MODULE 6

Measuring malnutrition: Individual assessment

PART 3: TRAINER'S GUIDE

The trainer's guide is the third of four parts contained in this module. It is NOT a training course. This guide provides guidance on how to design a training course by giving tips and examples of tools that the trainer can use and adapt to meet training needs*. The trainer's guide should only be used by experienced trainers to help develop a training course that meets the needs of a specific audience. The trainer's guide is linked to the technical information found in Part 2 of the module.

Module 6 covers anthropometry as a way of measuring the nutritional status of an individual. It does not include micronutrient status as this is covered in Module 4. Anthropometry is used in both emergency and non-emergency situations. This module can be used to provide a practical training for field workers to carry out measurements to assess nutritional status either as part of a nutrition survey or to identify individuals for selective feeding programmes. It can also provide a short practical briefing on the different anthropometric indices and classifications for senior managers. This module focuses on individual assessment while population assessment (nutrition surveys) is covered in Module 7.

Navigating your way around the guide

The trainer's guide is divided into six sections.

1. **Tips for trainers** provide pointers on how to prepare for and organize a training course.
2. **Learning objectives** set out examples of learning objectives for this module that can be adapted for a particular participant group.
3. **Testing knowledge** contains an example of a questionnaire that can be used to test participants' knowledge either at the start or at the end of a training course.
4. **Classroom exercises** provide examples of practical exercises that can be done in a classroom context either by participants individually or in groups.
5. **Field-based exercises** outline ideas for field visits that may be conducted during a longer training course.

* The images and text in the anthropometric measurement cards are drawn from FANTA-2 (2010). *Generic CMAM Job Aids*. Washington DC: Fanta Project.

CONTENTS

1. Tips for trainers

Step 1: Do the reading!

- Read Part 2: Technical notes of this module.
- Familiarize yourself with the technical terms from the glossary.
- Read through the following key documents (see full references and how to access them in Part 4 of this module):
  - ENN, UCL-CIHD, ACF (2010). *Management of Acute Malnutrition in Infants (MAMI) Project: Technical Review: Current evidence, policies, practices & programme outcomes*. London. ENN.
  - FANTA. (2003). *Anthropometric Indicators Measurement Guide Washington: FANTA*.
  - SCN & CDC (2000). *Adolescents: Assessment of Nutritional Status in Emergency-affected Populations*. Geneva: SCN.
  - United Nations Standing Committee on Nutrition (2000). *Adults: Assessment of Nutritional Status in Emergency-affected Populations*. Geneva: SCN.
  - WFP. (2000). *Food and Nutrition Handbook*. Rome: WFP.
  - WFP & CDC. (2005). *A Manual: Measuring and Interpreting Malnutrition and Mortality*. Rome: WFP.
  - WHO (2008). *WHO Child Growth Standards: Training Course on Child Growth Assessment, Modules B & C*. Geneva: WHO.

Step 2: Know your audience!

- Find out about your participants in advance of the training:
  - How many participants will there be?
  - Do any of the participants already have experience of carrying out anthropometric measurements?
  - Could participants with experience be involved in the sessions by preparing a case study or contribute through describing their practical experience?

Step 3: Design the training!

- Decide how long the training will be and what activities can be covered within the available time. In general, the following guide can be used:
  - A **90-minute** classroom-based training session can provide a basic overview of the different anthropometric indices and classification systems for child and adult undernutrition.
  - A **half-day** classroom-based training session can provide an overview of the various anthropometric indices and classification systems for child and adult undernutrition and include Exercise 2 or 3.
  - A **one-day** classroom-based training session can provide a more in-depth understanding of anthropometry with some practical measurement taking and a case study.
  - Combine Modules 6 and 7 for a two one-day session for participants who require survey training.
- Identify appropriate learning objectives. This will depend on your participants, their level of understanding and experience, and the aim and length of the training.
- Decide exactly which technical points to cover based on the learning objectives that you have identified.
- Divide the training into manageable sections. One session should generally not last longer than an hour.
- Ensure the training is a good combination of activities, e.g., mix PowerPoint presentations in plenary with more active participation through classroom-based exercises, mix individual work with group work.

Step 4: Get prepared!

- Prepare PowerPoint presentations with notes (if they are going to be used) in advance and do a trial run. Time yourself! Recommended PowerPoint presentations that can be adapted from existing sources include (see full references and how to access them in Part 4 of this module):

Existing PowerPoints for a session on measuring malnutrition: individual assessment

	Author	Specific session
1.	FAO. (2007). FAO Food Security Information for Action Distance Learning Material – Food Security Information Systems and Networks; Reporting Food Security Information; Nutritional Status Assessment and Analysis.	Nutritional Status Assessment and Analysis (2.5-3 hours) • Nutritional Status and Food Security • Assessing Status • Nutritional Status Indicators
2.	UNICEF, CDC, Columbia University and Tufts University. (2003). Training for Improved Practice.	Session 3: Basic Concepts
3.	WFP & Feinstein International Famine Centre, T. U. (2001). WFP Food and Nutrition Training Toolbox.	Session 7: Measurement of Malnutrition: Individual Nutritional Assessment (Part I)
4.	WFP & CDC. (2005). Training course: Measuring and Interpreting Malnutrition and Mortality. Rome: WFP.	Day 1: Introduction and anthropometry

- Prepare exercises and case studies. These can be based on the examples given in this trainer's guide but should be adapted to be suitable for the particular training context.
- Find the appropriate equipment for the session such as MUAC tapes, scales and height boards. You will also need the *weight-for-height* (WFH) look-up tables and participants will need calculators.
- Prepare a 'kit' of materials for each participant. These should be given out at the start of the training and should include:
  - Timetable showing break times (coffee and lunch) and individual sessions
  - Handouts including Parts 1, 2 and 4 of this module plus exercises as required
  - Pens and paper

REMEMBER

People remember 20 per cent of what they are told, 40 per cent of what they are told and read, and 80 per cent of what they find out for themselves.

People learn differently. They learn from what they read, what they hear, what they see, what they discuss with others and what they explain to others. A good training is therefore one that offers a variety of learning methods which suit the variety of individuals in any group. Such variety will also help reinforce messages and ideas so that they are more likely to be learned.

2. Learning objectives

Below are examples of learning objectives for a session on measuring malnutrition in individuals. Trainers may wish to develop alternative learning objectives that are appropriate to their particular participant group. The number of learning objectives should be limited; up to five per day of training is appropriate. Each exercise should be related to at least one of the learning objectives.

Examples of learning objectives

At the end of the training, participants will:

- Be familiar with the standard methods used to measure weight, height, mid-upper arm circumference (MUAC) and oedema.
- Understand the classifications of undernutrition in children and adults using different anthropometric indices.
- Be able to identify Z-score ranges for weight-for-height for children 6-59 months using the 2006 WHO Growth Standards simplified field tables for boys and girls
- Be aware of the uses of anthropometric measurements in both emergency and non-emergency contexts.
- Be aware of the limitations of anthropometry.

3. Testing knowledge

This section contains one exercise which is an example of a questionnaire that can be used to test participants' knowledge of anthropometry either at the start or at the end of a training session. The questionnaire can be adapted by the trainer to include questions relevant to the specific participant group.

Exercise 1: What do you know about measuring malnutrition?

What is the learning objective?

- To test participants' knowledge about anthropometry

When should this exercise be done?

- *Either* at the start of a training session to establish knowledge level
- *Or* at the end of a training session to check how much participants' have learned

How long should the exercise take?

- 15 minutes

What materials are needed?

- **Handout 1a:** What do you know about measuring malnutrition?: Questionnaire
- **Handout 1b:** What do you know about measuring malnutrition?: Questionnaire answers

What does the trainer need to prepare?

- Familiarize yourself with the questionnaire questions and answers.
- Add your own questions and answers based on your knowledge of the participants and their knowledge base.

Instructions

Step 1: Give each participant a copy of Handout 1a.

Step 2: Give participants 10 minutes to complete the questionnaire working alone.

Step 3: Give each participant a copy of Handout 1b.

Step 4: Give participants five minutes to mark their own questionnaires and clarify the answers where necessary.

Handout 1a: What do you know about measuring malnutrition?: Questionnaire

Time for completion: 10 minutes

Answer all the questions

Note that for some questions there is only ONE correct answer while for other questions there are SEVERAL correct answers.

1. Which form of undernutrition is of most concern during an emergency?
   a) Chronic undernutrition or stunting in children 6-59 months
   b) Undernutrition in both adults and children 6-59 months
   c) Acute malnutrition or wasting in children 6-59 months

2. What are the indicator(s) used to measure wasting? *Circle the correct answer.*
   a) MUAC
   b) Weight-for-height index
   c) Height-for-age index
   d) Weight-for-age index

3. A child is measured lying down according to which of the following criteria: *Circle the correct answer*
   a) < 18 months
   b) < 87 cm
   c) > 110 cm
   d) > 25 months
   e) < 24 months

4. Match the following nutritional indices for children 6-59 months a) to g) with the classification of undernutrition I. to VII. below:

a) Weight-for-height index <-2SD and ≥ -3SD	I. Moderate stunting
b) Weight-for-age index <- 3 SD	II. Severe wasting
c) Height-for-age index <-2 SD and ≥ -3SD	III. Moderate wasting
d) Height-for-age index < -3 SD	IV. Moderate underweight
e) Weight-for-age index <-2 SD and ≥ -3SD	V. Moderate wasting
f) MUAC < 115mm	VI. Severe underweight
g) MUAC > 115mm and <125mm	VII. Severe stunting

5. Are the following statements true or false? Write true or false after each sentence.
   a) Infants below the age of six months are difficult to measure.
   b) Acute malnutrition in school aged children adolescents (5-19 year olds) is assessed using the same anthropometric indices as adults.
   c) In some emergencies, adults may be nutritionally assessed through anthropometry.
   d) Anthropometry can be used to assess micronutrient status.
   e) Nutritional indices are never calculated for children 6-59 with oedema.

6. Name two indicators that can be used to assess adult undernutrition. *Write your answer below.*

7. Why are young children often measured in surveys during emergencies? *Circle the correct answer.*
   a) Young children are easier to measure than adults.
   b) Children often show signs of malnutrition first and so act as a proxy for the entire population.
   c) Adults often refuse to be measured.

8. What is a Z-score? Write your answer below.

9. What is the difference between a growth reference and a growth standard? *Write your answer below.*

Handout 1b: What do you know about measuring malnutrition? Questionnaire answers

1. **c)** Acute malnutrition in children reflects recent changes in dietary intake and infection and acts as a 'proxy' for the nutritional status of the entire population.

2. **a)** and **b)**

3. **b)** and **e)**

4. **a)** – **III** (or **V**)
   b) – **VI**
   c) – **I**
   d) – **VII**
   e) – **IV**
   f) – **II**
   g) – **V** (or **III**)

5. **a) True.**
   b) False. Adolescents are difficult to nutritionally assess accurately because of the adolescent growth spurt. They are assessed with body mass index (BMI) for age.
   c) True. In emergencies in some countries or contexts, adults may be at nutritional risk.
   d) False. Anthropometry cannot reflect micronutrient status of an individual.
   e). False. While generally weight-for-height is not calculated for children 6-59 with oedema, it can be helpful to differentiate between individuals with kwashiorkor versus marasmic-kwashiorkor.

6. **Body mass index (BMI) and MUAC.** For pregnant women, MUAC is the only nutritional index that can be used.

7. **b)**

8. **A Z-score** is equivalent to **one standard deviation (SD)** which is the measure of the distance between an individual's value and the expected value of the WHO GS population. Ninety-five per cent of the WHO GS population has an anthropometric SD score between -2 and +2 which is within the normal range.

9. **A standard** is based on prescriptive criteria and involves value or normative judgments. In contrast, a **reference** reflects the expected values in a reference population.

4. Classroom exercises

This section provides examples of practical exercises that can be carried out in a classroom context either by participants individually or in groups. Practical exercises are useful between plenary sessions, where the trainer has done most of the talking, as they provide an opportunity for participants to engage actively in the session. The choice of classroom exercises will depend upon the learning objectives and the time available. Trainers should adapt the exercises presented in this section to make them appropriate to the particular participant group. Ideally, trainers should use case examples with which they are familiar.

Exercise 2: Taking anthropometric measurements of adults

What is the learning objective?

- To be familiar with the standard methods used to measure weight, height and MUAC in adults
- To be able to classify undernutrition in adults using different anthropometric indices

When should this exercise be done?

- After a theory session on assessing undernutrition in adults

How long should the exercise take?

- 30 to 40 minutes

What materials are needed?

- 2 MUAC tapes at least 280 cm long (or normal measuring tapes)
- 1 set adult scales (at least 120kg), ideally an electronic scale
- 1 adult height board (at least 200cm long)
- Calculator
- **Handout 2a:** Measuring adults practical: Instructions
- **Handout 2b:** Measurement recording form – adults
- **Handout 2c:** Measurement instructions and picture cards for MUAC, weight and height

Instructions

Step 1: Get participants into groups of four.

Step 2: Give each participant a copy of Handouts 2a, 2b and 2c.

Step 3: Review with the group techniques for carrying out accurate measurements and how to calculate BMI

Step 4: Give the groups up to 30 minutes to measure MUAC, weight and height and record. Go round the groups and look at their technique, and calculations.

Step 5: Allow 10 minutes for feedback in plenary.

Discussion points for feedback in plenary

➡ Discuss the variance in the measurements of the same adult and methods of resolving differences in measurement, e.g., taking the mean of readings.

Handout 2a: Measuring adults practical: instructions

Time for completion: 15 minutes

Task I: Practise measuring adult MUAC

- Get into groups of four participants.
- Take turns to measure to the nearest 0.1 cm the MUAC of the other three people in the group. Do each measurement twice and record the findings on Handout 2b.
- Compare each other's results and calculate the mean (the average) of the readings.

Time for completion: 15 minutes

Task II: Practice calculating BMI

- Take turns to measure the weight and height of the other three people in the group. Do each measurement twice and record the findings on Handout 2b.
- Calculate the BMI of each person. Use the formula below for this.

$$\text{BMI} = \frac{\text{Measured weight (kg)}}{\text{height2 (m2)}}$$

Example: Weight: 62.5 kg, Height: 1.72 mm

Height squared = 1.72m x 1.72m = 2.96

$$\text{BMI} = \frac{62.5\text{(kg)}}{2.96\text{ (m2)}} = 21.1$$

- Compare each other's results and discuss any differences in the measurements.

Handout 2b: Measurement recording form – adults

Measurer's name: _____

Measurements	Adult measured	MUAC	Weight	Height	BMI
1st recording	1				
2nd recording	1				
Mean					
1st recording	2				
2nd recording	2				
Mean					
1st recording	3				
2nd recording	3				
Mean					

Handout 2c: Measurement instructions and picture cards for MUAC, weight and height

Note: the images have been developed for measuring children 6-59, however the concepts and steps are similar and outlined below.

Mid-upper arm circumference (MUAC) measurements

1. Uncover the left arm as far as the shoulder.
2. Bend the arm and place the lower arm across the stomach.
3. Find the midpoint between the tip of the bone at the back and top of the shoulder and the elbow by finding them with your fingertips first and then marking them with a pen.
4. Measure the distance between the two marked spots while standing behind the individual and divide this measurement by two. This is the mid-upper arm.
5. Release the arm so that it hangs relaxed alongside the body.
6. Wrap the MUAC tape around the arm at this midpoint and measure the circumference.
7. The tape should be comfortably crossed over from 0 mark, not too loose, not too tight.
8. Take the measurement to the nearest 0.1cm where the tape crosses at 0.

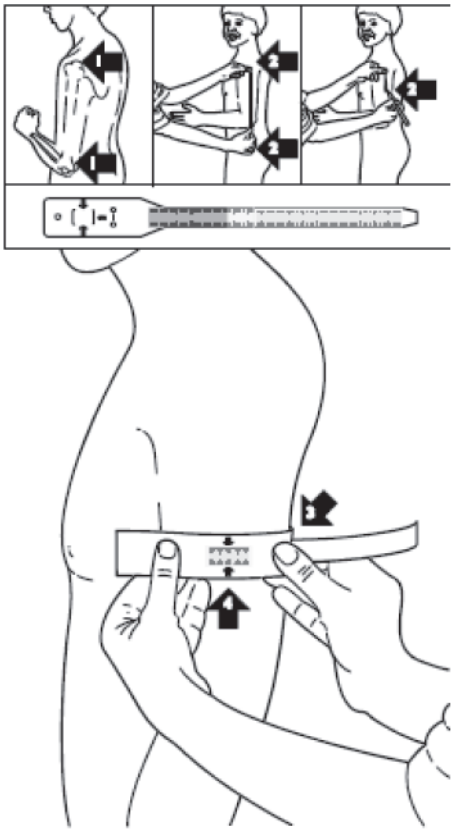
Weight measurements

1. Ensure that the adult scale is placed on a firm surface.
2. Always adjust the 'scale to zero' before weighing.
3. Remove outside clothing and shoes.
4. Read the weight to the nearest 0.1 kg.
5. Repeat the procedure of reading and recording the individual's weight. Record the average of the two measurements.

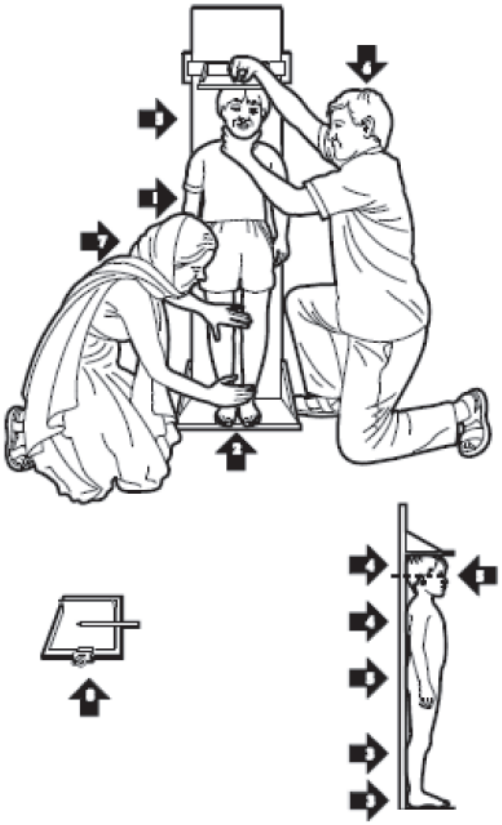
Height measurement

1. Place the measuring board on a smooth level, flat hard surface preferably against a wall.
2. Remove shoes, sandals, socks, headgear or any other heavy items.
3. Ask the individual to stand with his/her back against the measuring board.
4. Position the individual with bare feet together. Check the position of the heels, buttocks, shoulders and back of the head touching the board.
5. Hold the chin so that the individual is looking up straight.
6. Adjust the headpiece so that it is level.
7. Lower the headpiece until it is firm on top of the head. Press gently to ensure that it's in contact with the head.
8. Read the height to the nearest 0.1cm. Record the reading immediately.

MUAC measurement (left arm)



Height measurement



Exercise 3: Interpreting anthropometric data

What is the learning objective?

- To understand the classifications of undernutrition in children and adults using different anthropometric indices

When should this exercise be done?

- After a theoretical session on the different classifications of undernutrition

How long should the exercise take?

- 30 minutes

What materials are needed?

- **Handout 3a:** Interpreting anthropometric data
- **Handout 3b:** Interpreting anthropometric data: Model answers

Instructions

Step 1: Give each participant a copy of Handout 3a.

Step 2: Ask participants to work in pairs.

Step 3: Give the pairs 15 minutes to read and answer the questions in the handout.

Step 4: Allow 15 minutes for feedback in plenary.

Step 5: Give each participant a copy of Handout 3b.

Handout 3a: Interpreting anthropometric data

Time for completion: 15 minutes

Task I: Practise classifying anthropometric indices

The table below has been given to you by a colleague working in the media department of your organization. He or she comes to you for help to interpret the data with the following questions. Answer them and be ready to discuss in plenary.

1. Does this data relate to children or adults?
2. Can you explain what MUAC and BMI are and what the cut-offs indicate?
3. Which population has the highest rate of undernutrition?
4. Do you have any other comments about these population groups?

	Country	District	Population	Undernutrition level
1	**Kenya**	Moyale district	Residents	MUAC < 23.0 = 29.6%
2		Samburu district	Residents	MUAC < 23.0cm = 53.5%
3		Marsabit district	Residents	MUAC < 23.0cm = 36.6%
4	**Somalia**	Gedo region	Residents	MUAC < 18.5cm = 0%
5		Bardera town	Residents	MUAC < 18.5cm = 10.0%
6		Wajid district	Residents	MUAC < 18.5cm = 0.8%
7		Middle Juba	Residents	MUAC < 18.5cm = 3.0%
8	**Uganda**	Karamoja province	Resident agro-pastoral zone	BMI < 16 = 4.4% BMI < 18.5 = 27.3%
9	**Myanmar**	North Rakhine state	Residents	BMI < 16 = 12.7% BMI < 18.5: 27.0% BMI ≥ 25: 1.6%
10	Indonesia	Nias island	Residents	BMI < 18.5 = 8.3% BMI ≥ 25 = 29.0%
11	Nepal	Mugu district	Residents	MUAC ≤ 194mm = 3.8%
12	Pakistan	North west frontier	IDP camps	BMI < 16 = 1.5% BMI < 18.5 = 15.5%
13		Azad Jammu and Kashmir province	IDP camps	BMI < 16 = 2.3% BMI < 18.5 = 14.8%
14	Haiti	Artibonite department	IDPs	BMI < 18.5: 1.6% BMI ≥ 25: 3.6%
15	Occupied Palestinian Territory	Gaza strip	Residents	BMI < 18.5: 0.0% BMI ≥ 25: 3.6%

Handout 3b: Interpreting anthropometric data: Model answers

1. **Does this data relate to children or adults?**

   This table only shows adult undernutrition results expressed as either body mass index or MUAC.

2. **Can you explain what MUAC and BMI are?**

   Two nutritional indices are being used:

   a) MUAC with cut off points for severe (< 18.5 cm) and moderate (< 23 cm) undernutrition

   b) BMI with cut off points for severe (< 16), moderate (≥ 16 to < 18.5) and no nutritional risk (> 25)

   The Nepal results use MUAC < 194 mm which is not an internationally agreed cut-off.

3. **Which population has the highest rate of undernutrition?**

   It is difficult to compare the different populations as the indices used differ as do the cut off points. Clearly Myanmar, Kenya and Uganda show high levels of undernutrition compared to the Gaza Strip.

4. **Do you have any other comments about these population groups?**

   It would be useful to know more about the population groups, whether pregnant women are included, as well as when and how surveys were carried out before making any firm conclusions about the data.

Exercise 4: Calculating weight-for-height/length and classifying anthropometric data for children 6-59 months

What is the learning objective?

- To be able to calculate anthropometric indices using the 2006 WHO Growth Standards.

When should this exercise be done?

- Participants need to be familiar with the anthropometric indicators and indices.

How long should the exercise take?

- 50 minutes

What materials are needed?

- **Handout 4a:** Calculating anthropometric indices
- **Handout 4b:** Calculating anthropometric indices: Model answers

  NOTE: Height and Weight columns are not required for programmes that use only MUAC and bilateral pitting oedema as entry criteria. Adapt the activity to the country context.
- **Handout 4c:** WHO growth standard simplified field tables weight-for-length/height for boys and girls
- **Handout 4d:** Classification of individual nutritional status according to WFH index
- **Handout 4e:** Classification of individual nutritional status according to WFH index: Model answers
- Calculators

Instructions

Step 1: Give each participant a copy of Handouts 4a and 4c.

Step 2: Allow five minutes in plenary to do the exercise using child one as an example.

Step 3: Give participants 10 minutes to complete Handout 4a.

Step 4: Give each participant a copy of Handout 4b.

Step 5: Allow 10 minutes to go through the answers in plenary.

Step 6: Give each participant a copy of Handout 4d.

Step 7: Give participants 15 minutes to complete Handout 4d.

Step 8: Allow 10 minutes to go through the answers in plenary.

Exercise 4: Calculating weight-for-height/length and classifying anthropometric data for children 6-59 months (continued)

Discussion points for feedback in plenary

- Reference weights for boys and girls are different.
- Rounding digits correctly is essential. Children may be misclassified if the tables are not used properly. For example, child 8 could be incorrectly classified as moderate (e.g. -3 Z-score rather than <-3 Z-score).
- One child may be identified with a different level of malnutrition depending on the nutritional index. Order of decision-making for entry to a community-based management of acute malnutrition (CMAM) programme is: 1) bilateral pitting oedema, 2) MUAC and 3) weight-for-height (% of median or z-score). MUAC gets priority over weight for height indices because it used as a screening measure in the community. If child has bilateral pitting oedema, measuring MUAC or weight-for-height is still of use to check for marasmic kwashiorkor.
- Children with oedema are classified as severely malnourished regardless of their weights.
- It is however necessary to calculate weight-for-height or take MUAC measurements on oedematous children in order to differentiate between kwashiorkor and marasmic-kwashiorkor which is a particularly life threatening condition.
- Z-scores are now recommended for admission and discharge criteria into selective feeding programmes, as opposed to percentage of the median.

Handout 4a: Calculating anthropometric indices

Exercise:

1. Using the 2006 WHO Growth Standards simplified field tables, identify the Weight for height/length Z-score range for each child (e.g. <-2 and > -3)
2. Classify each child as normal, moderate or severely acutely malnourished based on a review of all measurements

Child Name	Sex	Bilateral Pitting Oedema	Age (years)	Height (cm)	Weight (kg)	MUAC (mm or colour)	Weight for Height Z-Score range	Classification
Child 1	F		3	98.2	12.5	126		
Child 2	M		5	110.0	14.8	123		
Child 3	M	++	5	102.2	13.5	121		
Child 4	F		4	91.1	9.3	110		
Child 5	M		9 months	69.9	6.7	125		
Child 6	F	+++	4	105.2	18.0	112		
Child 7	F		8 months	68.2	5.0	105		
Child 8	M		1	84.3	8.9	102		
Child 9	F		2	97.2	11.0	109		
Child 10	M	+	1.5	89.7	12.9	130		

Handout 4b: Calculating anthropometric indices: Model answers

Weight-for-Height Z-scores (WHO)

Child Name	Sex	Bilateral Pitting Oedema	Age (years)	Height (cm)	Weight (kg)	MUAC (mm or colour)	Weight for Height Z-Score range	Classification
Child 1	F		3	98.2	12.5	126	> -2	Normal
Child 2	M		5	110.0	14.8	123	< -2 and > -3	Moderate acute malnutrition
Child 3	M	++	5	102.2	13.5	121	> -2	Severe (bilateral pitting oedema)
Child 4	F		4	91.1	9.3	110	< -3	Severe (WFH and MUAC)
Child 5	M		9 months	69.9	6.7	125	< -2 and > -3	Moderate
Child 6	F	+++	4	105.2	18.0	112	> median	Severe (marasmic kwashiorkor- MUAC shows severe wasting)
Child 7	F		8 months	68.2	5.0	105	< -3	Severe (MUAC and WFH)
Child 8	M		1	84.3	8.9	102	<-3 z	Severe (MUAC and WFH)
Child 9	F		2	97.2	11.0	109	= -3 z	Severe (MUAC), WFH = -3 therefore classified as moderate if just looking at WFH
Child 10	M	+	1.5	89.7	12.9	130	> median	Severe (bilateral pitting oedema)

Remark: Order of decision-making for entry to a CMAM programme is: 1) bilateral pitting oedema, 2) MUAC and 3) weight-for-height (% of median or z-score). MUAC gets priority over weight for height indices because it used as a screening measure in the community. If child has bilateral pitting oedema, measuring MUAC or weight-for-height is still of use to check for marasmic kwashiorkor.

Handout 4c: WHO Growth Standard Simplified Ta bles Weight-for-Length/Height for Girls and Boys

Simplified field tables

Weight-for-length GIRLS Birth to 2 years (z-scores)

World Health Organization

CM	-3 SD	-2 SD	-1 SD	Me-dian	1 SD	2 SD	3 SD
45.0	1.9	2.1	2.3	2.5	2.7	3.0	3.3
45.5	2.0	2.1	2.3	2.5	2.8	3.1	3.4
46.0	2.0	2.2	2.4	2.6	2.9	3.2	3.5
46.5	2.1	2.3	2.5	2.7	3.0	3.3	3.6
47.0	2.2	2.4	2.6	2.8	3.1	3.4	3.7
47.5	2.2	2.4	2.6	2.9	3.2	3.5	3.8
48.0	2.3	2.5	2.7	3.0	3.3	3.6	4.0
48.5	2.4	2.6	2.8	3.1	3.4	3.7	4.1
49.0	2.4	2.6	2.9	3.2	3.5	3.8	4.2
49.5	2.5	2.7	3.0	3.3	3.6	3.9	4.3
50.0	2.6	2.8	3.1	3.4	3.7	4.0	4.5
50.5	2.7	2.9	3.2	3.5	3.8	4.2	4.6
51.0	2.8	3.0	3.3	3.6	3.9	4.3	4.8
51.5	2.8	3.1	3.4	3.7	4.0	4.4	4.9
52.0	2.9	3.2	3.5	3.8	4.2	4.6	5.1
52.5	3.0	3.3	3.6	3.9	4.3	4.7	5.2
53.0	3.1	3.4	3.7	4.0	4.4	4.9	5.4
53.5	3.2	3.5	3.8	4.2	4.6	5.0	5.5
54.0	3.3	3.6	3.9	4.3	4.7	5.2	5.7
54.5	3.4	3.7	4.0	4.4	4.8	5.3	5.9
55.0	3.5	3.8	4.2	4.5	5.0	5.5	6.1
55.5	3.6	3.9	4.3	4.7	5.1	5.7	6.3
56.0	3.7	4.0	4.4	4.8	5.3	5.8	6.4
56.5	3.3	4.1	4.5	5.0	5.4	6.0	6.6
57.0	3.9	4.3	4.6	5.1	5.6	6.1	6.8
57.5	4.0	4.4	4.8	5.2	5.7	6.3	7.0
58.0	4.1	4.5	4.9	5.4	5.9	6.5	7.1
58.5	4.2	4.6	5.0	5.5	6.0	6.6	7.3
59.0	4.3	4.7	5.1	5.6	6.2	6.8	7.5
59.5	4.4	4.8	5.3	5.7	6.3	6.9	7.7
60.0	4.5	4.9	5.4	5.9	6.4	7.1	7.8
60.5	4.6	5.0	5.5	6.0	6.6	7.3	8.0
61.0	4.7	5.1	5.6	6.1	6.7	7.4	8.2
61.5	4.8	5.2	5.7	6.3	6.9	7.6	8.4
62.0	4.9	5.3	5.8	6.4	7.0	7.7	8.5
62.5	5.0	5.4	5.9	6.5	7.1	7.8	8.7
63.0	5.1	5.5	6.0	6.6	7.3	8.0	8.8

CM	-3 SD	-2 SD	-1 SD	Me-dian	1 SD	2 SD	3 SD
63.5	5.2	5.6	6.2	6.7	7.4	8.1	9.0
64.0	5.3	5.7	6.3	6.9	7.5	8.3	9.1
64.5	5.4	5.8	6.4	7.0	7.6	8.4	9.3
65.0	5.5	5.9	6.5	7.1	7.8	8.6	9.5
65.5	5.5	6.0	6.6	7.2	7.9	8.7	9.6
66.0	5.6	6.1	6.7	7.3	8.0	8.8	9.8
66.5	5.7	6.2	6.8	7.4	8.1	9.0	9.9
67.0	5.8	6.3	6.9	7.5	8.3	9.1	10.0
67.5	5.9	6.4	7.0	7.6	8.4	9.2	10.2
68.0	6.0	6.5	7.1	7.7	8.5	9.4	10.3
68.5	6.1	6.6	7.2	7.9	8.6	9.5	10.5
69.0	6.1	6.7	7.3	8.0	8.7	9.6	10.6
69.5	6.2	6.8	7.4	8.1	8.8	9.7	10.7
70.0	6.3	6.9	7.5	8.2	9.0	9.9	10.9
70.5	6.4	6.9	7.6	8.3	9.1	10.0	11.0
71.0	6.5	7.0	7.7	8.4	9.2	10.1	11.1
71.5	6.5	7.1	7.7	8.5	9.3	10.2	11.3
72.0	6.6	7.2	7.8	8.6	9.4	10.3	11.4
72.5	6.7	7.3	7.9	8.9	9.5	10.5	11.5
73.0	6.8	7.4	8.0	8.8	9.6	10.6	11.7
73.5	6.9	7.4	8.1	8.9	9.7	10.7	11.8
74.0	6.9	7.5	8.2	9.0	9.8	10.8	11.9
74.5	7.0	7.6	8.3	9.1	9.9	10.9	12.0
75.0	7.1	7.7	8.4	9.1	10.0	11.0	12.2
75.5	7.1	7.8	8.5	9.2	10.1	11.1	12.3
76.0	7.2	7.8	8.5	9.3	10.2	11.2	12.4
76.5	7.3	7.9	8.6	9.4	10.3	11.4	12.5
77.0	7.4	8.0	8.7	9.5	10.4	11.5	12.6
77.5	7.4	8.1	8.8	9.6	10.5	11.6	12.8
78.0	7.5	8.2	8.9	9.7	10.6	11.7	12.9
78.5	7.6	8.2	9.0	9.8	10.7	11.8	13.0
79.0	7.7	8.3	9.1	9.9	10.8	11.9	13.1
79.5	7.7	8.4	9.1	10.0	10.9	12.0	13.3
80.0	7.8	8.5	9.2	10.1	11.0	12.1	13.4
80.5	7.9	8.6	9.3	10.2	11.2	12.3	13.5
81.0	8.0	8.7	9.4	10.3	11.3	12.4	13.7
81.5	8.1	8.8	9.5	10.4	11.4	12.5	13.8

Simplified field tables

Weight-for-length GIRLS Birth to 2 years (z-scores)

World Health Organization

CM	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
82.0	8.1	8.8	9.6	10.5	11.5	12.6	13.9
82.5	8.2	8.9	9.7	10.6	11.6	12.8	14.1
83.0	8.3	9.0	9.8	10.7	11.8	12.9	14.2
83.5	8.4	9.1	9.9	10.9	11.9	13.1	14.4
84.0	8.5	9.2	10.1	11.0	12.0	13.2	14.5
84.5	8.6	9.3	10.2	11.1	12.1	13.3	14.7
85.0	8.7	9.4	10.3	11.2	12.3	13.5	14.9
85.5	8.8	9.5	10.4	11.3	12.4	13.6	15.0
86.0	8.9	9.7	10.5	11.5	12.6	13.8	15.2
86.5	9.0	9.8	10.6	11.6	12.7	13.9	15.4
87.0	9.1	9.9	10.7	11.7	12.8	14.1	15.5
87.5	9.2	10.0	10.9	11.8	13.0	14.2	15.7
88.0	9.3	10.1	11.0	12.0	13.1	14.4	15.9
88.5	9.4	10.2	11.1	12.1	13.2	14.5	16.0
89.0	9.5	10.3	11.2	12.2	13.4	14.7	16.2
89.5	9.6	10.4	11.3	12.3	13.5	14.8	16.4
90.0	9.7	10.5	11.4	12.5	13.7	15.0	16.5
90.5	9.8	10.6	11.5	12.6	13.8	15.1	16.7
91.0	9.9	10.7	11.7	12.7	13.9	15.3	16.9
91.5	10.0	10.8	11.8	12.8	14.1	15.5	17.0
92.0	10.1	10.9	11.9	13.0	14.2	15.6	17.2
92.5	10.1	11.0	12.0	13.1	14.3	15.8	17.4
93.0	10.2	11.1	12.1	13.2	14.5	15.9	17.5
93.5	10.3	11.2	12.2	13.3	14.6	16.1	17.7
94.0	10.4	11.3	12.3	13.5	14.7	16.2	17.9
94.5	10.5	11.4	12.4	13.6	14.9	16.4	18.0
95.0	10.6	11.5	12.6	13.7	15.0	16.5	18.2
95.5	10.7	11.6	12.7	13.8	15.2	16.7	18.4
96.0	10.8	11.7	12.8	14.0	15.3	16.8	18.6
96.5	10.9	11.8	12.9	14.1	15.4	17.0	18.7
97.0	11.0	12.0	13.0	14.2	15.6	17.1	18.9
97.5	11.1	12.1	13.1	14.4	15.7	17.3	19.1
98.0	11.2	12.2	13.3	14.5	15.9	17.5	19.3
98.5	11.3	12.3	13.4	14.6	16.0	17.6	19.5
99.0	11.4	12.4	13.5	14.8	16.2	17.8	19.6
99.5	11.5	12.5	13.6	14.9	16.3	18.0	19.8
100.0	11.6	12.6	13.7	15.0	16.5	18.1	20.0
100.5	11.7	12.7	13.9	15.2	16.6	18.3	20.2
101.0	11.8	12.8	14.0	15.3	16.8	18.5	20.4
101.5	11.9	13.0	14.1	15.5	17.0	18.7	20.6

CM	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
102.0	12.0	13.1	14.3	15.6	17.1	18.9	20.8
102.5	12.1	13.2	14.4	15.8	17.3	19.0	21.0
103.0	12.3	13.3	14.5	15.9	17.5	19.2	21.3
103.5	12.4	13.5	14.7	16.1	17.6	19.4	21.5
104.0	12.5	13.6	14.8	16.2	17.8	19.6	21.7
104.5	12.6	13.7	15.0	16.4	18.0	19.8	21.9
105.0	12.7	13.8	15.1	16.5	18.2	20.0	22.2
105.5	12.8	14.0	15.3	16.7	18.4	20.2	22.4
106.0	13.0	14.1	15.4	16.9	18.5	20.5	22.6
106.5	13.1	14.3	15.6	17.1	18.7	20.7	22.9
107.0	13.2	14.4	15.7	17.2	18.9	20.9	23.1
107.5	13.3	14.5	15.9	17.4	19.1	21.1	23.4
108.0	13.5	14.7	16.0	17.6	19.3	21.3	23.6
108.5	13.6	14.8	16.2	17.8	19.5	21.6	23.9
109.0	13.7	15.0	16.4	18.0	19.7	21.8	24.2
109.5	13.9	15.1	16.5	18.1	20.0	22.0	24.4
110.0	14.0	15.3	16.7	18.3	20.2	22.3	24.7

Simplified field tables

Weight-for-length BOYS Birth to 2 years (z-scores)

World Health Organization

CM	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
45.0	1.9	2.0	2.2	2.4	2.7	3.0	3.3
45.5	1.9	2.1	2.3	2.5	2.8	3.1	3.4
46.0	2.0	2.2	2.4	2.6	2.9	3.1	3.5
46.5	2.1	2.3	2.5	2.7	3.0	3.2	3.6
47.0	2.1	2.3	2.5	2.8	3.0	3.3	3.7
47.5	2.2	2.4	2.6	2.9	3.1	3.4	3.8
48.0	2.3	2.5	2.7	2.9	3.2	3.6	3.9
48.5	2.3	2.6	2.8	3.0	3.3	3.7	4.0
49.0	2.4	2.6	2.9	3.1	3.4	3.8	4.2
49.5	2.5	2.7	3.0	3.2	3.5	3.9	4.3
50.0	2.6	2.8	3.0	3.3	3.6	4.0	4.4
50.5	2.7	2.9	3.1	3.4	3.8	4.1	4.5
51.0	2.7	3.0	3.2	3.5	3.9	4.2	4.7
51.5	2.8	3.1	3.3	3.6	4.0	4.4	4.8
52.0	2.9	3.2	3.5	3.8	4.1	4.5	5.0
52.5	3.0	3.3	3.6	3.9	4.2	4.6	5.1
53.0	3.1	3.4	3.7	4.0	4.4	4.8	5.3
53.5	3.2	3.5	3.8	4.1	4.5	4.9	5.4
54.0	3.3	3.6	3.9	4.3	4.7	5.1	5.6
54.5	3.4	3.7	4.0	4.4	4.8	5.3	5.8
55.0	3.6	3.8	4.2	4.5	5.0	5.4	6.0
55.5	3.7	4.0	4.3	4.7	5.1	5.6	6.1
56.0	3.8	4.1	4.4	4.8	5.3	5.8	6.3
56.5	3.9	4.2	4.6	5.0	5.4	5.9	6.5
57.0	4.0	4.3	4.7	5.1	5.6	6.1	6.7
57.5	4.1	4.5	4.9	5.3	5.7	6.3	6.9
58.0	4.3	4.6	5.0	5.4	5.9	6.4	7.1
58.5	4.4	4.7	5.1	5.6	6.1	6.6	7.2
59.0	4.5	4.8	5.3	5.7	6.2	6.8	7.4
59.5	4.6	5.0	5.4	5.9	6.4	7.0	7.6
60.0	4.7	5.1	5.5	6.0	6.5	7.1	7.8
60.5	4.8	5.2	5.6	6.1	6.7	7.1	8.0
61.0	4.9	5.3	5.8	6.3	6.8	7.4	8.1
61.5	5.0	5.4	5.9	6.4	7.0	7.6	8.3
62.0	5.1	5.6	6.0	6.5	7.1	7.7	8.5
62.5	5.2	5.7	6.1	6.7	7.2	7.9	8.6
63.0	5.3	5.8	6.2	6.8	7.4	8.0	8.8
63.5	5.4	5.9	6.4	6.9	7.5	8.2	8.9
64.0	5.5	6.0	6.5	7.0	7.6	8.3	9.1
64.5	5.6	6.1	6.6	7.1	7.8	8.5	9.3

CM	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
65.0	5.7	6.2	6.7	7.3	7.9	8.6	9.4
65.5	5.8	6.3	6.8	7.4	8.0	8.7	9.6
66.0	5.9	6.4	6.9	7.5	8.2	8.9	9.7
66.5	6.0	6.5	7.0	7.6	8.3	9.0	9.9
67.0	6.1	6.6	7.1	7.7	8.4	9.2	10.0
67.5	6.2	6.7	7.2	7.9	8.5	9.3	10.2
68.0	6.3	6.8	7.3	8.0	8.7	9.4	10.3
68.5	6.4	6.9	7.5	8.1	8.8	9.6	10.5
69.0	6.5	7.0	7.6	8.2	8.9	9.7	10.6
69.5	6.6	7.1	7.7	8.3	9.0	9.8	10.8
70.0	6.6	7.2	7.8	8.4	9.2	10.0	10.9
70.5	6.7	7.3	7.9	8.5	9.3	10.1	11.1
71.0	6.8	7.4	8.0	8.6	9.4	10.2	11.2
71.5	6.9	7.5	8.1	8.8	9.5	10.4	11.3
72.0	7.0	7.6	8.2	8.9	9.6	10.5	11.5
72.5	7.1	7.6	8.3	9.0	9.8	10.6	11.6
73.0	7.2	7.7	8.4	9.1	9.9	10.8	11.8
73.5	7.2	7.8	8.5	9.2	10.0	10.9	11.9
74.0	7.3	7.9	8.6	9.3	10.1	11.0	12.1
74.5	7.4	8.0	8.7	9.4	10.2	11.2	12.2
75.0	7.5	8.1	8.8	9.5	10.3	11.3	12.3
75.5	7.6	8.2	8.8	9.6	10.4	11.4	12.5
76.0	7.6	8.3	8.9	9.7	10.6	11.5	12.6
76.5	7.7	8.3	9.0	9.8	10.7	11.6	12.7
77.0	7.8	8.4	9.1	9.9	10.8	11.7	12.8
77.5	7.9	8.5	9.2	10.0	10.9	11.9	13.0
78.0	7.9	8.6	9.3	10.1	11.0	12.0	13.1
78.5	8.0	8.7	9.4	10.2	11.1	12.1	13.2
79.0	8.1	8.7	9.5	10.3	11.2	12.2	13.3
79.5	8.2	8.8	9.5	10.4	11.3	12.3	13.4
80.0	8.2	8.9	9.6	10.4	11.4	12.4	13.6
80.5	8.3	9.0	9.7	10.5	11.5	12.5	13.7
81.0	8.4	9.1	9.8	10.6	11.6	12.6	13.8
81.5	8.5	9.1	9.9	10.7	11.7	12.7	13.9
82.0	8.5	9.2	10.0	10.8	11.8	12.8	14.0
82.5	8.6	9.3	10.1	10.9	11.9	13.0	14.2
83.0	8.7	9.4	10.2	11.0	12.0	13.1	14.3
83.5	8.8	9.5	10.3	11.2	12.1	13.2	14.4
84.0	8.9	9.6	10.4	11.3	12.2	13.3	14.6
84.5	9.0	9.7	10.5	11.4	12.4	13.5	14.7

Simplified field tables

Weight-for-length BOYS Birth to 2 years (z-scores)

World Health Organization

CM	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
85.0	9.1	9.8	10.6	11.5	12.5	13.6	14.9
85.5	9.2	9.9	10.7	11.6	12.6	13.7	15.0
86.0	9.3	10.0	10.8	11.7	12.8	13.9	15.2
86.5	9.4	10.1	11.0	11.9	12.9	14.0	15.3
87.0	9.5	10.2	11.1	12.0	13.0	14.2	15.5
87.5	9.6	10.4	11.2	12.1	13.2	14.3	15.6
88.0	9.7	10.5	11.3	12.2	13.3	14.5	15.8
88.5	9.8	10.6	11.4	12.4	13.4	14.6	15.9
89.0	9.9	10.7	11.5	12.5	13.5	14.7	16.1
89.5	10.0	10.8	11.6	12.6	13.7	14.9	16.2
90.0	10.1	10.9	11.8	12.7	13.8	15.0	16.4
90.5	10.2	11.0	11.9	12.8	13.9	15.1	16.5
91.0	10.3	11.1	12.0	13.0	14.1	15.3	16.7
91.5	10.4	11.2	12.1	13.1	14.2	15.4	16.8
92.0	10.5	11.3	12.2	13.2	14.3	15.6	17.0
92.5	10.6	11.4	12.3	13.3	14.4	15.7	17.1
93.0	10.7	11.5	12.4	13.4	14.6	15.8	17.3
93.5	10.7	11.6	12.5	13.5	14.7	16.0	17.4
94.0	10.8	11.7	12.6	13.7	14.8	16.1	17.6
94.5	10.8	11.8	12.7	13.8	14.9	16.3	17.7
95.0	110.	11.9	12.8	13.9	15.1	16.4	17.9
95.5	11.1	12.0	12.9	14.0	15.2	16.5	18.0
96.0	11.2	12.1	13.1	14.1	15.3	16.7	18.2
96.5	11.3	12.2	13.2	14.3	15.5	16.8	18.4
97.0	11.4	12.3	13.3	14.4	15.6	17.0	18.5
97.5	11.5	12.4	13.4	14.5	15.7	17.1	18.7
98.0	11.6	12.5	13.5	14.6	15.9	17.3	18.9
98.5	11.7	12.6	13.6	14.8	16.0	17.5	19.1
99.0	11.8	12.7	13.7	14.9	16.2	17.6	19.2
99.5	1109	12.8	13.9	15.0	16.3	17.8	19.4
100.0	12.0	12.9	14.0	15.2	16.5	18.0	19.6
100.5	12.1	13.0	14.1	15.3	16.6	18.1	19.8
101.0	12.2	13.2	14.2	15.4	16.8	18.3	20.0
101.5	12.3	13.3	14.4	15.6	16.9	18.5	20.2
102.0	12.4	13.4	14.5	15.7	17.1	18.7	20.4
102.5	12.5	13.5	14.6	15.9	17.3	18.8	20.6
103.0	12.6	13.6	14.8	16.0	17.4	19.0	20.8
103.5	12.7	13.7	14.9	16.2	17.6	19.2	21.0
104.0	12.8	13.9	15.0	16.3	17.8	19.4	21.2
104.5	12.9	14.0	15.2	16.5	17.9	19.6	21.5

CM	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
105.0	13.0	14.1	15.3	16.6	18.1	19.8	21.7
105.5	13.2	14.2	15.4	16.8	18.3	20.0	21.9
106.0	13.3	14.4	15.6	16.9	18.5	20.2	22.1
106.5	13.4	14.5	15.7	17.1	18.6	20.4	22.4
107.0	13.5	14.6	15.9	17.3	18.8	20.6	22.6
107.5	13.6	14.7	16.0	17.4	19.0	20.8	22.8
108.0	13.7	14.9	16.2	17.6	19.2	21.0	23.1
108.5	13.8	15.0	16.3	17.8	19.4	21.2	23.3
109.0	14.0	15.1	16.5	17.9	19.6	21.4	23.6
109.5	14.1	15.3	16.6	18.1	19.8	21.7	23.8
110.0	14.2	15.4	16.8	18.3	20.0	21.9	24.1

Handout 4d: Classifying individual nutritional status according to WFH index

Time for completion: 10 minutes

Measurements have been taken on the 30 children below, and their Z-scores have been calculated. Based on the Z-score and presence or absence of bilateral oedema, classify the nutritional status of children below as severely or moderately malnourished.

Child	Height/ length (cm)	Weight (kg)	Z-score	Bilateral Oedema	Severe Acute malnutrition	Moderate Acute Malnutrition	No Acute Malnutrition
1	107.0	14.3	-2.10	N			
2	89.5	13.3	0.22	N			
3	99.0	12.3	-2.33	N			
4	101.5	13.7	–	Y			
5	108.0	17.9	-0.12	N			
6	69.5	8.1	-0.26	N			
7	58.0	4.7	-0.66	N			
8	108.5	14.9	–	Y			
9	101.0	14.0	-1.30	N			
10	80.5	11.1	0.22	N			
11	89.5	10.4	-2.17	N			
12	104.0	16.1	-0.41	N			
13	68.5	6.0	-2.67	N			
14	90.5	9.5	-3.19	N			
15	88.5	12.1	-0.61	N			
16	75.0	7.7	-2.42	N			
17	83.5	11.2	-0.34	N			
18	90.5	11.0	-1.90	N			
19	92.5	11.2	-2.08	N			
20	87.5	10.1	-2.18	N			
21	107.0	12.6	-3.21	N			
22	97.5	12.0	-2.23	N			
23	77.5	8.7	-1.81	N			
24	95.5	14.9	–	Y			
25	102.0	13.1	-2.12	N			
26	87.5	12.9	0.36	N			
27	97.5	13.0	-1.46	N			
28	57.5	5.5	1.24	N			
29	109.2	18.1	0.00	N			
30	72.0	8.1	-1.13	N			

Handout 4e: Classifying individual nutritional status according to WFH index: Model answers

Child	Height/ length (cm)	Weight (kg)	Z-score	Bilateral Oedema	Severe Acute malnutrition	Moderate Acute Malnutrition	No Acute Malnutrition
1	107.0	14.3	-2.10	N		X	
2	89.5	13.3	0.22	N			X
3	99.0	12.3	-2.33	N		X	
4	101.5	13.7	–	Y	X		
5	108.0	17.9	-0.12	N			X
6	69.5	8.1	-0.26	N			X
7	58.0	4.7	-0.66	N			X
8	108.5	14.9	–	Y	X		
9	101.0	14.0	-1.30	N			X
10	80.5	11.1	0.22	N			X
11	89.5	10.4	-2.17	N		X	
12	104.0	16.1	-0.41	N			X
13	68.5	6.0	-2.67	N		X	
14	90.5	9.5	-3.19	N	X		
15	88.5	12.1	-0.61	N			X
16	75.0	7.7	-2.42	N		X	
17	83.5	11.2	-0.34	N			X
18	90.5	11.0	-1.90	N			X
19	92.5	11.2	-2.08	N		X	
20	87.5	10.1	-2.18	N		X	
21	107.0	12.6	-3.21	N	X		
22	97.5	12.0	-2.23	N		X	
23	77.5	8.7	-1.81	N			X
24	95.5	14.9	–	Y	X		
25	102.0	13.1	-2.12	N		X	
26	87.5	12.9	0.36	N			X
27	97.5	13.0	-1.46	N			X
28	57.5	5.5	1.24	N			X
29	109.2	18.1	0.00	N			X
30	72.0	8.1	-1.13	N			X

5. Case studies

This section outlines ideas for exercises that can be carried out as part of a field visit. Field visits require a lot of preparation. An organization that is actively involved in programming has to be identified to 'host' the visit. This could be a government agency, an international non-governmental organisation (NGO) or a United Nations agency. The agency needs to identify an area that can be easily and safely visited by participants. Permission has to be sought from all relevant authorities and care taken not to disrupt or take time away from programme activities. Despite these caveats, field-based learning is probably the best way of providing information that will be remembered by participants.

Exercise 5: Taking anthropometric measurements in children

What are the learning objectives?

- To be familiar with the standard methods used to measure weight, height/length, MUAC and oedema
- To understand the classifications of undernutrition in children 6-59 months and adults using different anthropometric indices
- To be able to calculate anthropometric indices based on anthropometric measurements
- To be aware of the uses of anthropometric measurements in both emergency and non-emergency contexts
- To be aware of the limitations of anthropometry

When should this exercise be done?

- As part of a longer course

How long should the exercise take?

- 2 to 3 hours plus travel time to place

What materials are needed?

- 2 child MUAC tapes (usually 150cm; can be colour coded)
- 1 set Salter scales (25kg and measuring to nearest 0.1kg) and weighing pants
- 1 child height board (65.0-130.0cm)
- Calculator
- **Handout 5a:** Taking anthropometric measurements of children
- **Handout 5b:** Child anthropometric recording form
- **Handout 5c:** Measurement instructions and picture cards for length and oedema
- **Handout 5d:** Common sources of error in taking anthropometric measurements

Instructions

Step 1: Distribute Handouts 5a, 5b, 4c and 2c.

Step 2: Divide participants into groups of three.

Step 3: Allow 90 minutes for groups to complete Handouts 5a and 5b.

Step 4: Go around to the groups and look at their technique and their recordings and provide support as needed.

Step 5: Allow 30 minutes for feedback in plenary.

Step 6: Give each participant a copy of Handout 5d to highlight some of the most common mistakes made when measuring MUAC, weight, height and length. Discuss suggestions on how to address these mistakes.

Handout 5a: Ta king anthropometric measurements of children

Time for completion: 30 minutes

Practise measuring child MUAC individually.

- Measure the MUAC of six children to the nearest mm using the MUAC tape you have been given and record your answers in Handout 5b. Measure each child twice.

Time for completion: 60 minutes

Practise measuring weight and height, checking for bilateral oedema, and calculating weight-for height index.

- Measure the weight and height/length of six children and record your answers in Handout 5b. Measure each child twice.
- Check each child for the clinical sign of bilateral oedema.
- Calculate weight-for-height Z-scores range (e.g. < -2 and > -3 Z-scores) for each of the six children.
- If a laptop is available, use WHO Anthro 2005 to generate the actual Z-score value.

Be ready to discuss results in plenary when your trainer asks you to.

Handout 5b: Child anthropometric recording form

Measurer's name: _____

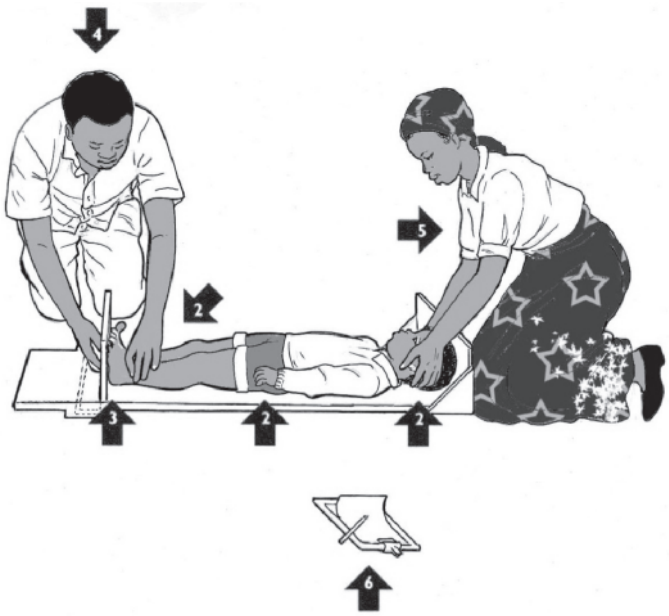
Measurements	Child No.	Age (mth.)	MUAC	Weight	Height	Bilateral Oedema	WFH Z-score range
1st recording	1						
2nd recording							
1st recording	2						
2nd recording							
1st recording	3						
2nd recording							
1st recording	4						
2nd recording							
1st recording	5						
2nd recording							
1st recording	6						
2nd recording							
AGREED MEASURE (CHECKED BY TRAINER)							

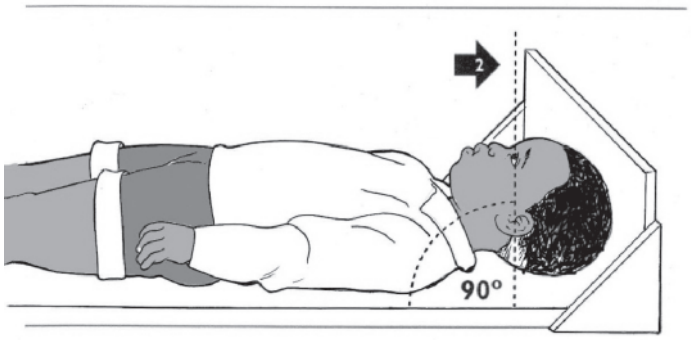
Handout 5c: Measurement instructions and picture cards for length and bilateral oedema

Length measurements

Length is measured for children under 2 years OR whose height is below 87cm if age cannot be accurately determined.

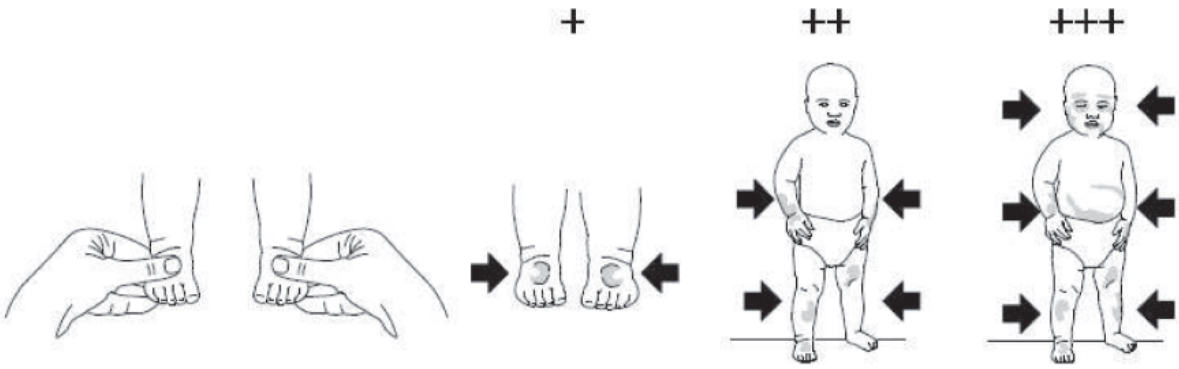
1. Place height board on the ground and remove child's shoes.
2. Place child on his/her back in middle of board, head facing straight up, arms at child's sides and feet at right angles to board.
3. While holding child's ankles or knees, move sliding board up against bottom of child's feet.
4. Take measurement to nearest 0.1 cm and read out loud.
5. Assistant, holding head in place, repeats the measurement for verification.
6. If child is 2 years or older or 87 cm or above standing up, subtract 0.7 cm from measurement.





Identifying bilateral oedema

1. Hold the child's feet and press thumbs on top of both feet using normal pressure. Count to 3 and then lift your thumbs. If no pit shows or if a pit only shows in one foot, the child does not have bilateral pitting oedema. If a pit shows in both feet, go to Step 2.
2. Continue the same test on the lower legs, hands and lower arms. If no pitting appears in these areas, then the child is said to have Grade + or mild bilateral pitting oedema. Mild bilateral pitting oedema only shows in the feet. If pitting appears in these areas, go to Step 3.
3. Look for swelling in the face, especially around the eyes. If no swelling appears in the face, then the child is said to have Grade ++, or moderate, bilateral pitting oedema. If swelling appears in the face, the child is said to have Grade +++ or severe bilateral pitting oedema.
4. Have a second person repeat the test to confirm results.



Handout 5d: Common sources of error in taking anthropometric measurements

Common errors	Solution
1. All measurements	
Restless child	Postpone measurement. Involve parent in procedure.
Inaccurate reading	Training and retraining stressing accuracy
Recording	Record results immediately after taking measurements and confirm record.
2. Length/height	
Incorrect method for age	Measure length when child is < 2 years or < 87 cm.
Foot wear/headgear	Remove – in privacy if necessary.
Head not in correct plane, chin too high or too close to body	Correct technique and get child to hold head straight by talking to him/her and crouching down to his or her level and looking into his/her eyes. The child will be encouraged to look at you, so position yourself to get head at right angle.
Child not straight along board, knees bent, feet pointing down when lying down	Correct technique with practise and regular retraining. Provide adequate assistance – three people needed. One for head, one for arms and middle and one for knees, feet and measurement taking. Get parent in middle to hold arms and talk to child to calm them.
Sliding board not firmly against heels/head	Settle child. Ensure adequate pressure applied. If measuring a child standing up, move head board to compress hair and ensure head touches board. If measuring a child lying down, move the sliding board to firmly touch the bottom of the feet.
Child not straight along height board – feet apart or knees bent	Don't take measurements while child is struggling. Ensure assistants and parent all help to position child. One for legs and feet, one for head and measurement taking. Parent can talk to child.
3. Weight	
Scale not calibrated	Recalibrate after every measurement.
Child wearing heavy clothing or amulets	Remove in private or make allowances for clothing and amulets by subtracting their weight equivalent from child weight, e.g., 100 g of clothes for underwear.
Child moving or anxious in hanging pants	Wait until child is calm. The more he or she moves and tries to grab measurers, the more likely the measurement is to be up to 1 kg off. One assistant to talk to child and other to position head in front of scales at the right angle to read measurement as soon as the scale stabilizes.
4. MUAC	
Child won't let go of mother	Get mother to hold child on her hip with child's left arm facing measurer.
Mid-upper arm point incorrect	Find tip of shoulder and elbow carefully. Practise finding half way between the two.
MUAC tape too loose or too tight giving an incorrect reading	Practise, supervise and retrain. Get measurer to practice on calm, older children and adults. Demonstrate.