

okay to do so for medical reasons, the client may still feel uncomfortable about it or prefer not to. Additionally, Sikh men often wear a turban as part of their faith.

Some of your clients will not be able to stand. Thus, you can measure their height while lying supine from the bottom of the feet to the crown of the head. For weight measurement, there are some beds that have a scale built into them in which you can weigh the client. Also, for clients that are in wheelchairs, there are often scales in which they can be wheeled onto the scale so that they can be weighed; you would need to weigh the wheelchair separately and subtract that from the total.

Priorities of Care

In acute settings, there may be times in which weighing the client daily is important or when symptoms related to certain diseases (e.g., heart failure, kidney disease) suggest sudden weight gain. For example, a daily increase of 2.5 kg in a 24 hour period should prompt you to consider what is causing this (e.g., fluid accumulation), how it is affecting the client (e.g., swelling, shortness of breath), consequences in

terms of worsening condition, and the potential for medical intervention. In addition to reporting these findings to the physician or nurse practitioner, you should inquire about any associated symptoms and assess the client's vital signs, auscultate lungs, and inspect for fluid accumulation (e.g., swollen legs and arms).

Clinical Tips

When a client requires regular weight checks due to a specific health condition, be sure to measure their weight at the same time each day (typically before breakfast) and have them wear the same or similar clothing each time such as a hospital gown. When possible, it is best to use the same scale with continuous measurements as the equipment can sometimes affect accuracy.

Considering that weight can be a sensitive and difficult topic, it is important to **use an inclusive approach** such as:

- Use a straightforward, matter of fact approach with all measurements. Provide relevance to measurements. “I need to measure your weight because...”
- Maintain privacy. This can sometimes be difficult

when scales are often in a common area or hallway in clinical settings.

- Consider posting a chart with height/weight conversions. Although the metric system (kilograms and metres) is used in Canada, many clients will still ask for height in feet/inches and weight in pounds (and many health care settings automatically tell clients these measurements as they know they are going to ask).
- Always be open to and recognize that some clients will turn their back to the scale and will not want to know the actual number. It is important to offer and respect this choice and inquire if the client wants to know their weight.
- Unless it is essential to know a client's weight, consider accepting their word, until you have a therapeutic relationship with that individual; this may well be at a future clinical visit.

Knowledge Bites

Weight scales must be calibrated as per the equipment guidelines. If you notice that they are not accurately calibrated, there is usually a tech expert in your institution

that can fix the scale. However, it is not too difficult to do it yourself. As additional information, here is a [video](#) that shows how to fix a scale that is not properly calibrated.

Activity: Check Your Understanding



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Body Mass Index

Body Mass Index (BMI) is an anthropometric body measurement that is calculated by **weight divided by height**. See **Figure 3** for the formula based on the imperial and metric system calculations. Adapted from WHO, Health Canada (2003) describes the following categories of BMI:

- Underweight (BMI less than 18.5) – increased risk of developing health problems.
- Normal weight (BMI 18.5 to 24.9) – least risk of developing health problems.
- Overweight (BMI 25 to 29.9) – increased risk of developing health problems.
- Obese (BMI 30 and over) – high risk of developing health problems.

However, Obesity Canada (Rueda-Clausen et al., 2020) outlines recommended BMI classifications that take into consideration ethnicities. For information check out the [Canadian Adult Obesity Clinical Practice Guidelines](#) on pg. 3 for information related to South-, Southeast- or East Asian ethnicity.

Also, you can check out the nomograms provided by Health Canada, called the [Canadian Guidelines for Body Weight Classification in Adults – Quick Reference Tool for Professionals](#).

Steps in measuring BMI are:

- Measure height and weight.
- Calculate BMI based on formula outlined in **Figure 3**. Round the BMI to one decimal point. For example, if the client weighs 50 kilograms and is 1.5 metres, then the BMI is: 22.2. If the client's weight is 160 lbs and is 5.2 in feet, then, the BMI is: 29.3.

Metric system	Imperial system
$\frac{\text{Weight (in kilograms)}}{\text{Height}^2 \text{ (in metres)}}$	$\frac{\text{Weight (in pounds)}}{\text{Height}^2 \text{ (in inches)}} \times 703$

Figure 3: BMI formulas

Knowledge Bites

Although it is important to be aware of this formula, it is **essential to be aware of how it is a flawed and racist** health standard particularly for people of colour and for people with high muscle mass.

Let's start by briefly reflecting on the **origins of BMI**, which will help you begin to understand its limitations.

BMI is commonly known as an indirect reflection of total body obesity. Originally, BMI was developed based on data from **European populations of white men** (AMA as cited by Tanne, 2023; Stewart, 2022). This is an important point

considering that body shape, structure, and composition are influenced by factors such as sex, race, and age (Tanne, 2023). For example, people who are Black have higher levels of bone mineral content and density than people who are white (Wager & Heyward, 2000). In addition, it has been found that in comparison to white women, Black women have muscles and bones that are heavier and have an increased quantity of body water (Aloia et al., 1997). Also, the BMI measurement can't differentiate fat from muscle (Karasu, 2016). As a result, someone with increased muscle mass may be identified as obese according to the BMI standard. Additionally, people who are South Asian typically have smaller body frames which influences BMI (Nair, 2021). These differences make a measurement such as BMI (which focuses merely on weight and height) an inaccurate measurement of body fat and obesity.

Despite Billewicz and colleagues writing in the 1960s that formulas like BMI couldn't measure fat, it still remains a well known and commonly used measure in today's society to identify obesity (as cited in Karasu, 2016). It is only recent that organizations such as the American Medical Association (2023) have finally highlighted that BMI alone is not appropriate for measuring body fat and that it doesn't take into consideration differences across age, sex, and race.

Contextualizing Inclusivity

If using BMI in your practice, keep in mind that you need to **use the sex assigned at birth** in the trans and gender-diverse population when determining a client's normal BMI. This can be quite distressing for some clients so it is important to be sensitive to this. There may be weight requirements for certain gender-affirming surgery making a sex-based measurement such as BMI problematic in this population.

Health Canada (2003) indicates that the BMI classification system **should be used carefully** with certain racialized groups, people with lean or muscular builds and those over 65 years of age. If BMI data is collected in the setting you work, it is important to **have a critical eye** in how you use it and possibly draw your colleagues' attention to its limitations particularly with racialized groups. Additionally, be aware of how the data may affect different clients from an emotional, psychological, and physical perspective. For example, some Black adolescents are constantly told to lose weight because their BMI is high. This can be distressing for them, and can result in mental health issues, eating disorders, and maladapted healthcare seeking behaviours (i.e., avoiding going to health care visits).

Based on the North American standards for BMI, it may appear that many Asians have a lower incidence of obesity. However, in a study on Asian Americans, it was

noted that they are more likely to gain weight centrally which is associated with comorbidities such as diabetes and cardiovascular disease (Li et al., 2022). Lower cut-offs for BMI for Asians may be needed to better reflect the difference in patterns of adiposity (Li et al., 2022).

Cases to reflect upon:

(1) A young black female was assessed as being overweight based on the original BMI scores. This led to the young female joining a weight loss program and losing most of the required weight. However, when she got to what was considered the high end of her weight range, her family became extremely concerned because she was becoming very thin and rather gaunt. A family physician was consulted and indicated that her weight loss be considered successful at the top end of the scale.

(2) A college football player has a low body fat percentage but a BMI of 33. As the healthcare provider, you may recognize that this BMI is in the obese range. Without acknowledging the limitations of BMI measurements, one might suggest a lifestyle change. However, it is important to recognize that BMI cannot differentiate between muscle and fat.

Priorities of Care

If someone's BMI is high or low, you should have a discussion with the client **focusing on their health and well-being**. It is important to ensure they are an **active partner** in the discussion and the health decisions made. When engaging in discussions, be sure you consider social determinants of health such as food security. If someone isn't food secure, you should consider discussing resources that may support them (e.g., food banks and certain healthy alternatives). You should also consider trends in BMI and whether there has been a trend upward or downward; thus, comparing the measurement to previous BMI is important.

Activity: Check Your Understanding



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Other Anthropometric Body Measurement Assessments

There are several other anthropometric body measurements used in healthcare settings. In this section, three additional measurements are discussed including:

- Waist and hip circumference.
- Waist-to-hip ratio.
- Waist-to-height ratio.

These measurements provide data related to **central adiposity**. Some research has suggested these body measurements are better predictors of certain diseases (such as diabetes) in comparison to BMI measurements (Mirzaei & Khajeh, 2018).

A **vinyl, flexible, non-stretch tape measure** should be used to assess waist and hip circumference. Its flexible nature allows for accuracy and the vinyl composition allows for cleaning after use. For both waist and hip circumference, discuss with the client that their waist and hip will need to be clear of any clothing. It is best to perform measurements on bare skin. You should stand at the client's side and ask them to stand with arms hanging down at their side.

Waist circumference

Waist circumference refers to the **distance around the waist**. This measurement is used as an indicator of health risk based on excess adipose tissue around the waist (Health Canada, 2003). Although not currently used as common in practice as BMI, it has been found that waist circumference may be a better marker of health risk because of its focus on central adiposity around the abdomen (Ross et al.,

2020). It is suggested that waist circumference provides information about the quantity of fat surrounding the body's main organs (e.g., heart, liver, kidneys). However, it is suggested that BMI and waist circumference measurements together (as opposed to alone) are a better approach in measuring obesity (Ross et al., 2020). Bosomworth (2019) indicates that a measurement that reflects central obesity is a better indicator of disease and mortality than BMI, and that a combination of the two is best.

Steps in measuring **waist circumference** include:

- Wrap the tape measure around the waist so that it is placed halfway between the lower margin of the ribs (at the mid-axillary line) and the lateral/superior edge of the iliac crest (the outside and top of the ilium). See **Figure 4**. This is the most common protocol, but keep in mind that it varies across and within institutions and countries. If your institution doesn't have a protocol, document your measurement location.
- Ensure the tape measure lays flat around the waist and parallel to the floor (it should be snug around the waist, but doesn't compress the skin).
- Ask the client to take two or three normal breaths and measure the waist just after the client breathes out when they are relaxed.
- It is best to repeat the process twice to confirm accuracy.

The guidelines indicate that there is increased risk of developing health problems when the waist circumference is greater than or equal to 102 centimetres (40 inches) in men and greater than or equal to 88 centimetres (35 inches) in women (Adapted from WHO, Health Canada, 2003). However, Obesity Canada (Rueda-Clausen et al., 2020) has proposed waist circumference cut-off points to take into consideration ethnicities. For additional information check out (pg. 5): [this link](#)

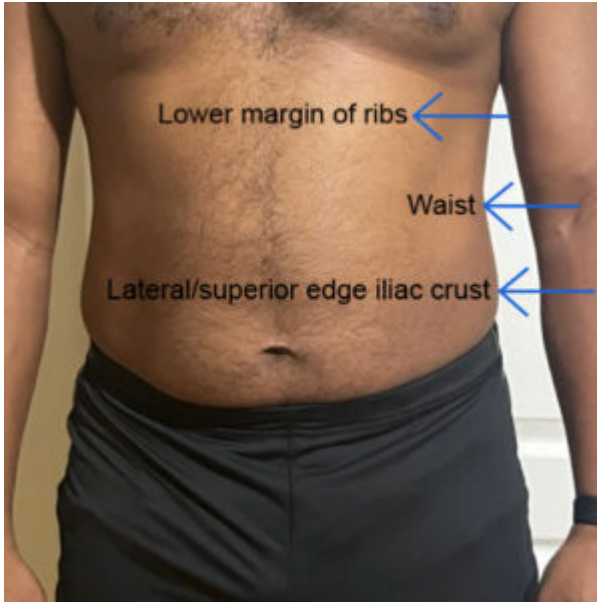


Figure 4: Waist circumference location

Waist-to-hip ratio

The **waist-to-hip ratio** refers to **waist circumference divided by hip circumference** (Andreacchi et al., 2021).

Steps in measuring waist-to-hip ratio include:

- Measure the waist circumference (as previously described)
- Wrap the tape measure around the hips so that it is aligned at what is typically referred to as the widest portion of the buttocks and hips (Andreacchi et al., 2021). See **Figure 5**.
- Then, you follow this formula: waist circumference divided by the hip circumference. For example, if the waist circumference is 76 centimetres and the hip circumference is 91 centimetres, the waist-to-hip ratio is: .84

The WHO (2008) guidelines indicate that increased risk is associated with waist-to-hip ratios of greater than or equal to .90 centimetres in men and greater than or equal to .85 centimetres.



Figure 5: Hip circumference location

Waist-to-height ratio

The **waist-to-height ratio** is a measurement of central adiposity (Yoo, 2016). The formula is: **waist circumference divided by height**.

Steps in measuring waist-to-height ratio include:

- Measure the waist circumference (as previously described) and measure the height (as detailed earlier).
- Then, you follow this formula: waist circumference divided by the height. For example, if the waist circumference is 76 centimetres and the height is 162 centimetres, the waist-to-height ratio is: .47

It is suggested that a waist-to-height ratio of .5 or higher means the client may have an increased risk for certain diseases. The optimal waist-to-height ratio is based on the belief that the client's waist measurement should be less than half their height.

Contextualizing Inclusivity

It is best to use a trauma-informed approach when taking these measurements. For example, place the tape measure at the side of the waist/hips and ask the client to hold it momentarily while you walk around them and wrap the tape measure around the waist/hips. This approach is less intrusive than reaching up and around the client to place the tape measure around them.

Knowledge Bites

There is research on how fat distribution varies across individuals from different cultural backgrounds. Wagner and Heyward (2000) note that many individuals who are Black and/or of African descent show patterns of carrying

more adipose tissue on the body's trunk than the legs. Thus, waist circumferences could be affected.

Clinical Tips

You should inquire about food/fluid intake, constipation or gas, and any swelling on the day of measurements because the amount of fluid/water, gas, and edema can affect waist measurements.

Activity: Check Your Understanding



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Children and Body Measurements

Anthropometric body measurements (including weight, height and BMI) are commonly used to measure and **track growth over time in children** (infants, children, adolescents). Unlike adulthood, there are substantial periods of growth and development in childhood. As a result, it becomes even more important to not make judgments or decisions based on one measurement in time with children but rather consider measurements over a period of time (Dieticians of Canada and Canadian Paediatric Society, 2014). Keep in mind that health comes in all sizes and shapes (OSF Healthcare System, 2023).

Height, weight, BMI and other body measurements are considered in the context of **growth charts** which are **percentile curves in reference or relative to children of the same age and sex** (Dieticians of Canada and Canadian Paediatric Society, 2014). In this chapter, you are introduced to percentiles for children aged 2 to 19 years of age. In Canada, these are based on the World Health Organization.

Boys' individual charts (based on sex assigned at birth):

- [2 to 19 years: boys – height-for-age and weight-for-age percentiles](#)
- [2 to 19 years: boys – body mass index \(BMI\) for age percentiles](#)

Girls' individual charts (based on sex assigned at birth):

- [2 to 19 years: girls – height-for-age and weight-for-age percentiles](#)
- [2 to 19 years: girls – body mass index \(BMI\) for age percentiles](#)

Interpretations

See **Table 2** for cut-off points for percentiles from the Dietitians of Canada and Canadian Paediatric Society (2014). Keep in mind that this table provides a simple understanding and in fact a full understanding of these cut-off points is much more complex. These are commonly used in primary care. When using these, additional training is suggested. Please see [Dietitians of Canada](#) for more information about training and additional interpretations.

In terms of how to read percentiles: an example is if a child's BMI is 80th percentile, that means that the child's BMI is more than 80% of children the same age and sex.

Table 2: Cut-off points

Growth status and indicator	2 to 5 years of age percentile	5 to 19 years of age percentile
Underweight Weight-for-age	<3rd	<3rd
Severely underweight Weight-for-age	<0.1st	<0.1st
Stunted Height-for-age	<3rd	<3rd
Severely stunted Height-for-age	<0.1st	<0.1st
Wasted BMI-for-age	<3rd	<3rd
Severely wasted BMI-for-age	<0.1st	<0.1st
Overweight BMI-for-age	>97th	>85th
Obese BMI-for-age	>99.9th	>97th
Severely obese BMI-for-age	n/a	>99.9th

Priorities of Care

Unexpected downward or sharp upward trends should be closely evaluated. Keep in mind that a trend is a general direction/change over a period of time and multiple measurements. For example, if a client shows a decrease in weight over multiple primary healthcare visits, this is something that should draw your attention. You may begin with a discussion about whether they have noticed the weight loss and whether there are any factors that may be contributing to this finding. You will want to continue to monitor whether this in fact is a trend that is of concern or whether it is just temporary.



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bodymeasurements/?p=34#h5p-6](https://pressbooks.library.torontomu.ca/bodymeasurements/?p=34#h5p-6)

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Key Takeaways

- Anthropometric body measurements are non-invasive and quantitative measurements related to body size and adipose tissue.
- It is important to problematize the assessment and evaluation of anthropometric body measurements.
- An inclusive approach to body measurement assessment is an approach that works towards ensuring that clients feel valued, involved, and heard.
- Height refers to the distance upward (ie., how tall a person is) and is typically reported by healthcare professionals in metres/centimetres in Canada and weight refers to the amount that a person weighs (ie., how heavy they are) and is typically reported in kilograms in Canada.
- Although it is important to be aware of the BMI formula, it is essential to be aware of how it is a flawed and racist health standard particularly for people of colour and for people with high muscle mass.
- Other anthropometric body measurements used in healthcare settings include waist and hip circumference, waist-to-hip ratio, and waist-to-height ratio.

Glossary

adipose tissue

refers to fat tissue.

health equity

is when all individuals have fair access to resources that they need and fair opportunity to reach their full potential and optimal health and well-being (Public Health Ontario, 2023; WHO, 2023).

neoliberal

in the context of healthcare, refers to an emphasis on personal autonomy and individualism.

trends

are general directions/changes over time (e.g., weight loss or weight gain).