

Assessment of child growth: Requests for Revisions to the DHS Model Questionnaires, Optional Modules, and Biomarkers for DHS-8 (2018-2023)

Section I. Information about the requesting party

- 1. Is this request being submitted on behalf of a group? If so, please provide the name of the group and the participating parties.**

This recommendation originated in a consultation with [the Council of Research & Technical Advice on Acute Malnutrition \(CORTASAM\)](#) on the use of MUAC in the community for the detection and diagnosis of acute malnutrition. It is based on a wealth of literature demonstrating increased use of MUAC in community platforms and programs, summarized in a systematic literature review published in 2018¹. A subsequent statement² was written and endorsed by CORTASAM, recommending the use of Mid-Upper Arm Circumference (MUAC) as the primary tool for detection, diagnosis, and discharge of acute malnutrition in children 6-59 months of age in the community. This recommendation is linked with the CORTASAM [Research Agenda for Acute Malnutrition](#) and the specific priority area on 'Effective Approaches to detect, diagnose, and treat acute malnutrition in the community and at scale'.

This recommendation was drafted by Amy Mayberry, Deputy Director for No Wasted Lives and reviewed by Dr. Bernardette Cichon, Research Advisor for No Wasted Lives. It is endorsed by the Council of Research & Technical Advice on Acute Malnutrition (CORTASAM).

Section II. Indicator definition and rationale

- 2. Please define the indicator or indicators you are requesting The DHS Program to incorporate. *Multiple indicators derived from a single set of questions should be included in the same submission. (Response required)***

To ensure that all children with acute malnutrition are identified and accounted for in prevalence and burden estimates, we propose the inclusion of Mid-Upper Arm Circumference (MUAC) and edema measurement.

Anthropometric measurement using MUAC is common practice in programs targeting children 6-59 months of age and it is of increasing relevance for two additional vulnerable groups: infants <6 months of age AND nutritionally vulnerable adults (both men and women). By including this measurement and these specific groups, we can improve the data available to better support

¹ Bliss et al. Use of Mid-Upper Arm Circumference (MUAC) by Novel Community Platforms to Detect, Diagnose, and Treat Severe Acute Malnutrition in Children: A Systematic Review (2018). Global Health: Science & Practice. Available [here](#).

² The Council of Research & Technical Advice on Acute Malnutrition. Recommendations on the use of Mid-Upper-Arm Circumference (MUAC) in the community: A statement from the Council of Research & Technical Advice on Acute Malnutrition (CORTASAM). No Wasted Lives; 2018.

programming and estimate optimum thresholds for all malnutrition (both under and over nutrition) in these vulnerable groups.

We are proposing the following indicators, which can be calculated from the set of questions proposed in Section III and existing questions in the survey. Please see Section IV for details on how each indicator would be calculated.

Indicator 1. Mid-Upper Arm Circumference (MUAC) of infants <6 months of age

Definition:

- 1) The distribution of Mid-Upper Arm Circumference (MUAC) across infants <6 months of age across
- 2) Mean z-score for MUAC-for-age

Indicator 2. Percentage and mean z-score of children (6-59 months of age) wasted by Mid-Upper Arm Circumference (MUAC)

Definition

- 1) Percentage of children 6-59 months of age wasted by Mid-Upper Arm Circumference (MUAC)
- 2) Mean z-score for MUAC-for-age

Indicator 3. Mid-Upper Arm Circumference (MUAC) of adults

Definition

- 1) The distribution of Mid-Upper Arm Circumference (MUAC) across adults
- 2) Mean z-score for MUAC-for-age

Indicator 4. Percentage of children 0-59 months of age with pitting edema

Definition

- 1) Percentage of children 0-59 months of age with pitting edema

3. What is the rationale for measuring this indicator (each of these indicators) in DHS surveys? (Response required)

WHO Guidance on the Management of Severe Acute Malnutrition in Infants and Children³ recommends the use of Mid-Upper Arm Circumference (MUAC) and examination of pitting edema by community health workers and community members for detection of acute malnutrition and by healthcare workers (and/or weight-for-height/weight-for-length) at primary health facilities for diagnosis, admission, and discharge for treatment.

The Mid-Upper Arm Circumference (MUAC) approach is a very quick and easy measurement that can efficiently be done as part of a survey with minimal training and resources. It is widely used programmatically and has been demonstrated in large-scale survey methodologies like national smart [SMART](#) nutritional surveys^{4,5} and [SLEAC Coverage Surveys](#). Inclusion in the DHS-8 would greatly help in aligning these ongoing programmatic efforts by improving prevalence estimates and

³ WHO. Guideline: Updates on the management of severe acute malnutrition in infants and children. Geneva, World Health Organization; 2013. Available [here](#).

⁴ National Nutrition Survey, Burkina Faso (2016). Available [here](#).

⁵ National Nutrition & Health Survey, Nigeria (2013, 2014, 2015). Available [here](#).

projected caseloads. This is particularly important in countries where treatment options are available but coverage is low; program planning and caseload estimates are critical to ensuring these vulnerable groups have access to life-saving interventions.

Kwashiorkor is a particularly poorly understood condition⁶ with the lack of prevalence data being a significant issue to progress our knowledge and understanding. Inclusion of edema screening in the DHS-8 would greatly improve the data needed to understand both the burden and etiology of this condition to better prevent and treat this condition effectively.

Section III. Proposed additions/revisions to the questionnaires or biomarkers

4. Please describe the requested addition or revision.

If the requested change is the addition of new questions to the DHS questionnaires or modules, complete questions 4.1 and 4.1.1. If the requested change is a revision to existing questions, complete question 4.2. If the change relates to anthropometry or a biomarker, please complete question 4.3.

4.1. For additions: If you have developed a question or set of questions to measure the indicator(s), please provide them in the space below or in a separate file attached with your submission.

We propose the addition of the following two key questions to the Biomarker Module alongside the existing anthropometric (weight and height) measurements taken for children 0-59 months of age and adults (both men and women).

| Question | Responses | Description |
|-------------------------------|--------------------------|--|
| Q1. MUAC in mm | mm... _ _ _ _ | ADDITION. To be asked with other questions on BIOMARKER MODULE, possibly after 107 for infants and children, after question 206 for women, and after question 306 for men. |
| Q2. Presence of pitting edema | YES..... Y NO N | ADDITION. To be asked with other questions on BIOMARKER MODULE, possibly after 107 for infants and children, after question 206 for women, and after question 306 for men. |

4.1.1 If requesting multiple questions, please specify the relative priority of each new question.

The addition of Question 1 on MUAC in infants, children and adults is the most important – it is both the easiest to measure and has the broadest application to acute malnutrition programming globally. Question 2 is similarly important but for a much smaller vulnerable group of those affected by Kwashiorkor.

⁶ Jose Luis Alvarez, Nicky Dent, Lauren Browne, Mark Myatt and André Briend (2016). Putting Child Kwashiorkor on the Map. Available [here](#).

4.2. **For revisions to existing questions:** Please specify the DHS-7 question number, the proposed revision to the question, and the rationale.

| DHS-7 question number | DHS-7 question text | Proposed new question | Rationale |
|-----------------------|---------------------|-----------------------|-----------|
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4.3. **For anthropometry and biomarkers: Please describe the measurement procedures or specimen collection procedures, point-of-care or laboratory testing procedures (as relevant), and any recommendations for return of results.**

Both MUAC and assessment of pitting edema are standard metrics for assessment of nutritional status in nutrition programs and surveys. Both are simple and affordable to assess, can be done by low-literate staff, and have a wealth of training materials available. Neither assessment requires specific procedures for specimen collection or laboratory testing.

MUAC

Mid-Upper Arm Circumference (MUAC) is the circumference of the left upper arm, measured at the mid-point between the tip of the shoulder and the tip of the elbow.

A MUAC tape is used for the assessment of nutritional status using mid-upper arm circumference. MUAC Tapes are color coded in addition to circumference measurement markings in mm or cm. The colors and measurements correspond to nutritional status as follows⁷:

- Green (>125 mm): not acutely malnourished
- Yellow (125 - >115 mm): moderate acute malnourish

⁷UNICEF Supply Division. Mid-Upper Arm Circumference (MUAC) Measuring Tapes. Technical Bulletin No. 13 revision 2. Available [here](#).

- Red (<115 mm): severe acute malnourished

MUAC tapes are simple to use, the measurement can be done by one person with simple training. The tape itself is affordable and easily transportable. Training is needed to ensure correct use of the MUAC tape, there are numerous tools available for this⁸.

Pitting Edema

Similarly, assessment for pitting edema is simple and does not require any equipment. Assessment is done visually and by pressing with the thumb for a few seconds on the feet, legs and hands. From this inspection, edema can be classified into three categories:

- Mild +: with evidence of pitting in the feet;
- Moderate ++: with evidence of pitting in the feet, legs, and possibly hands;
- Severe +++: with evidence of pitting in the feet, legs, hands and evidence of periorbital edema.

5. Can any related questions be deleted from the questionnaire to make room for the proposed new content? If so please specify which questions using the DHS-7 question numbers.

We do not propose deleting any existing questions.

6. What are the implications of these requested changes on measurement of trends using DHS data?

These data are currently not part of the core DHS questionnaire and would not affect reporting of trends.

Section IV. Indicator calculation

7. Indicate how to calculate the indicator(s). Include detailed definitions of the numerator and denominator of each individual indicator. If you have developed a tabulation plan for the indicator(s), please attach a file including the suggested table(s) with your submission.

Indicator 1. Mid-Upper Arm Circumference (MUAC) of infants <6 months of age

Numerator:

- Distribution by age (in months) and MUAC value (in mm)
- Mean MUAC: Sum of all MUAC measurements for infants <6 months of age who were assessed.
- Mean z-score for MUAC-for-age: Sum of MUAC-for-age z-scores for infants <6 months of age who were assessed.

Denominator:

- For mean z-score MUAC-for-age: Total number of infants <6 months with valid MUAC measurements.

Indicator 2. Percentage* and z-score of children (6-59 months of age) wasted by Mid-Upper Arm Circumference (MUAC)

⁸ FANTA. Training Guide for Community-Based Management of Acute Malnutrition (CMAM), 2018 Version. Available [here](#).

Numerator:

- Number of children 6-59 months of age with MUAC of the following values:
 - For Moderate Wasting: 115 and 125 mm.
 - For Severe Wasting: less than 115 mm.
- Mean MUAC: Sum of all MUAC measurements for children 6-59 months of age who were assessed.
- Mean z-score for MUAC-for-age: Sum of MUAC-for-age z-scores for children 6-59 months of age who were assessed.

Denominator: Total number of children 6-59 months with valid MUAC measurements.

*This indicator is a percentage calculated as the numerator divided by the denominator, multiplied by 100.

Indicator 3. Mid-Upper Arm Circumference (MUAC) of adults

Numerator:

- Distribution by age (in years), by gender (male/female) and MUAC value (in mm)
- Mean MUAC: Sum of all MUAC measurements for adults by gender (male/female) who were assessed.
- Mean z-score for MUAC-for-age: Sum of MUAC-for-age z-scores for adults by gender (male/female) of age who were assessed.

Denominator:

- For mean z-score MUAC-for-age: Total number of adults with valid MUAC measurements.

Indicator 4. Percentage* of children 0-59 months of age with pitting edema

Numerator:

- Number of children 0-59 months of age with pitting edema, by age group:
 - Infants <6 months of age
 - Children 6-23 months of age
 - Children 24-59 months of age

Denominator: Total number of children 6-59 months with valid assessment of pitting edema.

*This indicator is a percentage calculated as the numerator divided by the denominator, multiplied by 100.

8. Is the indicator useful when measured at the national level, or is it useful only when disaggregated to specific subnational areas, such as endemicity zones or project intervention regions?

For each indicator, select one of the three options by clicking in the appropriate box.

| | | | |
|-----------|--|---|--|
| Indicator | Useful <u>only</u> for subnational endemicity zones or project intervention regions. A single estimate at the national level is <u>not</u> meaningful. | Useful at both national and subnational regions, as sample size allows. | Useful only at the national level. Subnational estimates are not needed. |
|-----------|--|---|--|

| | | | |
|--|--------------------------|-------------------------------------|--------------------------|
| Mid-Upper Arm Circumference (MUAC) of infants <6 months of age | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Percentage of children (6-59 months of age) wasted by Mid-Upper Arm Circumference (MUAC) | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Mid-Upper Arm Circumference (MUAC) of adults | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Percentage of children 0-59 months of age with pitting edema | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Section V. Prior testing of the proposed question(s)

- 9. Have the proposed questions undergone any formal validation; i.e., have the questions been tested against a “gold standard” to assess their accuracy? If yes, please describe how well or poorly the questions performed and/or provide a publication or report of the validation exercise (or a link).**

MUAC is strongly associated with high mortality in children⁹. Both assessment of MUAC and pitting edema are routinely used for assessment of children in national/sub-national nutrition surveys and as diagnostic criteria for CMAM treatment programs.

There is an increasing evidence base on the use and accuracy of MUAC measurements for adults^{10,11} and infants^{12,13}.

- 10. Have the questions undergone any other kind of testing; e.g., cognitive testing, pilot testing. If so, please describe the results of the testing and/or provide a publication or report of the findings (or a link).**

⁹ Briend A et al. Low mid-upper arm circumference identifies children with a high risk of death who should be the priority for target for treatment (2016). BMC Nutrition. Available [here](#).

¹⁰ FANTA. Use of cutoffs for Mid-Upper Arm Circumference (MUAC) as an indicator or predictor of nutritional and health-related outcomes in adolescents and adults: A systematic review (2013). Available [here](#).

¹¹ Tonder et al. Mid-upper arm circumference (MUAC) as a feasible tool in detecting adult malnutrition (2018). South African Journal of Clinical Nutrition. Available [here](#).

¹² Mwangome MK et al. Mid-upper arm circumference at age of routine infant vaccination to identify infants at elevated risk of death: a retrospective cohort study in the Gambia (2012). Bulletin of the World Health Organization. Available [here](#).

¹³ Meeting Report: Management of at risk mothers and infants under six months (MAMI) Special Interest Group (SIG) meeting (2018). Available [here](#).

MUAC and assessment of pitting edema is widely used programmatically and has been demonstrated in large-scale survey methodologies like national smart [SMART](#) nutritional surveys and [SLEAC Coverage Surveys](#).

Section VI. Other considerations

11. Please provide information relevant to the kinds of questions below, and/or anything else you wish to share with us about this indicator (these indicators).

- Describe how the data for this indicator are being used (or will be used).
 - Are the data produced by this indicator actionable?
 - Who will use the data?
 - What kinds of decisions will be made using these data?
- For what kinds of countries would the indicator(s) be most useful?
- Does the DHS survey offer any particular advantage over other available data sources for measuring this indicator? If so, what?

It is critical that all children with acute malnutrition are identified and accounted for in global and national prevalence and burden estimates. Current global estimates do not account for children who are wasted by MUAC or with Kwashiorkor.

The inclusion of MUAC and pitting edema indicators are critically important for our understanding of the burden and etiology of wasting around the world and in different national and sub-national contexts. The expansion of MUAC data collection to infants and adults through the DHS-8 survey is important to ensure that these vulnerable groups are identified and reached.

Kwashiorkor is a particularly poorly understood condition with the lack of prevalence data being a significant issue to progress our knowledge and understanding. Inclusion of edema screening in the DHS-8 would greatly improve the data needed to understand both the burden and etiology of this condition to better prevent and treat this condition effectively.

The DHS-8 can uniquely improve how we understand and address wasting globally through routine, national and sub-national data. Not only is this in line with global guidance and recommendations from WHO, it allows for the alignment and improved linkages with prevention and treatment programs. This will directly support programs on the ground and national, regional and global decision-makers to ensure resources and capacity are sufficient to meet the needs.