

Assessments of Body Composition: Body Weight & Body Fat

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Assessments of Body Composition: Body Weight.

I'm going to split this article into 2 parts. In this part I'll brief you on 3 simple ways to assess your body composition (Bathroom Scales, BMI and Waist/Hip Ratio).

In the second part I'll go over some of the less common and more specialised ways to assess just how much body fat you have.

First of all...What is body composition?

It's all the different things that your body is made up of, and their relative proportions to each other. In a practical sense, it means how much fat you have compared to your muscles/bone/blood/internal organs etc.

A quick statistic for you:

In England in 2007, 61% of adults were classed as overweight, obese or morbidly obese! With only a little over a third classed as having "normal" weight. (Get these stats from the NHS at: <http://www.ic.nhs.uk/statistics-and-data-collections/health-and-lifestyles/obesity/statistics-on-obesity-physical-activity-and-diet:-england-february-2009>)

Percentage of adults in England - 2007

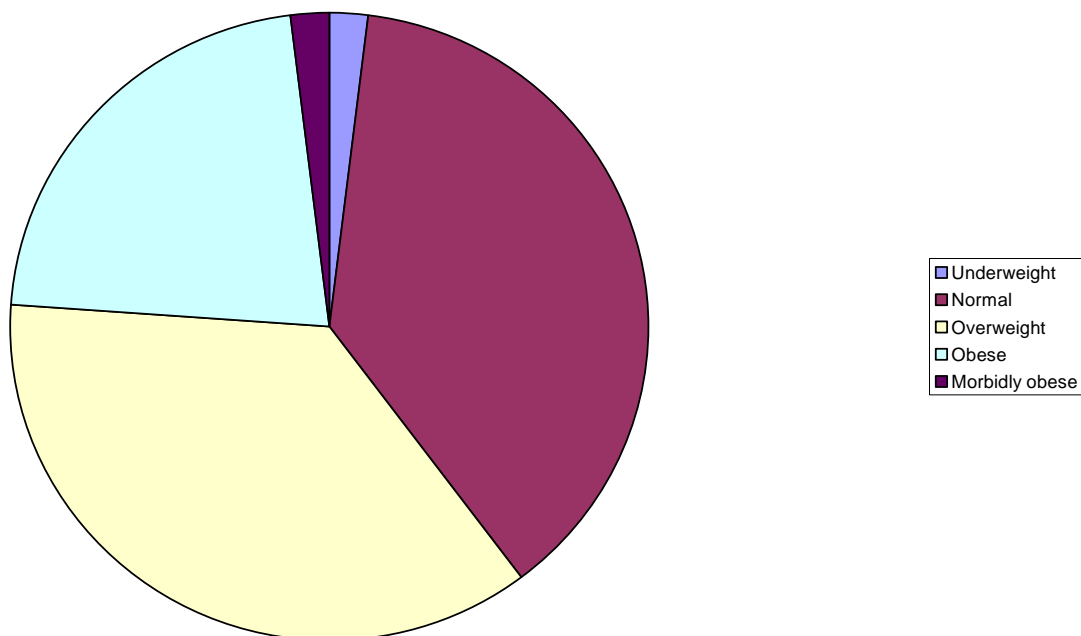


Figure 1 How many of us are underweight, normal or overweight

So how do you assess if you're under/overweight or normal?

There are a few different ways, each having its own advantages and disadvantages. I'm going to very briefly tell you the main points now.

The Bathroom Scales

What are they: You all know these. You stand on them and they tell you how much weight is pressing down on them. Simple. This is by far the most popular way for people to decide if they are overweight or not.

Pros:

- Cheap and simple. They cost only a few quid and anyone can do it anytime.

Cons:

- They don't give you any detail at all. They give you the total weight of *everything* that is pressing down on them, including but not restricted to:
 - Your bones
 - Your body fat
 - Your blood
 - Your skin
 - Your internal organs
 - Your muscles
 - Your clothes/shoes
 - The highly fluctuating water content of your body (I read about an Ironman athlete who lost **8kg** in one day of competition! This was not a loss in fat, but a loss of water through sweat).
 - The contents of your stomach (eg the food and fluids you have eaten and drunk recently)
 - The contents of your bowels (eg the poo and pee you have not passed yet)
- It is not comparable to other people. eg, Sue is 4 foot tall and weighs 12 stone and Dave is 6 foot 6 and weighs 13 stone...does that mean Dave is fatter than Sue?? I don't think so.



Summary: Bathroom scales are good at telling if you are gaining/losing *weight*, but totally useless at telling if you are gaining/losing *fat*.

Ask yourself if you want to lose weight or lose fat.

If you want to lose fat, then **consume slightly fewer calories than you burn day to day** (click [here](#) for more details).

If all you want is the scales to say you are lighter, you can try some of the following (I do **NOT** recommend any of these!!!):

- Chop a leg off (a leg weighs a lot, without it you will weigh less...but **you will probably die if you do this!**)
- Don't drink anything for a few days (1 litre of water weighs 1kg. If you don't drink the recommended 2-2.5 litres of water a day, you will weigh less, but **you will probably die if you do this!**)

- Sit in a sauna for a few hours (you will sweat out the water and weigh less...for a few minutes, until you have a drink and then you will be *exactly the same weight as you were before*)
- Wear one of those silly silver foil suits when exercising. You will sweat lots of water and weigh less...for a few minutes, until you have a drink and then you will be *exactly the same weight as you were before*)

I have a friend whose family is telling her she should drop down to 8 stone...why? What is so special about 8 stone? You can be 8 stone and be on deaths door, or 8 stone and an Olympic athlete. It is meaningless!

Don't judge your success/failure with the Bathroom Scales method because it has *nothing* to do with your health and fitness.

Body Mass Index (BMI)

What is it: This is the “standard” way of telling if your body is a healthy weight or not and is the method used in the NHS report above. It is worked out by:

your weight (kg) divided by your height (m) squared. For example, Billy-Bob is 70kg and is 1.8 metres tall. His BMI will be $70/(1.8 \times 1.8) = 21.6$.

Your body composition is judged by the following:

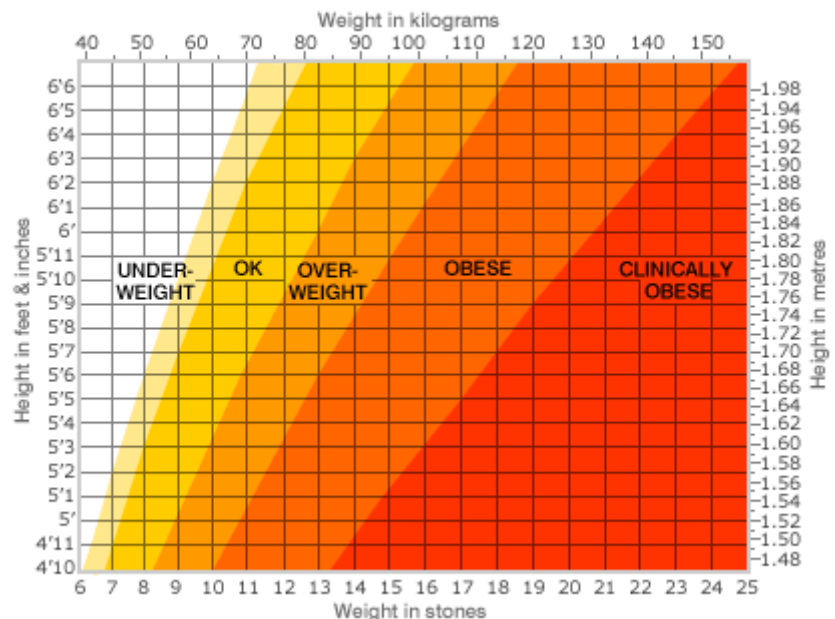
- Underweight - < 18.5
- Normal – 18.5-24.9
- Overweight – 25.0-29.9
- Obese – 30.0-39.9
- Morbidly Obese – >40.0

So Billy-Bob will be classed as “normal”.

Pros:

- Better than just the scales because it does take your height into account.
- It has an “underweight” category, helping people realise that “less” is not always “better” (essential to help prevent eating disorders).
- Very quick and simple to do. All you need is a set of scales, a tape measure and calculator.
- Easy and cheap to measure a great number of people. This makes statistical analysis much easier and more accurate.
- Very good and reliable on a “population” level.
- Good association between an “average” persons BMI and their risks of various medical conditions.

Cons:



- Does not actually tell you anything about your body composition.
- It has limitations for some groups of people that are not “average”. eg many athletes and those with a history of regular, heavy weight training can have unusually high BMI’s due to the extra muscle mass. Some elderly people can have unusually low BMI’s due to the natural decline of muscle mass with age.

Summary: The BMI is a quick and easy way to assess the weight of the “average” person, works best on large populations, but it still does not tell us anything about what you are made of. I find it useful for people who have never been active. It is very quick and easy to do, gives them a nice simple answer at the end and often it helps people make the final step to improving their diet and activity levels.

But if your BMI score is in the unhealthy range, please don’t do the usual things and say “it’s because muscle weighs more than fat”...because unless you *really do train like a professional rugby player*...I’m afraid it’s probably because your overweight. Harsh, but true I’m afraid.

Personally, I don’t bother much with the BMI scale for myself or any of the people I train. When new people start training for the first time, there are so many different things happening to their body (not just fat loss) that their BMI score seems to go all over the place!

Waist/Hip Ratio

What is it: This is a way to measure abdominal obesity, or how much fat you have round your belly. It compares your waist and hips to give an idea of the distribution of body fat (to see if you are “apple” or “pear” shaped). You get the score by dividing the circumference of your waist by your hips. This is what the NHS says about carrying too much fat around your waist:

“Extra fat around your middle increases the risk for a number of serious health problems including diabetes, high blood pressure, high cholesterol, and an inadequate blood flow to part of the heart muscle, which can cause a heart attack.”

When you get your score, check where you fall in the following table:

	Acceptable		Unacceptable	
	Excellent	Good	Average	High
Male	< 0.85	0.85 – 0.90	0.90 – 0.95	> 0.95
Female	< 0.75	0.75 – 0.80	0.80 – 0.85	> 0.85

This is usually used to work out potential health risks, as opposed to working out how much fat you are carrying.

Pros:

- Very cheap and simple to do. All you need is a tape measure and calculator.
- If you are overweight and have started a good exercise programme, you may see improvement here before the Bathroom Scales or BMI.
- Suitable to do on large groups/populations of people.

Cons:

- It does not estimate how much body fat you have.
- You need to be careful to measure in consistent places or you will get different results without getting a different body.
- Not much use for athletes and people who are fit and healthy, as it will just tell them what they already know – that they don't have much fat round their belly.



Measure waist
at narrowest point

$$\text{Ratio} = \frac{\text{Waist}}{\text{Hips}}$$

Measure hips at
widest point

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Summary: There is a good link between the waist/hip ratio and many health risks. I would suggest to not bother using it for estimating how much body fat you have. It was never meant to do that anyway. It is best suited for sedentary people and those who currently are, or are borderline overweight. As they get healthier they will see definite improvements in this score, which can be very motivating.

Assessments of Body Composition: Body Fat

Here in part 2, I'm going to cover ways to measure your body *fat*. And this is the important thing. A common goal of many people is to lose *weight*, when they should be trying to lose *fat*. The following methods are ways to measure how much body fat you are carrying. I would say that it is *much* more important to maintain a healthy *fat* level, than an arbitrary *weight*.

Skinfold Calipers

What is it: These are tools that pinch various parts of your body (usually between 3-9 different places) and measures the thickness of the fat there. The more body fat you have, the greater the measurement.

You can either use the measurements directly (if the sum total of your measurements are reducing, you are losing body fat. If they are increasing then you are gaining body fat), or they can be plugged into various complex equations. These take your sex, height and age into account and give you an estimate of your body fat percentage (how much fat you have compared to everything else).

Your body fat percentage is compared to the following:

Men

- 3-5% - Essential Fat
- 5-13% - Sport performers
- 12-18% - Health/Fitness
- 19-24% - Potential Risk
- >25% - Obese

Women:

- 11-14% - Essential Fat
- 12-22% - Sport performers
- 16-25% - Health/Fitness
- 26-31% - Potential Risk
- >32% - Obese



Why are the womans percentages all higher than the mens? That's just biology for you. Women have to be able to do things that men don't have to worry about (like delivering babies). So they are built in different ways.

Pros:

- These do directly measure how much body fat you have at various parts of your body. This is a much more personalised assessment.
- These can give an estimate of how much body fat you have in total. So it does not matter how much you weigh, as long as your body fat percentage is under control.
- Cheap – a robust entry level set of calipers can be bought for less than £20.

- Quite simple to start using them, and when used correctly they are an accurate and reliable way to measure your body fat levels.
- You get actual measurements from many parts of your body. These include many “trouble spots” like belly, bingo wings, love handles etc.

Cons:

- Difficult to get consistent results. Every person will pinch you in slightly different ways, so make sure you are assessed by the same person each time.
- While simple to use, it does take a lot of experience to get consistent, reliable results. It is often said you need to have done at least 100 assessments before you get consistent and reliable.
- There are many equations out there that estimate your total body fat percentage. Because of where the research was done (sports science universities), most of these equations relate to fit and healthy western white blokes. But there are different equations for different sexes, ethnic origins, age-groups etc. I’ve seen the same data plugged into 2 different equations and give results of 7% and 17%! That’s a big difference! So make sure you use the appropriate equation!
- Because of how the equations work, a very small inaccuracy in the pinching can grow into a very big inaccuracy when estimating the total body fat percentage.
- Due to the positions where the body fat is pinched, you need close physical contact with people who are not wearing many clothes. High levels of professionalism and trust are required or you can get into serious trouble.
- For practical reasons, it is very hard to assess large groups/populations of people in this way.
- For practical reasons, it can be difficult to measure the extremely obese.

Summary: This is the first method so far that actually gives an estimate of your body fat levels and can tell you if they are increasing or decreasing. And I think that’s probably the best way to use it. While it is great fun to work out your body fat percentage and how much your flab weighs, it is very difficult to do this reliably.

A better way is to assess the *changes* in your body fat levels. You do this by comparing the sum total of your skinfold measurements and make sure it is going in the right direction.

If you would like a skinfold caliper assessment for yourself, [Contact Me](#) for an appointment.

BIA - Bioelectrical Impedance Analysis

What is it: You might have seen these in many shops – Body Fat Scales. These come in various shapes and sizes but they work in the same way.

An electrical charge is passed from one electrode to another (you don’t feel *anything*) and the devices estimates your body composition from the results. How



does it do this? The device detects how much resistance the electrical current encountered through the body. Muscle tissue (which contains relatively high amounts of water) presents little resistance to the electricity. Fat however, contains relatively low amounts of water, so presents a higher resistance to the electricity.

The device takes into account various factor about your (age, gender, height, weight) and using various equations gives an estimation of your body fat percentage.

The 3 main shapes available are:

- Handheld – this passes the charge up one arm, through the chest and down the other arm. This only actually measures the top part of your body and the device uses various equations to “guess” the rest of your body. As a rule, these are the least reliable.
- Scales to stand on – this passes the charge up one leg and down the other. This actually only measures the bottom half of your body and uses various equations to “guess” the rest of your body.
- Freely connecting electrodes – these clip onto a hand a foot and passes the charge up the arm, through the torso and down the leg. This measures from the tip of one arm, through the body to the tip of the foot...so it has a lot less “guessing” to do. As a rule, these are the most reliable

Pros:

- These devices are coming down in price all the time. I bought my scales for £20.
- They are very portable. Good ones can slip easily into a laptop case.
- No training is required to use these. Just enter the subjects physical data and it does the rest itself.
- Non invasive and suitable for people to do practically anywhere. People can keep their clothes on (only the points where the electrodes contact need be bare skin).
- Under the right circumstances, they are highly consistent.
- Fast. It only takes a few seconds and you have a result.



Cons:

- A major factor effecting the results is the subjects hydration levels. If they are well hydrated (drunk fluids within the past few hours, or not taken a piss recently), the machine will think there is more water containing muscle and *underestimate* fat levels. If they are dehydrated (been exercising, sweating, just woken up, been drinking alcohol/caffeine in the last few hours or just taken a piss), then the machine will think there is more water scarce fat and *overestimate* fat levels. According to my scales, by body fat varied by over 5% within 30 minutes...just because I had breakfast!
- As with the skinfold calipers, there are various equations that can be used for various populations. But with these devices you are usually restricted to the 1 or 2 preprogrammed into it. If your subject does not of the appropriate

population, then tough. Different equations make a big difference! I used the 2 preprogrammed equations in my scales and the results varied by 10%!

Summary: This is a quicker, more convenient way to estimate body fat levels. By taking the human element out of the measurement, it is easier to be consistent. In other words, it is more automatic. This is more than suitable for most people, as long as you bare in mind the many ways that throw off the results.

But it can't give you the fine detail the skinfold calipers can. In other words, you don't actually measure the body itself and you don't get any information about different *parts* of the body.

Make sure you know what kind of information you want and use the appropriate tool for the job.

Hydrostatic (underwater) weighing

Disclaimer!! From this point forwards, I have no actual experience with these methods. I'm just repeating to you what other, cleverer and richer people have said. If you have actual experience with the following, please correct me if I'm wrong.

What is it: With this method you are actually weighed twice. Once on dry land (just put on the scales and weighed), then again while you are *completely submerged under water* after emptying your lungs of air. Because we float slightly, there are 2 different measurements. These 2 measurements are then put through various equations and the *density* of your body is worked out. This is done using the Archimedes principle (he who jumped out his bath shouting "eureka!").

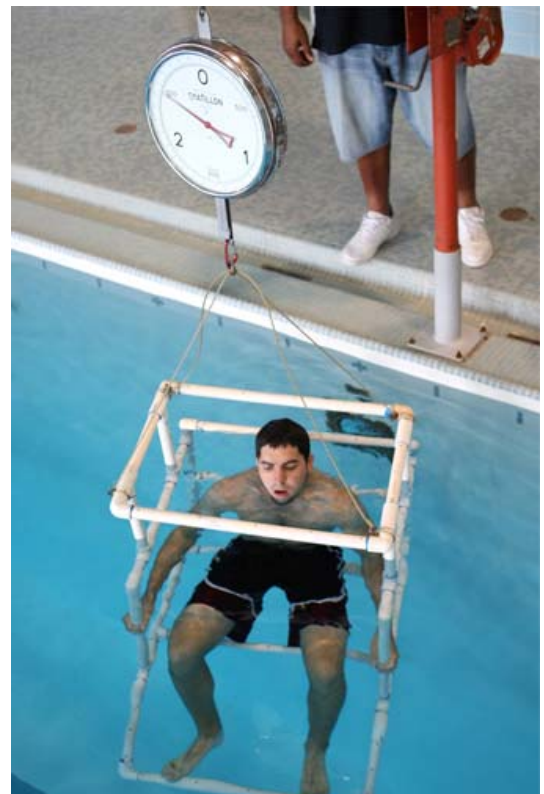
As we all know, different materials (fat, muscle, bone etc) have different densities and so float to varying degrees. By comparing your density to that of other known materials, your body fat percentage is worked out.

Pros:

- Very accurate and considered the "gold standard" when it comes to assessing body fat levels. This means, all other ways of assessing body fat levels are compared and calibrated with this method.

Cons:

- Price and availability. This method requires big, specialist equipment, usually found in sports science universities. It requires specialist training to conduct it, so all this means you may have to travel very far to find one and it costs you loads.



- As with the previous 2 methods, fat levels are still only *estimated* using equations derived from research on various populations. So it requires using the *correct* equation or results can be wrong.
- Because this measures density of your *whole body*, the air in your lungs are also included. This means you are required to *empty your lungs and then submerge your head under water*. This is neither easy or pleasant to do. But the more air you have in your lungs, the less your average density so the more likely to have your fat levels *overestimated*.

Summary: By all accounts, this is the best, most accurate way to measure your fat levels. But the cost and practicalities make it very hard to justify for most people. Do you really need that accuracy? If you are professional athlete, maybe you do...but if your average Joe Bloggs, I doubt it.

Dissection

What is it: This is the only true and accurate way to determine your body fat levels...have a pathologist surgically cut every last gram off the body and put it all on a set of scales.

Pros:

- The only method to accurately *measure* the fat levels, as opposed to *estimating* it.
- Very accurate and reliable.

Cons:

- Expensive. You will need a pathology lab and a qualified and experienced pathologist to do the procedure...
- ...Oh yes, and if you were not dead before this, you *certainly* will be dead after it.

Summary: Not very practical, I think you will agree. I just put it in here for completeness.

But on a slightly serious note, this is the *only* method that you should believe if it gives you a body fat percentage that includes a decimal point. This method is accurate enough to do this. With *any* other method, please ignore the decimal point...they simply do not have the resolution to be able to go that far.

Conclusions

As you can see from all the methods I've covered, there are pros and cons for each method. There is no single "perfect" way to assess your body fat levels. So which one(s) you choose depends on who you are and what your goals are.

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