MODULE 2. Nutrition Assessment and Classification

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What is the nutrition care process?

The nutrition care process is a systematic approach to providing high-quality nutrition care. The process includes four interrelated steps, shown in figure 1. The figure is shown as a circle because nutrition assessment is an ongoing process. The arrow points to nutrition assessment, the subject of this module.

The results of a client’s nutrition assessment and classification of nutritional status determine all the other elements of nutrition assessment, counseling, and support (NACS)—counseling, treatment, and referral to food security and other support.

Why is nutrition assessment important?

- To identify people at risk of malnutrition for early intervention or referral before they become malnourished
- To identify malnourished clients for treatment. Malnourished people who are not treated early have longer hospital stays, slower recovery from infection and complications, and higher morbidity and mortality.
- To detect practices that can increase the risk of malnutrition and infection
- To identify clients who require nutrition education and counseling, particularly on improving use of local food sources
- To establish appropriate nutrition care plans

Full nutrition assessment can be preceded by nutrition screening—a rapid, simple process to identify people who may be malnourished or at risk of malnutrition to determine whether they need more detailed nutrition assessment. Nutritionists, trained facility-based health care providers, and trained community service providers can do nutrition screening in health care facilities, during growth monitoring or home-based care, and during support group meetings. Simple nutrition screening can include checking for bilateral pitting edema (swelling in both feet or legs caused by the accumulation of excess fluid under the skin in the spaces within the tissues, characterized by indentation of the skin when pressure is applied that persists after the pressure is released), measuring weight and mid-upper arm circumference (MUAC) (the circumference of the left upper arm measured at the mid-point between the tip of the shoulder and the tip of the elbow using a measuring or MUAC tape), and gathering information about food

FIGURE 1. The Nutrition Care Process

<table>
<thead>
<tr>
<th>Nutrition Assessment</th>
<th>Nutrition Classification/Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obtain/collect data about a client or population.</td>
<td>Identify the problem.</td>
</tr>
<tr>
<td>Analyze/interpret the data using evidence based standards.</td>
<td>Determine causes/contributing risk factors.</td>
</tr>
<tr>
<td>Cluster signs and symptoms.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nutrition Monitoring and Evaluation</th>
<th>Nutrition Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor input, process output, and outcome indicators.</td>
<td>Select, plan, and implement an appropriate action.</td>
</tr>
<tr>
<td>Evaluation outcome and impact indicators.</td>
<td>• Counseling</td>
</tr>
<tr>
<td></td>
<td>• Treatment</td>
</tr>
<tr>
<td></td>
<td>• Referral</td>
</tr>
</tbody>
</table>

Source: Academy of Nutrition and Dietetics.
intake and food security status. Nutrition screening requires standardized training in line with national and local policies and health systems. Special training materials may be needed for low literacy or illiterate populations. Community service providers need government-approved recording and referral materials, clear roles, and guidance on whom to screen, how, and how often. They may also need incentives to conduct accurate and consistent community nutrition screening and referrals.

**Why is it important to classify nutritional status?**

Health care providers classify clients’ nutritional status to determine counseling messages, eligibility for treatment of malnutrition, and nutrition care plans (see Module 3. Nutrition Counseling) and to monitor clients’ recovery from malnutrition.

**What is nutrition assessment?**

Nutrition assessment is collecting information about a client’s medical history, anthropometric measurements, clinical and biochemical characteristics, dietary practices, current treatment, and socioeconomic situation including food security. This information identifies medical complications that affect nutrition, tracks growth and weight, detects dietary habits that increase the risk of disease, informs nutrition education and counseling, and establishes a framework for an individual nutrition care plan. Nutrition assessment requires specialized training and should be done by clinicians, dieticians, and nutritionists.

Health care providers should prioritize the following clients for nutrition assessment:

1. Pregnant and postpartum women
2. Clients with unintentional weight loss
3. Clients who have been prescribed specialized food products to treat malnutrition
4. Clients with disease-related symptoms that can be managed through diet
5. Clients with HIV, TB, or other chronic diseases

**How often should nutrition assessment be done?**

The frequency of nutrition assessment depends on a client’s age and pregnancy and disease status and on national policies. The recommendations below should be adjusted based on national guidelines.

- **Pregnant/postpartum women**: On every antenatal visit
- **Infants 0–< 6 months of age**: At birth and on every scheduled post-natal visit
- **Infants 6–59 months of age**: During monthly growth monitoring sessions for children under 2 and every 3 months for older children
- **Children over 5 years of age**: On every clinic visit
- **Adolescents and adults**: On every clinic visit
- **People with HIV**: On every clinic visit and when initiating or changing antiretroviral therapy (ART)

**What are the different types of nutrition assessment?**

An easy way to remember types of nutrition assessment is **ABCD**: Anthropometric, biochemical, clinical, and dietary.
Anthropometric assessment

Anthropometry is the measurement of the size, weight, and proportions of the body. Anthropometric measurements include weight, height, and mid-upper arm circumference (MUAC). Body mass index (BMI) and weight-for-height are anthropometric measurements presented as indexes. Each of these indexes is recorded as a z-score. Z-scores are measured in standard deviations (SD), which describe how far and in what direction an individual’s anthropometric measurement deviates from the mean (for a healthy person of the same age and sex). The same measures should be used every time a client’s nutritional status is assessed in order to compare results.

Weight

Weighing is usually the first step in anthropometric assessment and a prerequisite for finding weight-for-height z-score (WHZ) for children and BMI for adults. Weight is strongly correlated with the development of disease. Unintentional weight loss can mean poor health and reduced ability to fight infection. Weighing clients requires a functioning weighing scale that measures weight in kg to within the nearest 100 g. Accurate weight measurement is important because errors can lead to incorrect classification of nutritional status and the wrong care and treatment.

All infants lose weight immediately after birth. This is not a problem unless an infant loses as much as 10 percent of birth weight. Infants should regain their birth weight within 1 week of birth. Most double their birth weight by the end of 5 months.1 Infants with low birth weight (< 2,500 g) are at higher risk of physical and cognitive impairments and nutrition-related chronic diseases in later life.

Length and height

Measuring length or height requires a height board or measuring tape marked in centimeters (cm). Measure height for children 2 years and older who are more than 87 cm tall and for adults.

Have a comment?

1 www.mayoclinic.com/health/infant-growth/AN01654
**Weight-for-height**

WHZ is an index to assess the nutritional status of children from birth to 59 months of age. WHZ compares a child’s weight to the weight of a child of the same length/height and sex in the World Health Organization (WHO) Child Growth Standards to classify the child’s nutritional status. You will need tables with the WHO Child Growth Standards. There are separate WHO Child Growth Standards for boys and girls.

**Mid-upper arm circumference (MUAC)**

MUAC is the circumference of the left upper arm measured at the midpoint between the tip of the shoulder and the tip of the elbow, using a measuring or MUAC tape. MUAC measurements in millimeters (mm) are more accurate than measurements in centimeters. MUAC is a proxy measure of nutrient reserves in muscle and fat that are unaffected by pregnancy and independent of height. Use MUAC to measure children as an alternative to WHZ, adolescents as an alternative to BMI-for-age, all pregnant women and women who are up to 6 months postpartum, and non-pregnant/postpartum adults whose weight and height cannot be measured (e.g., if they cannot stand or no equipment is available). Do not use MUAC to assess nutritional status in people with edema.

**MUAC or WHZ?**

MUAC is quicker and simpler than WHZ to assess nutritional status in children under 5 because MUAC tapes are inexpensive and easy to use. MUAC may identify fewer children at risk of malnutrition, but those children are likely to be at higher risk of mortality. Some programs now use MUAC as the only admission criterion for inpatient treatment of SAM. However, in some populations, the prevalence of acute malnutrition measured by WHZ and MUAC may differ substantially. WHO recommends using both if each indicator yields a different prevalence of acute malnutrition. Some programs use MUAC to identify and refer children at risk of acute malnutrition and WHZ to admit children for treatment of SAM. However, using MUAC for community screening and referral could miss a large proportion of children who would be malnourished according to WHZ. WHZ may overestimate the prevalence of malnutrition in some populations.

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### MUAC cutoffs to classify nutritional status in children 6 months to 14 years of age

<table>
<thead>
<tr>
<th></th>
<th>Severe acute malnutrition (SAM)</th>
<th>Moderate acute malnutrition (MAM)</th>
<th>Moderate malnutrition</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>6–59 months</td>
<td>&lt; 115 mm</td>
<td>≥ 115 to &lt; 125 mm</td>
<td></td>
<td>≥ 125 mm</td>
</tr>
<tr>
<td>5–9 years</td>
<td>&lt; 135 mm</td>
<td></td>
<td>≥ 135 to &lt; 145 mm</td>
<td>≥ 145 mm</td>
</tr>
<tr>
<td>10–14 years</td>
<td>&lt; 160 mm</td>
<td></td>
<td>≥ 160 to &lt; 185 mm</td>
<td>≥ 185 mm</td>
</tr>
</tbody>
</table>

Source: WHO 2010.
Because there are few data on the relationship between MUAC and mortality and other functional measures in adults, WHO has not established standard MUAC cutoffs to classify nutritional status in adults.

A Médecins Sans Frontières Switzerland review of literature between 1995 and 2012 identified MUAC as the preferential indicator to identify acute malnutrition in pregnant women because it is insensitive to changes over the total period of pregnancy, is easy to measure, requires only one measurement, has a relatively strong association with low birth weight, and does not require knowledge of gestational age. The review found that MUAC cutoffs for SAM in pregnant women varied from < 210 mm to < 230 mm in national nutrition protocols and recommended a conservative cutoff of < 230 mm for treatment of malnutrition in pregnant women in Africa and Asia who are at risk of low birth weight.

The cutoffs below are suggestions based on current practices.

### MUAC cutoffs to classify nutritional status in adults

<table>
<thead>
<tr>
<th>Non-pregnant/postpartum</th>
<th>Pregnant/postpartum</th>
<th>Nutritional status</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 190 mm</td>
<td>&lt; 190 mm</td>
<td>SAM</td>
</tr>
<tr>
<td>≥ 190 to &lt; 220 mm</td>
<td>≥ 190 mm to &lt; 230 mm</td>
<td>Moderate malnutrition</td>
</tr>
<tr>
<td>≥ 220 mm</td>
<td>≥ 230 mm</td>
<td>Normal nutritional status</td>
</tr>
</tbody>
</table>

**Body mass index (BMI)**

BMI is an anthropometric indicator based on weight-to-height ratio. It is the preferred indicator of body thinness to classify malnutrition in adults and adolescents 15 years and older who are not pregnant or postpartum. BMI is not an accurate indicator of nutritional status in pregnant women or adults with edema, whose weight gain is not linked to their nutritional status. Use MUAC for these groups.

Calculate BMI by dividing a person’s weight in kg by the square of the person’s height in meters (m). Convert measurements in cm to m (100 cm = 1 m).

\[
BMI = \frac{\text{weight (kg)}}{\text{height}^2 (\text{m})}
\]

BMI below the WHO cutoffs (shown in the table below) indicates a need for nutrition interventions to slow or reverse weight loss.

<table>
<thead>
<tr>
<th>BMI</th>
<th>Nutritional status</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 16.0</td>
<td>Severe malnutrition</td>
</tr>
<tr>
<td>≥ 16.0 to &lt; 17.0</td>
<td>Moderate malnutrition</td>
</tr>
<tr>
<td>≥ 17.0 to &lt; 18.5</td>
<td>Mild malnutrition</td>
</tr>
<tr>
<td>≥ 18.5 to &lt; 25.0</td>
<td>Normal nutritional status</td>
</tr>
</tbody>
</table>


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Low pre-pregnancy weight and inadequate weight gain during pregnancy are the most significant predictors of intrauterine growth retardation and low birth weight. The table below shows recommended total weight gain during pregnancy and weekly and monthly weight gain during the second and third trimesters in relation to BMI at the beginning of pregnancy. Women who gain less than the amount recommended may need specialized food products.

<table>
<thead>
<tr>
<th>Pre-pregnancy BMI</th>
<th>Recommended total weight gain</th>
<th>Recommended weekly weight gain, 2nd and 3rd trimesters</th>
<th>Recommended monthly weight gain, 2nd and 3rd trimesters</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 18.5</td>
<td>12.7–19.5 kg</td>
<td>0.5 kg</td>
<td>2.0 kg</td>
</tr>
<tr>
<td>18.5–24.9</td>
<td>11.3–17.1 kg</td>
<td>0.5 kg</td>
<td>2.0 kg</td>
</tr>
<tr>
<td>25.0–29.9</td>
<td>6.8–12.2 kg</td>
<td>0.3 kg</td>
<td>1.2 kg</td>
</tr>
<tr>
<td>≥ 30.0</td>
<td>5.0–9.8 kg</td>
<td>0.2 kg</td>
<td>0.8 kg</td>
</tr>
</tbody>
</table>


The British Association for Parenteral and Enteral Nutrition (BAPEN) has a Malnutrition Universal Screening Tool (MUST) that uses weight, height, BMI, weight loss, and acute disease score to determine risk of malnutrition. You can find the tool at http://www.bapen.org.uk/screening-for-malnutrition/must-calculator. BAPEN has also developed a MUST iPhone app that can be downloaded at http://www.bapen.org.uk/screening-for-malnutrition/must/must-app.

BMI-for-age z-score

BMI can be used to measure the nutritional status of adults over 18 years of age because they have completed their physical development. Because children and adolescents are still growing and developing, however, their age and sex have to be considered when measuring their nutritional status. BMI-for-age is the preferred indicator of body thinness to classify malnutrition in adolescents 15–18 years of age.

Below are the WHO BMI-for-age classifications of malnutrition in adolescents 15–18 years of age.

<table>
<thead>
<tr>
<th>BMI-for-age</th>
<th>Nutritional status</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; −3 z-score</td>
<td>Severe malnutrition</td>
</tr>
<tr>
<td>≥ −3 and &lt; −2 z-score</td>
<td>Moderate malnutrition</td>
</tr>
<tr>
<td>≥ −2 and &lt; −1 z-score</td>
<td>Mild malnutrition</td>
</tr>
<tr>
<td>≥ −1 z-score</td>
<td>Normal nutritional status</td>
</tr>
</tbody>
</table>


WHO reference charts and tables for BMI-for-age, height-for-age, and weight-for-age for children and adolescents 5–19 years of age can be found here: http://www.who.int/growthref/en/.
Biochemical assessment

Biochemical assessment is checking levels of nutrients in a person’s blood, urine, or stools. Lab test results can give trained medical professionals useful information about medical problems that can affect appetite or nutritional status.

Clinical assessment

Clinical assessment includes checking for visible signs of nutritional deficiencies such as bilateral pitting edema, emaciation (a sign of wasting, which is loss of muscle and fat tissue as a result of low energy intake and/or nutrient loss from infection), hair loss, and changes in hair color.

Bilateral pitting edema, also called nutritional edema, is swelling in both feet or legs (bilateral) characterized by pitting (indentation) of the skin when pressure is applied. Edema is the abnormal accumulation of fluid in the interstitial spaces of tissues. Either too much fluid moves from the blood vessels into the tissues or not enough fluid moves from the tissues back into the blood vessels. This imbalance can cause swelling in one or more parts of the body. Edema is a sign of severe malnutrition ONLY if it is in both feet or both legs. Other reasons for edema, especially in adults, that are not related to nutrition include congestive heart disease, lymphatic disorders, kidney disease, and other conditions. Bilateral pitting edema is a sign of severe malnutrition on its own and sufficient reason for inpatient treatment of malnutrition. Any person with bilateral pitting edema should be classified automatically as severely malnourished with medical complications, regardless of the results of anthropometric measurement.

Clinical nutrition assessment also includes checking for or asking about symptoms of infection that can increase nutrient needs (e.g., fever) and nutrient loss (e.g., diarrhea and vomiting), as well as medical conditions that impair digestion and nutrient absorption and increase the risk of developing malnutrition (e.g., HIV, celiac disease). Medical records should provide information about illness, hospitalizations, operations, diagnostic tests and therapies, and medications that can affect nutritional status.

Some medications can interfere with nutrient absorption, digestion, metabolism, and utilization. In return, nutritional status and diet can affect how medications work. Information about what medications clients are taking allows health care providers to counsel them on how to manage drug-food interactions and drug side effects (see Module 3. Nutrition Counseling). For children, clinical assessment may also include the history of growth patterns, onset of puberty, and a developmental history.

Assessing food and fluid intake is an essential part of nutrition assessment. It provides information on dietary quantity and quality, changes in appetite, food allergies and intolerance, and reasons for inadequate food intake during or after illness. The results are compared with recommended intake such as recommended dietary allowance (RDA) to counsel clients on how to improve their diets to prevent malnutrition or treat conditions affected by food intake and nutritional status (e.g., cardiovascular disease, cancer, obesity, diabetes, and hyperlipidemia). Some common ways to assess dietary intake are described here, although some may be time consuming for health care providers.

**24-hour recall**
This method was designed to quantify the average dietary intake for a group of people, although it can be used to assess individual nutrition intake. A client is asked to remember in detail all the food and drink consumed during the previous 24 hours. The method can be repeated on several occasions to account for day-to-day variation in intake. Health care providers may prompt clients to remember what they ate or drank by time periods or activities (e.g., just after waking up, before going to bed) or to estimate portion sizes by looking at household measures, food models, household utensils, photographs, or actual food.

**Food frequency questionnaire**
A food frequency questionnaire (FFQ) is designed to obtain information on overall dietary quality rather than nutrient composition and intake. The FFQ examines how often someone eats certain foods, and sometimes the size of the portions. This method is quick and inexpensive but under-reporting is common.

**Food group questionnaire**
Another way to do dietary assessment is to show clients pictures of different food groups (often available from national nutrition authorities) and ask whether they ate or drank any of those foods the previous day.
USAID defines food security as “having, at all times, both physical and economic access to sufficient food to meet dietary needs for a productive and healthy life.” This definition includes **food availability** (sufficient quantities of food available consistently to all people in a country, region, or household through domestic production, imports, and/or food assistance), **food access** (adequate resources to obtain a sufficient quantity and quality of food), and **food utilization/consumption** (proper biological use of food by the body).

Programs that provide food support based on food insecurity usually have their own eligibility criteria and often provide food for the entire household. If food support is available in a community, simple screening can determine eligibility.

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**RESOURCES**


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