

Standard Operating Procedures for the LAKANA trial
SOP Proc-03: Performing anthropometric measurements.
 Version 1.0 (2022-11-15)

1. Purpose and overview:

This SOP¹ describes the specific procedures that will be followed for taking children’s anthropometric measurements as part of LAKANA Growth sub-study. The measurements that are presented include mid upper arm circumference (MUAC), length, and weight. This SOP refers to data collection form (DCF) DCF07 and SOP Safety-01.

2. Applicability to and responsibilities of various staff members

Staff member	Responsibility
Measurer	<ul style="list-style-type: none"> - Takes measurements - Notifies unwanted event during measurement to district supervisor - Reviews results recorded in the tablet computer
Assistant measurer	<ul style="list-style-type: none"> - Calibrates the equipment* - Fill in calibration reports in the tablet computer* - Helps position the child correctly while the measurer takes the measurements - Records readings accurately in the tablet computer*
District supervisor	<ul style="list-style-type: none"> - Plans the schedule of the visit - Manages any accident/equipment malfunction

**To be performed by the measurer if no assistant is available.*

3. Required materials

Item	Number	Specification
MUAC Tape	2 packs (50 tapes) per health facility	Tricolor Shorr® Child MUAC tapes. Color divisions: 0 – 11.5 cm Red (severe acute malnutrition) 11.5 – 12.5 cm Yellow (moderate acute malnutrition) 12.5 – 26.0 cm Green (well-nourished)
Length measuring board	2 boards per health facility	Portable Infant/Child ShorrBoard®. Capacity: 130 cm x 0.1 cm.

¹Abbreviations: SOP = standard operating procedure, LAKANA = Large-scale Assessment of the Key health-promoting Activities of two New mass drug administration regimens with Azithromycin, CSCCom = Centre de Santé Communautaire, MUAC = Mid Upper Arm Circumference, DCF = Data Collection Form.

Item	Number	Specification
Digital weighing scale	2 scales per health facility	Digital baby scale SECA 354. Maximum load: 20 kg Graduations: 5g <10 kg > 10 g Accuracy: ± 30 g Temperature range: + 10 °C to + 40 °C
AA batteries	4 per scale	AA batteries (1.5 V) 4 AA batteries should last for up to 20,000 weighing operations.
Calibration log	-	Calibration log in tablet computer to be completed daily prior to taking first measurement (See appendices 2 and 3 for template).
Tablet computer	1 per Measurer	
Removable skin marker	1 per Measurer	Color: white To be used for marking child's arm during MUAC measurement procedure.
Alcohol-free cleaner	<i>As required</i>	Designed to sanitize the MUAC tapes.
Antibacterial surface wipe	<i>As required</i>	Designed to sanitize the measuring boards and the scales.
Hand sanitizer	<i>As required</i>	To be used by measurers to disinfect their hands prior/after handling children
Calibration weights	3 per health facility	2, 5 and 10 kg
Calibration rods	1 per health facility	60.0 cm

4. Definitions and general instructions

4.1. Definitions

- 4.1.1.** Measurer: a LAKANA data collector measuring anthropometrics who will be trained, and his / her performance standardized prior to beginning of data collection.
- 4.1.2.** Assistant measurer: a LAKANA data collector who will oversee calibrating the instruments and will assist the measurer by helping position the child correctly. The assistant measurer will be trained prior to beginning of data collection. If only one Anthropometrist per team is available, the measurer will also perform the assistant measurer's tasks. Assistance for positioning or holding a child will be requested from the caregivers who will be trained by the measurer.

- 4.1.3.** Caregiver: a person responsible for looking after a child. The caregiver is responsible for providing consent for study drug administration to eligible infants.

4.2. General instructions

- 4.2.1.** There will be at least one Measurer and if possible one Assistant measurer stationed at each health facility. Both measurers will receive the same training, therefore their roles are interchangeable. They will decide prior to a visit who will endorse the measurer or assistant roles.
- 4.2.1.1. If an assistant measurer is not available, the measurer will also be responsible for calibrating the equipment and filling in calibration reports. Assistance for positioning a child will be requested from the caregiver. The caregiver will first be trained by the measurer on how to position the child.
- 4.2.2.** Measuring anthropometrics requires touching and handling an infant, both the measurer and assistant will wash or disinfect their hands before and after handling an infant. During COVID-19 epidemic, extra precautions will be taken as described in SOP-Safety 01.
- 4.2.3.** The preferred order for taking anthropometric measurements will be: 1- MUAC measurement, 2- weight measurement and 3- length measurement.
- 4.2.4.** Before taking the child's measurements, the measurer will carefully explain the procedures to the child's mother/caregiver and answer any questions that may arise.
- 4.2.5.** The measurer will take the measurement and calls out the reading to the assistant who will record it in the tablet computer (DCF07). The measurer will record the data if no assistant is available. MUAC results will be recorded to the nearest 0.1 cm. Length will be recorded to the nearest 0.1 cm. Weight will be recorded to the nearest 0.01kg (10 g)
- 4.2.6.** There will be three replicates for each measurement. The LAKANA statisticians will handle possible differences in the readings at the analysis stage.
- 4.2.7.** The assistant measurer or measurer will conduct routine calibrations of the anthropometry equipment to ensure that the equipment produces accurate measures (See Appendix 1, 2 and 3).
- 4.2.8.** To ensure that the anthropometry equipment functions properly and remains hygienic always, the measurer will keep the instruments clean after each use.
- 4.2.9.** The measurer will notify the district supervisor of any unwanted event during a measurement e.g., accident, equipment breaks or malfunctions.

5. Step-by-step procedures

5.1. Measuring MUAC

- 5.1.1.** The measurer will take the MUAC measurement using the flexible Shorr® child MUAC tape. The measurer will take the measurement on the left upper arm.

5.1.1.1.NB: If measurement cannot be taken (e.g., because a child will not calm down, a child has a malformation that makes measurement difficult, the caregiver refuses the measurement, or other reason), the measurer will record the information in the tablet computer.

5.1.2. Positioning the child for MUAC measurement

5.1.2.1. The measurer, or assistant if available, will ask the caregiver to remove the child's clothing that may cover the left arm.

5.1.2.2. The measurer, or assistant if available, will position the child in a sitting position on the caregiver's lap in such a way that the measurer can easily access the left arm.

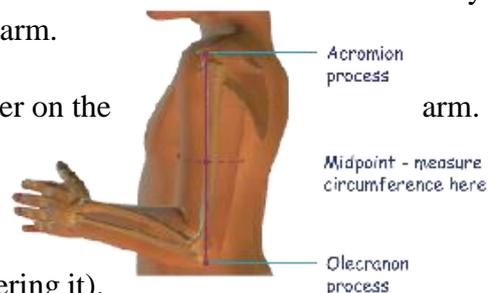


URC, USAID/SPRING-UNICEF IYCF Digital Image Bank (iycf.spring-nutrition.org)

5.1.3. Measurement of the MUAC

5.1.3.1. **Measurer:** locate the midpoint of the arm i.e., midpoint between the elbow and the shoulder

- with your fingertips, locate the tip of the child's shoulder i.e., the end of the bone with the most lateral bony protuberance of the back of the shoulder (acromion process). Mark the point with a marker on the arm.
- bend the child elbow to make a 45 degrees angle.
- locate the pointed, most prominent tip of the elbow (olecranon process). Mark the point with a marker on the arm.
- Place the MUAC tape at zero, which is indicated by two arrows, on the tip of the shoulder (first mark) and extend the tape straight down to the tip of the elbow (second mark).
- Read the number at the tip of the elbow and divide this number by two: this is the midpoint of the arm.
- Mark the midpoint with a marker on the arm.



5.1.3.2. **Measurer:** straighten the child's arm and wrap the MUAC tape around the arm at the midpoint (the tape should lie on top of the mark, covering it). Make sure the numbers are right side up. Make sure the tape is flat around the skin.

5.1.3.3. **Measurer (and assistant):** inspect the tension of the tape on the child's arm. Ensure the tape is passing horizontally around the arm, not sloping, and is not too tight or too loose.

5.1.3.4. **Measurer/Assistant:** have the tablet computer ready.

- 5.1.3.5.**Measurer:** once the tape is in the correct position on the arm and the tension is correct, read and call out the measurement to the nearest 0.1 cm.
- 5.1.3.6.**Measurer/Assistant:** record the reading in the tablet computer (if an assistant is available, the assistant will record the reading after calling it back to the measurer).
- 5.1.3.7.**Measurer:** Remove the tape from the child arm and check the recorded measurement on the tablet computer for accuracy.
- 5.1.4.** The measurer will repeat the MUAC measurement a second, and a third time. Each time, the measurer/assistant will record the measurement.
- 5.1.4.1.The measurer will not repeat step 5.1.4.1 (locating the midpoint).
- 5.1.5.** After taking the three MUAC measurements, the measurer will offer a non-alcohol wipe to the caregiver so that she/he can wipe off the marks on the child's arm.
- 5.1.6.** After a child has been measured (three times) and if sanitizing is required, the measurer will clean the MUAC tape with an alcohol-free cleaner.
- 5.2. Measuring weight**
- 5.2.1.** The measurer will measure the weight using the digital baby scale SECA 354. Children will be measured lying on their back or in sitting position (= the preferred position for a child able to sit) on the tray of the scale.
- 5.2.1.1.NB: If measurement cannot be taken (e.g. because a child will not calm down, a child has a malformation that made measurement difficult, the caregiver refuses the measurement, or other reason), the measurer will record the information in the tablet computer.
- 5.2.2. Preparing for measurement**
- 5.2.2.1.**Measurer/Assistant:** explain the procedure to the caregiver and ask for her/his help during the procedure. Explain that it is important to keep the child still and calm to obtain a good measurement.
- 5.2.2.2.**Measurer:** place the scale on a hard, flat, stable surface. Then position the tray as shown on the base of the scale and pull forward until the tray is heard to snap into place, and the release button is in the top position. The tray is now securely interlocked with the base.
- 5.2.2.3.**Measurer/Assistant:** ask the caregiver to remove the child's shoes, heavy clothing, wet diapers, and other heavy objects before the child is weighed. If a baby is weighed naked, a dry diaper can be put on to avoid child getting wet while taking weight.
- 5.2.2.4.If blankets or cloth are required, the scale will be recalibrated with the item on the scale before weighing.



5.2.3. Measuring the weight

5.2.3.1. The scale is equipped with an "AUTOHOLD" function to ensure correct readings for weights exceeding 500g. This function provides for automatic "fixing" of the weighing result on the digital display until the scale switches off after 2 minutes or is used for another weighing operation.

5.2.3.2. **Measurer:** Switch on the scale by pressing the green key (or "START" button). "0" will appear in display. A signal tone will indicate that the scale is now ready for weighing.

- The unit selected for weighing the baby will always be in 'Kg'. Options for units available are lbs (0.00) and Kg (Kilograms, 0.000). It is possible to switch over the weight display between kilo- grams (kg) and pounds using the kg / lbs button.

5.2.3.3. **Measurer:** Ask the Assistant or caregiver (if no assistant available) to place the child on the tray, ensuring that the child stays as still as possible. If the child is agitated or crying, it is best to let the caregiver place the baby and tell her/him specifically how to align the child.



- If the child's blankets or cloth are required, the measurer/assistant will recalibrate with the item(s) on the scale before weighing. The integrated TARE function can be used to tare in items present on the scale. The child's weight will then be automatically deducted from the total weight measured: – First place the item to be tared in on the scale. – Then press key TARE. The display of the scale is now reset to "0" and a normal weighing operation can begin.

5.2.3.4. **Measurer/Assistant:** Make sure that the infant or child is not switching off of the scale by touching buttons.

5.2.3.5. **Measurer:** Read the weighing result displayed, and if an assistant is available, call out the measurement (up to 3 decimal places).

5.2.3.6. **Measurer/Assistant:** Record the reading in the tablet computer.

5.2.3.7. **Measurer:** Check the recorded measurement on the tablet computer for accuracy.

5.2.4. The measurer will repeat the length measurement a second, and a third time. Each time, the assistant will record the measurement.

5.2.4.1. Between the repeated measurements, the caregiver will lift the child up from the scale.

5.2.5. After a child has been measured (three times), the measurer will clean the board with an antibacterial surface wipe.

5.3. Measuring recumbent length

5.3.1. The measurer will measure the length using the ShorrBoard®. Children targeted are aged less than two years, they will be measured lying down.

5.3.1.1.NB: If measurement cannot be taken (e.g. because a child will not calm down, a child has a malformation that makes measurement difficult, the caregiver refuses the measurement, or other reason), the measurer will record the information in the tablet computer.

5.3.2. Preparing for measurement

5.3.2.1.**Measurer/Assistant:** explain the procedure to the caregiver and ask for her/his help during the procedure. Explain that it is important to keep the child still and calm to obtain a good measurement.

- If an assistant is not available, train the caregiver on how to assist with measuring the length especially how to position/maintain the head during the procedure.

5.3.2.2.**Measurer:** place the measuring board on hard, flat surface i.e., table.

5.3.2.3.**Measurer/Assistant:** ask the caregiver to remove the child's shoes, socks and hair ornaments, if any. If a baby is measured naked, a dry diaper can be put on to avoid getting wet while measuring length.

5.3.2.4.**Measurer/Assistant:** with the caregiver's help, lay the child on the board by supporting the back of the child's head with one hand, and the trunk of the body with the other hand. Gradually lower the child onto the board.

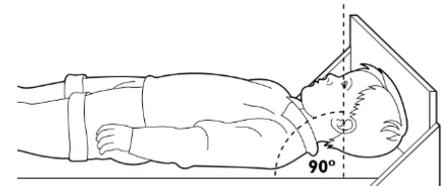
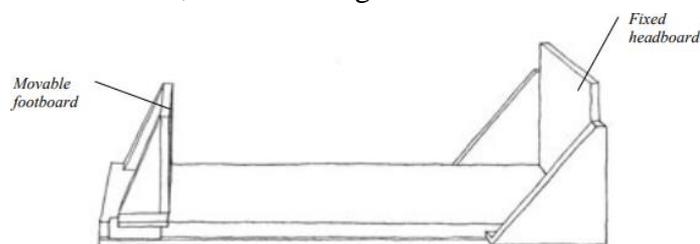
5.3.3. Measuring the length

5.3.3.1.**Measurer:** Stand on the right side of the child so that you can hold the footboard with your right hand. Ensure that the graduated edges are close to you so that you can read it vertically and not from the sides.

5.3.3.2.**Measurer:** If an assistant-measurer is available, ask the caregiver to stand close at the footboard side, facing the child as it will help to keep him/her calm. If it is the caregiver who is assisting you, ask him/her to stand at headboard (see 5.3.3.3)

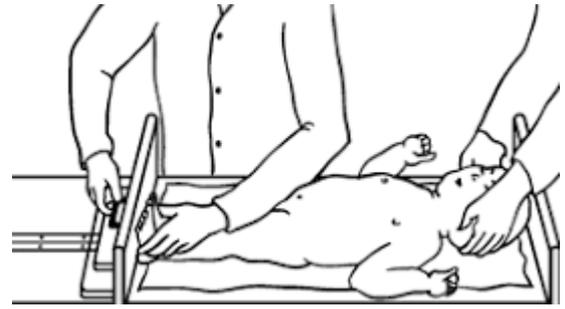
5.3.3.3.**Assistant/Caregiver:** Stand at headboard side (behind the base of the board) to help position child's head.

5.3.3.4.**Assistant/Caregiver:** Cup your hands over the child's ears. 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. Your head should be straight over the child's



head. Hold the baby's head between your palms to keep the extended position during the measurement.

- 5.3.3.5. **Measurer:** make sure the child is lying flat and at the center of the board. Place your left hand on the child's knees and apply a gentle pressure to ensure that the knees are not flexed. Do not press too hard. With your right hand, place the footboard firmly against the child's heel.



- 5.3.3.6. **Measurer:** Check with the assistant/caregiver to see whether the baby's head is still in touch with the headboard and the baby is still straight on the board. If not, correct.
- 5.3.3.7. **Measurer:** When the child position is correct, read (and call out the measurement if an assistant is available) to the nearest 0.1 cm. Remove the footboard and release your left hand from the child's knees.
- 5.3.3.8. **Assistant/Caregiver:** release the child's head. (Assistant: record the reading in the tablet computer and show it to the measurer).
- 5.3.3.9. **Measurer:** Check the recorded measurement on the tablet computer for accuracy (or record the measurement if no assistant is available).

- 5.3.4. The measurer will repeat the length measurement a second, and a third time. Each time, the assistant will record the measurement.

- 5.3.4.1. Between the repeat measures, the caregiver will take the child off the board and then place the child back on the board, so the second measure begins again.

- 5.3.5. After a child has been measured (three times), the measurer will clean the board with an antibacterial surface wipe.

5.4. Checking for nutritional oedema

- 5.4.1. **Measurer:** Using both thumbs of your hands, apply normal pressure on top of both feet of the child for about three seconds



5.4.2. After three seconds, release the pressure. Observe the resulting effect on the child's feet.

5.4.2.1. If there is oedema, an impression remains on both feet for a few seconds as shown below. Record the information in the tablet computer.



5.5. Child with abnormal values or signs of malnutrition

5.5.1. The measurer will refer children with moderate acute malnutrition (as indicated by the yellow color with the MUAC tape) or severe acute malnutrition (as indicated by the red color with the MUAC tape) or nutritional oedema manifested as bilateral pitting oedema (sign of severe acute malnutrition) to the CCom health agents (nurses, doctor) so that appropriate measures can be taken by the health staff, with the consent of the caregiver.

6. Occupational Safety Issues

In a non-epidemic situation, there are no specific occupational safety issues.

During COVID-19 epidemic, procedures for safe and proper work will be used to reduce the risk of exposure to a hazard and prevent transmission between the study team and the study participants. Special considerations due to COVID-19 are presented in SOP-Safety 01.

7. Quality Assurance / Quality Control

Standardization sessions will be held every 6 months during data collection to ensure the measurers are following the recommended techniques, to monitor reliability (precision and accuracy) and to take corrective measures if required.

Regular calibration and maintenance will help ensure that growth measurement equipment produces accurate and reliable measurements when proper measurement techniques are followed. On a daily basis and prior to taking first measurement, the assistant measurer will record the calibration data and upload the data to the server. (see Appendix 2 and 3 for the calibration log).

8. Appendices and other related documents

Document number	Document content
Appendix 1	Maintenance and calibration of anthropometric equipment

Document number	Document content
Appendix 2	Scale Calibration Log
Appendix 3	Length board Calibration Log

9. Version history, authors and approvals

Version (date)	Edits to the SOP text (author)
Version 1.0 (2022-11-15)	Authored by Laura Adubra, in consultation with Per Ashorn, Ulla Ashorn, and Rikhard Ihamuotila. Reviewed by the IWG.

Appendix 1: Maintenance and calibration of anthropometric equipment

1- Maintenance of MUAC tapes

The Shorr Child MUAC tape does not need any special maintenance, the tapes are weather-resistant; the synthetic paper is extremely durable; and can withstand extreme climatic conditions. The MUAC tape is flexible, does not tear, stretch or fray.

The printed measuring scale does not wear off but if for any reason the numbers become hard to read, the tapes must be replaced: there will be at least 50 tapes available at the CSCCom. if more tapes are needed: notify the supervisor.

If “sanitizing” is required, use only alcohol-free cleaners.

2- Maintenance and calibration of scales

The Study coordinator (or his/her designee) will assign a unique instrument No./ID to all the scales which are in use and label them clearly. The study coordinator will save the information in a dedicated register.

a. Maintenance

- Check for damage. Equipment that shows evidence of damage and/or cannot be cleaned adequately must be repaired or replaced: notify the district supervisor.

b. Calibration

- The measurer/assistant measurer will make sure to calibrate the scale daily, prior to taking first measurement, using measuring standardized weights of: 2, 5 and 10 kg.
- Zero the scale.
- Gently place the calibration weight (e.g. 5 kg) in the center of the scale. To ensure an accurate measurement reading, the weight(s) must be placed evenly over the center area of the scale.
- Read the measurement to the nearest gram.
- Repeat steps a second time. (i.e. weigh the calibration weight a total of two times).
- The measurement reading should be exactly the same as the known weight of the calibration weight each time (e.g. a 5.00 kg calibration weight should read 5.000 kg on the scale).
- An acceptable tolerance range is +/- 0.05 kg over or under the weight of a known calibration weight (e.g. a scale with a 5 kg weight on it should read between 4.95-5.05 kg).
- Record the outcome on the ‘Calibration log’ and indicate any action taken if needed. On weekly basis, each team will submit a weekly report to the district supervisor.

c. Record Submission

The measurer/assistant measurer will submit the daily calibration reports to the server. The reports will be reviewed in Implementation Working Group (IWG) meetings and feedback provided to the data collection team as needed.

3- Maintenance and calibration of length boards

The Study coordinator (or his/her designee) will assign a unique instrument No./ID to all the length boards which are in use and label them clearly. The study coordinator will save the information in a dedicated register.

a. Maintenance

- Check that the joints of the length board are tight and straight. If not, tighten or straighten them.
- Check that the measuring tape can be read. If it is too worn to be read, it should be replaced.
- Check for damage. Equipment that shows evidence of damage and/or cannot be cleaned adequately must be repaired or replaced: notify the district supervisor.

b. Calibration

- The measurer/assistant measurer will make sure to calibrate the length measuring board daily, prior to taking first length measurement on the child, using measuring rods of known length: 60.0 cm.
- Place the rod directly on the base with one end firmly against the headboard.
- Bring the footboard to rest firmly against the other end of the calibration rod.
- Read the measurement to the last completed millimeter.
- The measurement reading should be the same as the known length of the calibration rod (e.g. a 60.0 cm calibration rod should be measured as 60.0 cm with the length board).
- An acceptable tolerance range is 0.5 cm over or under the length of a known calibration rod (e.g. a length board being checked with a 75 cm rod should read between 59.5 cm and 60.5 cm).
- Record the outcome on the 'Calibration log' and indicate any action taken if needed. On weekly basis, each team will submit the log to the district supervisor.

c. Record Submission

The measurer/assistant measurer will submit the daily calibration reports to the server. The reports will be reviewed in IWG meetings and feedback provided to the data collection team as needed.

