Briefing note on proposed MUAC cut-offs for children 5 to <19 years for screening for uncomplicated Severe Acute Malnutrition

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Challenge

The WHO defines severe acute malnutrition (SAM) in children 6 months to 5 years of age by MUAC <115 mm or WHZ < -3 and or nutritional oedema.[1] There are no agreed/standardized MUAC cut-offs for the diagnosis of acute malnutrition in children and adolescents aged 5 to <19 years. The diagnosis of acute malnutrition has been based on BMI-for-age, which is difficult to apply in humanitarian contexts. As a result, many children aged 5 to <19 years with acute malnutrition are not identified.

Applicability

This guidance responds to requests from various humanitarian stakeholders — including national and international NGOs, government actors, Red Cross/Red Crescent entities, and UN agencies — for standardized MUAC cut-offs to screen for severe acute malnutrition among children aged 5 to <19 years.[2] While this document was developed with the Gaza context in mind, the GNC Wasting Global Thematic Working Group (GTWG) considers the proposed MUAC thresholds to be widely applicable in humanitarian contexts. Reference should always be made to existing national and/or context-specific guidelines where possible.

This briefing note does **not** cover the treatment, monitoring, or discharge of uncomplicated SAM in children aged 5 to <19 years. For guidance on these topics, please refer to other relevant resources as applicable.

Key application considerations

Age determination: Accurate age determination can be challenging in emergency contexts. It is essential that frontline personnel have appropriate tools and training to obtain or verify age reliably.

Country-specific validation: The proposed MUAC thresholds should be reviewed and validated by relevant Ministry and Cluster/Sector partners. These recommendations are intended to guide, not replace, national or context-specific protocols. Downward adjustment of the lowest MUAC thresholds is discouraged due to the risk of compromising sensitivity. Any variation in cut-offs should be evaluated for its impact on treatment admissions and programmatic outcomes.

[1] Current MUAC Cut-Offs to Screen for Acute Malnutrition Need to Be Adapted to Gender and Age: The Example of Cambodia
[2] Note: this brief is about identifying cut-offs for screening, not monitoring response to treatment. Adolescents generally show very slow MUAC gain since body composition changes more gradually as they grow older. Therefore, while MUAC can be useful for community-level screening, it may not be ideal for monitoring progress during treatment. In such cases, weight-based indicators like BMI-for-age are more appropriate. Given their age, most adolescents are likely to cooperate, making height measurement easier and more reliable.

MUAC tapes to use: Where feasible Adult MUAC tapes should be procured and used for older children instead of child MUAC tapes. When using child MUAC tapes for older children, the color coding should be ignored.

Monitoring, reporting, documentation and sharing lessons learned: There is an urgent need for operational research, follow-up, lessons learned and knowledge sharing within the global nutrition community regarding the implementation and outcomes of using these suggested MUAC cut-offs.

Background

In 2023, the Adult Malnutrition Sub-Working Group was established under the GNC's Wasting GTWG to develop technical guidance on the identification and management of uncomplicated SAM among adolescents and adults. A comprehensive review of national and international protocols, guidance, and scientific literature is nearing completion, with findings to be disseminated in 2025.

In October 2023, the conflict between Israel and Gaza escalated, resulting in heavy bombing, massive displacement of the Gaza population and a near total blockade of aid to an already aid dependent population. The impact on the nutritional status of communities in Gaza has been catastrophic. While nutrition partners scaled up programs to treat acute malnutrition in vulnerable children under the age of 5 years and pregnant and breastfeeding women and girls, it was recognized that all population groups in Gaza are at increased risk of malnutrition.

There is a lack of consensus on MUAC criteria to identify acute malnutrition among older age groups. Given the role of the GTWG sub-group in developing guidance on the identification of acute malnutrition in older age groups, the Gaza Nutrition Cluster was interested in a technical brief on anthropometric criteria to identify uncomplicated severe acute malnutrition among 5 to <19 year olds for use in Gaza and other humanitarian emergencies.

Use of BMI in humanitarian contexts is difficult, requiring measuring both height and weight and strong technical capacity. In Gaza and other emergencies, access to height boards and scales may be restricted, and can be difficult to transport and to use in crowded areas and strong technical capacity might not be available during emergencies. The use of MUAC is therefore recommended.

Recommended MUAC cut-offs

The GTWG considered several studies and guidelines to arrive at two proposed options for MUAC cut-offs for children and adolescents aged 5 to <19 years with uncomplicated SAM. MUAC cut-offs according to age as proposed in three studies by Mramba et al[3], Bahwere[4] and Sharn et al[5], are presented in Table 1 below.

[3] Mramba L, Ngari M, Mwangome M, Muchai L, Bauni E, Walker AS, Gibb DM, Fegan G, Berkley JA. A growth reference for mid upper arm circumference for age among school age children and adolescents, and validation for mortality: growth curve construction and longitudinal cohort study. BMJ. 2017 Aug 3;358:j3423. doi: 10.1136/bmj.j3423. PMID: 28774873; PMCID: PMC5541507

[4] Bahwere, Paluku. Anthropometric Cut-off Points for Older Children and Adolescents in Syria. ENN. 27 Feb. 2017.

[5] Sharn AR, Sorgho R, Sulo S, Molina-Molina E, Rojas Montenegro C, Villa-Real Guno MJ, Abdel-Rahman S. Using mid-upper arm circumference z-score measurement to support youth malnutrition screening as part of a global sports and wellness program and improve access to nutrition care. Front Nutr. 2024 Aug 12;11:1423978. doi: 10.3389/fnut.h2024.1423978. PMID: 39188981; PMCID: PMC11345244

Table 1. Comparison of proposed MUAC cut-offs for SAM provided by Mramba et al., Bahwere, and Sharn et al. (Note: Mramba at al. and Bahwere provided cut-offs for ages 5 to <19 years, Sharn et al. for ages 5-9 years in half-year increments)

Age (years)	Mramba et al. proposed SAM cut-offs (mm) [3]	Bahwere proposed SAM cut-offs(mm) [4]	Sharn et al. proposed SAM cut-offs (mm) [5]
5	131	140	141 (age 5.5=143)
6	136		144 (age 6.5=146)
7	142		147 (age 7.5=148)
8	148		149 (age 8.5=151)
9	153		152 (age 9.5=153)
10	159	160	
11	165		
12	170		
13	176		
14	182		
15	187	200	
16	193		
17	199		
18	204	220	
Country of origin for the study population	United States and international growth data; cohorts from Kenya, Uganda, and Zimbabwe	Syria	Brazil, Colombia, India, Kenya, Mexico, Philippines, Tanzania, United Kingdom, United States

MUAC cut-offs proposed in **option 1** in Table 2 below are based primarily on the study by Mramba et al., as this study had a wide geographic scope, sound methodology, and clear statistical validity.

Option 2 took into consideration a study by Fiorentino et al.[6] This study argued that current cut-offs based on the identification of the risk of mortality alone, may not adequately

6] Fiorentino M, Sophonneary P, Laillou A, Whitney S, de Groot R, Perignon M, Kuong K, Berger J, Wieringa FT. Current MUAC Cut-Offs to Screen for Acute Malnutrition Need to Be Adapted to Gender and Age: The Example of Cambodia. PLoS One. 2016 Feb 3;11(2):e0146442. doi: 10.1371/journal.pone.0146442. PMID: 26840899; PMCID: PMC4739613. Current MUAC Cut-Offs to Screen for Acute Malnutrition Need to Be Adapted to Gender and Age: The Example of Cambodia | PLOS One

reflect the nutritional needs and growth patterns of older children, potentially leading to underdiagnosis of acute malnutrition in Cambodia. A study of anthropometric criteria for the Syrian context [7] and several guidelines [8] have either proposed or used similar higher MUAC cut-offs for children in the 5-7- and 5-9-years age groups.

A comparison of **option 1** (with the initial MUAC cut-offs) and **option 2** (with higher cut-offs for 5–7-year-old group) are presented in the table below.

Table 2. Comparison of options for MUAC cut-offs for uncomplicated SAM 5 to <19 years proposed by the GTWG

Age (years)	Option 1 MUAC cut-off (mm)	Option 2 MUAC cut-off (mm)
5	**130**	**135**
6	**135**	**140**
7	**140**	**145**
8	**150**	**150**
9	**155**	**155**
10	**160**	**160**
11	**165**	**165**
12	**170**	**170**
13	**175**	**175**
14	**180**	**180**
15	**185**	**185**
16	**195**	**195**
17	**200**	**200**
18	**205**	**205**

[7] Bahwere, Paluku. Anthropometric Cut-off Points for Older Children and Adolescents in Syria. ENN. 27 Feb. 2017.
[8] Guide to Anthropometry: A Practical Tool for Program Planners, Managers, and Implementers

While nutrition partners may use the MUAC cut-offs proposed in either option 1 or option 2 according to context, the GTWG sub-group recommends that the lower MUAC cut-offs presented in option 1 be considered the minimum for classifying children as SAM. These options are applicable to both boys and girls.

If age determination is not possible, organizations may group individuals into broader age categories from options 1 or 2 and apply clustered cut-off values accordingly.

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