



## **Sedentary Lifestyles and High-fat, High-calorie Diets Blamed for Worldwide Increases in Overweight, Obesity**

*Rapid growth in the numbers of overweight and obese people means that, in some countries, more than half of the adult population is dieting. Specialists say that both excess weight and some forms of weight-reduction can present health risks. Pilots must exercise care in using weight-reduction drugs.*

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*FSF Editorial Staff*

Overweight and obesity have reached epidemic proportions in many parts of the world. The United Nations World Health Organization (WHO) estimated in 2000 that the number of obese adults worldwide totaled more than 300 million.<sup>1</sup> The Worldwatch Institute, an independent environmental research organization, estimated that the number of both overweight adults and obese adults totals 1.1 billion. In some countries, including the United States, Russia and the United Kingdom, more than half the adult population is overweight or obese.<sup>2</sup> (WHO defines overweight and obesity in terms of the body mass index (BMI), which calculates the relationship between an individual's height and weight [Figure 1, page 2]).<sup>3</sup>

The problems of overweight and obesity are being recognized increasingly not only in industrialized nations but also in developing nations; for example, in Colombia, 41 percent of adults are overweight or obese, and on the island of Nauru in Micronesia, as many as 70 percent of the women and 65 percent of the men are classified as obese.<sup>4,5</sup> In many countries, the problem has increased dramatically in recent years. For example, in China, the percentage of overweight and obese adults increased from 9 percent in 1989 to 15 percent in 1992;



in the United Kingdom, the percentage of obese adults doubled from 8 percent in 1990 to 16 percent in 2000.

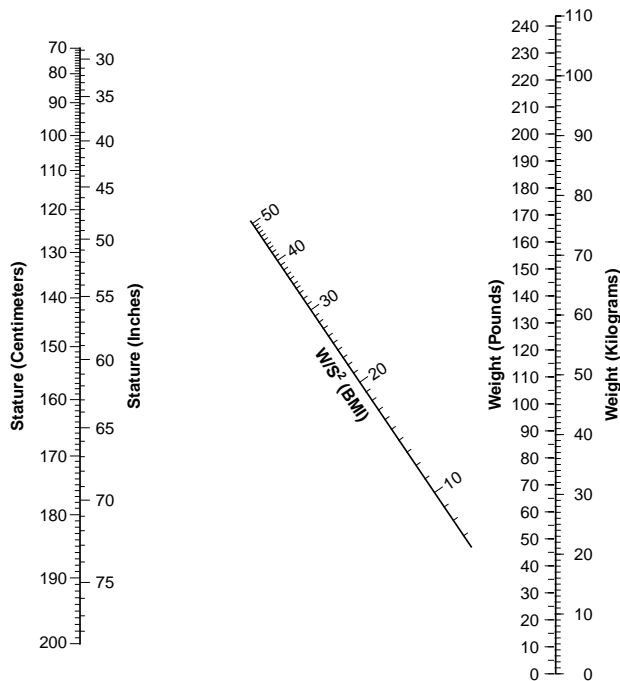
“Obesity is one of today's most blatantly visible — yet most neglected — public health problems,” WHO said. “If immediate action is not taken, millions will suffer from an array of serious health disorders.”<sup>6</sup>

Among those health disorders are non-insulin-dependent diabetes, cardiovascular disease, hypertension and stroke, some types of cancer, gastrointestinal diseases and arthritis, all of which are associated with overweight.

Obesity specialists convened by WHO in 1997 said in a report published after their meeting, “[T]he fundamental causes of the obesity epidemic are sedentary lifestyles and high-fat, energy-dense diets. ... The widespread decline in physical activity in most societies, combined with rising fat intake, [is] associated with rapidly rising rates of obesity.”<sup>7</sup>

Other, rarer causes of overweight are heredity; some diseases, such as thyroid disease, which affect the body's metabolism (the way in which the body processes food and other substances

## Calculating Body Mass Index



The body mass index (BMI) can be calculated several ways.

Using the nomogram above, find height (or stature) on the scale on the left and weight on the scale on the right. Use a ruler to connect the two points. The point where the ruler crosses the slanted line in the center is the BMI value.

Or calculate height (stature) in meters and find the square of that figure. Calculate weight in kilograms. Then divide height squared into weight to find the BMI value.

For people 18 years of age or older, a BMI between 25 and 29.9 indicates overweight. A BMI of 30 or more indicates obesity.

Source: Stanley R. Mohler, M.D./Roche, A.F.; Siervogel, R.M.; Chumlea, W.C.; Webb, P.P. "Grading Body Fatness From Limited Anthropometric Data." *American Journal of Clinical Nutrition* Volume 34 (1981): 2831-2838.

**Figure 1**

to carry out the body's functions, such as converting food to energy); and some medications, such as steroids.

Regardless of the cause of overweight, the treatment typically is the same: reducing the intake of calories so that the body uses more than are consumed.<sup>8</sup>

"Unfortunately, this is physiologically difficult, given the abnormally low calorie use associated with our sedentary lifestyles," said Worldwatch Institute Chairman Lester R. Brown. "For many of those who are overweight, achieving a healthy body weight depends on both reducing caloric intake and burning more calories through exercise. ... [E]xercise may be a genetic imperative."<sup>9</sup>

The number of obese and overweight pilots is not known, but Quay Snyder, M.D., associate aeromedical adviser for the Air Line Pilots Association, International, said that his office

receives "a couple of inquiries a week, at least" from airline pilots seeking help with weight problems.<sup>10</sup>

"Certainly we have plenty of obese pilots," Snyder said.

In the United States, surveys consistently show that most adults are trying to lose weight or to maintain their weight.<sup>11</sup> Most of those individuals, however, do not use the weight-reduction combination recommended by nutrition specialists at the U.S. Department of Agriculture (USDA) and elsewhere: reduced caloric intake and increased physical activity.

Many dieters rely exclusively on programs that reduce caloric intake. USDA, in the advance summary of a report being published in spring 2001, described a study of three categories of weight-reduction diets: high-fat, low-carbohydrate, high-protein diets; moderate-fat reduction diets, with large amounts of carbohydrates and moderate amounts of protein; and low-fat (and very-low-fat), very-high-carbohydrate, moderate-protein diets.

The study found that dieters in all three categories lose weight, as long as they limit their daily caloric intake.

"In the absence of physical activity, a diet that contains about 1,400 [calories] or 1,500 calories per day, regardless of macronutrient composition, results in weight loss," the summary said. "However, it is important to note that weight loss is not the same as weight maintenance."<sup>12</sup>

Long-term weight maintenance may involve other factors, including psychological issues and the dieters' abilities to develop strategies for confronting weight problems and modifying related behavior patterns, the summary said.

The study also found that diets in the moderate-fat-reduction category are best for ensuring adequate nutrition and that diets in the other two categories are nutritionally inadequate. Very-low-fat, very-high-carbohydrate, moderate-protein diets are deficient in vitamin E, vitamin B<sub>12</sub> and zinc, the summary said. High-fat, low-carbohydrate, high-protein diets contain insufficient amounts of vitamin E, vitamin A, thiamin, vitamin B<sub>6</sub>, folate, calcium, magnesium, iron, zinc, potassium and dietary fiber and are high in saturated fat and cholesterol. They also may result in ketosis, a build-up of chemicals called ketone bodies (or ketones) in the blood stream.

Ketones exist normally in the body, as chemicals derived from the liver's conversion of fats into energy that the body can use for fuel. In much the same manner in which fats are converted into ketones, carbohydrates and some proteins are converted by the liver into glucose, a sugar that fuels most of the body's functions. Glucose and ketones travel from the liver through the blood stream to the tissues that need them for fuel. When little glucose is available, typically because of a diet low in carbohydrates, most tissues use ketones instead. Some parts of the body, including the brain and muscles used for rapid

movements, however, do not function as well when they use ketones as they do when they use glucose.<sup>13</sup>

The Cornell University Division of Nutritional Sciences, in its *Nutriquest* question-and-answer service, said that the brain needs about 150 grams of carbohydrates a day (the equivalent of 12 slices of bread or three baked potatoes).

“If you eat a low-carbohydrate diet for a while ... your brain can start to use ketones for about 50 percent of its fuel needs,” the Division of Nutritional Sciences said. “But when your brain uses ketones, it cannot function at its best — thinking and reaction times tend to slow down. People tend not to notice these changes when they are on a low-[carbohydrate diet] to no-carbohydrate diet, because the brain changes make them slower to react to any stimulus, including the stimuli that come from self-awareness. ... [I]t may make a difference if you use machinery, such as a car, which requires quick thinking and quick reflexes.”<sup>14</sup>

On a diet of no carbohydrates or low carbohydrates, the body converts some proteins (proteins that are being eaten and proteins already in the muscles) to glucose to supply the brain’s needs. The resulting loss of muscle mass may cause tiredness.

The muscles that are needed for fast movements, such as the hand muscles used in typing, also are unable to use ketones efficiently. Therefore, “fast, repeated hand movements will slow down and your hands’ endurance will decrease; for example, you will become slower and more tired when you type for a long time,” the Division of Nutritional Sciences said.<sup>15</sup>

Robert C. Atkins, M.D., the proponent of one of the most popular low-carbohydrate diets, said that his diet is effective *because* the restrictions on carbohydrate intake induce ketosis — a desired condition in the Atkins Diet — and force the body to use its secondary energy source — stored body fat — for energy.

Ketones are “simply the energy fuels derived from our fat stores,” Atkins said. “Enzymes are present within all our cells, including our brain cells, to convert ketones into useable fuel. When ketones are used as fuel, the most consistent finding is a decrease in appetite.”<sup>16</sup>

Atkins’ diet limits the intake of carbohydrates —especially foods containing sugar and white flour — in favor of more proteins and fats. Nutritional supplements are recommended, including multivitamins and essential oils and fatty acids.

Some medical problems — including advanced kidney disease; gout; urate kidney stones; unmanageable constipation; or allergies to meat, cheese or other primary foods in the diet — may “interfere with a person’s ability to be on the diet,” Atkins said. Others who may have difficulty include individuals who lack the digestive enzymes needed to digest fat and protein. Individuals who are underweight or a normal weight should follow a modified version of the diet.<sup>17</sup>

Dean Ornish, M.D., advocates a vastly different approach. Ornish’s very-low-fat, very-high-carbohydrate, moderate-protein diet, restricts fat intake to 10 percent of daily caloric intake (but recommends at least one serving a day of a full-fat soy food) and recommends fruits, vegetables, whole grains, beans and soy products. He tells dieters to avoid meat, poultry, fish, fats, oils, dairy products (except for non-fat dairy products), nuts, egg yolks, and foods containing caffeine or fat.<sup>18</sup> Recommended nutritional supplements include vitamins and fish oil (for fatty acids).

He said that the fruits, vegetables, beans and whole grains that comprise most of his diet contain “anti-aging, anti-cancer and anti-heart-disease properties.” Because of concerns that essential fatty acids may be lacking in a diet with less than 10 percent of its calories derived from fat, an earlier version of the diet was modified to add the full-fat soy food recommendation.

USDA and government authorities in many other countries advocate moderate-fat reduction diets. The USDA’s “food-pyramid” plan recommends six servings to 11 servings a day of carbohydrates, five servings to nine servings of fruits and vegetables, two servings to three servings each of dairy products and meat and other proteins, and limited amounts of fats, oils and sweets.<sup>19</sup> Promoters of these diets, such as the Association for the Study of Obesity, based in the United Kingdom, say that they provide the proper balance of energy and nutrients needed to maintain the proper weight and good health.

“If an individual’s diet does not meet his or her nutritional needs, he or she will eventually become ill,” the association said. “For example, a low iron intake will lead to anemia, which causes tiredness, weakness and — ultimately — death. A diet will also be poorly balanced if the foods are not consumed in healthy proportions. For example, the diet may contain too many high-fat foods or too few fruits and vegetables. Unbalanced diets increase the risk of long-term health problems, such as heart disease, cancer, obesity, tooth decay, gall stones and osteoporosis.”<sup>20</sup>

Specialists warn against trying to lose weight too quickly by reducing daily caloric intake too much. USDA dietary guidelines say, “A generally safe rate is 1/2 [pound] to one pound [0.23 kilogram to 0.45 kilogram] a week. ... Avoid crash weight-loss diets that severely restrict calories or the variety of foods.”<sup>21</sup>

Such diets are likely to deprive dieters of essential nutrients and to result in a quick weight loss, followed by a weight gain.

Occasionally, flight crewmembers and cabin crewmembers have mentioned dieting as a factor in their reports on incidents pertaining to flight safety.

For example, in a report filed with the U.S. National Aeronautics and Space Administration (NASA) Aviation

Safety Reporting System (ASRS), an air carrier captain said that he had briefed a very-high-frequency omnidirectional radio approach to an airport in the United States but had not observed that circling east of the runway was prohibited. During the approach, flown at dawn in instrument meteorological conditions, he flew the airplane in a circle east of the runway.<sup>22</sup> The subsequent landing was normal.

“I was tired,” the captain said in his discussion of the January 1989 incident. “I had recently gone on a diet. AME [aviation medical examiner] said I needed to lose weight. I was more tired. ... The F/O [first officer] and I were rushed. I had expected a different approach (and had originally briefed it during the ‘descent and approach checklist’). The brief for the new approach was cursory.”<sup>23</sup>

In another ASRS report, a cabin crewmember on a U.S. air carrier described circumstances surrounding an in-flight illness, which resulted in the flight’s being diverted to an en-route airport and the flight attendant’s visit to a hospital emergency room in July 1998:<sup>24</sup>

I worked a flight from Chicago to Los Angeles. ... I had been on a diet for two weeks which consists of no caffeine, no sugar and no carbohydrates. Prior to my flight in Chicago, I drank an extra-large coffee (with caffeine), as our flight was a late departure, and it was a long duty day due to a schedule change. Approximately 2 1/2 hours into the flight, I felt strange. My initial thought was hypoxia. I asked the other two flight attendants if they felt unusual, and they said no. My next suspicion was possible hypoglycemia [an abnormally low blood sugar level]. I drank orange juice, had some sugar and water. Nothing helped. From my first-aid training, I deduced that I might be having the symptoms of an oncoming seizure. ... There was absolutely no doubt in my mind — I felt that this was a potentially life-threatening situation. We diverted to Las Vegas. ... I was put into an ambulance and taken to the hospital. The emergency room physician determined that I had an acute anxiety attack due to the caffeine that I drank. He said that the diet I was on is not safe.

Later, the cabin crewmember visited another physician whose assessment was the same as the emergency room physician’s. No further medical treatment was required, and the crewmember returned to a normal flying schedule.

Because of their often-irregular work schedules, pilots and other crewmembers may encounter difficulties in maintaining healthy diets or in adhering to healthy weight-reducing diets. During layovers and between flight segments, high-calorie, high-fat snacks and “fast foods” may be the most readily available foods.

Snyder suggested guidelines for pilots trying to lose weight, including:<sup>25</sup>

- Eat a healthy breakfast comprised primarily of complex carbohydrates such as breads, bagels, cereals and other starches. Avoid high-sugar foods and excessive amounts of fruit; both cause the level of sugar in the blood to increase for several hours, then to decrease. The decrease leads to hunger. Complex carbohydrates help maintain steady blood sugar levels for a longer period. Although proteins and fats also help maintain steady blood sugar levels, the proteins and fats typically eaten in some countries for breakfast, including sausage or bacon, may be difficult to obtain in low-calorie forms. Eggs, however, are a low-calorie alternative (if the dieter is not also trying to reduce cholesterol intake), as is low-fat yogurt eaten with wheat germ or some other cereals;
- Keep a water bottle available and drink about three quarts (2.8 liters) of water a day. This amount will keep the stomach full and prevent dehydration. Water is preferable to coffee with cream and sugar and to juice, both of which add to caloric intake but not to nutrient value (except for the vitamin C in some juices), and to soft drinks, which sometimes contain substances that may interfere with the body’s absorption of some nutrients;
- Snack on dried fruit, which can be carried in plastic bags. For long flights without access to healthy food, carry a powdered nutritional dietary supplement that can be mixed with water, or fresh vegetables. If fresh vegetables are available, they also are healthy snacks;
- In restaurants, avoid buffet tables and order healthy, low-fat food from a menu. Fruit or sorbet are low-fat alternatives to other types of dessert; and,
- Avoid alcoholic beverages, which are high in calories and have little or no nutrient value.

Many pilots also find exercising difficult when they are away from home, said Snyder, who suggested that, for many, walking might be the most convenient form of exercise.

“Walking around in the terminal, while not a method to increase strength, will consume some calories,” Snyder said. “This is particularly true if the pilot walks around instead of eating.”<sup>26</sup>

In addition to dieting, some individuals use weight-loss medications, but virtually all of them are unacceptable for use by pilots who are flying, Snyder said. Most of the medications are stimulants — mood-altering medications whose use is prohibited by aviation medical authorities worldwide.

Although the medications can be effective appetite suppressants, after their use is discontinued, appetite — and weight — return.

“The effects are not permanent because they do not modify behavior long-term and ... they are potentially dangerous, from

both health [considerations] and medical certification considerations,” Snyder said.<sup>27</sup>

Two forms of surgery are performed to help obese patients in weight-reduction (or fat-reduction) in instances in which physicians determine that other methods have been ineffective and in which physicians and patients agree that the benefits of the surgery will outweigh the health risks:

- Gastric surgery will limit food intake by creating a pouch at the top of the stomach to hold about one ounce (28.3 grams) of food. A 0.25-inch (6.4-millimeter) outlet at the lower end of the pouch is small enough to delay the emptying of food from the pouch and to cause a feeling of fullness. Some forms of the surgery also construct bypasses of parts of the small intestine to reduce absorption of food.

The U.S. Academy of Bariatric Surgeons said that, after surgery, “most patients lose weight rapidly and continue to do so until 18 [months] to 24 months after the procedure. Although most patients then start to regain some of their lost weight, few regain it all.” Some patients, however, require follow-up surgery to correct abdominal hernias and other complications; some develop gallstones; and some develop nutritional deficiencies.<sup>28</sup> The procedures typically are performed only on obese patients; and,

- Liposuction, typically performed for cosmetic reasons, suctions fatty tissue from beneath the skin in a designated portion of the body. The American Society for Aesthetic Plastic Surgery says that liposuction removes localized fat deposits but that the procedure “should not be considered a substitute for overall weight loss.” Risks may include bleeding, infection and reactions to anesthesia.<sup>29</sup>

The number of people whose weight exceeds the optimum level has increased dramatically in recent years, and overweight and obesity now endanger the health of millions of people worldwide. Many specialists agree that the most effective methods of weight-reduction involve long-term behavioral changes to emphasize healthy, low-fat diets and regular exercise. ♦

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