



Inclusive Approach to Anthropometric Body Measurement Assessments

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“Inclusive Approach to Anthropometric Body Measurement Assessments” is an open educational resource (OER) created for undergraduate nursing students at the introductory level. The resource introduces students to body measurements, but does so in an inclusive manner. This resource is a unique contribution to nursing education as content is theoretically informed by an inclusive approach to assessment that incorporates culturally-responsive techniques related to race/ethnicity, gender/sex/sexual orientation, body sizes/types, and ability/disability. It is part of the first health assessment resource that is informed by clinical judgment with the goal to facilitate students’ clinical decision making and ability to prioritize care by recognizing and acting on cues and signs of clinical deterioration. Interactive clinical judgment activities and formative assessments to evaluate a student’s learning are integrated throughout the resource. The integration of clinical judgment throughout this resource will support students’ capacity to enhance patient safety and equitable health outcomes as well as their success in writing national nursing exams to become licensed to work as a Nurse.

This OER builds on existing open resources specific to health assessment including:

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Acknowledgments

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Learning Outcomes

- Apply skills related to anthropometric body measurements.
- Understand the racist origins of anthropometric body measurements.
- Examine the impact of unreliable anthropometric body measurements.
- Integrate inclusive and anti-racist approaches to anthropometric body measurements.

Introduction to Anthropometric Body Measurement Assessments

Anthropometric body measurements are **non-invasive** and **quantitative** measurements related to body size and **adipose tissue**. Examples of measurements discussed in this chapter include: height, weight, body mass index (BMI), waist and hip circumference, waist-to-hip ratio, and waist-to-height ratio.

It is important to first note that these measurements are **not diagnostic tools** and should never be used alone in assessing a person's health. Anthropometric body measurements are important in healthcare and are assessed and evaluated for several reasons:

- Broadly speaking, these measurements can provide information about a client's state of health, nutritional status, and help evaluate risks associated with certain diseases.
- In particular, these measurements help determine a client's growth throughout the lifespan (e.g., development and patterns) and potential growth problems such as growth delays in children.
- In primary care or long-term care, these measurements help evaluate **trends** over time such as weight loss or weight gain or height loss associated with aging and disease processes.
- In acute care and also with chronic illnesses, weight measurements can provide information about fluid gain and fluid loss and are also important in relation to the calculation of certain medication dosages particularly with children.
- Sometimes, it is important to elicit a baseline weight which is then reassessed at each healthcare visit and in certain cases, daily.

In this chapter, we will problematize anthropometric body measurements and discuss an inclusive approach

Contextualizing Inclusivity

The dominant discourse about health and well-being in nursing and medicine is one that focuses on weight-centred discussions (O'Hara & Taylor, 2018). And yet, these discussions negate a myriad of factors related to health and well-being. Additionally, it has been found that dieting is a strong predictor of weight gain (O'Hara & Taylor, 2018). Thus, we need to shift these discussions so that they are **focused on health and well-being**, the social determinants of health, and factors contributing to **health equity** (O'Hara & Taylor, 2018).

Clinical Tips

The limitation of one-time body measurement assessments is that they are restricted to one point in time. It is best to consider trends in body measurements across a period of time.



An interactive H5P element has been excluded from this version of the text. You can view it online here:

<https://pressbooks.library.torontomu.ca/bodymeasurements/?p=22#h5p-1>

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Problematizing Anthropometric Body Measurement Assessments

It is important to **problematize** the assessment and evaluation of anthropometric body measurements and reflect on **how these measurements are used** since they are **biased and not neutral**. For example, these body measurements may bring to the forefront body image issues that are closely related to one's personal identity (Puhl, 2022). Additionally, the origins of these measurements are deeply embedded in racist, sexist, and ableist discourse. Evidence concerning how to use these measurements has shifted and is continuing to shift. We delve into this evidence in this chapter.

It is important to be **attentive and critical** of how weight and health are constructed within society, and especially within the media. In Western society, dominant body ideals of thinness have existed for many years. In many of today's cultures (including Western society), a thinner body often suggests an **illusion of health** (Farrell, 2011). But this is not necessarily true, and it is important to NOT assume someone is healthy just because they are thin. Additionally, when a person does not fit this thin ideal, their body image and personal identity can be adversely affected leading to and/or exacerbating physical and mental health issues.

We live in a culture where fat shaming is normalized; people who are overweight and obese are stigmatized and made to feel ashamed of and blamed for their body size and medical issues that may arise (Dolezal & Spratt, 2022; Spratt, 2021). The cultural stigma surrounding weight/obesity inhibits the ability to fully examine health issues and health outcomes (Farrell, 2011). This stigma can limit individuals (such as healthcare providers) to identify and

recognize medical concerns versus aesthetic concerns (Farrell, 2011).

Contextualizing Inclusivity

In the context of healthcare, a **neoliberal** discourse can be marginalizing because it can **negate** the influence of **social determinants of health**. It also reinforces a shaming/blaming discourse in which the individual is solely responsible for their weight. Similarly, while body positivity and the Health At Every Size movements have recently come to frame wellness as acceptance and empowerment, this also places an onus on the individual to achieve “health” and prove health through other forms of measurement such as blood pressure, heart rate, and cholesterol levels (Gibson, 2022). It is important to see how such discourses may place a moral obligation on individuals to project health, whilst ignoring the social and biological influences which may constrain efforts (Gibson, 2022).

These kinds of discourse can have a **negative impact** on physical and mental health in which the person may gain additional weight as a result of a negative feedback loop (Brewis & Wutich, 2019; Meulman, 2019). The stigma surrounding obesity can also lead to eating disorders and mental health conditions such as depression (Chakravorty, 2021; Puhl et al., 2014). It **assumes that obesity is a choice** and negates social

determinants of health such as structural and socioeconomic factors (Dolezal & Spratt, 2022). This neoliberal and shaming/blaming discourse is problematic because: it assumes a singular notion of health; it assumes that access to healthy food choices and healthy lifestyles is equal across populations; and does not address the complex causes of obesity (Spratt, 2021).

Knowledge Bites

See FoodShare TO's (2021) panel titled "[Dismantling fat shaming and weight stigma in health and wellness spaces.](#)" This panel discussion problematizes the singular notion of health and will help you understand the concept of "fat oppression" and "body liberation" and the important role you play in activism.

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Inclusive Approaches to Anthropometric Body Measurement Assessments

Although it is important to assess and evaluate anthropometric body measurements, **how you do so** is just as important in order to promote inclusivity. An **inclusive approach** to body measurement assessment is an approach that works towards ensuring that clients feel valued, involved, and heard. It is also an approach that aligns with and supports what is important to the client as opposed to what is important to you as a healthcare professional – these two do not always align.

An important component of inclusive approaches is **anti-racism**. Anti-racism involves an active approach to centring the voices of racialized people and dismantling all forms of racism including systemic and institutional racism (Hassen et al., 2021). It is important to recognize that racism affects every aspect of a racialized person's life (Prendergast, 2023). And that means, racism affects body measurement assessments and evaluations. Although we will get deeper into this discussion, you need to consider how you can engage in anthropometric measurements from a critical and anti-racist stance.

For example, in order to do so, one must critically examine and reflect upon concepts of **power and oppression**. An anti-racist approach must actively **challenge whiteness**: which “is not about being white ... [but about] the racial power which has claimed normative dominance” and continues to nurture, sustain, and reproduce racist institutions and systems (Patel, 2021). Recall the history and origins of these measurements and whether they apply to all bodies.

As a nursing professional, it is important to consider what you

can do to ensure body measurement assessments are performed in an inclusive manner. See **Table 1** for guiding principles of inclusive practice to anthropometric body measurement assessments.

Table 1: Principles of inclusive practice to anthropometric body measurement assessments

Principle	Considerations and examples
<p>Broaden your understanding of unconscious (implicit) biases surrounding weight</p>	<p>There is evidence showing the role of unconscious bias surrounding weight and racism (Lofton et al., 2023). This unconscious bias influences healthcare professionals' anti-fat attitudes (FitzGerald & Hurst, 2017). You should reflect on your own unconscious biases because they can have a negative effect on clients' health and wellness. For example, it has been found that Black clients who are overweight (in comparison to white clients who are overweight) report poorer healthcare provider communication including spending less time with them and explaining things less clearly (Wong et al., 2015).</p>
<p>Consider whether and how a body positive approach is appropriate</p>	<p>A body positive approach is the acceptance of all bodies at any size, shape, ability or any other characteristic. Focusing on a client's strengths is important, but it is also important to not lay the onus regarding health on the client solely. Thus, a body positive approach must be used cautiously. Keep in mind that there are many social determinants of health that influence health and wellness and that clients cannot fully control all factors that influence their body or these factors are outside of the control of clients (e.g., racism, safe housing, access to food). You should engage in conversations and assessment in ways that are non-judgmental and empathetic.</p>
<p>Actively listen to the client and amplify their voice</p>	<p>It is important to spend time listening to all clients and amplifying their voices. Their experiences and stories are vital to helping you understand factors in their life that may influence their health and body measurement findings. Additionally, what is important to them should help inform your thinking and approach.</p>
<p>Avoid generalizations when assessing clients</p>	<p>Normal anthropometric body measurements can sometimes be a misnomer considering the many factors that influence weight among other measurements. Thus, you should avoid generalizations in terms of merely inferring from broad principles and standards. Rather, you should consider each person as an individual and recognize variations.</p>

<p>Avoid reliance on one measurement in time in assessment practices</p>	<p>An anthropometric measurement only provides a one-time snapshot of the client's health and well-being. Considering trends over time and over multiple anthropometric measurements provides a more comprehensive overview of their health and well-being. Also, considering that measurements can fluctuate (e.g., weight can fluctuate on a daily basis and throughout the day due to factors such as hormones and fluid intake), it is important to consider weight ranges. For example, you may ask the client: "what is your normal/usual weight range?"</p>
<p>Avoid reliance on one anthropometric body measurement related to clients</p>	<p>Evidence concerning the various anthropometric body measurements continues to shift in terms of which ones best predict disease and mortality. Currently, it is best to use a combination of body measurements (more to be discussed later in this chapter).</p>
<p>Recognize the multi-dimensional causes of obesity</p>	<p>There is the misperception that the sole cause of obesity is behavioural-related (i.e., eating too much and an inactive lifestyle) when in fact the causes of obesity are multi-dimensional and also much more complex. It is important to consider the social, economic, genetic, environmental, metabolic and hormonal dimensions as well as factors related to one's physical and mental health. For example, trauma can contribute to weight gain or weight loss.</p>

Contextualizing Inclusivity

Supporting a client's **agency and providing choice** is important in terms of sharing information with clients about their body measurements. For example, it may not be important to a client to know their weight. Rather,

they may monitor their weight/size by the fit of their clothes. Additionally, body measurements may not be important or even a factor in how clients monitor their health and quality of life.

As you reflect on the various anthropometric body measurements, it is important to recognize that the suggested norms vary based on sex, ethnicity, and age (WHO, 2008). In this chapter, a preliminary understanding of how these vary based on body size/frame, body composition, and body fat distribution is shared.

Knowledge Bites

An inclusive approach to anthropometric body measurements involves attention to **intersectionality** in terms of the interconnected nature of social identities (e.g., race-gender-sexuality-class-ability). For example, weight stigma is interwoven within these social identities and also the discrimination that may arise from them. Attention to intersectionality will help you understand how weight stigma is interwoven with multiple forms of oppression and institutional injustice; measures of the physical body are

deeply rooted in white superiority, patriarchy, ableism, capitalism and colonialism.

You should consider the **social determinants of health** when discussing anthropometric measurements, weight, and obesity management. **Food insecurity** is when individuals cannot access food, often due to financial reasons, and results in inadequate nutritional intake (Raphael et al., 2020). Food insecurity has become a major issue in Canada as the cost of inflation and groceries continue to rise, and clients who are food insecure may make choices that do not support their health and well-being including healthy weight and nutrition goals.

Clinical Tip

1. **Explain the purpose** of anthropometric body measurements and how information will be used (to determine the broader picture of a client's health).
2. Ask for **client consent** to collect information.
3. **Seek permission** to touch as needed to complete assessments and/or measurements.
4. **Listen** to the client to gain a better understanding of their health from their perspective, to identify any influencing factors, and their personal health goals.

5. **Be mindful** of your non-verbal cues/body language when measuring clients. You may come across as being judgemental without that intent.
6. **Avoid commenting** on a client's weight-related physical appearance, body shape and size (e.g. you have such skinny legs, you have a bit of a tummy).

Activity: Check Your Understanding



An interactive H5P element has been excluded from this version of the text. You can view it online here:

<https://pressbooks.library.torontomu.ca/bodymeasurements/?p=26#h5p-2>

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Weight and Height

Weight refers to the amount that a person weighs (ie., how heavy they are) and is typically reported in kilograms in Canada (metric system). However, if you ask clients their weight, they will probably provide it to you in pounds (imperial system). Thus, you may need to convert weight from the imperial to the metric system and vice versa. **1 kilogram = 2.2 lbs**. Thus, if a client tells you that they are 50 lbs, then to convert to kg, you would divide 50 by 2.2 which equals 22.7 kg.

Height refers to the distance upward (ie., how tall a person is) and is typically reported by healthcare professionals in metres/centimetres in Canada (metric system). However, if you ask clients their height, they will probably provide it to you in feet/inches (imperial system). Thus, you may need to convert height from the imperial to the metric system and vice versa. **1 metre = 3.28 feet = 39.37 inches** (1 foot = 12 inches). Thus, if a client tells you that they are 5.2, then to convert to metres, you would divide 5.2 by 3.28 = 1.58 metres.

These measurements are often assessed together particularly in childhood and adolescence and/or with a first healthcare visit. In adulthood, weight is often assessed as needed during preventative primary healthcare visits or at each visit with a specialist when undergoing long-term treatments for conditions such as cancer, diabetes, and heart failure.

Weight measurement

In a primary care setting, weight measurement is usually done on a **mechanical beam scale**, which has a balance bar as opposed to a digital scale. They have been shown to be more accurate than digital scales. **See Figure 1.**

If using a mechanical beam scale, the **steps in measuring weight** are:

1. Ensure accurate calibration by checking to see that the balance bar is in the middle of the balance bar window when the small and large weight indicators are at zero.
2. Ask the client to remove their shoes and any heavy garments such as a coat. If there are concerns, you may have the client wear a gown.
3. Ask the client to step on the scale. (when they do so, the balance bar will move up)
4. Now, you will move the large weight indicator followed by the small weight indicator until the balance bar is in the middle of the balance bar window. If the balance bar is above the middle of the balance bar window, you need to increase the weight indicators. If the balance bar is below the middle of the balance bar window, you need to decrease the weight indicators.
5. You can note the weight when you have adjusted the weight indicators until the balance bar is in the middle of the balance bar window. To note the weight, you should add the large and small weight indicators together.
6. For example, in **Figure 1**, the weight in pounds is 72.8 lbs. Since $1 \text{ kg} = 2.2 \text{ lbs}$, you would divide 72.8 lbs by 2.2 to get a weight of 33.09 kg.

Here is a [video](#) that shows you how to use a mechanical beam scale, although please note it is in pounds.

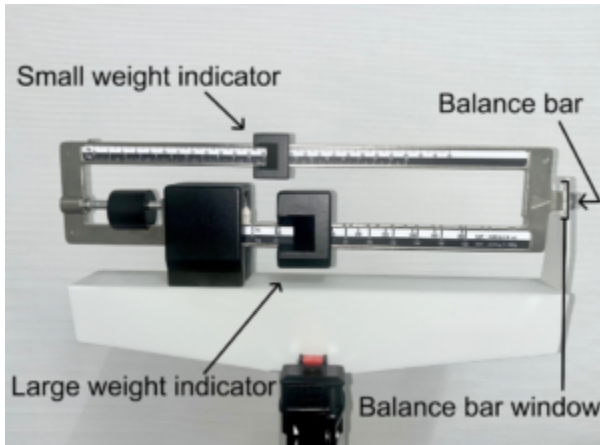


Figure 1: Mechanical beam scale (illustrated by Tayiba Rahman)

Height measurement

Height measurement can be done with a device that consists of a vertical ruler and an adjustable horizontal height rod that can be adjusted up or down so that the headpiece rests on the crown of the head (i.e., the top of the head). See **Figure 2**. This device is often attached to the mechanical beam scales in healthcare facilities particularly in primary care.



Figure 2: Height measurement (By Biswarup Ganguly, CC BY 3.0, <https://commons.wikimedia.org/w/index.php?curid=60558118>)

If using this device, **steps in measuring height** are:

1. Ask the client to remove their shoes, hat/head pieces, and bulky clothing.
2. Have them stand on the scale facing backwards with their head in a neutral position looking straight forward (the scale will be on a flat surface).
3. Have them stand with legs straight and arms straight and hanging at the side.
4. Pull the upper height rod up above their head and then pull the headpiece out so that it is at a right angle to the wall.
5. Lower the upper height rod until the headpiece touches the crown of the client's head and remains at a right angle to the wall.
6. Ask the client to step off the scale.
7. Note the client's height at the indicator line (where it says "read") on the lower height rod (ruler).

- If this device is not readily available, you can also measure a client's height with the back of their head, shoulders and buttocks touching the wall and use a flat ruler at a right angle to the wall/client to mark an area on the wall. Then, measure from that area down to the floor to determine the client's height.

Here is a [video](#) that shows how to use height rods, but please note that it is in feet/inches.

Contextualizing Inclusivity

It is always important to engage in respectful and open discussions with the client in order to ensure an inclusive assessment. This is particularly important when accommodations are needed. You should always be sensitive and responsive to the potential need for accommodations with clients. Some examples are:

- It is important that height measurement is at the crown of the head. However, some clients may have hair or a headpiece or head covering that is higher than the crown of their head.
- Some clients may feel uncomfortable removing clothing or head pieces/head coverings. For example, some female Muslim and Jewish clients may wear a head covering and feel uncomfortable removing it at all or removing it in the presence of the opposite gender. Although it may be viewed as

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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<https://pressbooks.library.torontomu.ca/bodymeasurements/?p=30#h5p-4>

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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](#)

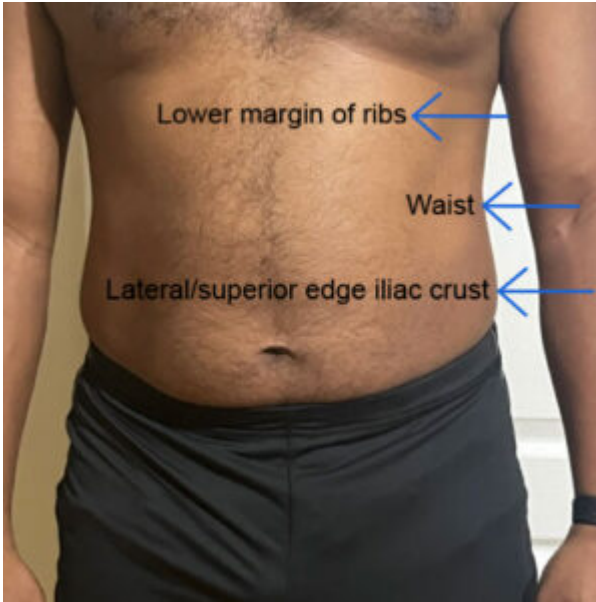


Figure 4: Waist circumference location

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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OSF Healthcare System (2023). Taking the confusion out of reading a growth chart. <https://www.osfhealthcare.org/blog/taking-the-confusion-out-of-reading-a-growth-chart/>

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).