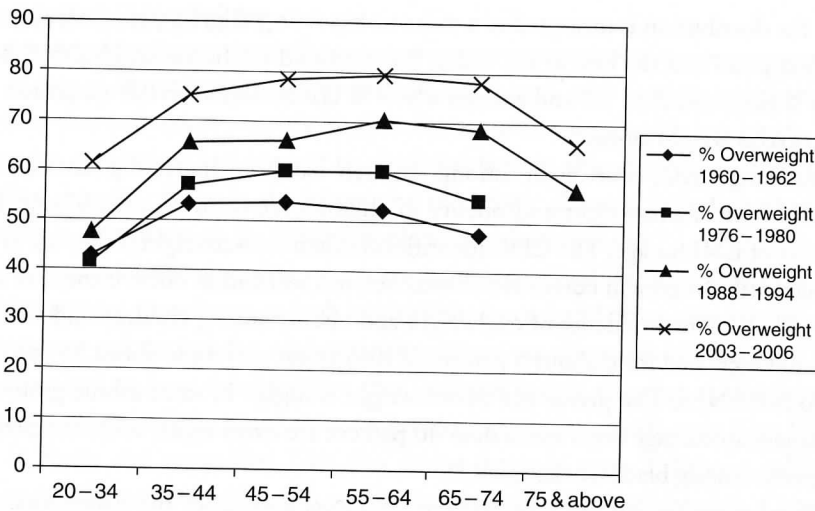


FIGURE 16-1 Percentage of Overweight Males. *Source:* Data from U.S. Centers for Disease Control and Prevention, *Health, United States*, 2008, Table 75.

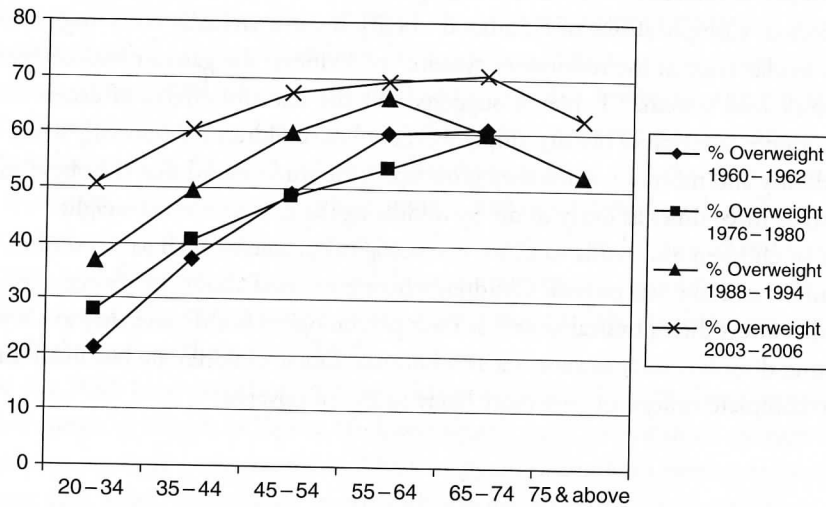


FIGURE 16-2 Percentage of Overweight Females. *Source:* Data from U.S. Centers for Disease Control and Prevention, *Health, United States*, 2008, Table 75.

in females. Fat distribution is measured as a waist-to-hip ratio (WHR), with the waist measured at the smallest point and the hips at the widest point around the buttocks. Health risks in men who have a WHR more than 1.0 and women whose WHR is more than 0.8 are greater than the risks due to excess weight alone.³

In an alarming trend, overweight among children has been increasing steadily since the 1960s. Definitions of overweight and obesity in children are complex calculations, based on growth curves of BMI for age. The CDC identifies children as overweight if they are at or above the 85th percentile on growth curves established before 1980 and as obese if they are above the 95th percentile.^{9,10} The prevalence of overweight and obesity among children and adolescents 6 to 19 years old increased from about 5 percent in the earliest surveys to about 33 percent in the 2003–2006 NHANES. The prevalence of overweight is higher in some ethnic groups: among Mexican American teenage boys, more than 40 percent are overweight, while the prevalence is over 44 percent among black teenage girls.¹¹

Children who are fat are likely to become fat adults and suffer the concomitant risks of chronic disease. For example, a study that tracked 679 school children for 16 years found that weight during childhood was a good predictor of whether an adult would exhibit risk factors for cardiovascular disease and diabetes.¹² Obese children are for the first time being diagnosed with type 2 diabetes, which is sometimes called “adult-onset diabetes” because until recently it was believed to occur almost exclusively in adults.¹³ This is especially likely to occur in American Indian adolescents, who have a high prevalence of obesity, but blacks and Hispanics are also affected. Complications of childhood obesity involve virtually every organ, including the cardiovascular system, the respiratory system, the kidneys, the gastrointestinal system, and the musculoskeletal system.¹⁴ Evidence suggests that the harmful effects of excess weight increase with longer duration of obesity, implying that obese children are especially likely to suffer excess morbidity and mortality when they grow up.⁶ One study found that the obese adolescent girls are two or three times as likely to die by middle age as girls of normal weight.¹⁴

Obesity in children also tends to cause psychological problems such as depression, anxiety, social isolation, and low self-esteem. Children who are worried about their weight may undertake diets that affect their physical as well as their psychological health, and they are at increased risk for eating disorders such as anorexia and bulimia. Obese children are less likely than thinner ones to complete college and are more likely to live in poverty.¹⁴

Diet and Nutrition

Obesity is caused by unhealthy eating patterns combined with inadequate physical activity, each a factor that influences people's health whether or not they weigh too much. The public health aspects of physical activity will be discussed later in this chapter. This section and the next explore the role of diet in the prevention of chronic diseases, including obesity, and describe public health efforts to encourage people to eat a healthier diet.

Most analyses find that Americans eat too much protein and fat and too few fruits and vegetables. This pattern contributes to high levels of cholesterol and other blood lipids and to high blood pressure—risk factors for cardiovascular disease, as discussed in Chapter 11. The evidence is less clear on how the American diet increases cancer risk, but epidemiologic studies show that breast and colon cancer risks are greater in populations that eat diets high in meat and low in fruits and vegetables. Diet is a major factor in type 2 diabetes, which is often brought on by obesity and which can usually be controlled by careful eating. Osteoporosis, a debilitating disease of the elderly, especially white women (see Chapter 28), is likely to become increasingly common because young women are not getting enough calcium, best obtained in low-fat dairy products.

The federal government, in a number of reports over the years by various advisory committees, has developed recommendations on how Americans should eat to maintain health and prevent chronic disease. Since 1980, the U.S. Department of Agriculture and the Department of Health and Human Services have reviewed the recommendations every five years and have released reports called *Dietary Guidelines for Americans*.¹⁵ Agreeing on recommendations has often proved controversial, because the food industry tends to oppose any recommendation that calls for eating less of any food substance.¹⁶ However, evidence clearly supports the recommendations included in the 2005 guidelines that people should eat more dark green vegetables, orange vegetables, legumes, fruits, whole grains, and low-fat milk and milk products; they should eat less refined grains, total fats (especially cholesterol, and saturated and trans fats), less added sugar, and fewer calories. The guidelines contain special recommendations for specific population groups. The eating pattern now recommended is “the traditional eating pattern of poor people throughout the world.”¹⁷(p.739)

While the 2005 food guidelines did not change significantly from those issued earlier, the food guide pyramid, shown in **Figure 16-3**, was significantly revised in an attempt to make its recommendations more understandable. The new pyramid comes in twelve versions for people of different ages, sexes, and activity levels, with specific recommendations that are more individualized than the pyramid of the past. People can visit the Web site MyPyramid.gov and find guidelines appropriate for them. Another change is the addition of a recommendation for physical activity, illustrated by the figure climbing steps on the side of the pyramid.

Dietary surveys conducted by the Department of Agriculture have shown that while the diet of Americans has improved over the past several decades, people fall far short of the federal recommendations. One third of the population eats at least some food from all food groups, but only 1 percent to 3 percent eat the recommended number of servings from all food groups on a given day. Fruits are the most commonly omitted item. Intake of fat and added sugars continues to be too high. While people appear to eat close to the recommended number of vegetable servings, half of these servings are iceberg lettuce, potatoes (including chips and fries), and canned tomatoes.¹⁶ One unfortunate trend is that African Americans of low socioeconomic status, who used to eat a more healthful diet than wealthy whites, have now adopted eating patterns that have traditionally been associated with higher incomes. It is as if, as one commentator suggests, they feel they are now “able to afford steak instead of having to ‘fill up’ on bread or peas or beans.”¹⁷(p.739)

Federal surveys suggest that, among the causes of increasing obesity, especially in children, is the increased intake of sweetened beverages. The proportion of calories that the average American obtained from soft drinks and fruit drinks more than doubled between 1977 and 2001.¹⁸ The trend was similar for all age groups, but the numbers were highest in the younger

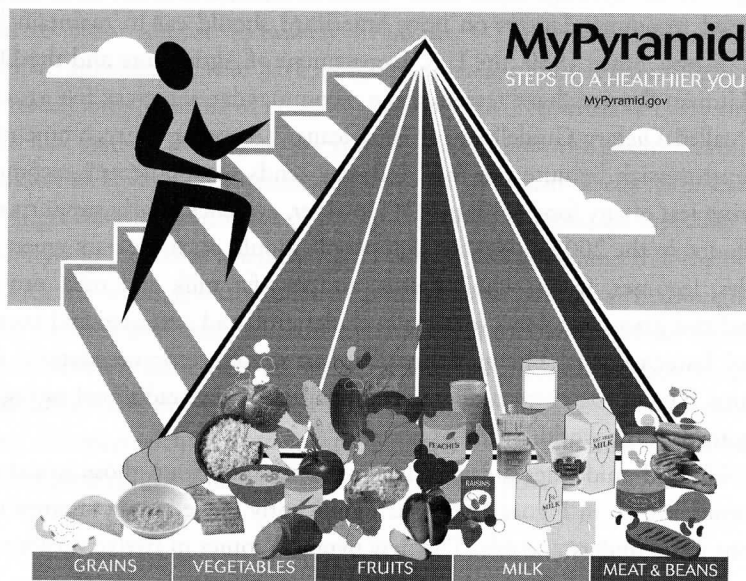


FIGURE 16-3 Food Guide Pyramid. Source: U. S. Department of Agriculture. www.mypyramid.gov/downloads/MiniPoster.pdf

age groups, rising from 4.8 percent to 10.3 percent of calories in the 2- to 18-year-old group and from 5.1 percent to 12.3 percent among those between the ages of 19 and 39. Meanwhile, consumption of milk decreased by 38 percent overall, including among children age 2 to 18, the group for whom milk consumption is most important for future health. Consumption of other beverages has not changed significantly over the period studied. These trends are unhealthy, not only because soft drinks and sweetened juice drinks contain “empty calories” that contribute to weight gain, but also because consuming milk products appears to help people control their weight in addition to providing calcium for their bones. According to the researchers, reducing soft drink and fruit drink intake “would seem to be one of the simpler ways to reduce obesity in the United States.”^{18(p.209)}

Promoting Healthy Eating

It might seem that what each individual eats is under his or her individual control. But many social, cultural, and economic factors contribute to dietary patterns. Eating habits and dietary preferences develop over a lifetime, influenced by family, ethnicity, the media, and other factors in the social environment. The high prevalence of overweight in the United States combined with the large numbers of people who are trying unsuccessfully to lose weight makes it clear that changing eating patterns is very difficult, even for highly motivated people. Studies of patients with a variety of medical conditions requiring special diets have found that even they have difficulty sticking to the prescribed diet. The rate of adherence to a diet by people with diabetes ranged from 20 percent to 53 percent to 73 percent in three different studies. People with kidney failure who were on dialysis were found to have a rate of adherence to the recommended diet of 39 percent and 42 percent in two separate studies. Another study found that the ability of people with high cholesterol to adhere to a low-cholesterol diet was only 30 percent.¹⁹

Several major public health campaigns conducted in entire communities and aimed at reducing cardiovascular risks found that obesity was the most difficult risk factor to control. The Stanford Three-Community Study, the Stanford Five-City Study, the Minnesota Heart Health Program, and the North Karelia (Finland) Project all had reasonable success in reducing risk factors such as smoking, hypertension, and blood cholesterol, but none of them interrupted the increase in the prevalence of obesity in the communities studied.³

Nevertheless, public health advocates have attempted to apply the ecological model of health behavior, discussed in Chapter 14, to create a social environment that favors healthier eating. For example, making nutritious foods more readily available—intervention at the community and institutional levels—should encourage people to choose their foods more wisely. The food industry is responding to many consumers’ concerns about weight and health by providing a

greater choice of low-fat and low-calorie foods. Many restaurants offer "heart healthy" selections on the menu and label them thus. Worksite and school cafeterias provide healthy food choices including salad bars. While such measures do not guarantee that people will eat a healthier diet, they remove barriers that make it hard for people to do so.

Enhancing self-efficacy and providing social support are ways of promoting healthy eating at the level of the individual and his or her family and friends.¹⁹ Social support is provided when a whole family is willing to adopt a diet together, or by group programs such as Weight Watchers. Self-efficacy can be improved by "point of choice" postings of nutritional information, which can help shoppers who are concerned about the nutritional content of food but do not know how to make wise choices. Several major campaigns using point of choice postings have been conducted by supermarket chains in collaboration with health advocacy organizations such as the American Heart Association, but the results have been mixed. Other approaches to enhancing self-efficacy and adherence to diets include demonstrations of healthy cooking methods and practice in calculating portion sizes.

Public health advocates look at evidence from antismoking campaigns for ideas on how to improve the social environment to affect the American diet. The success of the public service announcements of the 1960s, together with later bans on cigarette advertising in the broadcast media, in reducing smoking prevalence (see Chapter 15) inspired a number of media campaigns to promote more healthful eating. One such campaign was California's "5-A-Day" Campaign for Better Health, which attempted to increase fruit and vegetable consumption among state residents to five servings per day.¹⁶ The assumption is that eating more fruits and vegetables leads to eating less of nonnutritious foods. The program proved to be successful in increasing consumption of fruits and vegetables in the state. Later, the National Cancer Institute launched the program nationwide, although funding was never adequate to maintain the early successes of the California program. As in the case of antismoking campaigns, public health advocates must compete with well-financed advertising campaigns by food manufacturers promoting highly attractive but nonnutritious foods.

Another problem with the "5-A-Day" approach is that fresh fruits and vegetables are relatively expensive and are often unavailable in poor neighborhoods. Fast food restaurants, on the other hand, are inexpensive and are often concentrated in low-income neighborhoods. Moreover, U.S. government policy subsidizes industrial agriculture, which produces high-calorie commodities at the expense of more nutritious produce.²⁰ Food advertising focuses predominantly on processed foods, which are more profitable for the industry.³

The food and beverage industries use some of the same approaches to increasing their sales as the tobacco companies have used. As documented in Marion Nestle's book, *Food Politics: How the Food Industry Influences Nutrition and Health*,¹⁶ companies do everything they can to encourage Americans to eat more. They do this by processing foods to make them taste good, which

often means sweet, fatty, or salty. They push larger portions, often by promoting them as good buys; for example, a large serving of fries might cost only pennies more than a small serving while it might have twice as many calories. The companies also advertise extensively, especially to children. They take advantage of the fact that, with most women working outside the home, convenience and efficiency are major factors in food choice and fewer family meals than in the past are home cooked. As Nestle describes, food companies "conduct systematic, pervasive, and unrelenting . . . campaigns to convince government officials, health organizations, and nutrition professionals that their products are healthful or harmless, to undermine any suggestion to the contrary, and to ensure that federal dietary guidelines and food guides will help promote sales."^{16(p.26)} Like tobacco companies, food companies argue that diet is a matter of individual choice, and they use science to sow confusion about the harm their products can do.

The Institute of Medicine, after a thorough study aimed at developing criteria for evaluating the outcomes of programs to prevent and treat obesity, concluded in a report called *Weighing the Options* that prospects were dim for people seeking to lose weight. "The fact is that despite the billions of dollars spent, few people reduce their body weight to a desirable or healthy level and even fewer maintain the weight lost beyond two or three years."^{3(p.158)} The report noted that for most people, weight is not lost once and for all but that its control demands continuing effort. Accordingly, the Institute of Medicine recommends thinking in terms of lifelong weight management, encouraging overweight people to try at least to avoid gaining additional weight. According to the report, even small weight losses can raise self-esteem and improve the health of people suffering from obesity-related chronic conditions.

Public health advocates believe that tackling the obesity epidemic will require community-based efforts to increase the availability of healthy foods, changes in national agricultural policy to encourage the availability of nutritious food at a reasonable cost, and regulation of food industry advertising to promote ethical marketing standards.²¹ A number of proposals have been made to tackle the obesity epidemic with tools similar to those that proved successful in the "tobacco wars." In addition to the educational campaigns such as the one for "5-A-Day" fruits and vegetables, they include requirements for food labeling and advertising to carry information on calorie, fat, and sugar content and prohibitions on making misleading health claims. Fast food restaurants should be required to provide nutritional information on packages and wrappers. The nutritionist Nestle proposes taxes on soft drinks and other junk foods to fund "eat less, move more" campaigns and perhaps to subsidize the costs of fruits and vegetables.^{16(p.367)}

Some of these proposals are beginning to be implemented in some places, but they have proved controversial. New York City requires calorie counts to be posted on the menus of fast food restaurants. The New York State governor, David Paterson, proposed a tax on sugar-sweetened soft drinks and juice drinks as part of his 2009 budget proposal, but the idea has met vigorous opposition. When the Maine legislature passed a similar tax, the law was repealed by voters.²²

Because the impact of lawsuits against tobacco companies was so successful, forcing the companies to raise prices, limiting their advertising and marketing, and publicizing their fraudulent claims, public health advocates are beginning to think about similar lawsuits against fast food companies. Although a lawsuit against McDonald's by obese teenagers was laughed out of court, some lawyers see potential for challenging food companies on deceptive advertising and marketing practices, using consumer protection laws. In 2006, the Center for Science in the Public Interest announced a lawsuit against the Kellogg Company and the makers of the television show *SpongeBob Squarepants* for using the cartoon character to sell sweetened cereals, Pop Tarts, and cookies to children under 8.²³ One lawyer who was involved in tobacco cases and is now reportedly preparing suits against food companies is quoted as saying, "The issue is what goes on with the kids, the advertising, what's in schools. That's an issue that has some oomph to it."²⁴

In fact, many public health advocates believe that the best hope of preventing obesity in adulthood is to influence children's habits. Thus a great deal of attention is being paid to preventing overweight in children. One proven approach is to encourage breastfeeding, which has many other health advantages as well, for both mother and infant. A number of studies have shown that breastfeeding has a long-term protective effect against obesity in children. It also helps the mother to lose weight she gained during pregnancy.²⁵

It is also important to increase parents' awareness that their children are at risk. In a follow-up to the 1988–1994 NHANES survey, after children were weighed and measured, mothers were asked whether their child was overweight, underweight, or about the right weight. Nearly one third of mothers of overweight children reported that their child was about the right weight.²⁶ The state of Arkansas addressed this problem by mandating that schools send home a weight report card, and a number of other states and school districts have followed suit, although the practice is controversial because of concerns about stigma.²⁷ It is clear, however, that efforts to prevent and treat childhood obesity must involve parents. The American Academy of Pediatrics recommends that doctors should measure and chart children's BMI at least once a year.²⁸ However, a 2002 study found that fewer than 10 percent of practitioners follow all the guidelines.²⁹ Many pediatricians feel unprepared to educate the parents on what to do if their child is overweight.

In 2005, the Institute of Medicine published a report called *Preventing Childhood Obesity: Health in the Balance*.³⁰ Calling childhood obesity a “critical public health threat,”^{30(p.2)} the report recommends steps that federal, state, and local governments should take to make prevention of obesity in children and youth a national priority. Recommendations include developing guidelines for advertising and marketing of foods and beverages to children and giving the Federal Trade Commission authority and resources to monitor compliance. The report notes that “more than 50 percent of television advertisements directed at children promote foods and beverages such as candy, fast food, snack foods, soft drinks, and sweetened breakfast cereals that are high in calories and fat, low in fiber, and low in nutrient density.”^{30(p.172)} It also recommends that governments should develop and implement nutritional standards for all foods and beverages sold or served in schools. Food and beverage companies have invaded schools with vending machines selling unhealthy drinks and snacks, fast food in school cafeterias, and special educational programs and materials accompanied by advertisements for fast food and junk food.

As discussed below, obesity and chronic disease are as much a result of lack of physical activity as they are of unhealthy diets. Weight-loss programs are most successful, in adults as well as in children, when they combine diet and exercise. “Exercise is today’s best buy in public health,” one commentator notes. “It is positive and acceptable, has insignificant side effects, and can be inexpensive.”^{31(p.252)}

Physical Activity and Health

Most studies on how to lose weight have found that the most effective approach combines dieting and physical activity. Dieters who are physically active are more likely to lose fat while preserving lean mass. This combination not only promotes a healthier distribution of body weight (a lower WHR), but it also helps people avoid the weight loss plateaus that can result from dieting. Since lean mass burns more calories than fat burns, a dieter who loses muscle mass will end up with a higher proportion of his or her weight consisting of fat, and thus fewer calories will be needed to maintain the new weight, making it more difficult to lose additional pounds. Exercising when dieting helps to ensure that the weight lost will be fat. Raising the amount of physical activity without reducing calorie intake, while a relatively inefficient way to lose pounds, is likely to reduce the waist-to-hip ratio and thus improve health.³²

A number of epidemiologic studies have demonstrated that people who are more physically active live longer. For example, a study of almost 17,000 male Harvard alumni found that those who engaged in vigorous activities for three or more hours per week were less than half as likely

to die within the 12- to 16-year follow-up period than those who had the lowest activity levels.³³ Among Harvard graduates who were sedentary at the beginning of the study, those who took up moderate sports activity at some time during the follow-up period had a 23 percent lower death rate than those who remained sedentary.³⁴

Exercise clearly protects against cardiovascular disease, as demonstrated by epidemiologic studies and through biomedical evidence. The Framingham Study found, as early as the 1970s, that the risk for both men and women of dying from cardiovascular disease was highest among those who were the least physically active and that more activity was associated with lower risk.³⁵ Exercise offers protection against both heart disease and stroke. Several studies have indicated that inactive men and women are more likely to develop high blood pressure than those who are active and that moderate intensity exercise may help reduce blood pressure in people whose pressure is elevated.³⁶

There is some biomedical evidence for how physical activity protects against cardiovascular disease. One major factor is the effect on blood cholesterol, especially the tendency for exercise training to increase levels of high density lipoprotein, "the good cholesterol." Even a single episode of physical activity has been found to improve the balance of blood lipids, an effect persisting for several days.³⁷ By lowering cholesterol levels in the blood, exercise protects against atherosclerosis. Studies on monkeys have demonstrated that exercise has a protective effect even when the animals are fed a diet high in cholesterol and fats.³⁸ Other favorable effects of physical activity on the cardiovascular system include a lowering of blood pressure, an increase in circulation to the heart muscle, and a reduced tendency of blood to form clots. Moreover, physical activity reduces the risk of diabetes, which is an important risk factor for cardiovascular disease.

Type 2, or adult-onset diabetes is related to weight gain in adults, especially weight gain distributed in an "apple" shape, a consequence of insufficient physical activity. The high prevalence of obesity among Americans contributes to the ranking of diabetes as the sixth leading cause of death, probably an underestimate because many cardiovascular deaths have diabetes as an underlying cause.

Early suspicions that physical inactivity contributed to diabetes were raised by observations that prevalence of the disease was higher in societies or groups that moved from a traditional lifestyle to a more technologically advanced environment. This transition has been extensively studied in certain American Indian and Pacific Islander communities. While the increased risk stems in part from changes in diet and increased prevalence of obesity, physical activity may be an independent risk factor.³⁹ The Nurses' Health Study and the Physicians' Health Study have both found that regular physical exercise reduces the incidence of type 2 diabetes.^{40,41} The protective effect of exercise against the development of diabetes seems to work largely by increasing the sensitivity of muscle and other tissues to insulin.

There is also evidence that physical activity protects against cancer, especially colon cancer and breast cancer. Some studies suggest a protective effect against cancer of the lung, prostate, and uterine lining. Exercise also improves survival and quality of life among individuals who have been diagnosed with several kinds of cancer.⁴²


How Much Exercise Is Enough, and How Much Do People Get?

There is some controversy over how much exercise is enough to provide a health benefit. Part of the problem is that it is difficult to obtain reliable measures of study subjects' degree of activity. Most studies use self-reported information given in response to questionnaires, and many measure activity at a single point in time. Since the studies suffer from weaknesses in measurements of exposure (to exercise), most do not yield a clear dose-response effect. However most researchers agree that the amount of benefit increases with the intensity, frequency, and duration of the physical activity, and that the activity must be regular and ongoing to provide an ongoing benefit.³²

To send a clear message to Americans about the importance of increasing their physical activity, a panel of researchers convened by the CDC and the American College of Sports Medicine (ACSM) developed recommendations for how much and what kind of exercise people should aim for.³² They arrived at a minimum standard of about 150 kilocalories of energy per day of light to moderate activity, which could be broken up over the course of the day. People can achieve the expenditure of 150 kilocalories each day by walking briskly for about 30 minutes or by running at 10 minutes per mile for about 15 minutes, or by performing other activities shown in Table 16-2. This recommendation, endorsed in a surgeon general's report, is supported, for example, by a study of almost 74,000 women aged 50 to 79, which found that those who did the recommended amount of exercise for 30 minutes a day, 5 days a week had 30 percent less heart disease than those who were less active.³² More exercise was better, but the greatest benefit was gained in going from being sedentary to thirty minutes of walking.⁴³

Some scientists have disputed the validity of the CDC/ACSM recommendation, arguing that more vigorous, sustained exercise is necessary to achieve a significant benefit.⁴⁴ This view is supported by an Institute of Medicine report issued in 2002 that calls for sixty minutes a day of moderate exercise. The report concluded that thirty minutes a day is not adequate to maintain normal weight.⁴⁵ The 2005 Dietary Guidelines for Americans follow the Institute of Medicine recommendations for exercise. Others argue, however, that it is preferable to set realistic goals for modest improvement, given that a very small percentage of the population gets even the minimal amount of exercise recommended by the CDC/ACSM panel.

Table 16-2 Examples of Moderate Amounts of Activity

Washing and waxing a car for 45–60 minutes	<p>Less Vigorous, More Time</p>  <p>More Vigorous, Less Time</p>
Washing windows or floors for 45–60 minutes	
Playing volleyball for 45 minutes	
Playing touch football for 30–45 minutes	
Gardening for 30–45 minutes	
Wheeling self in wheelchair for 30–40 minutes	
Walking 1¼ miles in 35 minutes (20 min/mile)	
Basketball (shooting baskets) for 30 minutes	
Bicycling 5 miles in 30 minutes	
Dancing fast (social) for 30 minutes	
Pushing a stroller 1½ miles in 30 minutes	
Raking leaves for 30 minutes	
Walking 2 miles in 30 minutes (15 min/mile)	
Water aerobics for 30 minutes	
Swimming laps for 20 minutes	
Wheelchair basketball for 20 minutes	
Basketball (playing a game) for 15–20 minutes	
Bicycling 4 miles in 15 minutes	
Jumping rope for 15 minutes	
Running 1½ miles in 15 minutes (10 min/mile)	
Shoveling snow for 15 minutes	
Stairwalking for 15 minutes	

*A moderate amount of physical activity is roughly equivalent to physical activity that uses approximately 150 Calories (kcal) of energy per day, or 1,000 Calories per week.

†Some activities can be performed at various intensities; the suggested durations correspond to expected intensity of effort.

Source: U.S. Department of Health and Human Services, *A Report of the Surgeon General: Physical Activity and Health at a Glance*, 1996. www.cdc.gov/nccdphp/sgr/pdf/sgraag.pdf

In fact, 40 percent of American adults report that they engage in no physical activity at all during their leisure time, according to the 2006 National Health Interview Survey. Lack of activity is more common in females than males and more common in African Americans and Hispanics than whites. People with less education and lower incomes are more likely to be inactive than those of higher socioeconomic status, and older adults tend to be more inactive than younger ones.⁴⁶

Lack of physical activity is a major factor in the trend toward increasing prevalence of obesity in children. The federal government recommends that children and adolescents should be physically active at least sixty minutes every day.⁴⁷ While most younger children report having engaged in exercise that makes them “sweat and breathe hard,” surveys show that activity falls off dramatically during the high school years. Only 35 percent of high school students reported in 2007 that they got the recommended amount of exercise, while 25 percent did not participate in 60 minutes of physical activity on any day during the week before they were surveyed.⁴⁸ Only 24 percent of students were enrolled in daily physical education classes when they were in 12th grade.

There is evidence that television may be an important factor in children’s physical inactivity. American children spend more time watching television and videotapes and playing video games than doing anything else except sleeping.⁴⁹ A national study of children and adolescents from diverse socioeconomic backgrounds found that obesity was directly associated with the amount of time spent watching television.⁵⁰ In fact, children with a television in their bedroom are especially likely to be overweight, in part because their parents underestimate the amount of time they spend watching.⁵¹ Black and Hispanic children are more likely than white children to have a television in their bedroom. A trial conducted among third and fourth grade students in a California school found that reducing the hours they spent watching television by half to a third over a period of six months reduced their BMI significantly compared with a control group.⁴⁹ Television encourages not only physical inactivity, but also snack consumption; children are bombarded with television commercials for nonnutritious food products.

Promoting Physical Activity

As with most attempts to change people’s behavior, the most effective approach to promoting physical activity is likely to employ the ecological model, intervening at a number of levels of influence. Efforts to motivate individuals to be more active must be combined with interventions that make the physical and social environment more conducive to physical activity. In part because research on the effectiveness of these interventions is difficult to do, most studies have focused on short-term changes in exercise behavior. There is very little evidence that any program has had long-term success in increasing physical activity among significant numbers of people.

Many organizations and federal agencies recommend that healthcare providers counsel their patients about physical activity. However, the evidence is mixed as to whether such counseling actually motivates individuals to exercise more.⁵² Studies of the effectiveness of counseling find that counseling practices of primary care physicians are highly variable, from a brief recommendation to be more active to a referral for intensive counseling by health educators. Somewhat

more effective are community-wide campaigns that include improving access to places for physical activity and using group settings to help people set individual goals, teaching skills for incorporating activity into daily routines, and providing social support to people trying to adopt healthier behaviors.⁵²

The suburban lifestyle, which requires people to drive to wherever they want to go, is a major barrier that is very hard to overcome. As part of health promotion programs, some communities build walking trails or persuade shopping malls to open early for “mall walkers.” Schools are a greatly underused resource for community recreation. Surveys of bicycle riders suggest that many more people would commute to work by bicycle if safe bike paths or bike lanes were available, and some communities have responded to this evidence by building such routes. Community trials designed to increase physical activity—usually as part of a “healthy heart” program—have incorporated such environmental modifications while also employing communications strategies, from public service announcements about physical activity to signs that provide cues to action. In one study, signs that said, “Stay Healthy, Save Time, Use the Stairs,” were placed next to an escalator. This measure increased the percentage of people who used the stairs from 8 percent to 17 percent.³²

Pedometers are increasingly being used in campaigns to motivate people to increase their physical activity. Generally, it is recommended that healthy adults should walk about 10,000 steps a day, which is about 5 miles, a requirement that would fulfill the federal recommendation of about 60 minutes of leisure time physical activity. The recommendation for less active people is to measure their current number of steps and gradually increase the number by about 2000 a day. A 2007 review of the effectiveness of pedometers in increasing physical activity found that people who wore the instruments did, in fact, increase the number of steps they took by an average of about 27 percent. Moreover, these individuals significantly reduced their BMI and blood pressure.⁵³

Many public health advocates believe that the best hope for increasing population-wide physical activity is to focus on developing the habit of exercise in children and adolescents. Most young children engage in physical activity because they enjoy it. One strategy for promoting exercise is to encourage children to play outdoors.⁵⁴ This can be a problem for families living in poor urban neighborhoods, where children’s risk of obesity is high. A Census Bureau report published in 2007 found that 34 percent of black and 39 percent of Hispanic parents keep their children inside because they believe it is too dangerous to allow them to play outside.⁵⁵ A potential solution is described in a study conducted in two low-income neighborhoods in New Orleans. Researchers opened a schoolyard and provided attendants to ensure children’s safety. They observed that the number of children who were outdoors and physically active in the schoolyard and the surrounding neighborhood was 84 percent higher than in a comparison neighborhood. Surveys found that the children in the intervention neighborhood spent less

time watching television or movies or playing video games than children in the comparison school. The authors commented that providing safe play spaces holds promise as a simple, inexpensive measure that should be applied more widely.⁵⁶

Walking or biking to school is another straightforward way to increase children's physical activity. Less than 16 percent of students aged 5 to 15 years walked or biked to school in 2001, in contrast to 48 percent of children in 1960.⁵⁷ Much of this difference is determined by the distance a child must travel to get to school, a factor that communities could consider when new schools are built. However, when distances are manageable, parents and schools can encourage children to walk by participating in public health programs such as the Walking School Bus or the Safe Routes to School program. In both of these programs, groups of children from the same neighborhood walk or bike together under the supervision of one or more adults, who ensure that the route is safe, that children are protected from traffic, crime, and aggressive dogs.

The CDC recommends that physical education classes teach school-age children about the health benefits of physical activity and help them to develop skills that can be applied in lifelong physical fitness activities, such as jogging, tennis, and aerobic dance. These programs can be more effective if they are culturally appropriate for the targeted population. For example, one experimental program in a California middle school with predominantly black and Hispanic students was called "Dance for Health." Regular physical education classes were replaced with moderate- to high-intensity aerobic dance, accompanied by popular music recommended by the students themselves. At the end of the three-month program, participating students had lower BMIs and a more positive attitude toward physical activity than a control group. The program was especially popular and effective with girls.⁵⁸

A youth development program focused on American Indian young people, who are particularly prone to obesity, type 2 diabetes, and suicide, is called Wings of America. Given that many American Indian communities include running in some of their celebrations, Wings of America uses running as a catalyst for empowering youth to take pride in themselves and their culture. The organization sponsors cross-country teams, runs youth development summer camps, and provides speakers and other assistance for wellness programs, conferences, clinics, and fairs.⁵⁹

Despite such efforts, Americans' lack of exercise is one of the most intractable problems facing public health today. Very little is known about psychosocial, cultural, environmental, and public policy factors that may influence physical activity. The surgeon general's *Physical Activity and Health* report called for more research on various interventions and their long-term effects.³² There is much to learn about how to motivate Americans to exercise adequately. In the words of one researcher, "The return of physical activity as the norm in everyone's everyday life—the 'restoration of biological normality'—will require cultural change on a scale similar to that which has occurred with smoking."^{32(p.253)}

Confronting the Obesity Epidemic

The prevalence of overweight and obesity has increased so rapidly over recent decades (see Figures 16-1 and 16-2) that public health professionals have begun calling it an epidemic. The health risks caused by overweight and obesity threaten to reverse many of the improvements in public health that were achieved in the 20th century. In fact, an analysis published in 2005 projected that life expectancy of Americans will decline in the future due to obesity.⁶⁰ The authors predict that if current trends continue, the next generation will be the first to die younger and sicker than their parents. They suggest that concerns about bankruptcy of the Social Security system are overblown, because fewer people will be around to collect the checks. However, the costs of treating obesity-related diseases, especially diabetes, will put increased strain on Medicare.

Costs of treating the diseases caused by overweight and obesity are estimated to account for 5 percent to 7 percent of total U.S. medical expenditures and, when nursing home expenditures are included, the costs may have reached as high as \$92.6 billion in 2002 and more than \$100 billion in 2009.^{20,61} About half of the costs are paid by Medicare and Medicaid, the government health insurance plans, and the other half by private health insurance and by individuals.

In 2000, then surgeon general David Satcher organized a public "listening session" on the problem, which led to the publication of the *Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity*.⁶² The purpose was to develop a national plan and to forge coalitions of governments, organizations, and individuals to "promote healthy eating habits and adequate physical activity, beginning in childhood and continuing across the lifespan." As Dr. Satcher states in the report's foreword, "Many people believe that dealing with overweight and obesity is a personal responsibility. To some degree they are right, but it is also a community responsibility. When there are no safe, accessible places for children to play or adults to walk, jog, or ride a bike, that is a community responsibility. When school lunchrooms or office cafeterias do not provide healthy and appealing food choices, that is a community responsibility. When new or expectant mothers are not educated about the benefits of breastfeeding, that is a community responsibility. When we do not require daily physical education in our schools, that is also a community responsibility. There is much that we can and should do together."^{62(p.xiii)}

Conclusion

Poor diet and physical inactivity have been ranked second among the behavioral factors identified as the leading actual causes of death in the United States. The combination of eating too much and exercising too little causes a very high prevalence of obesity among Americans. Obesity contributes to many health problems, including cardiovascular disease, diabetes, and most kinds of cancer. It is not only the extra pounds, but how the weight is distributed that adversely affects health. Extra weight in the hips and buttocks is less harmful to health than extra weight in the midsection.

Americans eat too much protein and fat and too few fruits and vegetables. This pattern of eating is itself unhealthy even if it did not lead to obesity. Increases in the consumption of sweetened beverages and decreases in the consumption of milk over the past 25 years, especially among children, have contributed to the obesity epidemic.

Recommendations for a healthy diet call for people to eat more vegetables, fruits, whole grains, and low-fat milk products. However, people have great difficulty in changing their eating patterns, as seen from the large numbers who are trying to lose weight, most of them without success. Public health programs to promote healthy eating employ the ecological model, trying to create a favorable social environment by conducting media campaigns, encouraging the ready availability of nutritious foods, and providing nutritional information so that people will choose their foods wisely.

Exercise helps to protect against cardiovascular disease, diabetes, and some forms of cancer, in addition to helping to control weight. People who are physically active live longer than those who are inactive. Americans get far too little exercise, a factor that contributes to the high prevalence of obesity. Most public health interventions to promote physical activity apply the ecological model of behavior, using interpersonal and media messages to motivate people to exercise and removing environmental barriers that hinder them.

Because of the difficulty in changing diet and physical activity patterns of adults, the best hope of improving the population's behavior may be to focus on children. The prevalence of obesity in children is increasing in the United States. Breastfeeding can help protect children against being overweight. Some studies have shown that interventions that involve the whole family can be effective in reducing children's obesity. Encouraging children to play outside and to walk or bike to school can help increase their physical activity. In school, physical education classes that help children develop skills they can use later in life may encourage them to develop the habit of being physically active. One of the most important obstacles to the development of healthful diet and activity patterns in children is television watching, which not only promotes inactivity but also tempts children with advertisements for nonnutritious snacks.

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