FIELD WORK PROCEDURES

2
The fieldwork procedures include several components that are crucial for enhancing the quality of anthropometric data:

2.1. Data collection
2.2. Interview and measurements
2.3. Data capture/entry
2.4. Quality assurance methods and field supervision

**2.1. DATA COLLECTION**

The survey manager should ensure, with support from the fieldwork coordinators and field supervisors, that all procedures required for data collection are fully understood and correctly implemented.

These procedures include:

- how to identify the sampled households, follow call-back protocols and identify eligible respondents and children for anthropometric survey in the households;
- how to follow a standardized protocol when faced with special cases in the field (e.g. missing survey subject, empty houses, individuals with disabilities, polygamic families, etc.).

**Key steps to enhance anthropometric data quality during the data collection process**

a) Ensuring survey teams have received the survey package (survey manager, fieldwork coordinators, field supervisors);
b) Making logistical arrangements (survey manager, fieldwork coordinators);
c) Coordinating with local authorities on arrival in the sampled PSU (field supervisors);
d) Identifying sampled households and eligible respondents (field supervisors);
e) Preparing to collect data (interviewer/anthropometrist);
f) Collecting data (anthropometrists including the interviewer);
g) Following up after data collection (anthropometrists, field supervisors).

**Brief overview of steps during data collection**

**a) Ensuring survey teams have received the survey package**

_Survey teams should have received the survey package with all the relevant information including a list of the sampled households:_ the package should include equipment as well as a survey manual with guidelines on how to identify respondents and specific instructions on taking measurements and completing the questionnaire properly: these topics should have been developed during the planning process and explained in depth during the training. Anthropometrists and field supervisors should refer to this manual should there be any queries during the data collection process.

Before going into the field, each survey team will receive a list with the sampled households assigned to that team for the day. When organizing the daily work roster, fieldwork coordinators should consider where the assessment is going to be done, and how much time is required to reach the PSU where the measurements will be made. Teams should be carefully organized so that a reasonable number of households can be visited on a daily basis while avoiding an excessive workload and field team fatigue.

**b) Making logistical arrangements**

Once logistical arrangements are made, teams should be monitored to see whether they are well prepared for each working day. Fieldwork should be organized in such a way as to allow field teams to move between households over the course of the day. An adequate supply of materials (e.g. a sufficient stock of questionnaires, weighing scales, etc.) should be at hand.

Fieldwork coordinators should report any problems accessing PSUs to the survey manager. Primary sampling units should under no circumstances be replaced at field level.
c) Coordinating with local authorities on arrival in the sampled PSU
Meet with the area representative to explain the objectives of the survey and what is expected of each participating household. Provide the list of households selected on the basis of the sampling plan and advise local authorities in the PSU on how to explain to household heads why anthropometry data are being collected. Explain the exact nature of the data to be collected and how the survey will proceed.

d) Identifying sampled households and eligible respondents
The PSUs will have been assigned to specific survey teams ahead of fieldwork, and field supervisors are responsible for assigning individual households from the list of sample household provided by central office, to the individual interviewers on each data collection day. The survey team will receive a list with sampled households and they are responsible for filling in a "household questionnaire" for each planned household whether an interview can be completed or not. A model of the household questionnaire can be consulted in Annex 3.

For each household questionnaire, fill in first the name of the head of household, then the other members. The names of those currently not at home but who usually live in the household or of those who stayed the previous night should also be recorded, based on the agreed definition of "household member" for the survey. The questionnaire should list all children under 6 years of age, indicating those eligible for the child questionnaire and those not.

On the list of household members, check the names of the children under 6 years of age. Issue a separate child questionnaire for each child aged under 6 years of age who is eligible for the survey (see model "Questionnaire for child anthropometry" in Annex 4).

Even if not recommended as standard protocol, if a survey protocol states that only a single child needs to be measured in each household, all children in that household should be included in the household member list in the household questionnaire before the child questionnaire is administered for each of these children under 6 years of age. Only children under age 5 will be measured. Among the children under 5 years old in the child questionnaire (based on date of birth information), one child is selected for measurement. The importance of including all children under 6 years of age in the household questionnaire is to ensure that random selection can be properly applied; this is essential for calculating sample weighting and helps later to estimate the “percentage of missing data” and evaluate survey quality.

If there are no children under 6 years of age in the sampled household, i.e. making it impossible to complete an individual child questionnaire for that household, thank the respondent and move on to the next household assigned by the field supervisor.

If the household is empty, destroyed, not found or the caretaker refuses to take part in the survey, enter this information in the corresponding section (this is question UF10 in the model child questionnaire) and move on to the next household assigned by the field supervisor.

The household and child questionnaires will serve as a record of non-response, which means that incomplete questionnaires need to be retained and submitted: they are an integral part of the sample and a record of them should exist within the public datasets. Non-response rates will be used to calculate the sampling weights applied in the final data analysis.

Call-backs should be conducted following the terms of the protocol. The recommendation is to make an initial visit and then return at least twice if required.

e) Preparing to collect data
The survey team should explain to the head of household the various procedures to be undertaken, all of which should be compliant with local and international ethical norms. A clear, general explanation should be provided of the purpose and nature of the survey and the kinds of data to be collected. The caretaker or head of household should be given the opportunity to ask questions and to decide, as the case may be, not to take part.

The survey team should correctly identify the respondents eligible to take part in the survey. Verbal permission from the caretaker or head of household is necessary before proceeding with a survey questionnaire or undertaking any kind of measurement. It is essential that verbal permission be sought, and an explanation provided to the respondent or caretaker about how the information will be used and by whom. An assurance must be given that any information collected will remain confidential.
f) Collecting data

Taking measurements of individuals can be intrusive and time-consuming. It is the task of the survey team to minimize discomfort and inconvenience during anthropometric measurements. The anthropometrist's confidence and stance are important to reassure both mother and child: this includes instructing the mother/caretaker to stay close to and maintain eye contact with the child while talking to them in a calm and reassuring tone of voice. The mother or caretaker should always be present when measurements are taken.

It is recommended that the measurements be made away from direct sunlight since it can hamper reading displays on scales and other equipment; it is also more comfortable for anthropometrist and child. The chosen area for measurement should however be well enough lit to allow the measuring board ruler and weighing scale to be read without difficulty (see section 2.2 on Measurements for further information).

g) Following up after data collection

Household call-backs should be conducted in line with the protocol. If a child is not present, the caretaker should be asked when the child is likely to be present so that the anthropometrist can return to perform the measurements at a suitable time.

It is recommended that two call-backs be made: this means an initial visit plus two more call-back visits before leaving the PSU. The call-back protocol developed for the survey suggests making attempts at different times of the day (e.g. call-backs should not be made in the morning within 30 minutes of the previous attempt but spread out between morning, afternoon and evening).

The field supervisor should review all questionnaires to check that they have been completed properly before leaving the PSU. If digital data collection is being used, the field supervisor should also check that the equipment is functioning properly and follow the various steps to upload data to the server.

The survey team should make sure that all equipment is securely placed in the vehicle and thank the representative of the PSU for their collaboration before leaving.

2.2. INTERVIEW AND MEASUREMENTS

This section describes best practice for procedures to collect anthropometry data. It does not include specific instructions on measurement techniques or training but provides links to specific documents including instructions on how to calibrate the equipment at the beginning of the survey and then maintain it accurately and regularly.

There are many anthropometric variables that have a legitimate place in the assessment of the nutritional status of children under 5 years of age; this document will concentrate however solely on measurement and interpretation of:

| – weight-for-age – WFA; |
| – length-for-age (for children < 24 months) or height-for-age (for children ≥ 24 months) – HFA; |
| – weight-for-length (for children< 24 months) or weight-for-height (for children ≥24 months) – WFH. |

Appropriate anthropometric equipment is required to perform weight and length/height measurements in order to calculate these indices. There is a pressing need for high quality and “user friendly” equipment wherever feasible. Recommended product specifications for the devices used to take anthropometric measurements can be found in Chapter 1, in the section on equipment.

Key steps to take into consideration while taking measurements

a) Recording the date of birth and date of interview;

b) Observing general recommendations when taking anthropometric measurements;

c) Preparing to measure the child;

d) Measuring weight;

e) Measuring length (in children under 2 years old);

f) Measuring height (in children 2 years old and above);

g) Recording measurements;

h) Calibrating equipment.
Brief overview of steps for collecting anthropometric data in the field

a) Recording the date of birth and date of interview

Ensure all questions related to the date of interview and date of birth are properly completed in the questionnaire (see model questionnaire for child anthropometry in Annex 4). Where vital registration is not a universal practice, a local events calendar should have been developed during the planning stage.

Start by asking for documentary evidence of the date of birth (e.g. birth certificate, baptismal certificate, clinic card, etc.). Record the day, month and year of birth as noted on the documentary evidence, if available, and indicate what type of documentary evidence is acting as the data source for the questionnaire. The ideal source is a written document, so even if the mother says she knows the date of birth by heart request politely to see a copy of the documentary evidence and record the information directly from it.

If no document is available, ask the mother or caretaker for the date of birth as they recall it and indicate the source on the questionnaire as “mother/caretaker’s report” (following the model for child questionnaire in Annex 4). If the mother/caretaker does not know the date of birth, then at minimum the month and year of birth should be obtained using a local events calendar. The local events calendar will have been prepared and tested prior to finalization of the questionnaire and completion of training, and all anthropometrists should have been trained on how to use it during data collection.

If using documentary evidence or the mother/caretaker’s report, the anthropometric team should record the actual day of birth (assuming it is specified). If using the local events calendar, it is very probable that it will be impossible to identify the exact day of birth. In this case, anthropometrists have to enter 98 (unknown) for the day of birth and enter the birth month and year as determined by the local events calendar. The source of the information should always be recorded in the questionnaire. Refer to the instructions for more details on how to use the local events calendar when filling in the questionnaire (see Chapter 1, section 1.3 on Questionnaire development).

TIPS

- Always record the date of birth and date of visit on the questionnaire;
- The questionnaire should have two distinct spaces for the day, two for the month and 4 for the year (e.g. DD/MM/YYYY) and their order should follow national convention;
- When filling in the questionnaire, never leave a blank space for DD or MM or YYYY (i.e. 14 June 2018 is 14/06/2018 and if day is unknown then it is 98/06/2018);
- Never make up a value if the caretaker does not know the information you have requested, and use standard codes for unknown items such as 98 for DD;
- Avoid recording the age in months on the questionnaire (see the model questionnaire in Annex 4).

TOOLS

- For more information, see Annex 4 (model anthropometry questionnaire);
- For more information on how to develop and use an event calendar see Section 1.3 on Questionnaire development in Chapter 1.

b) Observing general recommendations when taking anthropometric measurements

Anthropometrists’ preparation: anthropometrists should not have long fingernails and their hands should be clean before approaching children who are about to be measured. Anthropometrists should remove any object from their hands and wrists such as clunky watches or bracelets so as prevent them getting in the way and hampering the measurement or even harming the child. No member of the field team should smoke while working.

Placement of the equipment: a careful choice should be made about where to place the measuring board and scale. Be sure that there is a sturdy, flat surface for the measuring board and digital weighing scale, and sufficient light for the measurements to be read with precision. If the floor is not flat, consider bringing a wooden board in order to stabilize the scale. If the scale is solar-powered, there must be adequate light to operate the mechanism.

Individuals with disabilities: It is recommended to measure individuals with disabilities. However, it can be a challenge to acquire accurate and safe measurements in individuals with impairments that affect their ability to stand, straighten their
arms, legs or back or hold themselves steady. In these circumstances, it may be necessary to adapt the measurement protocols or provide additional assistance to the child being measured. Child safety takes priority.

c) Preparing to measure the child
When a child is brought into contact with any measuring equipment (length/height board or weighing scale), the child must be held carefully so that he or she does not trip or fall. Children should never be left alone with a piece of equipment; physical contact with the child, except for the few seconds while taking his or her weight, should always be maintained. Remember that the caretaker should not assist in the measurement process but can and should talk to and soothe the child while measurements are being carried out.

Handle the child carefully. When you are taking weight and length/height measurements, the child needs to be as calm as possible. A child who is excited or scared can make it very difficult to get an accurate measurement. Infants and young children should be held by their mother to foster a sense of security. This can be done right up to the point of measurement, but not during measurement for length.

If a child shows distress this can have a big emotional impact on the other children who are waiting to be measured. It is better to leave the distressed child to calm down and come back later to weigh and measure this particular child. In some cases, it may be possible to weigh and measure a distressed child after he or she has seen other children—especially siblings—going through the measurement process.

d) Measuring weight
Specific instructions on how to weigh children under 5 years old are provided in different manuals. Refer, for instance, to FANTA Anthropometry Guide 2018 for instructions on weighing infants and children under 5 years old with standing electronic scales (pp. 174-177).

Tared weight: Children under 2 years of age or who cannot stand still are best weighed with the mother holding them ("tared weight"). In this case, weigh first the mother, then switch the scale to the tared mode and weigh the mother together with the baby: the scale will display the baby’s weight. If the child is not able or willing to stand on the scale, use the tared weight. The tared weight can be used for a child of any age provided the child is held properly by the mother.

Children two years of age or older can be weighed alone, provided the child stands still or does not jump while standing on the scale. If the child is fidgety it is better to adopt the tared weighing procedure instead.

It is recommended that children be weighed undressed to the minimum. Owing to cultural preferences or climate, some parents or caretakers may not allow the child to be weighed without clothes. To accommodate this preference and maintain accuracy, children may be wrapped in a blanket.

Using blankets and the taring scale: First ask the adult to stand on the scale with the blanket and tare the scale so that the weight of the blanket used to cover the child while weighing will not be included when measuring the child’s weight. The adult should then wrap the child in the blanket and stand on the scale while holding the child for measurement.

If it is not possible to weigh the child with minimal clothing, it should be noted in the questionnaire that the child was not undressed to the minimum.

If the child has braids or hair ornaments that are likely to interfere with length/height measurements, remove them before weighing to avoid any delay between the measurements. If the child is not undressed with minimal clothing or hair ornaments cannot be removed, these factors must be recorded in the questionnaire.

e) Measuring length (in children under 2 years old)
Refer, for instance, to FANTA Anthropometry Guide 2018 for instructions on measuring length in children under 2 years of age (pp. 181-183).

Be prepared to measure length immediately after weighing, while the child is minimally clothed, and shoes are off. Ensure that the board is in the right position and placed on level ground. If the anthropometrist is unable to get the child to put both legs outstretched in the correct position, make sure at least one leg is straight with the foot flexed against the footpiece. Allowing the child to adopt a position with only one straight leg should be regarded as an exception and

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1 Best practice on weighing children with clothes cannot be provided at this stage. Further research is required.
permitted only when extremely difficult children are being measured. It is important to proceed quickly when measuring length to avoid locking of the legs.

In every case, the actual position adopted (lying down/recumbent length) should be systematically recorded in the questionnaire (see model questionnaire for child anthropometry in Annex 4).

Digital readers are optimal, but if a measuring board with tape measure is used the anthropometrist must make sure, in order to obtain a correct measurement, that his or her eye is parallel with the footpiece so that the board placement is read on the appropriate plane.

f) Measuring height (2 years old and above)
Refer, for instance, to FANTA Anthropometry Guide 2018 for instructions on measuring height in children 2 years of age and older (pp. 184-187).

When measuring a child, ask the parent/caretaker to place the child on the board and kneel in front of the child. The measurer should kneel on the left side of the child, with the trained assistant kneeling on the child’s right (or the parent/caretaker moving to that position).

In every case, the actual position adopted (standing) should be systematically recorded in the questionnaire.

Digital readers are optimal, but if a measuring board with tape measure is used the anthropometrist must make sure, in order to obtain a correct measurement, that his or her eye is parallel with the footpiece so that the board placement is read on the appropriate plane.

• Pay special attention when measuring recumbent length in children under 2 years old due to the difficulty of measuring children in this age group when in this position; measurement error tends to be an issue2.

• FANTA Anthropometry Guide: weighing infant and children under 5 years of age with a standing electronic scale (pp. 174-177); measuring length in children under 2 years of age (pp. 181-183); measuring height in children 2 years of age and older (pp. 184-187).

g) Recording measurements
Complete questions and measurements for one child at a time. This avoids potential problems with mix-ups that might occur when several children are waiting to be measured. If an error is made when completing the questionnaire, measurements should be crossed through and the corrected measurement written alongside so that any change is clearly visible. For computer-based surveys, see the section on Data capture/entry in Chapter 2.

Always record carefully whether recumbent length or standing height was measured. If a child is 2 years old or older and cannot stand, measure the child’s recumbent length and note this in the questionnaire (in the question about measurement position); equally, if a child is less than 2 years old and is measured standing, this should also be noted in the questionnaire. In both cases, explain why this child was not measured in the appropriate position for his or her age. In such cases, an adjustment will be required in the data analysis phase prior to calculating the z-scores based on the WHO Child Growth Standards (0.7 cm should be added to the standing height to convert it to recumbent length for children below 2 years old, and 0.7 cm subtracted from the recumbent length to convert it to standing height for children 2 years or older). This adjustment is made automatically by the software program in the standard analysis approach (see Chapter 3 on Data Analysis).

If the child is measured in the non-standard measurement position for his or her age, the event and the reason for this discrepancy must be recorded in the questionnaire.

TIPS

• In the questionnaire, the row for recording weight should have three distinct spaces, including one space for the decimal value (e.g. 12.4kg);

• In the questionnaire, the row for recording length/height should have four spaces, including one space for the decimal value (e.g. 108.3 cm);

• To avoid any transcription errors, it is recommended that the anthropometrist reading the measurement repeat it out loud twice to the person completing the questionnaire. Once it has been recorded, the anthropometrist should then check the questionnaire to confirm that the measurement has been correctly entered.

h) Calibrating equipment

In this document, the term “calibration” refers to the notion of confirming that an anthropometric device functions accurately when weighing or measuring an object of known weight or length.

Calibration should be done whenever an item of equipment is purchased and then routinely repeated at specific intervals. Measurements performed during the calibration process should be recorded and checked for accuracy on each occasion. This also helps to ensure that faulty equipment is quickly identified and replaced.

Routinely calibrating anthropometry equipment ensures that it continues to provide accurate measurements. Both the digital weighing scale and measuring board should be routinely calibrated during an anthropometric survey.

These checks should be carried out before starting fieldwork, and regularly thereafter, although not necessarily every day. It may be feasible to carry out daily checks depending on equipment available to the anthropometry team during their survey (e.g. weights and sticks of known values).

The following regular checks should be carried out.

– Each scale should be tested with a standard weight of at least 5 kg: a daily check is strongly recommended to ensure accuracy.

– A measuring board can be calibrated using piping of a known length, e.g. 110 cm. If different measuring boards are checked using the same calibrating rod or pipe, discrepancies between these various items of equipment will become readily apparent. A daily check is recommended.

Calibration log tools for anthropometric equipment are presented in Annex 6.

The survey office should have back-up equipment in readiness for use during fieldwork. Fieldwork coordinators should be informed immediately if equipment is defective and request replacement devices. Length/height and weight measurements should not be performed until replacement equipment is provided.

TIPS

• Do not use faulty equipment;

• If readings prove to be inaccurate during the data collection process in the field and the equipment cannot be calibrated, the device should be replaced immediately; The team should wait until a new device arrives and revisit the PSU when the new equipment has been tested for accuracy;

• Equipment needs to be protected from extreme weather conditions throughout the survey, e.g. extreme heat or cold, rain, etc.

TOOLS

• For details on calibration procedures and equipment care see section 5.0 “Care for measurement equipment” in the WHO Training Course on Child Growth Assessment (p. 25).
### TABLE 4. FAULTY PRACTICES WHEN TAKING ANTHROPOMETRIC MEASUREMENTS AND HOW TO AVOID THEM

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<th>FAULTY PRACTICES</th>
<th>HOW TO AVOID THEM</th>
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| Non-calibrated equipment is used (e.g. a malfunctioning electronic scale, a wooden height board with poor quality metre tapes) | • Weighing should be postponed if the equipment has not been recently calibrated;  
• Check the equipment is calibrated at the start of the survey and regularly throughout (using standard weights) on a daily basis;  
• Ensure spare or backup equipment is available in case faulty or broken items need replacing during the survey. |
| Poor positioning of the scale or the measuring board                             | • Make sure the scale is flat on the ground and the child correctly positioned before taking the measurement (if necessary use the adjustable feet on the scale to achieve a level position). |
| Poor positioning of the measurers                                                | • The "main measurer" anthropometrist should read the measurement facing the metre scale and not upside down. |
| The measurer is holding a pen when taking measurements                           | • When measuring children avoid holding a pen or other device. Anthropometrists should avoid wearing rings or clunky watches while doing the measurements. |
| Measuring a child standing up when the measurement should be taken lying down (child aged < 24 months) | • The child's age in years should be determined before commencing measurement in order to make sure the measuring position corresponds to the position recommended for their age group. |
| The child is measured wearing shoes or with braids or ornaments in the hair (footwear or headgear not removed) or not undressed to the minimum | • Ask the mother to remove the child's shoes and any other ornament or object on their head (hair clips, extensions, braids, etc.). If a hair feature cannot be removed, this should be noted in the questionnaire;  
• Note on the questionnaire whenever a child is not undressed to the minimum. |
| The child not lying straight along the length of the board                        | • Ensure that the child's head or feet are correctly positioned, ask the child standing up in the height board to look straight up perpendicularly to the board, and check the position of the child's body on the board before taking the measurement;  
• Do not read length/height measurements if the child's position is incorrect, e.g. if the child is leaning to one side, heels are not touching the board and/or hands are not positioned at sides (height). |
| Length/height measurements are rounded off to the nearest 0.0 or 0.5 cm rather than being read off and recorded in 0.1 cm increments | • The child's heels should be flush against the back of the board with the soles of the feet flat on its base (height) or flat against the footpiece (length).  
• Do not round off numbers when reading or recording measurements. Record length/height to the exact mm. |
2.3. DATA CAPTURE/ENTRY

Accurate capture of anthropometric measurements is a key step in collecting and processing anthropometric data. Several approaches are widely used for capture of anthropometry data, including:

1. paper forms for collecting data, with subsequent data entry in a central office (see Annex 3 for a model questionnaire);
2. paper forms for collecting data, with same-day data entry in the field (sometimes known as computer assisted field editing or CAFE);
3. computer-assisted data collection (otherwise known as computer-assisted personal interviewing or CAPI) or mobile data collection.

All three approaches have been used successfully, but it is now most common to use either the second or third option, with electronic capture of anthropometric measurements in the field. The key element in the whole process is the accurate capture of anthropometric data and minimizing the transcription of measurements in this process is therefore critical to ensure quality. Using paper forms prior to entering data in a tablet or computer requires measurement data to be recorded at least twice, once on paper and once in the tablet or computer, both of which offer a margin for error. With computer-assisted data collection, only a single transcription of the measurements is required, provided measurements are recorded directly using the tablet or computer and not via an intermediate step, e.g. writing the measurements first on a notepad. Recording measurements in an intermediate step increases the risk of error and defeats part of the purpose of direct measurement capture although this must be counterbalanced by the added complication of having to manipulate a tablet or computer while conducting anthropometric measurements. If an intermediate step needs to be used owing to such a complication, it should be in a form specifically designed for recording measurements, not simply a measurement written down in a notebook.

Many types of transcription errors can occur when anthropometric measurements are recorded. They include misreading written digits from the paper copy, mistyping digits, transposing digits or omitting digits. The data capture system, whether relying on registration of data on paper forms or direct entry at the time of measurement, should always be checked twice in order to detect data capture errors.

When used in the field, either with paper forms undergoing same-day data entry or computer-assisted data collection, the data capture system should include a double check of captured measurements with immediate verification of recorded values.

When paper forms undergo data entry in the central office, entry is usually performed by two separate data-entry operators; the resulting datasets are compared in order to detect any discrepancy in data entry, and any correction that needs to be made is based on the measurements recorded on paper. When data is collected on paper forms for entry in the office, it is standard practice that all data should undergo double-entry in order to detect data entry errors.

If a centralized data entry system is used instead of data capture in the field, data entry should commence as soon as forms and questionnaires from a PSU arrive back in the central office. Data entry should be carried out in small batches (e.g. a single PSU at a time). Double entry of data is required to eliminate keying errors. Once data recorded on a batch of forms and questionnaires has been individually processed feedback should be provided to the interviewing team based on any issues relating to the data. Additionally, it is recommended that checks be performed on the consistency of data collected, both when data are captured in the field and when entered in the office. See section 2.4 on quality assurance methods for information on the types of checks that should be reviewed during data collection.

The data capture or entry system must be carefully designed to facilitate the capture of anthropometric measurements with an emphasis on ensuring the quality of the data measured. Data capture or entry staff must be well trained and aware of the importance of accurately recording measurements and related data. Software programs for data capture or entry, as well as data checking, should be set up, tested and verified using data from the pilot or pre-test survey before the main field work phase begins. Any problems affecting the data capture or entry programs must be resolved, and the programs modified as necessary, before beginning data collection for the survey itself.
2.4. QUALITY ASSURANCE METHODS DURING DATA COLLECTION

Adequate and consistent field supervision during data collection is critical and should occur in the field as well as at the central level. Gaps in supervision can lead to significant delays in the scheduled timeline and most importantly to preventable mistakes in the collecting or recording of data.

Different checks can be performed to support quality assurance during data collection.

1. **Field supervision**: checks by the fieldwork coordinators and field supervisors via PSU control form and other forms, review of questionnaire data and direct observation and use of an anthropometry checklist;
2. **Re-measurement**: re-measure a random selection of children to assess precision and accuracy and re-measure children with flagged anthropometry data to reduce the volume of incorrect data included in the final dataset;
3. **Central level checks**: results from field check tables processed in the central office and reported back to the teams.

Field supervisors, fieldwork coordinators and data processors all play an important role in performing checks (see Annexes 1 and 2 for roles and responsibilities). The role of field supervisors is critical since it is impossible for the survey manager and fieldwork coordinators to be with each survey team on a daily basis during data collection. Field supervisors should accompany teams every day during data collection and oversee their work. The role of the fieldwork coordinators is to rotate between teams and provide higher-level supervision. It is recommended, at the very least, that a subset of fieldwork coordinators experienced in anthropometric measurements be available to monitor field work. In the first few weeks of field work it is especially important to have more intensive supervision so that any major problems can be identified and addressed early on. For surveys with a longer period of field work, intensive supervision towards the end of data collection is also recommended to ensure that the quality of teamwork does not fall off with time.

A minimum requirement is for fieldwork coordinators experienced in anthropometric measurements to visit every team within the first few weeks of data collection. Data processors can then start reviewing data as it begins to accumulate at the central level.

Most of these checks should be performed in the field. Consistency can be checked in the central office by comparing data with tables checked in the field. Some checks however should only be performed at the central level (e.g. to measure anthropometrist performance, etc.).

**Key checks to support collection of high quality anthropometric data during supervision at field level**

- a) Using PSU control forms;
- b) Reviewing data in questionnaires;
- c) Applying the anthropometry checklist;
- d) Taking re-measurements in the field;
- e) Other forms and checks.

**a) Using cluster control forms**

It is the task of the field supervisors to fill in the cluster control forms\(^3\) which set out the outcomes of each planned interview. Cluster control forms should be discussed daily with the teams to provide feedback on how closely they are following the call-back protocols and progressing with their work, as well as to address any outstanding issues. Fieldwork coordinators should also review the cluster control forms from the field supervisors when they visit different PSUs to monitor the progress of the survey.

The cluster control forms help to monitor the following aspects of data collection:

- **overall team progress** so that, if necessary, corrective action can be taken, e.g. by detecting issues such as high refusal or non-response rates. Information of this kind can indicate a problem in how respondents are being approached or data are being collected, and trigger corrective actions;

\(^{3}\) also referred as “interviewer assignment sheets” in some surveys.
– the percentage of interviews and measurements completed according to plan, revealing whether interviews were implemented or not following the planned timeline, and reasons for non-measurement (e.g. refusal, absence, etc.);
– completion of the assigned PSU before the team moves on to the next, thereby verifying that all eligible respondents have been interviewed and/or call-backs initiated in line with the protocol for all sampled households.

A model cluster control form can be found in Annex 7.

b) Reviewing data in questionnaires

**Paper-based questionnaire:** field supervisors should examine the paper-based questionnaires being completed by all team members on a daily basis and flag any anomalies when performing the checks below.

1. Check for missing or duplicate data, identifying the person and date of visit; length/height; weight; date of birth; standing/lying position for length/height measurement; and sex;
2. Check the source of the date of birth and whether it was confirmed by an official document, reported by the parent or caretaker, or estimated using the event calendar;
3. Check for consistency between the date of birth/age when the information has more than one source (e.g. household roster and anthropometry questionnaire);
4. Check for consistency between the date of birth/age and whether the child was measured standing up (for children aged 24 months and older) or lying down (for children aged under 24 months), while being aware that in some cases there may be a reason (which has to be recorded in the questionnaire) for a non-standard measurement position;
5. Check for consistency between the length/height and weight data; For example, the length/height value in cm should always be numerically greater than the weight value in kg; If the weight value exceeds the length/height value, this may indicate that length/height and weight values have been swapped

**Electronic-based questionnaire:** skip patterns or a restricted range of possible responses should be pre-programmed into an electronic device when it is used: this will reduce data capture errors when the data is recorded by the anthropometrist.

The following automatic checks should be programmed into the software program:

1. Missing data should not be permitted for personal identification and date of visit; length/height; weight; date of birth; standing/laying position for length/height measurement; and sex;
2. A built-in range should be applied for all variables including date of birth, age (in years 0–5, typically collected from the household roster), length/height and weight. For length/height and weight, DHS suggests the maximum ranges for children under 5 years old should be as follows:
   i) Length/height: 35.0–140.0;
   ii) Weight: 0.5–40.0.

Once the data has been entered by the anthropometrist it is the task of the field supervisor to run programs to check data structure. The program should be set to run automatically whenever an anthropometrist sends a data file to the field supervisor, but also able to function manually at any time. The best strategy is for the supervisor to provide immediate feedback by going over the report together with the anthropometrist and identifying households at which problems were encountered. Data can be considered “finalized” only when the structure check has been successfully completed by each household in the PSU: the team is then free to move to the next PSU. If the field supervisor waits until the scheduled last day in the PSU to receive data, he or she may find that there are several data issues that require the team’s stay in the PSU to be extended in order for the issues to be resolved, e.g. the structure check may reveal that an eligible respondent has yet to be measured.

The structure checks below should be performed by the field supervisor for each team member and any anomalies flagged.

1. Check for duplicate entries, identifying the person and date of visit; length/height; weight; date of birth; standing/lying position for length/height measurement; and sex.
2. Check the source of the date of birth and whether it was confirmed by an official document, reported by the parent or caretaker, or estimated using the event calendar;
3. Check for consistency between the date of birth/age when the information has more than one source (e.g. household roster and anthropometry questionnaire);
4. Check for consistency between date of birth/age and whether the child was measured standing up (for children aged 24 months and older) or lying down (for children aged under 24 months), while bearing in mind that in some cases there may be a reason (which has to be recorded on the questionnaire) for a non-standard measurement position;  

5. Flag unusual high or low z-score values for height-for-age, weight-for-age, and weight-for-height for re-measurement, and randomly select additional cases for re-measurement. A z-score is the deviation of an individual’s value from the median value of a reference population, divided by the standard deviation of the reference population. Z-scores should be calculated in accordance with WHO Child Growth Standards. The procedure for flagging outlying values for re-measurement and selecting random cases for re-measurement is described below: see the section on “Anthropometry re-measurements in the field”. The program should be able to issue a prompt for re-measurement of random and flagged cases while the team is still in the field. The reason for re-measurement should be blinded to the interviewer and supervisor.

c) Applying the anthropometry checklist

An anthropometry checklist can be a useful aid for measuring field team performance. The checklist includes a core set of essential tasks which should be performed when taking anthropometry measurements. Each task is a crucial step that, if omitted or done incorrectly, can result in poor quality data. Recording and monitoring whether the checklist has been completed is a factor that increases accountability when supervising team members.

The checklist can be used during household observations and completed either in a paper-based format or electronically. The person completing the checklist should inform the members of the household that his or her role is simply to observe data collection in a supervisory role. Feedback on the checklist results should be provided to the survey team after leaving the household.

The checklist can be used by field supervisors and fieldwork coordinators, although the person completing the checklist must be trained to use it correctly. The training should include instruction on how correct anthropometry measurements are obtained, how to use the checklist, and how to provide feedback and discuss results constructively and effectively with the anthropometrist.

In addition to the checklist, job aids and handbooks should be provided for the anthropometrists. All these documents should be included in the survey manual (see section 1.1 on Planning).

An example of an anthropometry checklist can be found in Annex 8.

d) Anthropometry re-measurements in the field

It is recommended that two types of re-measurement be performed while the survey team is in the field. The first, blinded re-measurement, involves randomly sampling a subset of the survey population and taking repeat measurements of height, weight, date of birth and sex on this random sample. The second, flagged re-measurement, involves performing repeat measurements of height, weight, date of birth and sex for children with unusual measurements.

Selecting cases for re-measurement, either owing to unusual measurements or as members of the random subset, is a task that should be performed by the field supervisor using a data capture or entry system designed for this purpose. Random selection of cases is straightforward with an electronic data system where blinded cases for re-measurement can be selected after completion of interviews. If data cannot be electronically captured in the field, random selection should be carried out by the field supervisor using pre-specified selection criteria. Flagging of cases for re-measurement is an electronic procedure and feasible only when electronic data capture is used in the field. The anthropometrist must be kept uninformed about the reason a child is selected for re-measurement i.e. whether it is because of an unusual measurement or as a member of the blinded random subset. Flagging of cases for re-measurement should not be performed in the absence of random re-measurement in order to avoid over-editing of data in the field: this could result in the suppression of genuine variation and introduce bias.

Blinded random re-measurement procedures

There are two approaches to blinded random re-measurement. Both require that a second measurement be taken on a child who has already been measured as part of the survey sample. The aim of the first approach is to assess precision: it requires the anthropometrist who took the original measurement to return in order to obtain a second measurement. The aim of the second approach is to assess accuracy: an expert anthropometrist therefore has

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4 A measuring position recorded as “standing” for a child who is younger than 9 months should be considered an entry error and flagged as such during data analysis. Refer to section on Data quality assessment and data analysis for more details.
to obtain the second measurement (for definitions of precision and accuracy see the section 1.4 on Training and Standardization). It is preferable to assess both precision and accuracy, but where this is not feasible precision alone should be assessed on a random subsample.

Re-measurements should be performed using the same type of calibrated equipment and standard measurement methods used for the initial measurement. Anthropometrists should remain unaware of the subsample of randomly selected households until they are instructed to undertake the second measurement. The field supervisor should take every precaution to ensure that the anthropometrist does not have access to the first measurement. Where the same anthropometrist is requested to take two measurements on the same subject an adequate period of time should have lapsed between measurements in order to minimize the chances of the anthropometrist recalling the original measurement. In spite of this consideration, the two measurements must be obtained within a certain window of time for them to be comparable: the weight of a child can change owing to different factors, so re-measurement should be done while the team is still within the PSU (i.e. at most 3–4 days after the first measurement).

Blinded anthropometric re-measurement data are used to determine if any teams are in need of retraining during field work and to assess data quality after the survey. When used for field supervision purposes, feedback on discrepancies regarding date of birth, sex, weight and length/height should be shared with the anthropometrists. A standard maximum acceptable difference for length/height measurements has not been established. The WHO Multicentre Growth Reference Study defined a maximum acceptable difference as 0.7 cm or less (11) while others have defined it as 1.0 cm or less (12).

Since this approach is being used only for quality assurance purposes, a third measurement is not recommended and only the first measurement should be used in the generation of prevalence and other estimates. However, for reasons of transparency, the second measurement should be retained in the dataset and carefully labelled so that users understand the meaning of this quality assurance variable.

**Flagged case re-measurement procedures**

Re-measurement of children with flagged data can reduce the amount of incorrect data included in the final dataset. Flagged data are defined using anthropometry z-score ranges for each anthropometric indicator. These should be based, as a minimum, on the WHO Child Growth Standard flag ranges and, as a maximum, on the range £ -3 SD or > 3 SD with a mean of zero based the WHO Child Growth Standards reference population. While it may be preferable from a data quality standpoint to use the maximum flag range, this approach can lead to a heavy workload in some settings. Use of survey data from a similar setting (e.g. previous surveys from the same country) can therefore be used to predict heuristically the number of re-measurements that will be required using different flag ranges: the decision about which particular range to adopt can be made based on grounds of feasibility. Further research is required to identify a balanced set of flag ranges that could be used in different settings to prompt re-measurement.

As noted above, outliers must not be identified by hand in the field and to avoid over-editing survey teams should not be provided with reference sheets for child growth (e.g. weight-for-height reference sheets). Z-score flagging should be done automatically using a software program that is able to generate anthropometry z-scores. While it is logistically easier to flag cases while the team is still in the household and re-measure children on the spot this is not recommended because the anthropometrist will no longer be blinded about the reason for re-measurement (i.e. blinded vs flagged).

Contrary to the blinded re-measurement procedure, the second measurement for flagged cases should be used for calculating prevalence and other estimates, although the original measurement should be retained in the dataset under a different variable name for reasons of transparency. All relevant information (date of birth, sex) and measurements (length or height, weight) should be re-measured.

e) Other forms and checks

Field supervisors should check the calibration log (see section 1.5 on Equipment in Chapter 1 and Annex 6) of their teams on a daily basis to determine if the equipment for measuring height and weight is being tested to confirm its proper functioning before teams leave for the field each day. Fieldwork coordinators should also review the calibration log when they visit different PSUs and provide feedback as required to the field supervisor who, in turn, will provide feedback to the team concerned.

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5 Natural variation of weight measurements collected on different days is unknown, so calculation of a maximum acceptable difference for weight requires research before it can be adopted. However, weight should still be measured and the anthropometrist remain blinded as to why a particular child is selected for re-measurement (blinded vs flagged).

6 Height-for-age <-6 or >6 z-scores, weight-for-age <-6 or >5 z-scores, weight-for-height <-5 or >5 z-scores
It is possible to create paper forms in order to provide summary information on the team’s performance.

**Key checks to support collection of high quality anthropometric data during supervision at central level**

a) Household completion rate;  
b) Completeness of age;  
c) Completeness of height measurement;  
d) Completeness of weight measurement;  
e) Source of age;  
f) Data heaping;  
g) Position of measurement;  
h) Cases out of range.

Aggregated data quality checks, as data begins accumulating, should be performed by a data processor at the central level. This information provides an objective and continuous measure of each anthropometrist’s performance and can also highlight issues relating to data collection. Relevant information obtained from the data quality checks needs to be provided to the field supervisors to help improve team performance.

Field check tables are one way of monitoring data quality while the fieldwork is still in progress. They are tabulations of data which are produced periodically in order to monitor the performance of each separate survey team. Each table focuses on an important aspect of data quality and is presented by team. Use of these tabulations is crucial during the entire fieldwork period when there is still time to arrange for field team members to be re-trained or problem PSUs to be re-measured. If the data from a particular team reveal problems, it may be useful to have each individual anthropometrist review the field check tables in order to see whether the problems are team-wide or restricted to one or two team members. The central office should be able to provide feedback to the survey teams on how they can improve their work and avoid repeating the same errors, based on field and central office checks.

Checks at central level which are included in the field check tables:

a) **Household completion rate**: percentage of households completed; no household member at home or no competent respondent; entire household absent for extended period of time; refused; dwelling vacant or address not a dwelling; dwelling destroyed; dwelling not found; and other reason, out of total number of eligible households;  
b) **Completeness of age**: percentage of date of births completely defined as day, month and year of birth; year and month of birth; and year of birth only, out of total number of eligible children;  
c) **Completeness of height measurement**: percentage of children measured; children not present; refused; other reason; and missing, out of total number of eligible children;  
d) **Completeness of weight measurement**: percentage of children measured; children not present; refused; and missing, out of total number of eligible children;  
e) **Source of age**: percentage of date of birth information obtained from birth certificate; vaccination card; caretaker’s recall; and other source, out of the total number of eligible children;  
f) **Data heaping**: height and weight digit preference for any digit (see section on digit preference in Chapter 3 on Data quality);  
g) **Position of measurement (standing)**: percentage of children recorded who were measured in the lying position who should have been measured in the standing position out of total number of children measured; and measured in the standing position who should have been measured in the lying position out of total number of children measured;  
h) **Cases out of range**: percentage of invalid HAZ, WAZ, WHZ based on WHO flags (see section 3.1 on Implausible values in Chapter 3 on Data quality).

If data based on blinded and flagged re-measurement related to anthropometry are available, this information can also be included in field check tables. These could also be tabulated using each anthropometrist’s unique identifier.

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7 Defined as children under two years of age measured standing up and children over two years of age measured lying down. Alternatively, or in addition, defined as children under 9 months of age measured standing up as this is likely to be biologically implausible (child unable to stand).
Re-training and standardization

A survey team should undergo re-training if observation or field check results, either at field level or in the central office, indicate poor performance during data collection. Re-training should be provided by an expert anthropometrist to ensure that the correct measuring techniques are being taught. If several teams are performing poorly, centralized retraining and re-standardization exercises is recommended. It is also preferable for all anthropometrists, in large surveys requiring more than 4 months’ data collection, to undergo re-standardization halfway through the data collection process.

TOOLS

• A model calibration log tool for anthropometric equipment is shown in Annex 6;
• A model cluster control form in shown in Annex 7;
• A model anthropometry checklist is shown in Annex 8. Standard field check tables are currently being developed to comply with the guidelines in this report.

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8 The model anthropometry checklist provided in Annex 8 was developed by the DHS Program and is based on use of a Seca® scale (model no. SECA 878U) and Shorr board. The checklist should be adapted accordingly if other equipment is used.
SUMMARY OF RECOMMENDATIONS AND BEST PRACTICES

Section 2.1- DATA COLLECTION PROCEDURES

Recommendations (must)
- List all children under 6 years old, before selecting children under 5 years old for measurement;
- Implement a minimum of 2 call backs per household at different times of the day and establishing optimal time for revisit of eligible children not present;
- Undertake checks of the scale with test weight of at least 5 kg daily.

Good practices (optional)
- Organize field work according to the timing set up with the PSU authorities

Section 2.2- INTERVIEW AND MEASUREMENTS

Recommendations (must)
- Always record the date of birth and date of visit on the questionnaire;
- Do not recording the age in months on the questionnaire;
- Weigh the child undressed to the minimum and if not possible, record it on the questionnaire;
- Request for braids or hair ornaments to be removed before length/height measurement;
- Position the child in lying or standing position for length/height based in the child's age group;
- The main measurers should read the measurement out loud twice to the person completing the questionnaire. Once it has been recorded, the main measurer should then check the questionnaire to confirm that the measurement has been correctly entered;
- Always record whether recumbent length or standing height was measured;
- Do not use faulty equipment;
- It is recommended to measure individuals with disabilities. However, it can be a challenge to acquire accurate and safe measurements in individuals with impairments that affect their ability to stand, straighten their arms, legs or back or hold themselves steady.

Section 2.3- DATA CAPTURE/ENTRY

Recommendations (must)
- If using a centralized data entry system, double entry of data is required to eliminate keying errors.

Good practices (optional)
- If a centralized data entry system is used instead of data capture in the field, data entry should be carried out in small batches;
- Software programs for data capture or entry, as well as data checking, should be set up, tested and verified using data from the pilot survey.

Section 2.4- QUALITY ASSURANCE DURING DATA COLLECTION

Recommendations (must)
- It is recommended that a subset of fieldwork coordinators experienced in anthropometric measurements be available to monitor field work;
In the first few weeks of field work it is especially important to have more intensive supervision so that any major problems can be identified and addressed early on;

For surveys with a longer period of field work, intensive supervision towards the end of data collection is also recommended to ensure that the quality of teamwork does not fall off with time;

It is recommended two types of re-measurement be performed while the survey team is in the field. The first, blinded re-measurement (randomly sampling a subset of the survey population and taking repeat measurements of height, weight, date of birth and sex), the second, flagged re-measurement.

Re-measuring children on the spot is not recommended because the anthropometrist will no longer be blinded about the reason for re-measurement (i.e. blinded vs flagged) or the original values;

Outliers must not be identified by hand in the field and to avoid over-editing survey teams should not be provided with reference sheets for child growth.

**Good practices (optional)**

If survey teams are performing poorly, a centralized retraining and re-standardization is recommended.