

Chapter 3

BODY MASS INDEX:

HEY, WHO ARE YOU CALLING FAT?

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Most of us don't need a scientific formula to know if we are fat. That information usually comes from looking in the mirror, struggling to button a pair of pants, seeing our own picture, etc. The only number that may be important to us in this respect is the number on the bathroom scale. And on an individual basis, this approach usually is OK. Most of us have a notion of what our ideal weight is.

But a problem arises when scientists, nutritionists, and other concerned professionals try to compare dietary treatments. On its own, body weight has been inadequate measure for comparative purposes. This is where a measurement called the body mass index (BMI) comes in. Although definitely not the best "fatness" measurement available, the BMI probably is the most popular. And this is why the BMI is relevant to the dieter, and why the BMI is being discussed early on in the *Daily Diet Score*.

In this chapter, I will describe how body size can be quantified with the BMI. Classifying an individual only by weight can be misleading because of the influence of height. For example, take two men who each weigh 200 pounds. The first man is six foot six inches tall, and the second man is five foot four inches tall. It does not take much imagination to appreciate that the 6'6" man is not overweight, but the 5'4" man is. It may not sound fair, but the shorter man cannot carry the same amount of weight as the taller man without being fat.

Naturally there are some exceptions to this simple observation. A woman eight months pregnant may not be overweight, even though she weighs 30 pounds more than she did before the pregnancy. As another example, a powerlifter who is 5'4" and weighs 200 pounds may be packed full of muscle and bone—and have very little (less than 10%) body fat. But these are the exceptions to the rule. For the rest of us who are not powerlifters, being 5'4" and weighing 200 pounds usually means that we are fat.

In the real world, a 6'6" man who weighs 200 pounds may be OK, but pork him up to 300 pounds...now he is obese. So the relationship between height and weight is very important. How can this relationship be described?

With the *Body Mass Index*, or BMI. The BMI is a number which, in most situations, describes the relative amount of fat carried on the frame. The BMI is calculated from a person's height and weight, so the BMI is a more accurate indicator of "how fat" someone is than their weight alone. In other words, the BMI is a description of your body size based on your height and weight.

How do you figure out your BMI? Probably the easiest way is if you have internet access. If you performed a search of "body mass index," a number of web sites with BMI calculators would be on the hit list. For example, check out the BMI calculator provided by the National Center for Chronic Disease Prevention and Health Promotion*. All you have to do on this site is enter your height and weight, click on "Calculate," and you have your BMI. For those of you who are mathematically inclined, you can calculate your BMI with the following formula:

$$\text{BMI} = [(\text{weight in pounds}) \div (\text{height inches})^2] \times 703$$

Alternatively, you can read your BMI from a table, which I have included with this chapter (see Table 3-1; courtesy of the National Heart, Lung and Blood Institute). Looking at our previous male examples, the 5'4"/200 lb guy has a BMI of about 34.5, while the 6'6"/200 lb guy has a BMI of 23 (Table 3-1 only goes up to 6'4", so I used an internet calculator for the taller

* www.cdc.gov/nccdphp/dnpa/bmi/bmi-adult.htm

man). For comparison, the 6'6"/300 lb gentleman has a BMI of 34.7—very close to the 5'4"/200 lb subject.

Incidentally, the BMI calculation is done the same for women as it is for men. That is, a 5'4"/200 lb woman also will have a BMI of 34.5. This “one-size-fits all” approach of the BMI to both sexes has been a source of criticism, which I will discuss in a later chapter.

So what do these BMI values mean? There are a variety of classification schemes for BMI. The National Heart, Lung, and Blood Institute (part of the National Institutes of Health, or NIH) has divided BMI values into four categories, as shown below and in Table 3-1:

19-24	normal
25-29	overweight
30-39	obese
≥ 40	extreme or morbid obesity

There are other BMI categories, too: 17-19 is underweight; and less than 17 is anorexic. The implications of these low BMI categories will be covered in a later chapter. Recently, the “super obese” category was added for those individuals with a BMI of greater than 50. For example, a 5'4" person who has weighs 300 pounds will have a BMI of 51.5. The super obese category is of concern to obesity surgeons, who may treat patients with BMIs greater than 60 or 70. A 5'4" person would have to weigh 408 pounds to have a BMI of 70.

According to the American Obesity Association, about 60% of Americans have a BMI of 25 or greater (i.e., they are at least overweight). About half of this group, or about 30% of all Americans, have a BMI of 30 or greater. So over 60 million adults in this country are obese (!).

You might be dismayed about how little wiggle room the BMI system gives you before you get labeled as overweight. For instance, a 5'2" person who weighs 131 pounds already has a BMI of 24. If this person gains another five pounds, then the BMI increases to 25—which puts this individual into the overweight zone. A 5'10" person who tips the scales at 167 pounds also has a BMI of 24; seven more pounds pushes her/his BMI up to 25.

At the other end of the spectrum, the 5'2" person can weigh as little as 104 lb before falling into the underweight category (BMI < 19). Similarly, the 5'10" individual can weigh as little as 132 lb and still be in the normal category...for some, 132 pounds may sound way too little for a five-foot ten-inch frame.

On the surface, the BMI may appear to be a neat little formula which will tell you whether your fat or not. But as hinted above, we can play around with the BMI and get misleading results. Here's another example: using an internet BMI calculator, a 5'4" woman who weighs 145 pounds will have a BMI of 24.9. According to Table 3-1, her BMI is still in the normal category—that is, she is not “fat.” But, if she gains a *single* pound (or worse, stands funny on the scale) and weighs 146 pounds, her BMI is boosted to 25.0. In this brief moment she has become overweight. Now how is that fair?

This little statistical blooper can be present in huge collections of data in which a “cutoff number” is sought. Take the example of blood pressure readings in adult men. At some point, someone or somebody is going to have to define a blood pressure value where normal ends and high blood pressure begins. The latter usually means having to take blood pressure pills. In our situation, the cutoff point is where “normal” weight ends and overweight begins.

The definition of these transition points usually is based on good scientific data. But when it comes right down to it, the decision of who to call normal and who to call fat is arbitrary.

For the poor woman above, why couldn't the overweight cutoff point have been placed at a BMI of 25.1? Then she wouldn't be "fat," at least by her BMI.

Another problem with the BMI is that it does not take into account the proportions of muscle, bone, and fat. Above I described the potential disconnect in weight vs. height for professional athletes. As might be expected, the BMI is not too helpful in these situations. If our 5'4"/145 lb lady was a shot-putter with 8% body fat, then calculating her BMI would be a waste of time. Such a woman would be packed with muscle, and could not be called fat, even though her BMI would say so.

The BMI also does not take into account how body fat is distributed. Let's take two examples of 5'4" women who both weigh 157 pounds. Both have a BMI of 27 (the overweight category). The first woman happens to carry most of her extra weight in her thighs, hips, and buttocks, but has a smallish waist. The second woman carries most of her extra weight in the abdomen (i.e., she has *truncal* obesity). The first woman has a pear-shaped body, and the second woman is apple-shaped.

Such shape differences actually have been recognized as having important health consequences (to be discussed). Essentially, pears are healthier than apples. So the apple-shaped woman carries higher health risks than the pear-shaped woman. This, despite the fact that both women are overweight with the same BMI. Now how is that fair?

It's not fair because the BMI is not a perfect descriptor of excessive body fat. There are other ways to describe how weight is distributed on the body, and there are more accurate methods to measure body fat (described in a later chapter). Currently the BMI does not work such concepts into its formula. Remember this: the BMI is an example of scientists trying to

impose order on a human characteristic. Such behavior can create an artificial situation, which can lead to inaccuracies.

Despite these drawbacks, the BMI has gained wide usage, and provides a common language for doctors, researchers, and patients to discuss weight issues. The BMI may not be the best descriptor for body fat that we have, but it's what we have right now. It would be to your advantage to gain an understanding of the BMI.

So are you overweight? Are you obese, morbidly obese, or even super obese? A reasonably good system, the BMI, is available to answer this question. So calculate your BMI. This will give you an objective measurement of how overweight you are. Moreover, I will use the BMI measurement frequently as I discuss the various concepts of the Daily Diet Score.

Which reminds me: by applying the DDS, you will take the pounds off and watch your BMI descend into the normal category. The DDS will provide you with a method of fine-tuning your progress into the “normal” BMI category. And once you have entered that category, the DDS will keep your BMI in check, and maintain a normal weight.

If you have found all the above ramblings on the BMI completely confusing, do not fret or despair. Just keep moving on through these chapters. Make no mistake, the BMI classification system is important. But there will be plenty of opportunities to use and understand it as we progress through the *Daily Diet Score*.

Body Mass Index Table

	Normal										Overweight										Obese										Extreme Obesity									
	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54				
BMI	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54				
Height (inches)	Body Weight (pounds)																																							
58	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167	172	177	181	186	191	196	201	205	210	215	220	224	229	234	239	244	248	253	258				
59	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173	178	183	188	193	198	203	208	212	217	222	227	232	237	242	247	252	257	262	267				
60	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179	184	189	194	199	204	209	215	220	225	230	235	240	245	250	255	261	266	271	276				
61	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185	190	195	201	206	211	217	222	227	232	238	243	248	254	259	264	269	275	280	285				
62	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191	196	202	207	213	218	224	229	235	240	246	251	256	262	267	273	278	284	289	295				
63	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197	203	208	214	220	225	231	237	242	248	254	259	265	270	276	282	287	293	299	304				
64	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204	209	215	221	227	232	238	244	250	256	262	267	273	279	285	291	296	302	308	314				
65	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210	216	222	228	234	240	246	252	258	264	270	276	282	288	294	300	306	312	318	324				
66	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216	223	229	235	241	247	253	260	266	272	278	284	291	297	303	309	315	322	328	334				
67	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223	230	236	242	249	255	261	268	274	280	287	293	299	306	312	319	325	331	338	344				
68	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230	236	243	249	256	262	269	276	282	289	295	302	308	315	322	328	335	341	348	354				
69	128	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236	243	250	257	263	270	277	284	291	297	304	311	318	324	331	338	345	351	358	365				
70	132	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243	250	257	264	271	278	285	292	299	306	313	320	327	334	341	348	355	362	369	376				
71	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250	257	265	272	279	286	293	301	308	315	322	329	338	343	351	358	365	372	379	386				
72	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258	265	272	279	287	294	302	309	316	324	331	338	346	353	361	368	375	383	390	397				
73	144	151	159	166	174	182	189	197	204	212	219	227	235	242	250	257	265	272	280	288	295	302	310	318	325	333	340	348	355	363	371	378	386	393	401	408				
74	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272	280	287	295	303	311	319	326	334	342	350	358	365	373	381	389	396	404	412	420				
75	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	279	287	295	303	311	319	327	335	343	351	359	367	375	383	391	399	407	415	423	431				
76	156	164	172	180	189	197	205	213	221	230	238	246	254	263	271	279	287	295	304	312	320	328	336	344	353	361	369	377	385	394	402	410	418	426	435	443				

Source: Adapted from *Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults: The Evidence Report*.

Table 3-1. Body Mass Index