one

What Is Fat?

"Am I fat?" My wife, Thea, is six-months pregnant and fretting over her appearance. I try to reassure her and tell her that she is beautiful, but it seems to have no effect. "Look at me—I'm a whale." I tell her that she looks terrific and remind her that what she is feeling is perfectly normal. As I'm saying these things, she nods her head. "Yeah, I know. Thanks." Then, after a pause, she looks at me and says, "But tell me, really, do you think I'm fat?"

Most Americans are probably all too familiar with this question. It looms over our culture like an ominous shadow. It haunts adolescence and ruins marriages. It feeds a mammoth diet and fitness industry. It motivates millions to battle with their own bodies. It is a national preoccupation. And, it is at the center of America's obesity epidemic.

To understand why more than 60 percent of Americans are considered "overweight" and 25 percent "obese," we need first to understand how these terms are being defined. After all, the very existence of an obesity "epidemic" hinges on what exactly obesity is. If someone is obese only if he or she weighs 350 pounds, then few Americans would qualify and there would be no epidemic; conversely, if obesity can be had with only 200 pounds, then many people will get this label and the term "epidemic" may be justified.

But the importance of this terminology goes beyond the question of whether too many Americans are "overweight"; it is also in the power this word has in our everyday lives. In America, being labeled or perceived as overweight means your life will be harder on a number of fronts. You may pay more for many goods and services such as airline tickets and insurance. You will receive different medical care. In some cases, you may be denied a job.[1] More important, the designation of

overweight or obese also goes to the very core of a person's identity. To be *over*weight is to be, by definition, abnormal or different. By calling people "overweight" or "obese," we are not simply delineating them by their body mass, but we are relegating them to the margins of society. Such labels also become internalized by the "overweight" or "obese" who think that something is wrong with them or that they must change their behavior in order to meet a particular physical ideal. Ultimately, the power of this terminology is not just in the way the overweight are treated by others, but in the way it makes them see themselves.

Yet, the curious thing is that even though we worry so much about being "overweight" and we hear so much about our "obesity" epidemic, these terms have no precise definition.[2] The *American Heritage English Language Dictionary* defines overweight as "weighing more than is *normal, necessary*, or *allowed*," while obese is "*extremely* fat, *grossly* overweight" (my italics). These definitions may seem straightforward but they raise a host of political questions: What standard determines "normal"? By what criteria is something deemed "necessary"? "Allowed" by whom? What point is "extreme" or "gross"?

In the case of body weight, these questions have no clear answers. If normalcy and necessity are what define obesity, then one can easily name any number of different standards on which to base a norm or a necessity. For example, what is considered overweight on a Hollywood starlet or a supermodel is probably thin for most ordinary women; conversely what is overweight on most men is skinny on a professional football player. This problem is confounded because so many different groups profit from setting the definition of these terms at one level or another; the diet industry, for instance, benefits from labeling everyone as overweight, while the fast-food industry prefers that no one thinks of themselves as obese. How these terms get defined ultimately depends on who gains from making people concerned about their body size and who has an interest in getting people to try to lose weight. Which leads us to the story of how our current standards of overweight and obese came to be defined.

The primary reason why more than 60 percent of Americans are "overweight" has nothing to do with fast-food, cars, or television; it is not because Americans are eating too much and exercising too little; nor is it because of any "fat" gene within us. The reason why a majority of Americans are overweight is because a nineteenth-century astronomer,

a twentieth-century insurance actuary, and a handful of contemporary scientists concocted some ideas about what a normal weight should be. These definitions have little to do with scientific evidence about weight and health and a lot to do with simple mathematics, insurance premiums, and the pecuniary interests of the pharmaceutical industry. If Michael Jordan is "overweight" or Arnold Schwarzenegger is "obese," (which they are according to our current standards), it is not because of their poor fitness or their precarious health; it is because a handful of people are defining these terms in ridiculous ways.

Damning Statistics

America's obesity epidemic originates in a simple measure, the body-mass index, or BMI. Most of us have had our BMI checked at one time or another: it's the test where you type in your weight and height and you're told if you're overweight. It is the most common method for classifying people's weight—used by nearly all doctors, government officials, and health organizations. The surgeon general and the Centers for Disease Control and Prevention (CDC) have used BMI as the primary basis for claiming that obesity is a major health epidemic. The National Heart, Lung, and Blood Institute and many weight-loss companies feature BMI calculators on their websites and many of us get pop-up ads asking us to check our BMI to see if we're overweight. BMI has become a ubiquitous part of the American lexicon. At first glance, BMI seems to be a relatively neutral way of determining weight status. It is simply the proportion of a person's height to weight. BMI has a curious history, though, that reveals much about the origins of America's "obesity epidemic."

Interestingly, the concept of BMI was not developed with any connection to body fat. The first person to use it was not even concerned with losing weight or with health but, rather, he was interested in the laws of the heavens. In the 1830s, a Belgian astronomer named Adolphe Quetelet was trying to test whether mathematical laws of probability could be applied to human beings.[3] These statistical laws were used in astronomy to predict the likelihood of a phenomenon based on repeated observations. Quetelet believed that such laws also governed human affairs. To predict human behavior, all one needed to do was gather

BMI Calculator*

Calculate Your BMI[a]		Obesity Class	BMI (kg/m²)
Enter Your Weight (in pounds) _____	Underweight	–	<18.5
Enter Your Height (feet) _____	Normal	–	18.5–24.9
(inches) _____	Overweight	–	25–29.9
CALCULATE Your BMI = _____	Obese	I	30–34.9
	Obese	II	35–39.9
	Morbid obesity	III	>40

*A BMI calculator, typical of many websites, automatically determines one's weight status after one simply types in one's weight and height. In this instance, the purpose of the BMI calculator offered by the American Society of Bariatric Surgery is to determine who might be eligible for weight-loss surgery (www.asbs.org/html/bmi.html).
[a]BMI = weight/height²; weight in kilograms = pounds × 0.45359237; height in meters = inches × 0.0254.

information on a large enough sample of a population and calculate general trends.[4]

To test his ideas, Quetelet began collecting information from French and Scottish army conscripts. Along with other details, Quetelet measured their weights and heights and plotted them along a distribution. For each height, he found a range of weights in what statisticians would later call a normal distribution or, more famously, a bell curve. At the center of the distribution (or top of the bell curve) Quetelet found the most number of cases, which was the average weight of the group. In charting these distributions, he happened to observe that the weight of "normal" conscripts (that is, those closest to the middle of the distribution) was proportional to their height squared; this general formula would later be used to determine BMI.[5] But Quetelet did not stop there. Since the average conscript's weight was proportional to his height, Quetelet reasoned that this must be what the ideal weight *should* be; anyone who deviated from this average could be considered either under- or overweight. This pseudoscientific conception of an "ideal" weight thus provided the first scientific notion of what overweight could be.

Quetelet's idea had deep political implications. Among his many accomplishments, Quetelet first derived the concept of the "average man." Because most people congregated around average points in their physical characteristics, Quetelet believed that deviants, criminals, or troublemakers could be identified by their physical abnormalities. A similar technique was now available for body weight. Not only could

Quetelet's method determine what was the "normal" weight for a population (which was simply the average), but it could also mathematically define who was abnormal or "overweight" by calculating how far someone "deviated" from the norm. The farther someone was from the average weight, the more they violated other social norms and the more they could be monitored, institutionalized, or controlled.

Quetelet's scheme was a harbinger of a larger wave of scientific attempts to measure and differentiate groups in society. Throughout the nineteenth and early twentieth century, scientists became enamored with measuring skulls, brows, body proportions, and other aptitudes. Following Darwin and the development of biology, it was the golden era of classification. Although these efforts were often done in the name of science, they sought to do more than merely taxonomize the population.[6] Most efforts at measurement were meant to identify miscreants and justify racial and economic prerogatives among a white, aristocratic elite. For example, in the late 1800s public officials and scientists went to great lengths to catalogue the physical characteristics of criminals, arguing that their delinquency was tied to their physiognomy.[7] By claiming that elite groups had certain traits, scientists could rationalize racial inequities in wealth, employment, and education—something that we see with the controversial claims linking race and I.Q. test scores today.[8] From Quetelet's measurement of BMI, the groundwork was laid for a similar process of classification for body weight. A high (or low) body weight, simply by being different from the average, was not only systematically identified, it was also problematized. Even though there was no linkage between weight and health, delinquency, or any social ill, just by being far from the average, overweight and underweight people were marginalized.

Although Quetelet's methods provided a "scientific" basis for classifying (and standardizing) body weight, BMI did not become widely used until a century later because body weight was not a very good mechanism for social differentiation. Most people in the nineteenth century struggled to get enough to eat and few had the luxury of worrying about whether they were too fat. Since only the rich and well-off could afford to be corpulent, there were few groups who were looking to differentiate people for being too heavy. That is, except for one—the insurance industry. For years, life insurance companies had been desperately trying to find mechanisms that would predict early deaths.

In the early 1900s, when medical technology was still crude, they had few diagnostic tools for determining who might die early, and thus be a greater policy risk. Even though they suspected that body weight (like other physical traits) could be a predictor of mortality, they had no way of systematically using it calculate their insurance premiums. In other words, because they had no way of knowing how much more of a risk a 240-pound man was than a 220-pound man, they did not know how much more that person should be charged for life insurance.

Seeking to answer this question, Louis Dublin, a statistician at the Metropolitan Life Insurance Company, started charting the death rates of its policyholders in the 1940s using a height-to-weight index. In line with industry expectations, Dublin found that thinner people lived longer. But, more important, he also found that the closer a person's weight was to that of the average twenty-five-year-old, the longer he or she would live, or least live before cashing out on their life insurance. From these findings, Dublin came up with some ranges for each height of what was an "ideal" body weight (that is, the weight at which a person had the longest life span). Although Dublin's classification scheme was primarily intended for insurance actuary tables, the tables soon took on a whole new function, thanks in large part to his tireless promotion of weight as a determinant of early mortality.[9] Following Dublin's lead, doctors, epidemiologists, and the federal government soon adopted these tables to analyze the "health" of the population. By the 1950s, the Met Life table was *the* method for determining who was overweight.

It is important to remember, however, that up until this point, BMI was never intended to be a gauge of someone's health. When Adolphe Quetelet came up with BMI, he was simply trying to classify the population and not make any predictions about death or disease. Nor were Louis Dublin's Met Life actuary tables based on any biological rationale; Dublin did not specify why heavier people would die earlier, nor did his model account for genes, diet, exercise, or many other influences on mortality. Rather, Dublin used weight because it was easy to measure and had a lot of statistical power to *predict* the likelihood of early death. But as a result of his use of the statistics, people came to think that body fat *caused* early death, an idea that Dublin himself propagated. Ultimately, the most influential factor in determining what Americans considered to be overweight was not based

Ideal Weight Table for Men and Women*

Women				Men			
Height in Shoes	Small Frame (lbs.)	Medium Frame (lbs.)	Large Frame (lbs.)	Height in Shoes	Small Frame (lbs.)	Medium Frame (lbs.)	Large Frame (lbs.)
6′	138–151	148–162	158–179	6′4″	162–176	171–187	181–207
5′11″	135–148	145–159	155–176	6′3″	158–172	167–182	176–202
5′10″	132–145	142–156	152–173	6′2″	155–168	164–178	172–197
5′9″	129–142	139–153	149–170	6′1″	152–164	160–174	168–192
5′8″	126–139	136–150	146–167	6′	149–160	157–170	164–188
5′7″	123–136	133–147	143–163	5′11″	146–157	154–166	161–184
5′6″	120–133	130–144	140–159	5′10″	144–154	151–163	158–180
5′5″	117–130	127–141	137–155	5′9″	142–151	148–160	155–176
5′4″	114–127	124–138	134–151	5′8″	140–148	145–157	152–172
5′3″	111–124	121–135	131–147	5′7″	138–145	142–154	149–168
5′2″	108–121	118–132	128–143	5′6″	136–142	139–151	146–164
5′1″	106–118	115–129	125–140	5′5″	134–140	137–148	144–160
5′	104–115	113–126	122–137	5′4″	132–138	135–145	142–156
4′11″	103–113	111–123	120–134	5′3″	130–136	130–143	140–153
4′10″	102–111	109–121	118–131	5′2″	128–134	131–141	138–150

*In 1943, the Metropolitan Life Insurance Company introduced its standard height-weight tables for men and women. The numbers represent the weights in pounds of people between ages of twenty-five to twenty-nine, those with the lowest mortality rates. (They take into account indoor clothing weighing three pounds, and shoes with one-inch heels.) Met Life described these as "desirable" weights, but, over time, they became known as "ideal" weights.

on criteria of health but criteria of profit and measurement within the insurance industry.

Despite this dubious history, BMI remains the basis for much of our official health policy today, both in the way we think of obesity and how we measure it. Government health agencies, such as the Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH), rely on BMI as the primary indicator of weight, health, and mortality risk in the American population. Today, almost all government agencies consider anyone with a BMI of 25 or more as "overweight." For an American man who is the average height of 5′9″ that would be 170 pounds; for an American woman who is the average height of 5′4″ that would be 145 pounds. A BMI of 30 or more is "obese" (that is, 204 pounds for a 5′9″ American male and 175 pounds for a 5′4″ American woman). According to government health officials and many obesity experts, these BMI scales are a simple and easy method for gauging your health. All you need to do is check your height and weight and "voila!" you can tell not only if you are "overweight" or "obese," but also how well you are. Except for one problem—it's not true.

The Problem with BMI

Despite its ubiquity among government agencies, medical practitioners, and health researchers, BMI is not only a poor measure of health, it is actually a lousy measure of obesity. To begin with, BMI is a measure of proportionate body weight and not a measure of body fat. This is why many professional athletes are technically "overweight" or "obese" even though they have little body fat. If we think of obesity as an excess of body fat (which most people do), then BMI is an inaccurate gauge.

And the problem does not stop there, for BMI is also a poor predictor of mortality. It is not a simple fact that the heavier a person is, the more likely he will die. The association between mortality and BMI is more of a U shape—those at both the low and high ends of the weight spectrum have higher mortality rates than those in the middle.[10] The rates of mortality at the high end of the BMI scale do not become prominent for men or women until a BMI is generally over 35 (which applies to less than 10 percent of the population). This correlation also varies by age—among older people, a BMI is negatively related to mortality (that is, the heavier you are, the less likely you are to die).[11]

Nor does BMI tell us much about why thinner or heavier people die. Although people at the either end of the BMI scale may have higher death rates, we simply do not know if early death comes from having too much or too little adipose tissue or whether BMI is simply reflecting other unmeasured influences.[12] BMI does not take into account fitness, heart rate, or fat distribution, all of which relate to disease and mortality.[13] By some accounts, fat distribution may actually be a better predictor of mortality than body weight—one study found the mortality associated with higher BMI levels can be completely accounted for by waist circumference.[14] Fat on someone's hips and thighs seems to have little or no relationship to the risk of death; it is only fat in the belly that seems to be problematic. Thus, if our concern with obesity is that it is supposedly killing thousands of Americans, then actually BMI tells us very little about who those people may be.

But these issues pale in comparison to the biggest problem with BMI; we have no clear criteria of what points on the BMI scale should be classified as "overweight" or "obese." Over the past two decades, the BMI thresholds for these terms have yo-yoed, sometimes being pegged at one level, sometimes at another. For example, between 1980 and 2000, the U.S. Dietary Guidelines (a joint report from the Departments of Agriculture and Health and Human Services) have defined overweight at various levels ranging from a BMI of 24.9 to 27.1.[15] In 1985, the National Institutes of Health (NIH) consensus conference recommended that overweight be set at a BMI of 27.8 for men and 27.3 for women—by this standard, a 6′ man would be overweight at 205 pounds, a 5′7″ woman would be overweight at 175 pounds.[16] Then, in the 1990s, the World Health Organization (WHO) came out with a recommendation that a BMI of 25 to 29 should be considered overweight and a BMI of 30 or more obese (more on this below).[17] To make the United States consistent with this standard, many federal health agencies and researchers soon began adopting the lower BMI standards, thus creating a confusing set of standards and guidelines.[18]

Partly to sort through these conflicting measures, in 1988 the NIH convened a panel of more than two dozen experts from the fields of health research, epidemiology, and nutrition to review the "evidence-based" research of the past twenty years. This NIH report concluded that the official designations of overweight should be set at a BMI of 25 and obesity at a BMI of 30, the same standards established by the WHO. Soon, this became the definitive guide for determining what was officially overweight and obese in the United States.[19]

At the time it came out, the NIH report caused a lot of controversy because, overnight, more than 37 million Americans suddenly became "overweight," even though they had not gained an ounce. What few people noticed, however, was that the scientific "evidence" to justify this change was nonexistent. According to the NIH report, the classification of overweight at a BMI of 25 was based on the putative linkages to mortality. According to the report, people who have a BMI of more than 25 had "significantly higher mortality" rates than those under 25, but in both the WHO and NIH reports, none of the research really substantiated this claim.[20] For example, the major source cited by the NIH board was a 1996 review of studies linking BMI and mortality by the nutritionist Richard Troiano and his associates. Yet, strangely enough,

Troiano's findings actually contradict most of the recommendations of the NIH panel. Not only did he discover that mortality was highest among the very thin as well as the very heavy, but also that the increased mortality was typically not evident until well beyond a BMI level of 30. And until one gets to a BMI of 40 or more, the differences in mortality are still within the bounds of statistical uncertainty. From these findings, Troiano concluded that "This analysis of mortality suggests a need to re-examine body weight recommendations. Weight levels currently considered moderately overweight (i.e., a BMI > 27) were *not* associated with increased all-cause mortality."[21] Ironically, although the NIH panel did recalibrate body weight recommendations, they did so in the opposite direction, *lowering* the BMI designation of what would be considered overweight and obese.

The fact of the matter is that, with our current data and measurement techniques, it is impossible to calculate the mortality risks of obesity accurately. The epidemiological studies that have estimated the links between BMI and mortality are not based on studies of the entire population or of all deaths, but on large pools of survey data from various projects tracking health. In these samples, epidemiologists simply measure the association between death rates or various diseases and body weights. If deaths or diseases are more common as weight goes up, a trend is identified. But calculating mortality in this way is a tricky business, largely because the illnesses that cause most deaths in America (that is, heart disease, cancer, and stroke) have so many sources. In other words, heavier people may have a higher mortality rate but this does not necessarily mean that it is their body fat that is killing them. Their weight may simply be capturing the effects of other unmeasured variables. The validity of this research depends largely on the variables that are included in the estimates and the margins of error from the coefficients. In order to determine that a certain trait has a really significant impact, the differences in the statistical estimates must be great enough not to simply be caused by random error. Moreover, it must be verified that the trait in question is the direct source of the problem and not simply a proxy for other causes. For example, mortality rates may be higher among the obese because heavier people are less likely to seek regular medical care, the consequence of the prejudice they often encounter among medical professionals.

The problem is that the major studies on the number of deaths due to obesity are fraught with all sorts of problematic assumptions. The two most commonly cited studies that linked higher BMI with mortality were written by the obesity researcher David Allison and his colleagues in 1999 and by a collection of CDC researchers in 2004. Both appeared in the *Journal of the American Medical Association (JAMA)*.[22] And both studies calculated that obesity (defined as a BMI of 30 or above) was causing several hundred thousand deaths a year. Yet, in neither of these studies did the researchers actually measure the linkage between obesity and death nor did they take into account other explanatory factors, such as genes, diet patterns, or exercise, that might also explain why heavier people had higher mortality rates.

In the 1999 study, Allison and his colleagues assumed "that all excess mortality in obese people is due to obesity." But, in reality, no one has proven that adiposity (excess amounts of fat) is an independent cause of heart disease, cancer, and stroke.[23] Moreover, their methods of calculating the obesity effects were incredibly crude: they divided the population between nonobese and obese and assumed that any deaths that occurred among the latter were due to their excess weight. Even if an obese person died in a car accident or from a snakebite, the cause of his or her death was attributed to body weight. These claims are as ludicrous as arguing that the difference in mortality rates between blacks and whites are the result of their skin color.

The 2004 *JAMA* study is more careful in its language but equally problematic in its conclusions. This study, written by researchers and the director of the CDC, calculated that the diet and inactivity associated with obesity causes 400,000 deaths a year in the United States. While they actually attribute these deaths to "poor diet and physical inactivity," they nevertheless assumed that these factors work primarily through obesity rather than having a negative impact on their own. In their view, the problem with inactivity and poor diet is that they make you fat and being fat is what kills you rather than simply saying that poor diet and inactivity are themselves problematic. Yet, as we'll see in later chapters, there is much more convincing evidence about the immediate health hazards of a poor diet and inactivity than there is about being too fat.

Indeed, if you look at the actual numbers on death, you'll find a much different story. Each year, roughly two million Americans die from all

causes. About 70 percent of these two million deaths are among people who are over 65. Among the elderly, obesity is not a major cause of death because overweight and obese senior citizens (those with a BMI above 24) actually live longer than those at a normal or below normal body weight (a BMI below 24).[24] Yes, that is correct—older people who are heavier live longer than those who are thin. So if obesity is not killing the elderly, it means that obesity can only be responsible for some part of the roughly 600,000 deaths among the remaining population under the age of 65. And what are these people dying from? The biggest killers among the nonelderly are largely unrelated to obesity; the top cause of death among people who are under forty-five is unintentional injury, primarily from automobile accidents; the top killer among people between forty-five and sixty-five is cancer, the leading cause of which is smoking. Among the top ten causes of death for people under sixty-five, only heart disease, diabetes, and a small fraction of cancer deaths have any plausible connection to body weight.

And, even if we *assume* that all the deaths from heart disease, diabetes, and other organ ailments are attributed to obesity, we only get, at most, about 174,000 deaths a year among people under sixty-five.[25] Yet this number is also too high because we know that plenty of thin people are also dying from heart disease, diabetes, and organ failure. In reality, we have no clear idea whether any deaths at all can be attributed solely to a person's body weight. After these and other discrepancies in the 2004 CDC report were brought to the attention of Congressman Henry Waxman in the summer of 2004 he asked the General Accounting Office of the U.S. government to launch an investigation. The CDC ended up retracting their earlier estimates and after an "internal review" in which the miscalculations were blamed on a "computer error" they released new estimates for which the annual rate of death attributed to obesity was only about 365,000 per year.[26] Even these numbers were based on specious reasoning; a more recent and reliable estimate from Kathryn Flegal, a researcher at the National Center for Health Statistics, puts the number of deaths attributable to "weighing too much" at fewer than 26,000 a year. In addition, Flegal found that people who are "overweight" (with a BMI of 25 to 29.9) live longer, on average, than those at a "normal" weight (a BMI between 18.5 and 24.9).[27]

These inferential problems get even worse when the discussion turns to the question of diseases. The 1998 NIH report made an extensive list

of diseases that were "associated" with higher BMIs including hypertension, type 2 diabetes, coronary heart disease, stroke, gallbladder disease, osteoarthritis, and some types of cancer. As the NIH report went through the list of these diseases, it cited hundreds of studies to back its claims, the result of a seemingly exhaustive search of the scientific literature. This evidence was supposed to prove that, even more than being a cause of death, a high BMI was a major health risk. Except, once again, there were two major problems.

First, there is no uniform point on the BMI scale at which all these diseases become more evident. The relationship between BMI and each disease varies considerably depending on the condition in question. For some conditions, such as diabetes, an increased likelihood can start as low as a BMI of 22; for other health conditions, such as many types of cancer, the increased risks do not begin until a BMI is much greater than 30. And again, in many instances, these health pathologies might not arise from adipose tissue but from associated causes. For example, the association between heart disease and obesity may come from greater insulin resistance among the obese, a factor that can be alleviated through exercise, even when weight isn't lost.[28] These health effects are also subject to significant differences depending on race, gender, and age. Even worse, some studies show that higher BMIs are actually associated with lower rates of cancer and heart disease.[29]

Indeed, the problem of misattribution appears throughout the NIH report. For example, throughout the report boxed statements give particular emphasis to messages such as "Weight loss produced by lifestyle modifications reduces blood pressure in overweight hypertensive patients."[30] This type of message is repeated with numerous other diseases. Yet in none of the studies cited was it conclusive that the weight loss itself was responsible for the remediation of the illness rather than the change in lifestyle. In fact, it is far more plausible that the increase in exercise and change in diet that affected the weight loss is the real cause for the health improvement.[31] This is like saying "whiter teeth produced by elimination of smoking reduces the incidence of lung cancer." Nevertheless, the NIH report continues to emphasize that weight loss was a causal factor.

Second, nearly all the studies linking obesity with disease are epidemiological studies; that is, they are simply surveys of the population and not clinical experiments. Not only are these data often problematic

(for instance, body weight is self-reported), but the inferences that can be made from the data are unclear. Epidemiology is a tricky business—one tries to find relationships between phenomena by examining large surveys of the population and seeing where statistical associations exist. To determine causality, such as with smoking and lung cancer, epidemiologists look for the strength of association (what percent of smokers get lung cancer?), the timing of the association (does lung cancer follow years of smoking?), and whether there is a plausible scientific explanation between the two (is there something in cigarette smoke that would trigger lung cancer?).[32] If these links are all clear, then causal inferences can be made with some confidence.

But in most studies linking body weight and disease, these conditions for determining causality are not met. Numerous critics, such as the editors of the *New England Journal of Medicine*, Dr. Glenn Gaesser of the University of Virginia and Professor Paul Campos of the University of Colorado, have pointed out that most of the evidence linking obesity, mortality, and disease is fraught with questionable methodological assumptions. In fact, many studies do not take into account other factors that might account for diseases such as smoking, access to medical care, family history, exercise, or diet.[33]

Perhaps the biggest problem with this research is that we do not have a good theory on why obesity causes heart disease, cancer, or other ailments. Indeed, the evidence does not support many of our common stereotypes about the health risks of obesity and disease. For example, it is common for people to think that being fat clogs your arteries, but there is no conclusive proof that having more body fat results in more atherosclerosis independent of one's diet.[34] There are only two medical conditions that have been shown convincingly to be caused by excess body fat: osteoarthritis of weight bearing joints and uterine cancer that comes from higher estrogen levels in heavier women (although this can be treated medically without weight loss).[35] All the other diseases are only linked to obesity through *associations* in large populations. It is not clear why having a lot of fat tissue would make someone more likely to have heart disease, asthma, or many of the other diseases commonly attributed to obesity.

Herein lies the biggest problem of making health-related claims about obesity—there is far more we do not know about the consequences of excess fatty tissue than we do. The hypotheses about the causal links

between excess fatty tissue and most health pathologies are largely untested. Although some obesity researchers now believe that many diseases may be caused by the hormones and signaling compounds produced by fat cells, they still have not proven how excess levels of these hormones may be harmful. The effect of these hormones in causing disease is still a matter of speculation.[36] Nor, more important, is there any conclusion about at what level of obesity such excess hormones become dangerous. As obesity researcher and NIH panel chair Xavier Pi-Sunyer says, "It's a very complicated system, and the more we learn about it, the more complicated it becomes."[37]

The Politics of Defining Obesity

So, if the scientific evidence about the relationship between BMI, mortality, and other health conditions is so unclear, why did the NIH, putatively the most objective public health institution in the United States, endorse these low thresholds of overweight and obese? According to one NIH panel member, the overweight designation came from the "best scientific judgment" of the committee members.[38] But the decision to lower the weight scale was not based on any revolutionary research in the scientific community about what an ideal weight should be—with such fuzzy evidence, science could not have possibly informed this decision. The U.S. government's proclamation of what BMI level was overweight or obese was based, in reality, on a subjective and arbitrary call on the part of just a few researchers. Ironically, the same NIH panel that strove for "evidence-based" and objective criteria ended up making a major proclamation that, in retrospect, appears to have been for reasons that had do nothing with health and a lot to do with the funding dynamics within the scientific professions and the pharmaceutical industry.

To understand this point, it is important to go back to the 1995 World Health Organization report that helped establish the idea that a person is overweight with a BMI of 25. This document probably had more impact on determining how obesity was defined than anything else. And who wrote this important document? Most of it was drafted and written under the auspices of the International Obesity Task Force (IOTF). On the surface the IOTF seems to be a credible association of scientists interested in obesity research and policy. According to its website, the IOTF's mission is to "inform the world about the urgency of the problem and to persuade goverments [sic] that the time to act is now." Their website also displays the logos of both the WHO and the International Association for the Study of Obesity, legitimate health organizations, making the IOTF seem like a purely scientific organization.[39]

In reality, however, the IOTF is anything but an unbiased congress of scientists. The IOTF is an organization primarily funded by Hoffman-La Roche (the maker of the weight-loss drug Xenical) and Abbott Laboratories (the maker of the weight-loss drug Meridia).[40] Like other organizations financed primarily by drug companies that don the "neutral" mantle of science (including the American Obesity Association), the primary mission of the IOTF is to lobby governments and advance particular scientific agendas that coincide with the pharmaceutical industry's goals. Indeed, the initial mission of the IOTF was to get the lower BMI standards imposed on the WHO report. Few realize that the effort to establish a worldwide standard for what is overweight and obese was sponsored primarily by a company that makes a weight-loss pill.[41]

The IOTF's chair, British nutritionist Philip James, typifies this conflict of interest. James, a well-regarded scientist, also has many financial links to the pharmaceutical industry. He has been amply paid for conducting clinical trials of Sibutramine (Meridia) and Orlistat (Xenical). He also engages in regular promotional activities for Hoffman-La Roche and Knoll Pharmaceuticals, offering regular praise of their products in press releases. In fact, in 2003, he presented the Roche Gulf Awards for Obesity Journalism to reporters who promoted studies (on which James consulted) showing, not surprisingly, that patients taking Xenical were 37 percent less likely to develop type 2 diabetes than those losing weight through lifestyle changes alone.[42] In short, James is not only a consultant for the drug industry, he also works as one of their pitchmen.

The influence of the pharmaceutical companies doesn't stop with such faux health organizations. The drug industry financially supports many researchers who are on the advisory panels to both the WHO and NIH. Pharmaceutical companies influence the tenor of scientific research and interpretation both by funding research and by contracting with various health researchers to serve as "consultants" for their various products. For example, the chair of the NIH committee (and a member of the WHO panel) is a doctor and medical researcher named

Xavier Pi-Sunyer (the same one quoted above). In addition to being a professor of medicine at Columbia University, Pi-Sunyer is also the director of the Obesity Research Center at St. Luke's-Roosevelt Hospital in New York City and the director of the VanItallie Center for Weight Loss. While Pi-Sunyer has these impressive scientific credentials, he also is on the advisory board or is a paid consultant to several diet and pharmaceutical companies, including Wyeth-Ayerst labs (makers of the fen-phen diet drug that ended up causing heart valve damage), Knoll, Eli Lilly Pharmaceuticals, Genentech, Hoffman-La Roche, Neurogen, and Weight Watchers International.[43] Pi-Sunyer has been the highly paid principal investigator on recent clinical trials of the drug Rimonabant made by Sanofi-Aventis. Indeed, Pi-Sunyer has been named in a lawsuit against the drug company Wyeth-Ayerst because he agreed to have his name attributed to scientific articles about the costs of obesity that were actually written by Excerpta Medica, a medical consulting firm, and paid for by Wyeth-Ayerst.[44] Not surprisingly, Pi-Sunyer is also a member of the IOTF.

Pi-Sunyer is not alone in his connections to the pharmaceutical industry—many of the researchers on the NIH board (once again the group that basically defined what overweight and obese mean in the United States), as well as most of the top obesity experts in the United States, including David Allison, George Blackburn, Tom Wadden, James Hill, and Judith Stern, are financially tied to diet and pharmaceutical companies. A particularly egregious example among this group is George Bray, one of the first obesity experts and the editor of *Obesity Research*, the leading academic journal on obesity studies. In addition to his long list of research publications, Bray also has a side job as a developer and marketer of a "weight-loss" thigh cream that has had little long-term success. It is difficult to find *any* major figure in the field of obesity research or past president of the North American Association for the Study of Obesity who does not have some type of financial tie to a pharmaceutical or weight-loss company.

While the pharmaceutical industry did not necessarily dictate the decisions of the obesity experts, the conflicts of interest among the leading researchers in the obesity field are both undeniable and problematic. The IOTF's campaign to lower the standard of what is overweight directly coincides with the economic interests of the diet and pharmaceutical industries, especially in the case with weight-loss drugs such as Meridia and Xenical.[45] By lowering the BMI standard and making more people think they are overweight, the pharmaceutical industry can create a much larger market for diet drugs and diet plans.

Of course, the pharmaceutical industry is not alone in wanting to lower the standard for being overweight and to increase the number of people that fall into that category. Significant financial incentives also exist for university health researchers and health agencies within the U.S. government. In fact, the coincidence of interest between the pharmaceutical industry and public health researchers has created something in the field of obesity that could best be described as a "health-industrial complex." The health-industrial complex is built upon a symbiotic relationship between health researchers, government bureaucrats, and drug companies. Drug companies sponsor research that defines current health issues and fund researchers who sit on the NIH board and within medical schools; government bureaucracies such as the NIH and CDC rely on the expertise of researchers to back their claims for increased congressional funding; and drug companies use health warnings issued by the CDC to promote their products. As the health writer Thomas Moore notes, "The same medical school physicians who serve on NIH consensus and other panels also work as consultants to these drug companies and are paid handsome fees to speak at the medical conferences that these companies finance. It is a tightly interlocking system."[46]

A key part of the health-industrial complex arises from the funding imperatives within medical research institutes. Within most of the research institutions and universities where health research is conducted, a significant portion of the salaries of scientists and their staffs is based on grants from foundations and support from private industry or the federal government. The application process for these grants is very political—who gets funded and at what level depends on a number of factors including the importance of the research problem in question and how well it fits within the established health paradigms. Similarly, the funding levels of the CDC, the NIH, and other government agencies depend upon perceptions of the U.S. Congress about the validity of their efforts. Lobbying groups such as Research!America tirelessly promote the possibility of looming health catastrophes in order to secure greater federal funding of health research. Getting funds to do health research and promotion, whether one is in the private or public sphere,

depends largely upon how serious a health problem one is researching. Pathologies affecting large or vocal populations, such as cancer or AIDS, get more money; conditions affecting smaller or less-represented groups get less.[47]

For obesity researchers, this means there are significant incentives to lower the threshold of what is considered overweight. By adopting the overweight standard of BMI at 25, they can add nearly 40 million people to the population at risk. For medical researchers focusing on weight loss, this quickly inflates the importance of their own efforts; for government agencies such as the CDC and NIH this gives them a new reason for expanding their own missions and increasing their budget requests; for both groups it provides a rationale for expanding their power.[48] Thus, it was not mere coincidence that soon after the NIH report the congressional budget appropriations for obesity-related programs in the CDC and NIH were increased. Nor does it seem like mere coincidence that one of the lead authors of the *JAMA* article that attributed 400,000 deaths a year to obesity was the director of the CDC (Julie Gerberding) and that she used the information in this article in her congressional testimony requesting a larger CDC budget.[49]

These efforts to lower the BMI threshold of what is considered overweight have further obfuscated the complicated relationships between body weight and health. Once the "experts" come out with evaluations of what is overweight or obese, even the most exaggerated or misinterpreted claims take on a life of their own and become accepted as unquestioned truth. After researchers first identified the growing weight of the American population in 1994, a host of news items and scientific articles sounded the alarm about the increase in body weight of the American public.[50] Obesity began to be paired with terms such as "epidemic," first, in a careful or measured way, but inevitably without criticism or introspection.[51] By the end of the decade, scholarly articles, government reports, and the news media were proclaiming obesity an epidemic with little acknowledgment of the medical complexity and problematic assumptions of this claim.

Although the media often sensationalize and oversimplify complicated issues in order to attract public interest, in the case of obesity this has been taken to great lengths. Consider these two examples. On March 10, 2004, the *New York Times* ran a headline "Death Rate from Obesity Gains Fast on Smoking." This major story presented the conclusions of the 2004 *JAMA* article that "obesity-related" deaths in the United States would soon top 400,000 and overtake smoking as the number one cause of preventable death in the United States without a single hint of criticism.[52] It reiterated the various costs associated with obesity but never questioned how these numbers were reached. Similarly, on January 8, 2003, the Associated Press ran a story with the headline "Obesity at Age 20 Can Cut Life Span by 13 to 20 Years." Only later did the story reveal that the obesity in question was at a BMI of 45 (that would be more than 340 pounds for a six-foot man), which affects less than 1 percent of the population.

With this growing consensus about the threat of the obesity "epidemic," it became increasingly difficult for ideas or findings that contradicted, or least questioned, the claims about obesity to gain any attention or audience. This occurred not only in the press but also among the very research institutes and government agencies that issue the reports. Last year, the writer Elliot Marshall reported in the journal *Science* that many researchers at both the NIH and the CDC had concerns about the "loosey-goosey" estimates of the number of deaths attributable to obesity, particularly in the way that age was used to calculate mortality.[53] One CDC staffer, who did not want to be quoted on the record for fear of losing his job, said that many at the CDC felt the conclusions of this report were not open to question, particularly as one of its lead authors, Julie Gerberding, was the director of the CDC. Marshall stated that many people believe that the *JAMA* article's "compatibility with a new anti-obesity theme in government health pronouncements—rather than sound analysis—propelled it into print."[54] Glenn Gaesser also reports that the NIH basically ignored the alternative studies that challenged the link between BMI and higher mortality when writing its report about the dangers of obesity.[55] While one might not expect a researcher to cite all the evidence about obesity, the NIH report omitted a number of studies questioning the link between BMI and mortality when setting the threshold of those considered overweight.[56]

Standardizing Our Weights

Now some may question why this is a very big deal; after all, does it really matter if the government gets its weight standards exactly right?

Isn't it a good idea to lose weight, even if weight is merely a proxy for other, more serious problems? Actually it is a big deal, for the use and definition of terms such as "overweight" and "obese" have a number of important consequences. First, being classified as overweight has an immediate impact on the lives of millions of Americans: it can determine whether they can work at certain jobs, whether they are considered fit parents, or whether certain drugs or medical procedures will be paid for by insurance or tax money.[57] Our current standards wrongly compel doctors to tell their patients they are sick and convince millions that they should starve themselves with dangerous crash diets and other weight-loss strategies. The current designations of overweight and obese may cause all sorts of unfair, unhealthy, and unnecessary behaviors on the part of Americans who think they need to be thin in order to be healthy.

Even more problematic is that these "official" pronouncements about what constitutes a healthy body weight are being thrust upon the general public in a coercive manner. Although they don't have a clear scientific rationale, our current standards of overweight and obese affect the self-image of many, imposing a standard by which most of us don't measure up, particularly if we are female, poor, or a minority. And, by evaluating ourselves relative to weight standards defined by BMI, we fall under the power of the medical and science professions that tell us how we should think about our bodies and how we should behave. Our current standards of overweight and obese are affecting the very conception of who we are.

But the biggest problem with our current definition of "obese" is that is makes weight a central determinant of health when, in fact, the relationship between body fat and health is far more complicated than what can be found with a BMI, particularly for the general population. Everyone has his or her own ideal body weight. My grandmother, who lived to a vigorous ninety-eight years old, was technically obese for most of her adult life. What is an optimal body weight for one person may be far heavier or lighter than for another.[58] Even if it is possible to identify an "ideal weight" for any one person, there is no way to create a uniform standard that can be applied for a large population.

Nevertheless, our government and the public health community continue to emphasize that we should evaluate our health relative to how much we weigh and to advise millions of Americans, who otherwise

would not consider their weight a problem, that they should lose weight. Yet this same government and health community is not providing any clear or safe guidance of how Americans should actually meet this thin ideal. Without any clear understanding of what is actually causing our weights to rise, the government's warnings about the dangers of body fat will only encourage people to take up unworkable or unhealthy diet plans, which often do more health damage than anything else. However, the campaign to shape our perceptions does not simply stop with making millions of us wrongly think we are overweight or obese; as we'll see in the next chapter, they also want us to change how we understand what this obesity means.