

# **ANTHROPOMETRY**

## **SURVEY COORDINATORS:**

CUSTOMIZE THE INSTRUCTIONS ON ANTHROPOMETRIC MEASUREMENTS TO YOUR COUNTRY'S QUESTIONNAIRES AND FIELDWORK PLANS. ENSURE THAT THE INSTRUCTIONS ARE INCLUDED IN THE MANUAL FOR INTERVIEWERS AND MANUAL FOR SUPERVISORS, EDITORS AND MEASURERS.

EXTENSIVE TRAINING SHOULD BE PROVIDED TO FIELD STAFF ON USING ANTHROPOMETRIC EQUIPMENT. IT IS IMPORTANT THAT YOU USE THE TOOLS RECOMMENDED BY UNICEF. PREVIOUS EXPERIENCE HAS SHOWN THAT, IN MANY CASES, LOCALLY PRODUCED MEASURING BOARDS HAVE FAILED TO MEET THE QUALITY STANDARDS REQUIRED IN MICS SURVEYS, WHILE VARIOUS TYPES OF ALTERNATIVE SCALES (SUCH AS HANGING SCALES) HAVE PRODUCED IMPRECISE RESULTS.

FOR INFORMATION ON ORDERING ANTHROPOMETRIC EQUIPMENT, CONTACT THE UNICEF REGIONAL OFFICE MICS COORDINATOR OR GLOBAL MICS COORDINATOR AT UNICEF HEADQUARTERS IN NEW YORK.

## ASSESSING CHILD NUTRITIONAL STATUS

The key indicators for monitoring the nutritional status of a child under the age of five are underweight, stunting and wasting, which are measured by obtaining the height or length and weight of the child along with the age in months. At the analysis stage, the actual measurements are compared to an international standard reference population to estimate the prevalence.

In 2006, the World Health Organization (WHO) released the new WHO Child Growth Standards to replace the National Center for Health Statistics (NCHS)/WHO reference population. The NCHS/WHO reference population was widely used for many years and published anthropometry indicators from previous MICS surveys were based on it.

The new standards are the result of a study involving more than 8,000 children from Brazil, Ghana, India, Norway, Oman and the United States. Overcoming the technical and biological drawbacks of the old reference population, which was based on a limited sample of children from a single country, the new standards confirm that children born anywhere in the world have the potential to develop to within the same range of height and weight, when raised in an environment that promotes healthy growth. This means that differences in children's growth to age five are more influenced by nutrition, feeding practices, environment and health care than by genetics or ethnicity. The new growth standards offer a new way to analyze child nutritional data and do in no way affect the actual height and weight measurements which are carried out the same way as previously.

The new standards will be used for MICS4 reporting on nutritional status. It should be noted, however, that because of the differences between the old reference population and the new standards, prevalence estimates of nutritional status indicators based on these two references are not readily comparable. For this reason, MICS4 countries are recommended to also produce the nutrition table using the old reference population, and include it in an appendix in the final report.

Each of the three nutritional status indicators can be expressed in standard deviation units (z-scores) from the median of the reference population, as follows:

### *Underweight (weight-for-age)*

Weight-for-age is a key measure of malnutrition that can reflect both acute and chronic undernutrition. Children whose weight-for-age is more than two standard deviations below the median of the reference population are considered moderately or severely underweight while those whose weight-for-age is more than three standard deviations below the median are classified as severely underweight. Underweight prevalence is an MDG indicator.

### *Stunting (height-for-age)*

Height-for-age is a measure of linear growth. Children whose height-for-age is more than two standard deviations below the median of the reference population are considered short for their age and are classified as moderately or severely stunted. Those whose height-for-age is more than three standard deviations below the median are classified as severely stunted. Stunting is a reflection of chronic malnutrition as a result of failure to receive adequate nutrition over a long period and recurrent or chronic illness.

*Wasting (weight-for-height)*

Finally, children whose weight-for-height is more than two standard deviations below the median of the reference population are classified as moderately or severely wasted, while those who fall more than three standard deviations below the median are severely wasted. Wasting is usually the result of a recent nutritional deficiency. The indicator may exhibit significant seasonal shifts associated with changes in the availability of food or disease prevalence.

## **ANTHROPOMETRY TRAINING**

The training programme on anthropometric measurements is crucial. There are a couple of key points to keep in mind when preparing for the training:

- Make sure to involve an experienced professional, knowledgeable about how to weigh and measure children properly, in the anthropometry training. Ideally, this person should have experience training measurers for household surveys or other data collection exercises in the field, which requires a very different training approach than those who work in a clinical or facility setting.
- Be sure to make arrangements early to obtain the necessary equipment, so that you have it in place and ready for the fieldwork staff training.

The training programme itself should be at least two days in length for all field staff with additional days for team measurers to continue to refine their skills. The training will need to include both in class explanations and exercises together with field practice. The training programme should always include practice weighing and measuring children; you should obtain permission and make arrangements to carry out practice sessions in places where young children can be found. A visit to a local day care or nursery provides a good opportunity to practice on older children who can stand on the scales themselves and have their height measured. Local clinics or health facilities may have lots of mothers with their babies so that recumbent length and “mother-and-baby” weighing can be practiced.

Below are some general guidelines and tips for anthropometry training.

- Following an introduction to anthropometry, organize a demonstration of proper weight and height/length measurements.
- Before the trainees practice how to measure the height/length on a child, they should practice in class: how the head and body should be positioned (this may be practiced against a wall, in groups), how to read numbers from the measuring tape and how to record numbers on the questionnaire.
- The same applies to weight measurements; before practicing on children, it is important to practice in class: how to operate the scale, how to read numbers from the display and how to record the numbers on the questionnaire.
- Include a standardization exercise. This involves doing a series of measurements on the same child where the trainer and measurers do independent measurements and then compare their results.
- Make sure to cover “difficult” situations in the training. For example; discuss what to do with physically disabled children (children with deformations that may interfere with the measurements), how to deal with sick and crying children, how to deal with children that resist being undressed for weighing and what to do with children (especially girls) with elaborate hairstyles (for example braids). See also section titled “Instructions for Supervisors and Measurers”.
- Remember to stress the importance of removing shoes, socks, clothes and any hair ornament or braids that may interfere with the weight and/or height/length measurements.
- Make sure that anthropometry is incorporated into the field practices during the training of the fieldwork staff and the pilot. This will provide opportunities for more practice in real field settings.

## **ANTHROPOMETRIC EQUIPMENT**

### **WEIGHING SCALES**

Each team will have one scale and the measurer will be responsible for weighing children. Extra scales should be ordered in case of breakdown, loss or theft.

The seca 874 U electronic scale is a floor scale for weighing children as well as adults (capacity 150 kilograms). It has a precision of 100 grams and a digital display. The child should be weighed directly, if possible. Alternatively, if the child is very small or is frightened or upset, the mother can first be weighed alone and then weighed while holding the child in her arms, and the scale will automatically compute the child's weight by subtraction. Unlike hanging scales, there is no stress to the child and there are no trousers to wash. The scale itself weighs 3.6 kg. No calibration is required, although a daily check is strongly recommended to ensure the accuracy of the scale. The check can be done by weighing the same object (with a known and constant weight) every morning before fieldwork begins.

The recommended scale is available in the UNICEF Supply Catalogue. Instructions on how to use the seca 874 U scale are found below<sup>1</sup>.

### **LENGTH/HEIGHT BOARDS**

In addition to weight, the MICS4 recommends that length or height also be measured. Since children under 2 years of age will be measured lying down (length) and older children will be measured standing up (height), measuring boards should be adaptable to both situations. As with scales, one measuring board per team is required.

UNICEF recommends a model made out of wood that can accommodate children up to approximately 120 centimetres, which is appropriate for the purposes of MICS4. The board weighs 5.7 kilograms, measures 70 centimetres when collapsed and comes with a shoulder strap. In the past, some countries have attempted to manufacture equipment locally, and in many cases, this has resulted in problems in measurements and durability.

The recommended board is available in the UNICEF Supply Catalogue. Instructions on how to use the board are found below.

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<sup>1</sup> For detailed technical specifications of seca 874 U please visit [http://www.seca.com/english/us/home/products/details/seca/product/flat\\_scales\\_265/seca\\_874/#specials](http://www.seca.com/english/us/home/products/details/seca/product/flat_scales_265/seca_874/#specials)

## The seca 874 U Electronic Scale

The seca 874 U scale can be used in two ways:

1. Children can line up for weighing, stepping on the scale one after the other.
2. Babies and very small children can be weighed while being held in the arms of a mother or helper. This second method of weighing is called 'tared weighing' and for this purpose the scale has a "mother-and-baby function".

The seca 874 U scale is powered exclusively by batteries. 10,000 weighing operations can be performed with one set of batteries. The scale uses six type AA 1.5 V batteries that are easily replaceable.

The scale switches off automatically;

- after 20 seconds in normal mode
- after 2 minutes, if the mother-and-baby function is switched on

### Preparing the seca 874 U Scale for use:

1. Place the scale on a hard, level surface (wood, concrete or firm earth). Soft or uneven surfaces may cause small errors in weighing.
2. Carefully turn over the scale so that the base is accessible. Press the closure of the battery compartment in the direction of the cover itself and open the battery compartment. Insert the supplied batteries into the battery compartment. Check that the polarity is correct. Close the cover and then turn the scale back up the right way. To activate the power supply, push the switch in position "ON".

3. *The scale will not function correctly if it becomes too warm or too cold.* It is best to use the scale in the shade, or indoors. If the scale becomes hot and does not work correctly, place it in a cooler area and wait 15 minutes before using it again. If it becomes too cold, place it in a warmer area.
4. The scale must adjust to changes in temperature. If the scale is moved to a new site with a very different temperature, wait for 15 minutes before using it again
5. Handle the scale carefully:
  - Do not drop or bump the scale.
  - Do not weigh loads totalling more than 150 kilograms.
  - Protect the scale from excess moisture or humidity.

### Cleaning the scale

To clean the scale, wipe surfaces with a damp cloth. *Never put the scale into water.*

### Storing the scale (-20° C to +65° C)

Do not store the scale in direct sunlight or other hot places.

### Operating the scale (0° C to +45° C)

Do not use the scale at temperatures below 0° C or above 45° C.

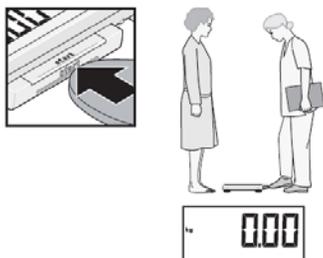
### Weighing an infant or young child held by the mother or other person who can help (tared weighing)

The **2 in 1** function enables the body weight of infants and young children to be determined. The child is held in the arms of an adult (mother or another adult helper).

**NOTE:**

The person being weighed must stand still on the scale.

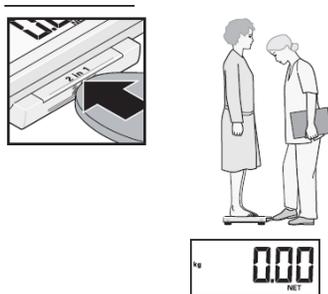
- Switch on the scale with no weight applied.
- Wait until **0.00** appears on the display.



- Ask an adult to step onto the scale. The adult's weight is displayed.



- Press the **2 in 1** key. The adult's weight is stored. **0.00** and the word **NET** appear on the display.



- Ask the adult to hold the first baby while standing on the scale and to try not to move.
- Wait until the weight display and the message **HOLD** are no longer flashing.
- Record the baby's weight.
- Ask the adult to step off the scale with the baby. The baby's weight remains displayed. The adult's weight remains stored. A new measurement is automatically taken as soon as any weight is placed on the scale again.
- Take measurements for other babies in the same way with the same adult. You do not need to reactivate the 2 in 1 function or switch the scale off and on again between measurements.



**If several babies or infants are to be weighed consecutively, it is important that it is always the same adult who performs the measurement and that this person's weight does not change (e.g. by taking off a garment).**

If no measurements have been taken for two minutes, the **2 in 1** function and the scale automatically switch off.

**NOTE:**

Even though the displays of the seca 874 U scales show two decimals, the last decimal is set to show always '0'. However, in order to be consistent with the corresponding question (AN3) in the questionnaire for children under five, the scales provided by UNICEF Supply Catalogue will have a sticker on the display of the **2 in 1** allowing the measurer to see only the first decimal of the measurement.

## INSTRUCTIONS FOR SUPERVISORS AND MEASURERS

### MEASURING PROCEDURES AND PRECAUTIONS

**(1) Procedures directed to specific individuals**

The procedures to be followed in measuring a child are directed to specific individuals, that is, the **measurer** and/or the **assistant** (in MICS4 the assistant should be the interviewer, field editor, or field supervisor), indicated in bold type at the beginning of each step.

**(2) Two trained people required**

Two trained people are required to measure a child's height and length. The measurer holds the child and takes the measurements. The assistant helps hold the child and records the measurements on the questionnaire. If there is an untrained assistant, such as the mother, then the trained measurer should also record the measurements on the questionnaire. One person alone can take the weight of a child and record the results if an assistant is not available.

**(3) Placement of the measuring board and scale**

Begin to observe possible places where the electronic scale and board can be positioned as soon as you walk into a sample household. Be selective about where you place the measuring board and electronic scale. During daylight hours, it is best to measure outdoors. If it is cold, rainy or if too many people congregate and interfere with the measurements, it may be more comfortable to weigh and measure a child indoors. Make sure there is adequate light.

**(4) Assessing the age of the child**

Before you measure, determine the child's age.

- If the child is less than 2 years old measure length.
- If the child is 2 years of age or older measure height.
- If accurate age is not possible to obtain measure length if the child is less than 85 centimetres or measure height if the child is equal to or greater than 85 centimetres.

**(5) When to weigh and measure**

Begin weighing and measuring after verbal information has been recorded on the questionnaire. This will allow you to become familiar with the members of the household. **DO NOT** weigh and measure at the beginning of the interview, that is, as soon as you enter a household, since this would likely be perceived as overly intrusive.

**(6) Weigh and measure one child at a time**

In cases when there is more than one eligible child of the same mother/caretaker, complete all the questionnaires for the mother/caretaker, and then weigh and measure her/his children. If there is more than one eligible child and more than one mother/caretaker, you should be careful about the timing of the measurements, and use your judgement in such cases. If you think that leaving all of the measurements until after the completion of all questionnaires will cause confusion and errors, then you must carry out measurements of children by the same mother/caretaker once the questionnaires administered to that mother/caretaker have been completed, and then move on to the next mother/caretaker. However, in reality, it is often the case that interviewing all mothers/caretakers first, and measuring all children at the end is more practical – use this option

if you are sure that this will not cause confusion. It is important to complete both the weight and the height/length measurements for one child before continuing with the next eligible child.

**(7) Control the child**

When you weigh and measure, you must control the child. The strength and mobility of even very young children should not be underestimated. Be firm yet gentle. Your own sense of calm and self-confidence will be felt by the mother and the child.

When a child comes into contact with any measuring equipment, that is, a measuring board or electronic scale, you must hold the child so that he or she doesn't trip or fall. Never leave a child alone with a piece of equipment. Always maintain physical contact with the child, except for the few seconds while taking his or her weight.

**(8) Coping with stress**

Since weighing and measuring requires touching and handling children, normal stress levels for this type of survey work are higher than for surveys where only verbal information is collected.

Explain the weighing and measuring procedures to the mother and, to a limited extent, the child, to help minimize possible resistance, fear or discomfort. You must determine if the child or mother is under so much stress that the weighing and measuring must stop. Remember, young children are often uncooperative; they tend to cry, scream, kick and sometimes bite. If a child is under severe stress and is crying excessively, try to calm the child or return the child to the mother for a moment before proceeding with the weighing and measuring.

Do not weigh or measure a child if:

- The mother refuses.
- The child is too sick or too distressed.
- The child is physically deformed, which will interfere with or give an incorrect measurement. To be kind, you may want to measure such a child and make note of the deformity on the questionnaire.

**(9) Recording measurements and being careful**

Record the measurements in pen. If you make an error, cancel it and rewrite the correct numbers. Keep objects out of your hands and pens out of your mouth, hair or breast pocket when you weigh and measure so that neither you nor the child will get hurt due to carelessness. When you are not using a pen, place it in your equipment pack, pen case or on the survey form. Make sure you do not have long fingernails. Remove rings and watches before you weigh and measure to prevent them from getting in the way. Do not smoke when you are in a household or when you weigh and measure.

**(10) Strive for improvement**

You can be an expert measurer if you strive for improvement and follow every step of every procedure the same way every time. The quality and speed of your measurements will improve with practice. You may be working with a partner to form a team. If so, you will be responsible not only for your own work, but that of your team.

You will be required to weigh and measure many children. Do not take these procedures for granted, even though they may seem simple and repetitious. It is easy to make errors when you are not careful. Do not omit any steps. Concentrate on what you are doing.

## NUTRITIONAL STATUS MEASUREMENT - SUMMARY PROCEDURES

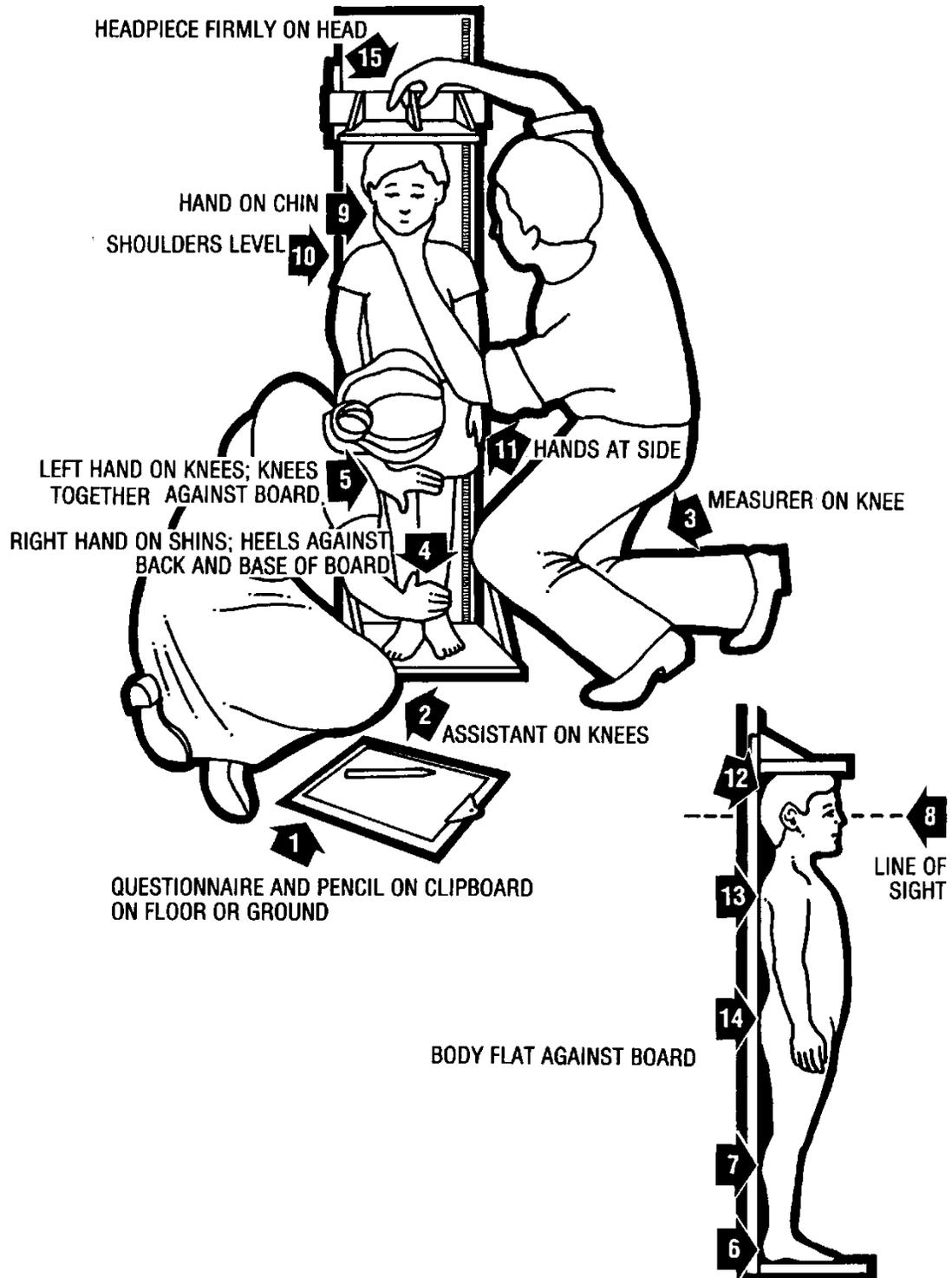
### MEASURING A CHILD'S HEIGHT: SUMMARY OF PROCEDURES (SEE ILLUSTRATION 1)<sup>2</sup>

- (1) **Measurer or assistant:** Place the measuring board on a hard flat surface against a wall, table, tree, staircase, etc. Make sure the board is stable.
  - (2) **Measurer or assistant:** Ask the mother to remove the child's shoes and unbraided any hair that would interfere with the height measurement. Ask her to walk the child to the board and to kneel in front of the child (if she is not the assistant).
  - (3) **Assistant:** Place the questionnaire and pen on the ground (Arrow 1). Kneel with both knees on the right side of the child (Arrow 2).
  - (4) **Measurer:** Kneel on your right knee only, for maximum mobility, on the child's left side (Arrow 3).
  - (5) **Assistant:** Place the child's feet flat and together in the centre of and against the back and base of the board. Place your right hand just above the child's ankles on the shins (Arrow 4), your left hand on the child's knees (Arrow 5), and push against the board. Make sure the child's legs are straight and the heels and calves are against the board (Arrows 6 and 7). Tell the measurer when you have completed positioning the feet and legs.
  - (6) **Measurer:** Tell the child to look straight ahead at the mother if she is in front of the child. Make sure the child's line of sight is level with the ground (Arrow 8). Place your open left hand on the child's chin. Gradually close your hand (Arrow 9). Do not pinch the jaw. Do not cover the child's mouth or ears. Make sure the shoulders are level (Arrow 10), the hands are at the child's side (Arrow 11), and the head, shoulder blades and buttocks are against the board (Arrows 12, 13 and 14). With your right hand, lower the headpiece on top of the child's head. Make sure you push through the child's hair (Arrow 15).
  - (7) **Measurer and assistant:** Check the child's position (Arrow 1-15). Repeat any steps as necessary.
  - (8) **Measurer:** When the child's position is correct, read and call out the measurement to the nearest 0.1 centimetre. Remove the headpiece from the child's head, your left hand from the child's chin and support the child during the recording.
  - (9) **Assistant:** Immediately record the measurement and show it to the measurer. Alternatively, the assistant could call out the measurement and have the measurer confirm by repeating back.
- NOTE:** If the assistant is untrained, the measurer records the height.
- (10) **Measurer:** Check the recorded measurement on the questionnaire for accuracy and legibility. Instruct the assistant to cancel and correct any errors.

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<sup>2</sup> The assistant for the height procedure should be the interviewer, field editor, or field supervisor.

ILLUSTRATION 1. MEASURING A CHILD'S HEIGHT

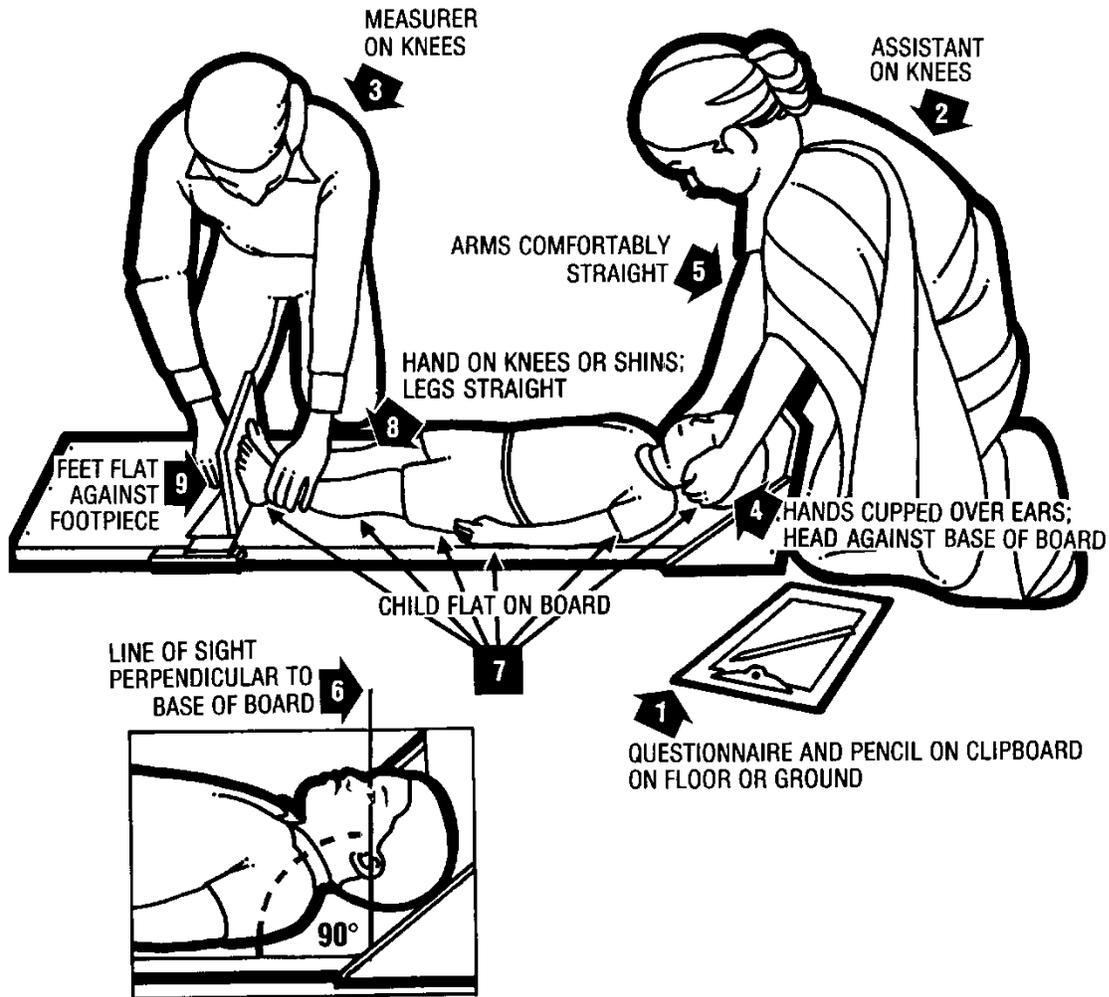


**MEASURING A CHILD'S LENGTH: SUMMARY OF PROCEDURES ( SEE ILLUSTRATION 2)<sup>3</sup>**

- (1) **Measurer or assistant:** Place the measuring board on a hard flat surface, such as the ground, floor or a steady table.
- (2) **Assistant:** Place the questionnaire and pen on the ground, floor or table (Arrow 1). Kneel with both knees behind the base of the board, if it is on the ground or floor (Arrow 2).
- (3) **Measurer:** Kneel on the right side of the child so that you can hold the footpiece with your right hand (Arrow 3).
- (4) **Measurer and assistant:** With the mother's help, lay the child on the board by doing the following:  
**Assistant:** Support the back of the child's head with your hands and gradually lower the child onto the board.  
**Measurer:** Support the child at the trunk of the body.
- (5) **Measurer or assistant:** If she is not the assistant, ask the mother to kneel on the opposite side of the board facing the measurer to help keep the child calm.
- (6) **Assistant:** Cup your hands over the child's ears (Arrow 4). With your arms comfortably straight (Arrow 5), place the child's head against the base of the board so that the child is looking straight up. The child's line of sight should be perpendicular to the ground (Arrow 6). Your head should be straight over the child's head. Look directly into the child's eyes.
- (7) **Measurer:** Make sure the child is lying flat and in the centre of the board (Arrow 7). Place your left hand on the child's shins (above the ankles) or on the knees (Arrow 8). Press them firmly against the board. With your right hand, place the footpiece firmly against the child's heels (Arrow 9).
- (8) **Measurer and assistant:** Check the child's position (Arrows 1-9). Repeat any steps as necessary.
- (9) **Measurer:** When the child's position is correct, read and call out the measurement to the nearest 0.1 centimetre. Remove the footpiece, release your left hand from the child's shins or knees and support the child during the recording.
- (10) **Assistant:** Immediately release the child's head, record the measurement and show it to the measurer. Alternatively, the assistant could call out the measurement and have the measurer confirm by repeating back.  
**NOTE:** If the assistant is untrained, the measurer records the length on the questionnaire.
- (11) **Measurer:** Check the recorded measurement on the questionnaire for accuracy and legibility. Instruct the assistant to cancel and correct any errors.

<sup>3</sup> The assistant for the length procedure should be the interviewer, field editor, or field supervisor.

ILLUSTRATION 2. MEASURING A CHILD'S LENGTH



## ASSESSING OEDEMA

In countries or areas where severe acute malnutrition is expected to be high the existence of oedema can be assessed as part of the Anthropometry Module. Oedema should be assessed after the weight and height/length measurements have been taken.

Oedema is the retention of water in the tissues of the body. Nutritional oedema always starts in both feet and extends upwards to other parts of the body. Bilateral (in both extremities) oedema is a sign of severe acute malnutrition. Oedema in one foot is not caused by malnutrition.

Oedema is assessed by holding one foot in each hand and applying pressure with the thumbs to the tops of the feet for three seconds. If the child has bilateral oedema, an impression or pitting will remain in both feet for a few seconds after the pressure is released. The child should only be recorded as having oedema if both feet clearly show an impression or pitting.

In the training for the fieldwork staff it is important to involve trainers (nutritionists) experienced in assessing oedema. Practice should include fieldwork staff practicing on each other; hard pressure is not necessary to assess oedema and it should not be painful or uncomfortable. Practice on children will be done as part of the anthropometry training. Since oedema, for the most part, is a rare condition, visiting a therapeutic feeding centre, hospital or clinic to practice checking for the existence of oedema on actual cases is recommended.

Bilateral oedema is a serious condition; many children with oedema will weaken and die unless they are treated. Including oedema in a survey comes with an ethical responsibility to set up a system with the Ministry of Health so that identified cases can be treated, through, for example, referral to therapeutic feeding centers, hospitals or health centers.