MODULE 4

Pregnant and Postpartum Women and Girls

What Does this Module Cover?

Module 4 focuses on anthropometry of pregnant and postpartum women and girls. The module is broken into sections that describe:

- the importance of nutrition during pregnancy and the postpartum period
- common nutrition-related conditions identified by anthropometry
- the measurements and indices used to identify nutrition-related conditions
- interpretation of anthropometric measurements and classification of nutritional status
- tools to assess the nutritional status of pregnant and postpartum women and girls

Users are encouraged to review Module 1 alongside this module because it explains key concepts that are relevant to all modules.

Who Is the Focus of Module 4?

In this guide, "pregnant and postpartum women and girls" refers to **women and girls of any age who are pregnant or have delivered a child within the previous 6 months.**

Nutrition during Pregnancy and the Postpartum Period: Why Does it Matter?

The nutritional status of women and girls before and during pregnancy affects their own health as well as the health, nutritional status, growth, and development of their children (Black et al. 2008; Ramakrishnan et al. 2012). Women who are undernourished, particularly those with short stature or iron deficiency, have a higher risk of dying from pregnancy-related causes than well-nourished women. Maternal short stature (often defined as height <145 cm), a reflection of past undernutrition, increases the risk of labor complications and need for assisted delivery, which is often not available in poor, low-resource communities, putting both mother and child at risk (Black et al. 2008; Black et al. 2013). Children born to undernourished women and girls are more likely to be small for their gestational age, be born preterm, die in the first month of life, and be stunted by age 2 (ibid). Being overweight or obese increases a mother's risk of pregnancy complications—including gestational diabetes, pre-eclampsia, and death—and increases her child's risk of preterm birth, neonatal and infant death, and being born larger than average size (which increases delivery complications). The long-term consequences of maternal overweight/obesity at the time of pregnancy include an increased likelihood of the child being overweight/obese into early adulthood (Williams et al. 2014). In addition, poor maternal nutritional status (both before and during pregnancy)—is an important risk factor for poor early child development, affecting a child's physical, social, emotional, and cognitive development (Britto et al. 2017).

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Nutrition during Pregnancy and the Postpartum Period: Why Does it Matter? (continued)

These risks are compounded among adolescent mothers, who are already at higher risk of maternal and child mortality, preterm delivery, and having low birth weight babies than their adult counterparts (World Health Organization [WHO] 2011; Harper et al. 2011). In fact, children born to adolescent mothers weigh, on average, about 200 g less than those born to adult women (WHO 2011). In addition, pregnancy during adolescence can negatively impact a girl's own nutritional status, particularly if it impedes the adolescent growth spurt (Ramakrishnan et al. 2012; Black et al. 2013). These challenges are faced by many of the more than 16 million adolescent girls who give birth each year (WHO n.d.).

Improving the nutritional status of pregnant and postpartum women and girls, as well as all women of reproductive age, will contribute to improved health of women and reduce their risk of mortality, while enhancing the health, growth, and development of their children. Weighing and measuring women and adolescent girls early in pregnancy can help determine their nutritional status and how well their bodies can cope with pregnancy. This information can identify women who may benefit from interventions or enhanced clinical care and can guide counseling and support to promote a healthy pregnancy and improve fetal growth. At the population level, anthropometric data can be used to evaluate trends in nutritional status among pregnant and lactating women and girls, helping to determine whether an intervention is needed.

What Nutrition-Related Conditions Are Identified through Anthropometry?

This section provides a brief description of the most common nutrition-related conditions affecting pregnant and postpartum women and girls that can be identified using anthropometry. The anthropometric measurements and indices used to determine these nutrition conditions are described in the **Measurements** section.

CONDITIONS IN THIS SECTION

Already familiar with nutrition-related conditions?

Jump ahead to the **Measurements** section.

CONDITION: **Short Stature**

Short stature refers to a woman who is much shorter than expected and may be an indication that undernutrition prevented her from growing to her full potential during childhood and adolescence. Women of short stature were often stunted as children (meaning they were too short for their age as identified by the length/height-for-age index).

Women of short stature are at increased risk of pregnancy complications such as cephalopelvic disproportion (when the fetus's head is too big to fit through the mother's pelvis) that may require cesarean section or other assistance to safely deliver the child. However, surgical delivery is often not available in low-resource settings and, when available, increases risk of maternal morbidity and mortality (Black et al. 2008; Black et al. 2013). Maternal short stature has also been associated with intrauterine growth restriction (when the fetus doesn't grow at the normal rate in the womb) and low birth weight, as well as increased risk of infant death, although the causal relationship is not clear (Black et al. 2013; Ververs et al. 2013). In areas where home delivery is common, referring pregnant women of short stature to health facilities may help ensure safe labor, delivery, and postpartum care (WHO 1995a). Since short stature reflects past environmental influence on growth, there are no associated dietary recommendations to address short stature since the condition cannot be reversed. However, if a short-statured woman still lives in the same nutritionally poor conditions in which her growth was stunted, she may continue to be nutritionally deprived, and this deprivation during pregnancy could affect her child's growth. Short stature, which commonly refers to women <145 cm tall, is identified through height measurement.

LINKS TO RELATED CONTENT

Measurement: Height

Interpretation: Cutoffs for short stature

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CONDITION: **Stunting in Adolescent Girls**

Stunting in adolescent girls reflects chronic malnutrition and occurs when a girl does not grow to her potential because of the long-term cumulative effects of inadequate dietary intake, frequent illness/ infection, or both. The result is that she is shorter than would be expected for a healthy girl of her age.

Stunting detected during adolescence is usually a result of poor growth during the first 1,000 days of life, from pregnancy through age 2, after which it is difficult to regain lost growth and fully recover from the effects of stunting (Victora et al. 2010; Martorell et al. 1994). Stunting can not only impair an individual's health but is also associated with poor cognitive and motor development and lower school achievement (Grantham-McGregor et al. 2007; Hoddinott et al. 2008). A girl's linear growth during adolescence can be negatively affected by pregnancy (Ramakrishnan et al. 2012), and both adolescent pregnancy and short stature in women are known to be associated with higher risk of complications and adverse pregnancy and birth outcomes (Harper et al. 2011; Ramakrishnan et al. 2012; WHO 1995a). As with a woman of short stature, if a girl still lives in the same nutritionally poor conditions in which her growth was stunted, she may be at increased nutritional risk. Dietary or other nutritional assessments may help to determine nutritional risk and delivering in a health facility may help reduce the risks of a complicated delivery. In an adolescent girl, stunting is identified using the height-for-age index for girls, compared against the 2007 WHO Growth Reference. Information on height-for-age cutoffs can be found in the Interpretation section, and information on the WHO Growth Reference is in Module 3.

LINKS TO RELATED CONTENT

Measurement: Height-for-age

Interpretation: Cutoffs for stunting

CONDITION: **Underweight/Thinness**

Underweight/thinness refers to a woman or girl whose weight is too low for her height, which reflects both nutritional intake and overall health. A woman or adolescent girl may be underweight/thin because of a rapid deterioration in nutritional status over a short time or chronic (long-term) malnutrition. Thinness may be a result of an inadequate diet; severe, repeated, or chronic illness or infection; or a combination of diet and illness. Some studies have found an association between maternal thinness and maternal mortality, although there is limited research on this association (Black et al. 2013; Ververs et al. 2013). Children of underweight/thin women are at higher risk of intrauterine growth restriction, low birth weight, and preterm birth. Underweight/thinness is determined by a woman's pre-pregnancy body mass index (BMI) (<18.5), which may not be available in settings where routine medical checkups are not common, and/or by mid-upper arm circumference (MUAC) which may be assessed throughout pregnancy.

TIP

The term "underweight" used for adolescents and adults, which reflects weight in relation to height, is distinct from the term "underweight" used for children under 10, which reflects weight in relation to age.

LINKS TO RELATED CONTENT

- Measurement: Pre-pregnancy BMI
- Measurement: MUAC
- Interpretation: Cutoffs for MUAC from a variety of countries
- Interpretation: Weight gain during pregnancy

CONDITION: Underweight/Thinness
↳ CONDITION: **Moderate Malnutrition**

Moderate malnutrition is used to describe moderate thinness identified by BMI as well as low MUAC (under a certain cutoff). Moderate malnutrition results from inadequate intake (quantity or quality) and/or utilization of food; severe, repeated, or chronic infections/illness (e.g., tuberculosis, HIV/AIDS, cancer); or a combination of these.

LINKS TO RELATED CONTENT

- Measurement: Pre-pregnancy BMI
- Measurement: MUAC
- Interpretation: Weight gain during pregnancy
- Interpretation: Cutoffs for MUAC

CONDITION: Underweight/Thinness
↳ CONDITION: **Severe Malnutrition**

Severe malnutrition is used to describe severe thinness identified by BMI, low MUAC (under a certain cutoff), and/or the presence of bilateral pitting edema of nutritional origin. Adults suffering from severe malnutrition are at increased risk of death. Medical treatment and nutrition support are necessary to address their condition. When reporting a person's nutritional status, it is useful to know what measure was used since edema will affect BMI but will not affect MUAC.

LINKS TO RELATED CONTENT

- Measurement: Pre-pregnancy BMI
- Measurement: MUAC
- Measurement: Bilateral pitting edema
- Interpretation: Weight gain during pregnancy
- Interpretation: Cutoffs for MUAC
- Interpretation: Classification of bilateral pitting edema

CONDITION: **Overweight and Obesity**

Overweight and obesity (severe overweight) occur when a woman or girl has too much body fat and weighs more than would be expected for a healthy woman or girl of the same height, putting her health at risk. Overweight and obesity are complex conditions with multiple causes, including an imbalance between calories consumed and calories expended, low levels of physical activity, medical conditions, and genetics, among others. The prevalence of overweight and obesity have been increasing worldwide, and about 35 percent of adult women are overweight or obese (WHO 2011). Overweight and obesity during pregnancy increase women's risk of developing gestational diabetes and pre-eclampsia, and of having complications during delivery; they also are associated with increased risk of death of the mother and newborn child. In addition, maternal overweight and obesity during pregnancy increase the risk that the child will be overweight or obese (Black et al. 2013). It is recommended that women who are overweight or obese gain less weight during pregnancy than women of normal weight (IOM and NRC 2009). Although there have been limited studies exploring the effects of overweight and obesity among pregnant adolescents, evidence suggests that they suffer similar risks, including increased risk of gestational diabetes, pre-eclampsia, and cesarean delivery (Sukalich et al. 2006). In addition, although some women lose weight or return to their pre-pregnancy weight, many women retain weight after pregnancy, with an average weight gain of 0.5 to 3.0 kg above their pre-pregnancy weight. The amount of weight gain (or loss) varies widely, and there is evidence that women who gain excessive weight during pregnancy or were overweight before pregnancy are more likely to retain more weight postpartum (Gore et al. 2003). Overweight and obesity in pregnant women are identified by calculating a woman's pre-pregnancy BMI. Postpartum weight retention is calculated by subtracting a woman's pre-pregnancy weight from her postpartum weight (at least 6 months after delivery).

LINKS TO RELATED CONTENT

- Measurement: Pre-pregnancy BMI
- Measurement: Gestational weight gain
- Measurement: Postpartum weight retention
- Interpretation: Weight gain during pregnancy
- Interpretation: Postpartum weight-retention guidelines

What Anthropometric Measurements and Indices Are Used for Pregnant and Postpartum Women and Girls?

This section describes the anthropometric measurements and indices commonly used to identify nutrition-related conditions in pregnant and postpartum women and girls, as well as the challenges with using them. In addition, bilateral pitting edema, a clinical measure of severe malnutrition, is included because it is frequently assessed alongside anthropometry. However, edema is common in pregnancy and usually is not nutrition-related. Anthropometric measurements during pregnancy seek to assess the mother's nutritional status and predict her body's ability to cope with pregnancy, identifying women and girls who may benefit from intervention. Anthropometry can also help to indirectly monitor the growth of the fetus, as good maternal nutritional status and appropriate weight gain during pregnancy contribute to normal/optimal fetal growth. However, using anthropometry to identify malnutrition during pregnancy and the first 6 months postpartum presents challenges. There is no global agreement on the best measures to use, and evidence to establish standard measures or cutoffs for use in developing countries is insufficient. The guidance here reflects the current knowledge of the most commonly used anthropometric measurements and indices. See **Table 4.1** for a summary of measurements and indices included in this module.

Already familiar with measurements and indices? Jump ahead to the Interpretation section.

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TABLE 4.1 Anthropometric Measures and Indices in this Module

	Height	**Height-for-age** (girls 19 and under)	**Pre-pregnancy BMI**	**Weight**	**MUAC**	**Bilateral Pitting Edema**
Nutritional condition that the measurement/index identifies	Short stature	Stunting	Thinness and overweight/ obesity	Used to monitor weight gain during pregnancy and postpartum weight loss	Thinness	Severe malnutrition

MEASUREMENT: **Height**

Height. A woman's height reflects her childhood growth, which is determined by a combination of genetic potential and environmental factors, such as nutritional status, disease, and poverty. It can be a proxy indicator for pelvic size, which can predict challenges such as obstructed labor. In pregnant women, height can be used to identify women with short stature who may need specialized medical care for a safe delivery. It can also be used in combination with weight to calculate pre-pregnancy BMI to assess underweight/thinness and overweight and obesity (see pre-pregnancy BMI below) and with age and sex to assess stunting in adolescent girls up to age 19 (see Pre-Pregnancy BMI section on the next page). Height can be measured at any time during pregnancy or postpartum.

LINKS TO RELATED CONTENT

Condition: Short stature in women

Interpretation: Cutoffs for short stature

MEASUREMENT: **Height-for-Age**

Height-for-age is sex-specific and measures a girl's height relative to her age. It identifies stunting (chronic malnutrition). This index can be used among adolescent girls until age 19. To date, stunting has not routinely been measured among school-age children and adolescents. Height-for-age can be applied to adolescent girls at any time during pregnancy or postpartum.

LINKS TO RELATED CONTENT

Condition: Stunting in adolescent girls

Interpretation: Cutoffs for stunting

MEASUREMENT: **Pre-Pregnancy BMI**

Pre-pregnancy BMI, a ratio of weight relative to height using the formula (weight in kilograms)/(height in meters)^2, is used to identify underweight/thinness and overweight and obesity in women and girls, and can help determine recommended weight gain during pregnancy. Women who are planning to become pregnant should try to achieve and maintain a healthy BMI before conceiving because a woman's BMI at the start of pregnancy affects the growth of her fetus, influences her weight gain during pregnancy, and is predictive of adverse pregnancy outcomes (IOM and NRC 2009). Note, BMI is not used during pregnancy since it cannot account for pregnancy-related weight gain (see **Box 4.1**). A low pre-pregnancy BMI indicates increased risk of low birth weight and intrauterine growth restriction. A high pre-pregnancy BMI is associated with complications such as pre-eclampsia, gestational diabetes, and need for cesarean delivery (Black et al. 2013). **To calculate BMI, a woman's weight before conception can be approximated by using a weight measured no more than 2 months before conception or during the first trimester of pregnancy** (IOM and NRC 2009). However, among the at-risk poor populations in developing countries, it is relatively common for a pregnant woman or girl's first contact with the health system to be after the first trimester, when it is no longer possible to measure or approximate pre-pregnancy weight (WHO 1995b; WHO 1995a). Adolescent pre-pregnancy BMI should be categorized using the WHO categories for adults, rather than the BMI-for-age charts (IOM and NRC 2009).

BOX 4.1 BMI AND PREGNANCY

BMI is not used for pregnant and postpartum women because there are no BMI reference standards that account for pregnancy-related weight gain. After delivery, it is hard to pinpoint a precise moment when using BMI with the standard cutoffs becomes meaningful. However, based on average weight loss patterns of postpartum women, **it is probably acceptable to start using BMI to assess nutritional status somewhere between 6 and 12 months postpartum.**

LINKS TO RELATED CONTENT

Condition: Underweight/thinness

Condition: Overweight/obesity

Interpretation: Weight gain during pregnancy

MEASUREMENT: **Gestational Weight Gain**

Gestational weight gain. Gaining a healthy amount of weight during pregnancy contributes to a healthy birth for mother and child. Gestational weight gain, also called pregnancy weight gain, is affected by pre-pregnancy weight as well as genetics, health, dietary choices, socioeconomic status, and culture, among other factors. There is a range of weight gain that is considered healthy, and recommendations vary according to a mother's pre-pregnancy BMI. If a woman gains too little weight, she may have a preterm or low birth weight infant; gaining too much weight in pregnancy is associated with retaining excessive weight postpartum, delivering large-for-gestational-age infants, and cesarean delivery, and it may lead to the child being overweight later in life (Siega-Riz et al. 2009; IOM and NRC 2009). To maintain a healthy pregnancy, it is recommended that underweight women gain more weight than their healthy/normal and overweight/obese counterparts, and that overweight and obese women gain less than women of normal weight. Most weight gain occurs in the second and third trimester, and weight loss during pregnancy is discouraged (including among overweight/obese women) (IOM and NRC 2009; Health Canada 2014).

It is recommended that adolescents' pre-pregnancy BMI be classified using WHO adult cutoffs rather than BMI-for-age. Using the adult ranges will probably classify the adolescents as thin more readily and therefore adolescents will be advised to gain more weight. This is appropriate because adolescents often need to gain more weight than their older peers for improved birth outcomes (IOM and NRC 2009).

LINKS TO RELATED CONTENT

Interpretation: **Weight gain during pregnancy**

MEASUREMENT: **Postpartum Weight Retention**

Postpartum weight retention is the difference between what a woman weighs before pregnancy and after delivery. Postpartum women who lose weight return to their pre-pregnancy weight at varying rates because of a number of factors including their pre-pregnancy weight, type of delivery, gestational weight gain, breastfeeding status, and age. Weight loss is generally more rapid in the first 6 months but may continue at a slower rate through 12 months postpartum (Butte and Hopkinson 1998; IOM 1991; Williams et al. 2014). Excessive postpartum weight retention is a concern, and evidence suggests it is associated with longer-term overweight and obesity (Endres et al. 2015; Gore et al. 2003). Clinicians may wish to monitor a woman's postpartum weight loss and weight retention to help her return to a healthy weight at a reasonable pace. There is no specific guideline for how soon after birth to monitor postpartum weight loss and the exact timing of when a woman should return to her pre-pregnancy weight. In 1992, the IOM published guidelines on healthy weight loss 4–6 weeks after delivery.

LINKS TO RELATED CONTENT

Condition: Overweight/obesity

Interpretation: Postpartum weight-retention guidelines

MEASUREMENT: **MUAC**

MUAC identifies underweight/thinness by measuring the circumference of the mid-upper arm and comparing it to a pre-determined cutoff. In pregnant women, low MUAC has been associated with intrauterine growth restriction, low birth weight, and neonatal morbidity (WHO 1995a). Because MUAC is a relatively simple measurement that requires minimal equipment, is not affected by pregnancy status, and can be measured at any time during pregnancy, it is increasingly being used to assess nutritional status of pregnant and postpartum women and determine eligibility for nutrition support programs, especially in emergency or humanitarian contexts when measuring weight and height may be difficult (Tang et al. 2016; WHO 1995a; Ververs et al. 2013). As discussed below, international evidence-based MUAC cutoffs for pregnant women have not been established. One study looking into MUAC cutoffs to assess malnutrition in pregnant women concluded that it would be difficult to recommend a cutoff that is suitable in all settings. The study recommended that countries and programs conduct a cost-benefit analysis before adopting a specific MUAC cutoff (Tang et al. 2016).

LINKS TO RELATED CONTENT

Condition: Underweight/thinness

Interpretation: MUAC

MEASUREMENT: **Bilateral Pitting Edema**

Bilateral pitting edema is an abnormal accumulation of fluid in body tissues that causes swelling. Bilateral pitting edema can be a clinical sign of a specific form of severe malnutrition known as nutritional edema, edematous malnutrition, severe malnutrition with edema, or kwashiorkor. However, edema is quite common during pregnancy, especially in the third trimester due to the additional blood and body fluid needed to support the fetus, and typically does not indicate malnutrition. Therefore, edema during pregnancy can be normal or it can indicate other medical conditions, such as pre-eclampsia (particularly if the edema is sudden and in the hands and face) (Swamy and Heine n.d.; Navarro-Colorado 2006). It is recommended that pregnant women and girls with edema be assessed further to determine the cause and provided with appropriate treatment as needed.

LINKS TO RELATED CONTENT

Condition: Severe malnutrition

Interpretation: Classification of bilateral pitting edema

How to Interpret Anthropometric Indicators and Classify Nutritional Status

This section provides guidance on how to interpret the various measurements and indices in this module to better understand the nutritional status of pregnant and postpartum women and girls. Aside from pre-pregnancy BMI, there are no universally accepted international cutoffs for most of the anthropometric measurements discussed in this module. Therefore, various countries have created their own guidance. The BMI cutoffs, along with caveats on the application of country-specific guidance on other anthropometric measurements, are discussed here.

Summary Tables: Classifying Nutritional Status of Pregnant and Postpartum Women and Girls

The summary tables in this section indicate cutoffs for various nutrition conditions and are organized according to the measurement or index used.

Short Stature and Height-for-Age

While a universally accepted international cutoff for short stature has not been established, a height of <145 cm is a commonly used cutoff in surveys such as the Demographic and Health Survey (DHS) and was also used in the Lancet's 2013 Maternal and Child Nutrition Series to identify short stature (see **Table 4.2**). However, various risks to mother and child have been associated with cutoffs ranging from approximately 140–156 cm (WHO 1995a; Ververs et al. 2013). For adolescent girls, height-for-age is the appropriate measure to identify stunting (see **Table 4.2**). See **Box 4.2** on the next page for more information on z-scores (used to determine height-for-age cutoffs).

TABLE 4.2 Cutoffs for Short Stature and Stunting

Age Group	Condition	Cutoff
Women	Short stature (adult)	< 145 cm
Adolescent girls up to age 19	Severe stunting (height-for-age)	< - 3 z-score
	Moderate stunting (height-for-age)	≥ - 3 and < - 2 z-score

LINKS TO RELATED CONTENT

Measurement: **Height and height-for-age**

Condition: **Short stature** Condition: **Stunting**

BOX 4.2 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. 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's growth over time.

Who Needs to Understand Z-Scores and Why?

Z-score cutoffs are used to define malnutrition according to anthropometric indices (e.g., length/height-for-age). 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 information on z-scores.

Pre-Pregnancy BMI and Recommended Pregnancy Weight Gain

In 2009, the IOM revised its pregnancy weight gain guidelines for women in the United States. These recommendations reflect the wide range of weight gain that can be considered healthy; they should be applied in the context of an individual woman's overall health and in conjunction with counseling on healthy diet and exercise. The guidelines may apply to similar populations outside the United States and have been adopted by some industrialized countries, such as Canada and New Zealand (Health Canada 2014; New Zealand Ministry of Health 2014). Others, such as the United Kingdom, have not adopted them.[7] The guidelines were not intended for use among populations in which women are substantially shorter or thinner than American women or do not have access to adequate obstetric care, which is often the case in developing countries (IOM and NRC 2009). There is limited research on the guidelines' applicability in developing countries, and studies have shown varying results (Ramakrishnan et al. 2014; Li et al. 2015). However, in the absence of country-specific weight gain guidelines, the 2009 IOM recommendations are a helpful reference point (see **Table 4.3**). Based on limited available evidence, the IOM recommends that these weight gain guidelines be applied to pregnant adolescents, although further research may be needed on optimal weight gain for this group (IOM and NRC 2009; Harper et al. 2011). Because gestational age and multiple weight measurements are required, gestational weight gain as a tool to guide nutrition counseling during pregnancy is more suited to non-emergency contexts (Ververs et al. 2013). Please note that while the IOM found that pregnancy weight gain guidelines also applied to women shorter than 157 cm, there was no evidence to determine whether guidelines should be modified for women shorter than 150 cm (IOM and NRC 2009).

[7] The United Kingdom does not currently have recommended pregnancy weight gain guidelines and instead focuses on achieving a healthy pre-pregnancy weight and healthy diet and physical activity during pregnancy (The National Institute for Health and Care Excellence [NICE] 2010).

TABLE 4.3 Recommended Total Weight Gain and Rate of Weight Gain during Pregnancy

Pre-pregnancy BMI[a]	Nutritional Status	Recommended in kilograms				Recommended in pounds			
		Singleton Pregnancies			Twins[b]	Singleton Pregnancies			Twins[b]
		Recommended Total Weight Gain	Rate of Weekly Weight Gain in 2nd and 3rd Trimester		Recommended Total Weight Gain	Recommended Total Weight Gain	Rate of Weekly Weight Gain in 2nd and 3rd Trimester		Recommended Total Weight Gain
			Mean	Range			Mean	Range	
BMI < 18.5	Underweight/ thin	12.5–18 kg	0.51 kg	0.44–0.58 kg	No recommend-ation	28–40 lbs	1 lb	1–1.3 lbs	No recommend-ation
BMI 18.5–24.9	Normal	11.5–16 kg	0.42 kg	0.35–0.5 kg	17–25 kg	25–35 lbs	1 lb	0.8–1 lb	37–54 lbs
BMI 25–29.9	Overweight	7–11.5 kg	0.28 kg	0.23–0.33 kg	14–23 kg	15–25 lbs	0.6 lb	0.5–0.7 lb	31–50 lbs
BMI ≥ 30	Obese	5–9 kg	0.22 kg	0.17–0.27 kg	11–19 kg	11–20 lbs	0.5 lb	0.4–0.6 lb	25–42 lbs

Adapted from IOM and NRC 2009.

a Based on a weight measured up to 2 months before conception or within the first trimester of pregnancy (IOM and NRC 2009).

b The guidelines for twins are provisional and do not refer to other multiples. There were insufficient data to establish guidelines for underweight women carrying twins (IOM and NRC 2009).

LINKS TO RELATED CONTENT

Measurement: Pre-pregnancy BMI

Measurement: Gestational weight gain

Condition: Underweight/thinness

Condition: Overweight/obesity

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Postpartum Weight: Signs of Possible Weight-Related Problems during Lactation

Guidance on postpartum weight management was developed by the IOM in 1992 to guide health professionals working with postpartum women who are breastfeeding. They are based on experiences in a U.S. population and are here as a reference. Their applicability to non-U.S. populations has not been determined. **Table 4.4** provides updated guidance, adapted[8] from the 1992 IOM guidance, to include the current BMI cutoffs.

TABLE 4.4 Signs of Potential Postpartum Weight-Related Problems

Pre-pregnancy BMI	Signal of potential problem
BMI < 18.5 (underweight)	• Losing more than 2 kg (4.5 lb)/month after the first month postpartum • Any additional weight loss after BMI returns to the underweight classification or weight returns to pre-pregnancy weight
BMI 18.5–24.9 (normal)	• Losing more than 2 kg (4.5 lb)/month after the first month postpartum • Falling below normal BMI • Weight gain leading to high BMI • Major fluctuations in weight and a preoccupation with weight
BMI 25 or higher (overweight or obese)	• Losing more than 3 kg (6.5 lb)/month after the first month postpartum • Postpartum weight gain

Source: Adapted from IOM 1992

LINKS TO RELATED CONTENT

Measurement: Pre-pregnancy BMI

Measurement: Postpartum weight retention

Condition: Underweight/thinness

Condition: Overweight/obesity

[8] The 1992 IOM classifications are based on pre-pregnancy weight-for-height, which was commonly used in 1992. The FANTA Guide to Anthropometry adapted the guidance to use the current BMI cutoffs, applying the recommendations for each category—"underweight, normal, overweight/obese"—according to the BMI currently associated with that category (e.g., underweight = BMI <18.5).

Mid-Upper Arm Circumference

Several studies have found an association between low MUAC and low birth weight, preterm birth, intrauterine growth restriction, and poor maternal health (Tang et al. 2016; Ververs et al. 2013; WHO 1995a). However, these studies used a variety of cutoffs. There is no clear definition of low MUAC or established universally accepted international MUAC cutoffs for pregnant and postpartum women. However, because MUAC is simpler to measure than other indicators and is not affected by pregnancy status, several countries have established their own cutoffs for classifying malnutrition in women who are pregnant or up to 6 months postpartum. Although there is limited evidence to support these cutoffs, they help determine eligibility for nutrition support programs. **Table 4.5** provides a few examples of cutoffs that select countries were using as of 2016; this is not an exhaustive list of countries that have established their own MUAC cutoffs. The 2011 Sphere Handbook and United Nations High Commissioner for Refugees (UNHCR) guidelines also note that although cutoffs vary by country, 210 mm or 230 mm are commonly used cutoffs for pregnant women's entry into feeding programs and 210 mm has been proposed as a cutoff for women at risk during emergency situations (Sphere Project 2011). In selecting cutoffs associated with enrollment in nutrition support programs, it will also be important to be aware of available resources. For example, a higher cutoff would qualify more people for enrollment, so it is important to ensure that a program has funds and supplies to provide support for all who qualify (UNHCR and World Food Programme [WFP] 2011). Currently, there are no specific recommendations for MUAC cutoffs for pregnant adolescents, and several countries stipulate that their cutoffs for pregnant and postpartum women also apply to pregnant and postpartum adolescents. While not clearly defined in all countries, "postpartum" in the cutoffs on the next page usually refers to women within 6 months of delivery.

TABLE 4.5 Sample Country-Specific MUAC Cutoffs

Country	Severe Malnutrition	Moderate Malnutrition	Normal
Cote d'Ivoire*	< 185 mm	≥ 185 to < 210 mm	≥ 210 mm
Democratic Republic of Congo*	< 210 mm	≥ 210 to < 220 mm	≥ 220 mm
Ethiopia	< 180 mm	≥ 180 to < 210 mm	≥ 210 mm
Malawi	< 190 mm	≥ 190 to < 220 mm	≥ 220 to < 300 mm
Mozambique	< 210 mm	≥ 210 to < 230 mm	≥ 230 mm
Namibia	< 190 mm	≥ 190 to < 230 mm	≥ 230 mm
Tanzania	< 190 mm	≥ 190 to < 230 mm	≥ 230 mm
Uganda	< 190 mm	≥ 190 to < 220 mm	≥ 220 mm
Zambia	< 210 mm	≥ 210 to < 230 mm	≥ 230 mm

* Indicates cutoff also used for pregnant adolescents.

Source: Adapted from: Food and Nutrition Technical Assistance III Project (FANTA). 2016. Nutrition Assessment, Counseling, and Support (NACS): A User's Guide—Module 2: Nutrition Assessment and Classification, Version 2. Washington, DC: FHI 360/FANTA.

LINKS TO RELATED CONTENT

Measurement: MUAC Condition: Underweight/thinness

Clinical Assessment: Bilateral Pitting Edema

Nutritional edema in pregnant women and girls can be classified as shown in **Table 4.6** below. However, as noted previously, bilateral pitting edema during pregnancy is relatively common and has many potential causes other than malnutrition.

TABLE 4.6 Nutritional Status Classification of Bilateral Pitting Edema

Description	Grade of Edema	Nutritional Status
No bilateral pitting edema	Absent (O)	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).

LINKS TO RELATED CONTENT

Measurement: Bilateral pitting edema Condition: Severe malnutrition

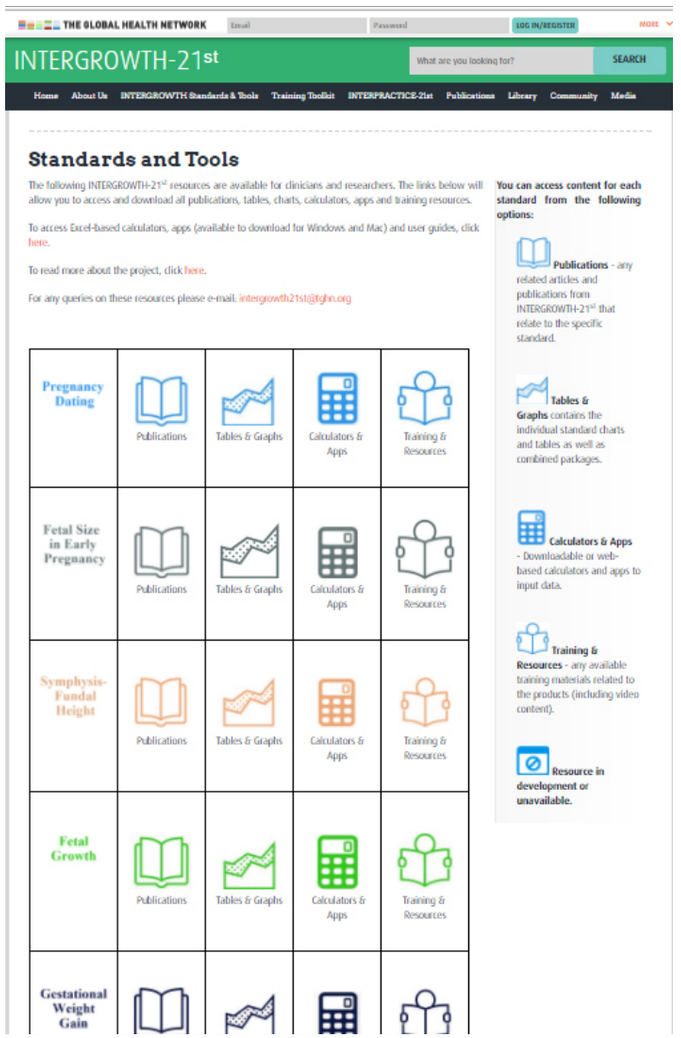
Tools to Assess, Classify, and/or Monitor Nutritional Status of Pregnant and Postpartum Women and Girls

TOOL: **INTERGROWTH-21st Standards and Tools**

In 2008, INTERGROWTH-21st, a multi-country project to extend the 2006 WHO Child Growth Standards into the fetal and neonatal period was launched. In addition to standards on fetal and newborn growth, INTERGROWTH-21st has developed gestational weight gain standards for pregnant women. As of the publication of this guide, standards for gestational weight gain for women with normal pre-pregnancy BMI are available on the website, with standards for overweight women forthcoming. The standards can be accessed at https://intergrowth21.tghn.org/gestational-weight-gain/#c6.

Because the INTERGROWTH-21st standards have not yet been widely adopted, they are not addressed in detail in this guide.

More information is available on the INTERGROWTH-21st Standards website.



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