# MODULE TWO

## Defining and Measuring Acute Malnutrition

MODULE OVERVIEW

This module reviews common nutrition and anthropometric terms, the causes of undernutrition in children and practical skills on how to measure acute malnutrition in children under 5.

The module will give field implementers of CMAM an overview of methods used to determine a child's nutritional status: testing for bilateral pitting edema, using mid-upper arm circumference (MUAC), and weight, height and age as measures. Proficiency in these skills is critical for identifying children who might be eligible for CMAM. Hands-on practice using these methods will be provided in the field visits to outpatient care sites in Module Four.

NOTES

The specific indicators which the CMAM service will use to determine nutritional status should be determined before this training module is conducted. If the service will admit children based on bilateral pitting edema and MUAC, there is no need to train on how to measure height and calculate weight-for-height (WFH).
If WFH will be used, the trainer should adapt the training to national policy and train participants to use WFH z-score (World Health Organization [WHO] child growth standards). In many countries, CMAM services use WFH as a percentage of the median of the National Centre for Health Statistics (NCHS) child growth references. The trainer must decide which WFH tables to use for the training and discuss international standards and context adaptations with the participants. The WHO tables (sex-specific for length and height) and the NCHS tables (sexes combined for length and height) appear in **Handout 2.5 Weight-for-Height Tables for Field Use**.

In some countries or emergency contexts, indicator cutoffs are adapted to the circumstances (e.g., resources, caseloads). The trainer must decide which cutoffs to use for the training and discuss international standards and context adaptations with the participants.

The cutoffs for MUAC are under debate. MUAC is accepted as an independent indicator for severe acute malnutrition (SAM). The current MUAC cutoff for SAM is 115 mm. However, MUAC is not yet accepted as an independent indicator for moderate acute malnutrition (MAM). Some countries use MUAC cutoffs of 120 mm or 125 mm for MAM. For now, this training guide uses the most common cutoff for SAM – below 115 mm – and for MAM — 115 mm to 124.9 mm — and notes that cutoffs are being debated. The guide will be updated for any new cutoffs reflecting evidence-based international guidance.

# I. DEFINING AND MEASURING ACUTE MALNUTRITION: CLASSROOM

| LEARNING OBJECTIVES | HANDOUTS AND EXERCISES |
|---|---|
| 1. Discuss Causes and Consequences of Undernutrition and Undernutrition Terminology | Handout 2.1 Causal Framework of Undernutrition<br><br>Handout 2.2 Undernutrition Definitions, Indices, Indicators and Indicator Cutoffs |
| 2. Identify the Clinical Signs of Acute Malnutrition | Handout 2.3 Clinical Manifestations of Acute Malnutrition |
| 3. Measure, Calculate and Classify Acute Malnutrition | Handout 2.4 Assessing Age, Bilateral Pitting Edema, MUAC, Weight and Height<br><br>Handout 2.5 Weight-for-Height Tables for Field Use<br><br>Exercise 2.1 Grades of Bilateral Pitting Edema<br><br>Exercise 2.2 Calculating WFH and Classifying Acute Malnutrition |
| Wrap-Up and Module Evaluation | |

## MATERIALS

- Blank cards
- Flip chart, markers
- Masking tape
- Cards with headings: Basic, Underlying, Immediate and Consequences
- Sets of cards with undernutrition terms and sets of cards with matching definitions
  - Calculators*
- Salter Scales
- Electronic scale (e.g., UNISCALE)
- Height boards*
- Height stick marked to 115 cm (cutoff for 5 years)
- Numbered and simple three-color MUAC tapes
- Photos of children with marasmus, kwashiorkor and Marasmic kwashiorkor
* Not required for services that use only bilateral pitting edema and MUAC as entry criteria

## ADVANCE PREPARATION

- Room setup, materials noted above
- Review all participant handouts
- Arrangements should be made for participants to conduct anthropometric measurements of children in the context of ongoing screening or CMAM services

## MODULE DURATION: TWO HOURS

Note: Depending on the needs of their audiences, trainers may choose to skip or spend more or less time on certain learning objectives and activities. The module duration is an estimate of the time it takes to complete all the learning objectives and activities.

# LEARNING OBJECTIVE 1:
## DISCUSS CAUSES AND CONSEQUENCES OF UNDERNUTRITION AND UNDERNUTRITION TERMINOLOGY

LO.1

Become familiar with **Handout 2.1. Causal Framework of Undernutrition** and Handout 2.2 Undernutrition Definitions, Indices, Indicators and Indicator Cutoffs.

**BRAINSTORM: CAUSES OF MALNUTRITION.** Give each participant two blank cards and ask them to think about what the causes of child undernutrition are and to write one cause on each card. Ask participants to post their cards and share their ideas.

Using cards marked "Immediate," "Underlying" and "Basic," have participants work together to group the causes by category and to place under the correspondingly labelled card.
- Immediate: e.g., food intake, illness
- Underlying: e.g., food insecurity, inadequate care practices, poor sanitation/water and inadequate health services
- Basic: e.g., political, cultural, religious, economic and social systems including women's status

Direct participants to **Handout 2.1. Causal Framework of Undernutrition** and ask participants if they can name some specific causes of undernutrition.

Note to participants that these causes contribute to all forms of undernutrition, and their presence and interaction will determine how they manifest themselves in a child or a population over time.

**ELICITATION: UNDERNUTRITION.** If covered in **Module One**, ask participants to define undernutrition and the forms it can take. If not, present the following points:

Undernutrition is a consequence of a deficiency in nutrients in the body and can take the form of:
- Acute malnutrition (bilateral pitting edema or wasting)
- Stunting
- Underweight
- Micronutrient deficiencies

Note to participants that malnutrition comprises both overnutrition (obesity) and undernutrition, but the term malnutrition is most often utilized for forms of undernutrition (e.g., acute malnutrition).

Ask participants to name consequences to undernutrition (e.g., increased risk of illness, increased risk of mortality due to weakened ability to fight other illness, poor growth, poor cognitive development)

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**PARTICIPATORY LECTURE: ACUTE MALNUTRITION.** Ask participants if they can identify the five methods commonly used to assess the nutritional status of children (if participants have no nutrition background, simply deliver the information in lecture): 1) bilateral pitting edema; 2) MUAC; 3) WFH; 4) height-for-age (HFA); 5) weight-forage (WFA). Remind participants that the focus of the training modules – and of CMAM programs – is acute malnutrition. Ask participants which assessment methods (above) assess acute malnutrition. Define acute malnutrition and the cutoffs for SAM and MAM.

- **Acute malnutrition** is caused by a decrease in food consumption and/or illness resulting in bilateral pitting edema or sudden weight loss. It is defined by the presence of **bilateral pitting edema** or **wasting** (low MUAC or WFH).

- **Acute malnutrition** comprises both SAM and MAM and can have the following indicators (with cutoffs):

|  | Bilateral Pitting Edema | MUAC* | WFH z-score (WHO standards or NCHS references) | WFH as a percentage of the median (NCHS references) |
|---|---|---|---|---|
| **SAM:** | Present | < 115 mm* | < -3 | < 70% |
| **MAM:** | Not present | > 115 mm* and < 125 mm* | ≥ -3 and < -2 | ≥ 70% and < 80% |

*cutoffs being debated

**NOTE:** If WFH is to be used, adapt the training according to the national policy, training participants to use the WFH z-score (WHO standards) or WFH as a percentage of the median (NCHS references)

**PRACTICE: ACUTE MALNUTRITION DEFINITIONS.** Still working in pairs, give participants a set of matching cards: 6 with undernutrition terms, and 6 with matching definitions (see below). Ask each group to match the terms with the definitions. Discuss in plenary.

Refer participants to **Handout 2.2 Undernutrition Definitions, Indices, Indicators and Indicator Cutoffs** for later reading and reference.

## MATCH TERM WITH CORRECT DEFINITION (ANSWER KEY)

| Terms | Definitions |
|---|---|
| **Acute malnutrition** | ▪ Bilateral pitting edema<br>▪ MUAC < 125 mm<br>▪ **Or** WFH z-score < -2 (low WFH) (WHO standards)<br>▪ **Or** WFH as a percentage of the median < 80% (NCHS references) |
| **Moderate acute malnutrition (MAM)** | ▪ MUAC < 125 mm and ≥ 115 mm (cutoff being debated)<br>▪ **Or** WFH z-score < -2 and ≥ -3 (WHO standards)<br>▪ **Or** WFH as a percentage of the median < 80% and ≥ 70% (NCHS references) |
| **Severe acute malnutrition (SAM)** | ▪ Bilateral pitting edema +/++/+++<br>▪ MUAC < 115 mm (cutoff being debated)<br>▪ **Or** WFH z-score < -3 (WHO standards)<br>▪ **Or** WFH as a percentage of the median < 70% (NCHS references)<br>▪ A child with SAM has an elevated risk of death |
| **Clinical manifestations of SAM** | ▪ Marasmus (severe wasting)<br>▪ Kwashiorkor (bilateral pitting edema or swelling of nutritional origin)<br>▪ Marasmic kwashiorkor (both bilateral pitting edema and severe wasting) |
| **Bilateral pitting edema** | ▪ A sign of SAM<br>▪ Also called kwashiorkor, nutritional edema or edematous malnutrition<br>▪ Verified when thumb pressure applied on top of both feet for three seconds leaves a pit (indentation) in both feet after the thumb is lifted<br>▪ An abnormal infiltration and excess accumulation of serous fluid in connective tissue or in a serous cavity |
| **Severe wasting** | ▪ A sign of SAM<br>▪ MUAC < 115 mm (cutoff being debated)<br>▪ **Or** WFH z-score < -3 (WHO standards)<br>▪ **Or** WFH as a percentage of the median < 70% (NCHS references)<br>▪ Also called marasmus<br>▪ A child with severe wasting has a high risk of death |

# LEARNING OBJECTIVE 2:
## IDENTIFY THE CLINICAL SIGNS OF ACUTE MALNUTRITION

Become familiar with **Handout 2.3 Clinical Manifestations of Acute Malnutrition.**

**BRAINSTORM AND WORKING GROUPS: CLINICAL MANIFESTATIONS OF ACUTE MALNUTRITION.** In plenary, ask participants if they can name the three clinical manifestations of acute malnutrition:

- Marasmus (severe wasting)
- Kwashiorkor (bilateral pitting edema)
- Marasmic kwashiorkor (severe wasting and bilateral pitting edema)

Divide participants into working groups and ask them to name the characteristics of clinical manifestations of acute malnutrition: marasmus, kwashiorkor and Marasmic kwashiorkor. Have one group present their answers and the other groups add additional points. Fill in any gaps.

Refer participants to **Handout 2.3 Clinical Manifestations of Acute Malnutrition** and review the classifications together. Invite and answer any questions.

**PRACTICE: CLINICAL MANIFESTATIONS.** Show pictures of children with marasmus, kwashiorkor and Marasmic kwashiorkor and ask participants to classify them by clinical manifestation. Answer any questions.

# LEARNING OBJECTIVE 3:
## MEASURE, CALCULATE AND CLASSIFY ACUTE MALNUTRITION

Become familiar with **Handout 2.4 Assessing Age, Bilateral Pitting Edema, MUAC, Weight and Height** and Handout 2.5 Weight-for-Height Tables for Field Use.

**PARTICIPATORY LECTURE: ASSESSING AGE.** Ask participants if they know when estimation of a child's age is important. Note that it is relevant for the use of MUAC as this indicator of SAM is used only for children 6-59 months and for the classification of treatment for SAM. In cases where the age of the child cannot be verified through a child health card (CHC) or immunization card, methods of estimating age include:

- **Estimating the month and year of birth with the help of a local events calendar.**
- **Recall of the mother/caregiver** is valid in the case of estimating the cutoff age of 6 months.
- In case the above methods fail, a young child's **swallow skills** can be tested with RUTF. If they pass the appetite test (can eat the RUTF), they are considered to be old enough to qualify for admission to outpatient care.
- For older children, age may be estimated based on **height**. The standard international proxy for children 59 months is 115 cm.

**PARTICIPATORY LECTURE: BILATERAL PITTING OEDEMA.** Describe how bilateral pitting is assessed (see **Handout 2.4**), noting that it is important that both feet are tested. If it is neither bilateral nor pitting, the edema is not of nutrition origin. Describe the three grades of bilateral pitting edema. Discuss how to assess bilateral pitting edema grades ++ and +++. Note that participants will have the opportunity to assess bilateral pitting edema in field site visits. Underline the importance of a second opinion in cases where bilateral pitting edema is present.

**PRACTICE: RECOGNISING BILATERAL PITTING OEDEMA.** Refer participants to **Exercise 2.1 Grades of Bilateral Pitting Edema.** Have the participants work in pairs to look at the photos and identify the severity of the bilateral pitting edema. Review answers together.

### EXERCISE 2.1 GRADES OF BILATERAL PITTING OEDEMA (WITH ANSWERS)

#### PHOTO 1

**BILATERAL PITTING OEDEMA +**

This child has bilateral pitting edema in both feet. This is grade + (mild). But the child might have grade ++ or +++, so the legs and face also should be checked.



#### PHOTO 2

**BILATERAL PITTING OEDEMA ++**

This child's feet, lower legs, hands and lower arms are swollen. This is grade ++ (moderate).



#### PHOTO 3

**BILATERAL PITTING OEDEMA +++**

This child has generalized bilateral pitting edema, including feet, legs, arms, hands and face. This is grade +++ (severe).



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**DEMONSTRATION: USING MUAC TAPE.** Refer participants to **Handout 2.4 Assessing Age, Bilateral Pitting Edema, MUAC, Weight and Height**. Ask how many participants have used MUAC tapes and which type (numbered or colored). Pass out MUAC tapes to participants and review briefly the cutoffs for SAM and MAM and how to find the measures on the tape. Demonstrate how to use MUAC tapes, outlining the process described in **Handout 2.4, Section 3.** Repeat the process for both numbered and colored tapes. Ask participants to practice on each other.

**PARTICIPATORY LECTURE: MEASURING WEIGHT AND LENGTH/HEIGHT.** Show participants the Salter Scale and the United Nations Children's Fund (UNICEF) UNISCALE, noting that they will encounter these scales in the field and have the opportunity to practice. For the Salter Scale, outline the considerations in **Handout 2.4, Section 4**. For the UNISCALE, briefly outline how the child can be weighed in the mother/caregiver's arms.

**PARTICIPATORY LECTURE: MEASURING LENGTH/HEIGHT.** (Note: in cases where bilateral pitting edema and MUAC are used for admission criteria, do not train participants to measure height of child.) Show participants the height board and note that length is measured for children under two or with a height below 85 cm (NCHS) or 87 cm (WHO), while height is measured for children over two or with a height above 85 cm (NCHS) or 87 cm (WHO). Describe the procedure outlined in **Handout 2.4, Section 5**. Note that in the case of children over two who are unable to stand, the measure will be taken lying down. In this case an adjustment downward of 0.5 cm is made to the measurement.

**PARTICIPATORY LECTURE: CALCULATING WFH Z-SCORE.** Refer participants to **Handout 2.5 Weight-for-Height Tables for Field Use** and ask participants if they are familiar with the tables. If not, carefully review the WFH tables with them. Make note that the first two tables are used to calculate WFH z-score using WHO Child Growth Standards and that the second two tables are used to calculate WFH as a percentage of the median using NCHS Child Growth References. Note that the training will address WFH z-score first.

Demonstrate step-by-step on a flip chart the process of how to determine WFH z-score:

1. Determine the age of the child in order to decide whether to use the length table or the height table. Remind participants that if a child over the age of 2 (or over 87 cm) must be measured lying down for whatever reason, subtract 0.5 cm from the measurement.

2. Find the child's height in the height column if using the height table or child's length in length column if using the length table. Note that length and height measurements ending on one decimal are rounded up or down:
   0.1, 0.2, 0.3, 0.4 are rounded down to 0.0 cm
   0.5, 0.6, 0.7 0.8, 0.9 are rounded up to 1.0 cm

3. Looking at the right side of the chart for a girl or the left side of the chart for a boy, find the median weight for a child of that height or length. Determine whether the weight of the child is above or below   -1, -2, -3 or -4 standard deviations (SDs).

4. Calculate the exact z-score by subtracting the median weight from the child's weight and dividing by the SD (in kg).

$$\frac{(child's\ weight) - (standard\ child's\ weight)}{(one\ SD)} = z\text{-score}$$

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**PRACTICE: CALCULATING WFH Z-SCORE.** Refer participants to **Exercise 2.2 Calculating WFH and Classifying Acute Malnutrition**. Work in plenary to calculate the WFH z-score for children 1 and 2 in the exercise. Answer any questions then ask participants to work in pairs to calculate the WFH z-score for children 3-10. Ask volunteer pairs to read their answers aloud. Answer further questions.

### EXERCISE 2.2 CALCULATING WFH AND CLASSIFYING ACUTE MALNUTRITION– PART A: CALCULATING WFH Z-SCORE (WITH ANSWERS)

**WFH Z-score (WHO standards)**

| Child Name | Sex | Age (in years unless noted) | Bilateral Pitting Edema | MUAC (mm or color) | Height (cm) | Weight (kg) | WFH Z-Score |
|---|---|---|---|---|---|---|---|
| Child 1 | F | 3 | | Green | 98.2 | 12.5 | **< -1 and > -2** |
| Child 2 | M | 5 | | 123 | 110.0 | 14.8 | **< -2 and > -3** |
| Child 3 | M | 5 | ++ | Yellow | 102.2 | 13.5 | **< -2 and > -3** |
| Child 4 | F | 4 | | 110 | 91.1 | 9.3 | **< -3** |
| Child 5 | M | 9 months | | 125 | 69.9 (Length) | 6.7 | **< -2 and > -3** |
| Child 6 | F | 4 | +++ | Yellow | 105.2 | 18.0 | **> median** |
| Child 7 | F | 8 months | + | 105 | 68.2 (Length) | 5.0 | **< -3** |
| Child 8 | M | 1 | | Red | 84.3 (Length) | 8.9 | **= -3** |
| Child 9 | F | 2 | | 109 | 97.2 | 11.0 | **< -2 and > -3** |
| Child 10 | M | 1.5 | + | Green | 89.7 | 12.9 | **= median** |

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**PARTICIPATORY LECTURE: CALCULATING WFH AS A PERCENTAGE OF THE MEDIAN.** Refer participants again to **Handout 2.5 Weight-for-Height Tables for Field Use** noting that on this round they are to work with the second pair of tables. Note that there are not separate tables for length vs. height, nor separate columns for gender.

LO.3

Demonstrate step-by-step on a flip chart the process of how to determine WFH as a percentage of the median:

1. Remind participants that if a child over the age of 2 (or over 85 cm) must be measured lying down for some reason, subtract 0.5 cm from the measurement.

2. Find the child's height or length in length column. Note that length and height measurements ending on one decimal are rounded up or down:

> 0.1, 0.2 are rounded down to 0.0 cm 0.3, 0.4 are rounded up to 0.5 cm
> 0.6, 0.7 are rounded down to 0.5 cm
> 0.8, 0.9 are rounded up to 1.0 cm

3. Find the median weight for that child, irrespective of gender. Determine whether the weight of the child is above or below 85, 80, 75, 70 or 65 percent.

4. Calculate the exact percentage of the median by dividing the child's weight by the median weight.

$$\frac{\text{child's weight}}{\text{median reference weight}} = \text{percentage of the median}$$

**PRACTICE: CALCULATING WFH AS A PERCENTAGE OF THE MEDIAN.** Refer participants to **Exercise 2.2 Calculating WFH and Classifying Acute Malnutrition**. Work in plenary to calculate the WFH as a percentage of the median for children 1 and 2 in the exercise. Answer any questions then ask participants to work in pairs to calculate the WFH as a percentage of the median for the children 3-10. Ask volunteer pairs to read their answers aloud. Answer further questions.

EXERCISE 2.2 CALCULATING WFH AND CLASSIFYING ACUTE MALNUTRITION–CALCULATING WFH AS A PERCENTAGE OF THE MEDIAN (WITH ANSWERS)

LO.3

**WFH as a Percentage of the Median (NCHS references)**

| Child Name | Age (in years unless noted) | Bilateral Pitting Edema | MUAC (mm or color) | Height (cm) | Weight (kg) | WFH as a Percentage of the Median |
|---|---|---|---|---|---|---|
| Child 1 | 3 | no | Green | 98.2 | 12.5 | ≥ 80% |
| Child 2 | 5 | no | 123 | 110.2 | 14.8 | = 80% |
| Child 3 | 5 | ++ | Yellow | 102.2 | 13.5 | ≥ 80% |
| Child 4 | 4 | no | 115 | 91.2 | 9.3 | = 70% |
| Child 5 | 9 months | no | 125 | 70.2 (Length) | 6.7 | <80% |
| Child 6 | 4 | +++ | Yellow | 105.2 | 18.0 | ≥80% |
| Child 7 | 8 months | + | 105 | 68.2 (Length) | 5.0 | <70% |
| Child 8 | 1 | no | Red | 84.2 (Length) | 8.9 | <80% |
| Child 9 | 2 | no | 109 | 97.2 | 11.0 | <80% |
| Child 10 | 1.5 | + | Green | 89.2 | 12.9 | = median |

**PRACTICE: DETERMINING CHILD'S NUTRITIONAL STATUS.** Refer participants back to **Exercise 2.2 Calculating WFH and Classifying Acute Malnutrition**. Still working in pairs, ask them to use the information on the presence of bilateral pitting edema and MUAC scores to determine whether the child has SAM or MAM or is normal.

Remind participants to use all the information on the sheet to make their determinations. Note to participants that:

- If a child has bilateral pitting edema, it is still useful to measure MUAC or WFH to check for Marasmic kwashiorkor.

- Bilateral pitting edema could increase the child's WFH and mask wasting or other warning signs, however a child with bilateral pitting edema is automatically classified as having SAM.

- In countries that use only bilateral pitting edema and MUAC as entry criteria, information on height and weight is not necessary.

Ask for volunteer pairs to read their answers aloud and then discuss and summarize in plenary. Ask participants what they would record for Child 7's admission criterion (this child has Marasmic kwashiorkor). Refer to answer sheet and fill in gaps.

### EXERCISE 2.2 CALCULATING WFH AND CLASSIFYING ACUTE MALNUTRITION– WFH
### Z-SCORE (WHO STANDARDS) (WITH ANSWERS)

**LO.3**

**Bilateral Pitting Edema and MUAC**

| Child Name | Age (in years unless noted) | Bilateral Pitting Edema | MUAC (mm or color) | Classification |
|---|---|---|---|---|
| Child 1 | 3 | no | Green | **OK** |
| Child 2 | 5 | no | 123 | **Moderate** |
| Child 3 | 5 | ++ | Yellow | **Severe (bilateral pitting edema)** |
| Child 4 | 4 | no | 115 | **Moderate** |
| Child 5 | 9 months | no | 125 | **Moderate** |
| Child 6 | 4 | +++ | Yellow | **Severe (bilateral pitting edema)** |
| Child 7 | 8 months | + | 105 | **Severe (Marasmic kwashiorkor)** |
| Child 8 | 1 | no | Red | **Severe (MUAC)** |
| Child 9 | 2 | no | 109 | **Severe (MUAC)** |
| Child 10 | 1.5 | + | Green | **Severe (bilateral pitting edema)** |

**Bilateral Pitting Edema and MUAC and WFH Z-score (WHO Standards)**

| Child Name | Sex | Age (in years unless noted) | Bilateral Pitting Edema | MUAC (mm or color) | Height (cm) | Weight (kg) | WFH Z-Score | Classification |
|---|---|---|---|---|---|---|---|---|
| Child 1 | F | 3 | no | Green | 98.2 | 12.5 | < -1 and > -2 | **Moderate** |
| Child 2 | M | 5 | no | 123 | 110.0 | 14.8 | < -2 and > -3 | **Moderate** |
| Child 3 | M | 5 | ++ | Yellow | 102.2 | 13.5 | < -2 and > -3 | **Severe (bilateral pitting edema)** |
| Child 4 | F | 4 | no | 115 | 91.1 | 9.3 | < -3 | **Severe (WFH)** |
| Child 5 | M | 9 months | no | 125 | 69.9 | 6.7 | < -2 and > -3 | **Moderate** |
| Child 6 | F | 4 | +++ | Yellow | 105.2 | 18 | > median | **Severe (bilateral pitting edema)** |
| Child 7 | F | 8 months | + | 105 | 68.2 | 5.0 | < -3 | **Severe (Marasmic kwashiorkor)** |
| Child 8 | M | 1 | no | Red | 84.3 | 8.9 | = -3 | **Severe (MUAC)** |
| Child 9 | F | 2 | no | 109 | 97.2 | 11 | < -2 and > -3 | **Severe (MUAC)** |

| Child 10 | M | 1.5 | + | Green | 89.7 | 12.9 | = median | **Severe (bilateral pitting edema)** |

**Bilateral Pitting Edema and MUAC and WFH as a Percentage of the Median (NCHS references)**

| Child Name | Age (years) | Bilateral Pitting Edema | MUAC (mm or color) | Height (cm) | Weight (kg) | WFH as a % of Median | Classification |
|---|---|---|---|---|---|---|---|
| Child 1 | 3 | no | Green | 98.2 | 12.5 | ≥ 80% | **Normal** |
| Child 2 | 5 | no | 123 | 110.2 | 14.8 | = 80% | **Moderate (MUAC)** |
| Child 3 | 5 | ++ | Yellow | 102.2 | 13.5 | ≥ 80% | **Severe (bilateral pitting edema)** |
| Child 4 | 4 | no | 115 | 91.2 | 9.3 | = 70% | **Moderate (borderline)** |
| Child 5 | 9 months | no | 125 | 70.2 | 6.7 | < 80% | **Moderate** |
| Child 6 | 4 | +++ | Yellow | 105.2 | 18.0 | ≥ 80% | **Severe (bilateral pitting edema)** |
| Child 7 | 8 months | + | 105 | 68.2 | 5.0 | < 70% | **Severe (Marasmic kwashiorkor)** |
| Child 8 | 1 | no | Red | 84.2 | 8.9 | < 80% | **Severe (MUAC)** |
| Child 9 | 2 | no | 109 | 97.2 | 11.0 | < 80% | **Severe (MUAC)** |
| Child 10 | 1.5 | + | Green | 89.2 | 12.9 | = median | **Severe (bilateral pitting edema)** |

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# WRAP-UP AND MODULE EVALUATION

**SUGGESTED METHOD: REVIEW THE LEARNING OBJECTIVES AND COMPLETE THE EVALUATION FORM**

- Review the learning objectives of the module. In this module you have:
    1. Discussed causes and consequences of undernutrition, as well as undernutrition terminology
    2. Identified the clinical signs of SAM
    3. Calculated and classified acute malnutrition

- Place the following questions in a basket. Ask volunteers to pick a question and answer it. Discuss answers.
    1. What are some basic causes of undernutrition?
    2. What kinds of actions are being taken in your community to address undernutrition?
    3. What is acute malnutrition? How is SAM defined?
    4. How do you measure bilateral pitting edema?
    5. What does the red color mean on a MUAC tape?

- Let participants know that they will have an opportunity to assess for bilateral pitting edema, use MUAC tapes and measure WFH during field visits.

- Ask participants to complete the evaluation form.