MODULE 1
Anthropometry Basics

What Does this Module Cover?

Module 1 provides an overview of anthropometry (measurement of the human body) for nutritional assessment. It explains key concepts that are relevant to all the modules in the guide:

- why nutrition matters
- the definition of anthropometry
- common uses of anthropometry
- commonly used anthropometric measurements, indices, and indicators
- information on how to interpret anthropometric data at the individual and population level

How the Demographic Groups in this Guide Are Defined

Modules 2–5 in this guide focus on anthropometry for specific demographic groups, which are defined as follows:

Children from birth to five years of age (Module 2) aligns with the ages covered by the World Health Organization (WHO) Child Growth Standards and refers to children from birth–60 ***completed*** months of age. At age 5 years and 1 month, they are no longer compared to the WHO Child Growth Standards.

Children and adolescents 5–19 years of age (Module 3) aligns with the WHO Growth Reference and refers to children age 61 months to 19 years (228 completed months). At age 19 years and 1 month, they are no longer compared to the WHO Growth Reference.

Pregnant and postpartum women and girls (Module 4) refers to women and girls of any age from the start of pregnancy until 6 months after delivery.

Adults (Module 5) refers to individuals 18 years of age (i.e., reached their 18th birthday) and older who are not pregnant or less than 6 months postpartum. ***Older adults*** refers to individuals 60 years of age (i.e., have reached their 60th birthday) and older.

Note: There is overlap in age groups between Module 3 (5–19 years of age) and Module 5 (18+ years of age). This is because the WHO Growth Reference includes children/adolescents up to 19 years of age and guidance for adults frequently begins at age 18 (e.g., WHO BMI cutoffs begin at age 18), which is commonly considered the beginning of adulthood. Clinicians should use their judgment on which indices, indicators, and cutoffs to use when measuring individuals who are between 18 and 19 years of age.

Nutrition indicators and/or programs commonly use slightly different age ranges or focus on a subset of the age groups described above. For example, they may focus on children age 6–59 months or 0–23 months.

Why Does Nutrition Matter?

Good nutrition is essential for the health, growth, development, and economic well-being of individuals and populations. Malnutrition—which occurs when an individual has inadequate, excessive, or imbalanced food intake that is not aligned with his/her nutritional needs—is a serious public health issue that contributes to high rates of maternal and child illness and mortality. In addition, malnourished individuals are less likely to achieve their full potential in terms of education and economic productivity, and they earn less income than well-nourished peers, making it difficult to break the cycle of poverty (Victora et al. 2008). When a high proportion of a population is malnourished, it weakens the entire economy, potentially reducing a country's gross domestic product (GDP) by as much as 3 percent (World Bank 2006). Addressing malnutrition is essential to promote development, and measuring nutritional status is crucial to identifying individuals who need nutritional care and support and to monitoring the nutrition situation of a population.

What Are the Main Types of Malnutrition?

Malnutrition can appear as either undernutrition (including micronutrient deficiency) or overweight/obesity. These are defined below.

Undernutrition is a consequence of inadequate nutrient intake and/or absorption, and/or illness or disease. Undernutrition increases the risk of illness and death—45 percent of deaths of children under 5 are attributable to various forms of undernutrition (Black et al. 2013). This is because poor nutrition impairs a person's immune system, making him/her more susceptible to illness and infections and less likely to recover. In addition, undernutrition, particularly early in life, hinders optimal physical growth and cognitive, motor, and socio-emotional development, which may in turn lead to short- and long-term impacts on learning and productivity (Grantham-McGregor 2007). The major types of undernutrition, which can occur alone or in combination, are **acute malnutrition** (wasting, thinness, and/or bilateral pitting edema), **chronic undernutrition** (stunting), **underweight** (a composite of stunting and wasting), and **micronutrient deficiencies** (e.g., deficiencies in vitamin A, iodine, iron, and zinc). Acute malnutrition, stunting, and underweight are in detail in later modules. Micronutrient deficiencies are assessed using biochemical and clinical methods—not by anthropometric measurements—and are therefore not addressed in this guide.

Overweight occurs when a person has too much body fat and weighs more than would be expected for a healthy person of the same height, putting his/her health at risk. **Obesity** is a severe form of overweight. Overweight and obesity are complex conditions with multiple possible causes, including an imbalance between calories consumed and calories expended, low levels of physical activity, medical conditions, and genetics, among others. Overweight and obesity increase the risk of non-communicable diseases including diabetes, heart disease, cancer, and stroke (Victora et al. 2008). Although undernutrition is still the primary concern in developing countries, globally, overweight and obesity are associated with more deaths than underweight (World Health Organization [WHO] 2016a). What was once considered an issue for high-income countries is now an emerging public health threat in countries across the globe, creating a double burden of malnutrition in many developing countries that continue to have a high prevalence of undernutrition.

What Is Anthropometry?

Anthropometry is the measurement of the human body. It is one of several approaches—which also include biochemical, clinical, and dietary assessment—used to assess nutritional status. Anthropometry can help identify the types of malnutrition present in an individual or population and measure progress toward improvement. However, it does not identify specific nutrient deficiencies (e.g., iron or vitamin A deficiency), which must be assessed through other methods. Common anthropometric measurements used in development programs include height/length, weight, and mid-upper arm circumference (MUAC). These and other measurements are discussed in detail later in relevant modules in this guide.

Anthropometry is used by health providers to identify individuals who are malnourished and refer them for proper care and treatment. At the population level, anthropometric data measured on multiple individuals (selected based on a representative sample) can be aggregated to provide an estimate of the nutritional status of a population, which can help inform program and policy decisions.

BOX 1.1 SCREENING VS. ASSESSMENT

Nutrition screening is a rapid process to identify people who may be malnourished and refer them for more detailed assessment and care. It can be done in a health facility or in a community setting through growth monitoring and promotion programs, community events, household visits, or group meetings.

Nutrition assessment involves collecting detailed information to identify specific nutrition problems and their causes and to develop an appropriate action plan to prevent or treat malnutrition or help manage other health conditions, such as HIV and tuberculosis (TB).

How Are Anthropometric Data Used?

Anthropometric data provide information on the nutritional status of individuals and/or populations. This information helps to determine nutrition trends, whether there is a nutrition problem, what to do about that problem, and whether the actions taken are working.

How Are Anthropometric Data Used for Individuals?

Nutrition Assessment and Screening

As part of nutrition assessment and screening, anthropometry is commonly used to assess the growth pattern and nutritional status of individuals, to identify at-risk or malnourished people so they can be referred to appropriate care, to tailor nutritional counseling and treatment to an individual's nutritional status, and to monitor the response of malnourished individuals to interventions. Anthropometry remains a key method of determining eligibility for certain care and support programs and is critical in determining what services are needed.

EXAMPLE *Assessing the MUAC of children to determine if they have acute malnutrition, and referring acutely malnourished children to appropriate treatment programs.*

How Are Anthropometric Data Used for Populations?

Nutrition Surveillance

This is the regular and systematic collection, analysis, and interpretation of data to track the nutrition trends of a population in a timely manner. Anthropometric data from nutrition surveillance help to inform policy decisions, target and design programs and interventions, and identify and raise awareness about deteriorating nutrition situations before they reach crisis levels.

EXAMPLE *Assessing the nutritional status of children in a food insecure region through quarterly surveys to monitor the nutrition situation and identify when extra support is needed.*

Influencing Policy and Strategy Development and Funding Levels

Anthropometric data have been used widely to raise awareness and gain political support to improve the nutrition situation in countries. Population-level anthropometric data can help governments, policymakers, and donors understand and prioritize nutrition issues, identify vulnerable populations, design policies and strategies, and set aside funding to implement the policies and strategies.

EXAMPLE

In response to data from a Demographic and Health Survey (DHS) indicating that stunting affects 38 percent of children under 5, a government develops a new nutrition policy and invests resources in malnutrition prevention.

Program Targeting, Design, and Planning

Anthropometric data, along with other key information, can help public health officials and nongovernmental organization (NGO) staff better define and understand the nutrition problems facing a population, enabling them to target interventions to the most nutritionally vulnerable—including specific age groups, sexes, ethnicities, socioeconomic groups, or regions—and develop an appropriate program to improve the situation.

EXAMPLE

While developing a nutrition action plan for a specific district, a public health official reviews the available anthropometric data and finds that acute malnutrition is elevated in the district. Based on these data, s/he includes community-based management of acute malnutrition as part of the nutrition action plan to address the problem.

Monitoring and Evaluation

Anthropometric data are frequently used to monitor the implementation and measure the effectiveness of food security and nutrition interventions and programs. Changes in specific population-level anthropometric indicators over the project's life are often used to measure a program's impact.

EXAMPLE

A food security program measures the percentage of children under 5 with stunting at baseline and endline to report on the change over time.

Global Tracking of Development Status

The development community uses anthropometric data to track a country's or population's health and/or nutritional status over an extended period of time. Anthropometry data are also used to compare the nutrition situation among countries and track nutrition-related global goals.

EXAMPLE

The Sustainable Development Goals for United Nations member states include anthropometric indicators for stunting, wasting, and overweight that countries report on as part of tracking progress on Goal 2, which aims to end hunger, achieve food security and improved nutrition, and promote sustainable agriculture.

Anthropometric Measurements and Indices

When measuring individuals, anthropometry uses measurements and indices (in **Box 1.2**) and compares these to standards, references, or cutoffs (discussed in more detail in the **Interpretation** section) to determine the nutritional status of an individual or population.

The anthropometric measurements discussed in this guide are weight (including birth weight), height/length, knee height (which can serve as a proxy for height), MUAC, head circumference, waist circumference, and calf circumference. Some of these measurements (e.g., adult height) can be used alone to assess nutritional status. Others, such as children's height, do not provide enough information on their own and must be used in conjunction with age or another anthropometric measurement to provide meaningful information about nutritional status. The indices discussed in the guide include height/length-for-age, weight-for-height/length, weight-for-age, head circumference-for-age, body mass index (BMI), and BMI-for-age. The guide also provides information on bilateral pitting edema, a clinical sign of severe acute malnutrition (SAM), that is commonly assessed along with anthropometric measurements of undernutrition.

A variety of anthropometric measurements and indices are used to assess nutritional status. The appropriate anthropometric measurement and index to assess a given nutritional condition varies by condition and demographic group. **Table 1.1** presents a summary of the anthropometric measurements and indices in this guide, along with information about the nutritional condition each measurement/index can be used to identify and the appropriate demographic group for its use. More detail about each anthropometric measurement and index is provided in the demographic-specific Modules 2–5.

BOX 1.2 MEASUREMENT VS. INDEX

Anthropometric **measurements** assess the size, shape, and proportions of the human body. Commonly used anthropometric measurements include length/height, weight, and MUAC.

When two or more anthropometric measurements are combined with each other or with age, it is called an anthropometric **index**. This combination of information can be used to identify some nutritional conditions. Common anthropometric indices include weight-for-height, weight-for-age, height-for-age, BMI (combination of weight and height), and BMI-for-age.

TABLE 1.1 Summary of Measurements and Indices in this Guide

	Module 2 Children birth to 5 years	**Module 3** Children and adolescents 5–19 years	**Module 4** Pregnant/postpartum women and girls (up to 6 months after birth)	**Module 5** Adults 18 years and older (not pregnant or < 6 months postpartum)
Birth Weight [Low birth weight]	✓ (only for newborns)			
Length/Height-for-Age [Stunting]	✓	✓	✓ (girls < 19 years of age)	
Weight-for-Age [Underweight]	✓	✓ (5–10 years of age only)		
Weight-for-Length/Height [Wasting/acute malnutrition, overweight/obesity]	✓			
BMI-for-Age [Wasting (acute malnutrition) (0–59 months of age)/thinness (5–19 years of age), overweight/obesity]	✓	✓		
Head Circumference-for-Age [Microcephaly, which can result from chronic undernutrition]	✓			
MUAC [Acute malnutrition]	✓ (6–59 months only)	✓	✓	✓
BMI [Thinness/underweight, overweight/obesity]			✓ (pre-pregnancy only)	✓
Waist Circumference [Overweight/obesity]				✓
Height (Knee height) [Short stature]			✓	✓
Weight [Gestational weight gain, postpartum weight loss, and weight loss]			✓	✓
Calf Circumference [Proxy for thinness among older adults]				✓
Bilateral Pitting Edema [Severe acute malnutrition]	✓	✓	✓	✓

Interpreting Anthropometric Data and Classifying Nutritional Status

Correct interpretation of anthropometric data is critical to understanding whether an individual is at risk of malnutrition or is malnourished and what proportion of a population is affected by malnutrition. This helps ensure the right actions are taken both at the individual and population level. This section provides guidance on how to interpret and classify an individual's nutritional status using the various measurements/indices in this guide and discusses how to determine population-level concern.

Interpreting Anthropometric Data and Classifying Nutritional Status for Individuals

Once anthropometric measurements are collected for an individual, the data are compared to an accepted reference (growth standard, growth reference, or cutoff) to classify an individual's nutritional status (see **Box 1.3**). Based on these references—many of which are sex-specific because males and females grow differently—an individual may be classified as having normal nutritional status or as undernourished, overweight, or at risk of malnutrition. The classification also indicates how severely undernourished or overweight he or she is.

This guide seeks to be broadly applicable across countries. Whenever possible, the interpretation guidance provided is drawn from WHO or other internationally applicable resources that are frequently used in developing countries. International growth

BOX 1.3
KEY DEFINITIONS

A **growth standard** is prescriptive. It demonstrates how healthy children grow under ideal circumstances.

A **growth reference** describes how a specific population has grown but does not necessarily reflect optimal growth.

A **cutoff** is a threshold beyond which an individual is determined to be malnourished. It also identifies the severity of undernutrition or overweight/obesity in an individual. Cutoffs can be used at the population level to signify when a nutrition situation is considered to be of public health concern. See **Table 1.11**, Public Health Prevalence Thresholds, for cutoffs that indicate public health concern.

standards and growth references (see **Box 1.4**) exist and are useful for assessing and monitoring the growth and classifying the nutritional status of infants, children, and adolescents for some measurements. This includes the WHO Child Growth Standards for children from birth to 5 years and the WHO Growth Reference for children and adolescents 5–19 years. The guide also provides information on the INTERGROWTH-21st standards for fetal, newborn, and preterm infant growth.

However, while universally accepted international guidance exists for several of the measurements/indices and demographic groups in this guide (e.g., all measurements/indices of children from birth to 5 years of age), there is limited global guidance for others (e.g., MUAC for individuals 5 years of age and older, waist circumference). For measurements with no global guidance, some countries have created their own cutoffs, which are discussed in Modules 2–5.

When using anthropometry to assess an individual's nutritional status, it is helpful to consider additional information, such as dietary practices, results of other medical assessments, and household socioeconomic status to better understand the situation. This additional information provides insight into the direct and underlying causes of the individual's nutritional status, helping to establish an effective treatment plan and/or refer an individual to other needed services.

The WHO Growth Standards and WHO Growth Reference described in **Box 1.4** provide information on how to classify and interpret anthropometric data.

BOX 1.4 GUIDANCE FOR INTERPRETING INFANT, CHILD, AND ADOLESCENT ANTHROPOMETRIC DATA

The internationally applicable standards and references in this guide include:

INTERGROWTH-21ST Global Perinatal Package (2014) WEBSITE

This set of international, globally validated standards allows for comparisons across populations for fetuses, newborns, and preterm infants during the postnatal growth period. The standards are meant to complement the WHO Child Growth Standards. Since the INTERGROWTH-21st standards have not yet been widely adopted in developing countries and require ultrasound technology to measure fetuses—which is not practical in most low-resource settings—they are only discussed in limited detail in Module 2.

WHO Child Growth Standards (Children from Birth to 5 Years) (2006) WEBSITE

This set of internationally accepted standards describes healthy growth of all children, regardless of ethnicity or socioeconomic status, under optimal conditions. It includes sex-specific growth standards for length/height-for-age, weight-for-age, weight-for-length/height, BMI-for-age, and head circumference-for-age, among other measures. These standards replaced the 1977 National Center for Health Statistics (NCHS)/WHO Growth Reference as the international standards. They are described in detail in Module 2.

WHO Growth Reference (Children 5–19 Years) (2007) WEBSITE

Constructed using statistical methods that adjust the 1977 NCHS/WHO reference for children and young people 1–24 years of age, the 2007 reference is aligned with the 2006 WHO Child Growth Standards for children under 5 and with adult BMI cutoffs. This is a reference, not a standard, and it is used for **BMI-for-age**, **height-for-age**, and **weight-for-age** for children 5–19 years. This reference is described in detail in Module 3.

Note: The U.S. Centers for Disease Control and Prevention (CDC) also has guidelines, created in 2000, for assessing the nutritional status of infants, children, and adolescents from birth to 20 years of age in the United States. However, since they are not commonly used in international settings, they have not been included in this guide.

WEBSITE

Global Anthropometric Cutoffs for Classifying an Individual's Nutritional Status

Tables 1.2–1.9 present universally accepted international cutoffs for classifying an individual's nutritional status, organized according to demographic group. More information on each measurement, index, indicator, and cutoff, as well as guidance for measurements/indices that do not have globally accepted cutoffs, can be found in Modules 2–5. These modules also include information on tools (e.g., growth charts, calculators, and assessment materials) that may be used in program settings to more easily classify nutritional status. There are two commonly used systems to interpret and classify anthropometric data: z-scores and percentiles.[1] This guide focuses on z-scores, following WHO recommendations. See **Box 1.5** for more information on z-scores.

BOX 1.5 MAKING SENSE OF THE DATA: Z-SCORES

What Are Z-Scores and What Do They Tell Us?

Anthropometric z-scores describe how far and in what direction an individual's measurement is from the reference populations' median value. For the WHO Growth Standards, the reference population is children of the same sex and age (depending on the measure). Z-scores that fall outside of the normal range indicate a nutritional issue (undernutrition or overweight). The further away from the normal range, the more severe the nutritional issue. Z-scores provide information on current nutritional status and can also be used to follow an individual child's growth over time.

Who Needs to Understand Z-Scores and Why?

Z-score cutoffs are used to define malnutrition according to anthropometric indices and measures. Therefore, health care workers and nutrition program staff need to understand what z-scores are, how to interpret them, and what they mean at individual and population levels to make informed decisions.

How Is a Z-Score Determined?

Z-scores can be estimated using growth charts/tables and/or calculated using computer software.

See Annex 2 for more details on z-scores.

[1] A percentile is similar to a rank; percentile refers to an individual's position on a given reference distribution, ranked in order of magnitude. For example, if 90 percent of children (grouped by age and sex) weigh less than 20 kg, then a child who weighs exactly 20 kg is in the 90th percentile for his/her age and sex (Gibson 2005).

Children from Birth to 5 Years of Age

The table below identifies universally accepted international cutoffs for children from birth to 5 years of age based on the WHO Child Growth Standards for several nutrition conditions: stunting, wasting, underweight, overweight/obesity, and small head circumference.

TABLE 1.2 WHO Child Growth Standards Classification

ANTHROPOMETRIC INDICATOR	AGE		Z-SCORE						
	0–23 months	24–60 months	< -3	≥ -3 to < -2	≥ -2 to < -1	≥-1 to ≤ +1	> +1 to ≤ +2	> +2 to ≤+3	> +3
Length-for-age Stunting	✓		Severe stunting	Moderate stunting	Normal				Extreme tallness is not usually a nutrition issue. May indicate endocrine disorder.
Height-for-age Stunting		✓							
Weight-for-age Underweight	✓	✓	Severe underweight	Moderate underweight	Normal		Do not use weight-for-age to determine overweight. Weight-for-length/height (0–60 months) and BMI-for-age (all ages) are better for assessing overweight in children.		
Weight-for-length Wasting, overweight, obesity	✓		Severe wasting/ severe acute malnutrition (SAM)	Moderate wasting/ moderate acute malnutrition (MAM)	Normal		Possible risk of overweight	Overweight	Obesity
Weight-for-height Wasting, overweight, obesity		✓							
BMI-for-age Wasting, overweight, obesity *Less commonly used than weight-for-height in children from birth to 5 years of age in developing countries*	✓	✓	Severe wasting/SAM	Moderate wasting/MAM	Normal		Possible risk of overweight	Overweight	Obesity
Head-circumference-for-age Small/large head size	✓	✓	Very small head circumference (severe microcephaly)	Small head circumference (microcephaly)	Normal			Large head circumference (macrocephaly) Not related to nutritional status.	

Sources: WHO 2008; CDC 2016; WHO 2016b

TABLE 1.3 Mid-Upper Arm Circumference

The table below identifies universally accepted international MUAC cutoffs for children 6–59 months of age based on WHO guidance. There is insufficient evidence to recommend a MUAC cutoff for children under 6 months of age.

Age Group	Nutritional Status	
	SAM	MAM
6–59 months	<115 mm	≥115 mm to <125 mm

Source: WHO/UNICEF/WFP 2014; WHO 2013.

TABLE 1.4 Birth Weight

The table below identifies universally accepted international low birth weight (LBW) cutoffs for newborns, based on WHO guidance. LBW is an outcome of intrauterine growth retardation and/or preterm birth and often reflects poor maternal nutrition and health before and during pregnancy. Birth weight measurements can reflect that a child was born preterm, is small for gestational age, or both.

Age Group	Low Birth Weight	Normal Birth Weight
Newborns, within 24 hours of birth	< 2,500 grams	≥ 2,500 grams

Source: WHO 2014.

Children and Adolescents 5–19 Years of Age

The table below identifies universally accepted international cutoffs for children 5–19 years of age based on the WHO Growth Reference for several nutrition conditions: stunting, wasting, underweight/thinness, and overweight/obesity.

TABLE 1.5 WHO Growth Reference Classification

ANTHROPOMETRIC INDICATOR	AGE	Z-SCORE						
		< -3	≥ -3 to < -2	≥ -2 to < -1	≥-1 to ≤ +1	> +1 to ≤ +2	> +2 to ≤+3	> +3
Height-for-age Stunting	5–19 years	Severe stunting	Moderate stunting	Normal				Extreme tallness is not usually a nutrition issue. May indicate endocrine disorder.
Weight-for-age Underweight	5–10 years	Severe underweight	Moderate underweight	Normal		Do not use weight-for-age to determine overweight. A child or adolescent is best assessed by BMI-for-age.		
BMI-for-age Thinness, overweight, obesity	5–19 years	Severe thinness	Moderate thinness	Normal		Overweight	Obesity	

Source: 2007 WHO Growth Reference.

Pregnant and Postpartum Women and Girls

The table below identifies the commonly used cutoffs for short stature in adult women and WHO guidance for stunting among adolescent girls. Please note: while a universally accepted international cutoff for short stature among adult women has not been established, the cutoff below is commonly used in surveys such as the DHS and was also used in the Lancet's 2008 Maternal and Child Undernutrition and 2013 Maternal and Child Nutrition series. The cutoff below was selected based on an increased risk of obstetric complications. However, various risks to mother and child have been associated with cutoffs ranging from approximately 140–156 cm (WHO 1995; Ververs et al. 2013).

TABLE 1.6 Short Stature and Stunting

Age Group	Condition	Cutoff
Adult women (age 18 years and older)	Short stature	< 145 cm
Adolescent girls to age 19	Stunting (height-for-age)	
	--Severe	< - 3 z-score
	--Moderate	≥ - 3 and < - 2 z-score

Source: ICF 2012; WHO 2007.

Adults (18 Years of Age and Older)

TABLE 1.7 BMI

The table below identifies the standard cutoffs for underweight (thinness) and overweight/obesity based on WHO guidance.

Classification	BMI (kg /m²) Cutoff Points
Underweight	<18.50
Severe thinness	<16.00
Moderate thinness	16.00–16.99
Mild thinness	17.00–18.49
Normal range	18.50–24.99
Overweight	≥25.00
Obese	≥30.00
Obese class I	30.00–34.99
Obese class II	35.00–39.99
Obese class III	≥40.00

Source: WHO Expert Consultation 2004.

TABLE 1.8 Short Stature (Women)

While a universally accepted international cutoff for short stature among adult women has not been established, the cutoff listed below is commonly used in surveys such as the DHS and was also used in the Lancet's 2008 Maternal and Child Undernutrition and 2013 Maternal and Child Nutrition series.

Condition	Cutoff
Short stature	< 145 cm

Source: ICF 2012

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Clinical Assessment: Bilateral Pitting Edema

Although not an anthropometric measurement, bilateral pitting edema is a clinical sign of SAM ("severe malnutrition" in adults) that is often assessed along with anthropometry and therefore included in this guide.

Bilateral pitting edema is identified using the internationally accepted classification system in **Table 1.9**. The classification system is used across all age groups. Modules 2–5 provide additional information on how to identify and classify bilateral pitting edema.

NOTE

In pregnancy, edema is common and may be normal or a symptom of other medical conditions besides severe malnutrition.

TABLE 1.9 Nutritional Status Classification of Bilateral Pitting Edema (applicable to all age groups)

Description	Grade of Edema	Nutritional Status
No bilateral pitting edema	Absent (0)	Does not have edematous malnutrition
Present in both feet/ankles	Mild (+)	SAM/severe malnutrition
Present in both feet/ankles, plus lower legs, hands, or lower arms	Moderate (++)	SAM/severe malnutrition
Generalized, including both feet, legs, hands, arms, and face	Severe (+++)	SAM/severe malnutrition

Sources: WHO 2013; WHO e-Library of Evidence for Nutrition Actions (eLENA) n.d. (a); WHO eLENA n.d. (b).

Interpreting Anthropometric Data and Classifying Nutritional Status for Populations

Interpreting Public Health Prevalence Thresholds using Anthropometric Data

While the above cutoffs help determine an individual's anthropometric status, it is also important to understand the nutritional status of a given population. Advocacy groups, government agencies, international bodies, and aid agencies use population-level anthropometric data—often in combination with trend data, information on the local context, and other indicators—to understand the type and magnitude of nutrition problems in a population.

BOX 1.6 ANTHROPOMETRIC INDICATORS

An anthropometric indicator is an objectively verifiable, quantitative measurement that reflects the nutritional status of an individual or population. An indicator can be used to track changes in a situation over time or demonstrate whether a program is achieving its objectives. Anthropometric indicators are constructed from anthropometric measures or indices.

An example of a population-level anthropometric indicator is: the percentage of children under 5 who are stunted (height-for-age < -2 z-scores).

TABLE 1.10 Examples of Population-Level Anthropometric Indicators

Below are anthropometric indicators that are commonly used in program settings and by donors and development groups to understand and track nutritional status at the population level.

	USAID Food for Peace	USAID Feed the Future	Sustainable Development Goals	WHO Nutrition Landscape Information System	Demographic and Health Surveys
Prevalence of Malnutrition					
% of children under 5 stunted (< -2 z-score)	X	X	X	X	X
% of children under 5 underweight (< -2 z-score)	X	X		X	X
% of children under 5 wasted (< -2 z-score)	X	X	X	X	X
% of children under 5 overweight (> +2 z-score)			X	X	X
% of women age 15–49 who are underweight (BMI < 18.5)	X	X		X	X
% of women age 15–49 who are overweight (BMI ≥ 25.0)				X	X
% of women age 15–49 of short stature (<145 cm)					X

In 2017, WHO and UNICEF established guidance (shown in **Table 1.11**) on public health prevalence thresholds for three child anthropometric indicators: stunting, wasting, and overweight. The new guidance can help identify populations at risk and can be used for targeting and planning interventions (e.g., a response when wasting is approaching 10 percent [high] among children under 5).

The 2017 guidance updates the previous significance levels for stunting and wasting that were first published in 1995, excludes underweight, and introduces thresholds for overweight. The approach to developing the 2017 thresholds was slightly different than that used in 1995. The 1995 wasting prevalence classifications were based on increases in the crude mortality rate. The stunting and underweight thresholds were somewhat arbitrary groupings based on categorizing the prevalences in 79 low- and middle-income countries into four levels (low, medium, high, very high) based on quartiles. The thresholds did not reflect the relationship between the prevalences and population-level outcomes or note how far the prevalences deviated from normal. They were not intended to serve as public health significance levels (WHO and UNICEF 2017).

The 2017 thresholds were developed to clarify the terminology around public health prevalence thresholds, harmonize labeling (very low, low, medium, high, very high), and establish a standard approach to develop the cutoffs (WHO 1995; WHO and UNICEF 2017). The 2017 thresholds are based on how far a prevalence level deviates from a normal prevalence based on the WHO Child Growth Standards. For example, "very low" indicates a country whose stunting, wasting, or overweight prevalence is within the "normal" range (i.e., less than 2.5 percent). The other categories (low, medium, high, and very high) are multipliers of the "very low" level (e.g., a country whose stunting prevalence is up to four times higher than the "very low" prevalence is categorized as "low") (WHO and UNICEF 2017).

Table 1.11 provides the updated prevalence thresholds and also includes the public health significance level for adults with low BMI and the public health trigger point for LBW as these are both relevant anthropometric indicators to track on a global level (WHO 2010; WHO 1995). All of the indicators should be interpreted in context. For example, consideration of the economy, climate conditions, food security trends, and migration in conjunction with anthropometry can help clarify the scope and magnitude of the situation.

TABLE 1.11 Public Health Prevalence Thresholds

Anthropometric Indicator	Prevalence Thresholds (%)				
	Very Low	Low	Medium	High	Very High
Stunting: Percentage of children age 0–59 months (height-for-age < -2 z-score)	< 2.5	2.5–9	10–19	20–29	≥30
Wasting: Percentage of children age 0–59 months (weight-for-height < -2 z-score)	<2.5	2.5 – < 5	5–9	10–14	≥15
Overweight: Percentage of children age 0–59 months (weight-for-height >+ 2 z-score)	<2.5	2.5 – < 5	5–9	10–14	≥15
	Public Health Significance Level (%)				
	Low	Medium	High	Very High	
Percentage of adults with low BMI (< 18.5)	5–9	10–19	20–39	≥40	
	Public Health Trigger Point for Action (%)				
Percentage of newborns with low birth weight (< 2,500 grams)	≥ 15				

Another resource for population-level decision-making is the Integrated Food Security Phase Classification (IPC). The IPC is a set of tools to assess and classify the severity and magnitude of food insecurity in several countries and includes anthropometric indicators. Due to the increasing need for countries to use and interpret various nutrition measurements, work is also underway to develop an IPC Nutrition Phase Classification, with tools and procedures for conducting a comprehensive nutrition assessment. The tools and procedures will be adaptable to the country context relative to data systems in place, methodological approach to nutrition assessment, and policies and systems used to guide nutrition activities.

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