IASC Global Nutrition Cluster, and

Standing Committee on Nutrition (SCN) Task Force on Assessment, Monitoring, and Evaluation

Fact sheet on the implementation of 2006 WHO Child Growth Standards for emergency nutrition programmes

for children aged 6-59 months

This fact sheet aims at providing a standard framework and guidance on transitioning from the 1977 National Centre for Health Statistics/WHO growth reference (NCHS reference) to the 2006 WHO Child Growth Standards (WHO standards) for emergency nutrition surveys and new and existing emergency nutrition programmes for the management of acute malnutrition.

This fact sheet is aimed at users of the new WHO standards for emergency nutrition programmes and at policy makers, from donors, to Governments, UN agencies and NGOs, and attempts to answer the most common questions that may arise during the transition process. More detailed information can be found at the WHO website or the links at the end of the fact sheet.

Characteristics	Explanation
	GENERAL INFORMATION
1. What is the rationale behind the change from using the NCHS reference to using the WHO standards?	Since the late 1970s, the NCHS reference has been in use throughout the world. This reference, based on data from several samples of children from the USA, provided a description of the attained growth of American children. In 1993, the WHO undertook a comprehensive review of the uses and interpretation of child growth references. The review concluded that new standards had to be developed that show how children across country *should* grow rather than merely describing how they grew at a particular time and place. It was also highlighted that the NCHS reference was potentially biased towards Caucasian bottle fed children, thus highlighting the needs for new growth standards reflecting conditions which would encourage proper growth and development in all settings. Following this review, in 1994, the World Health Assembly endorsed the development of a new set of international tools to assess infant and young child growth across the globe. The Assembly stressed the need to move beyond past approaches and towards the more desirable goal of describing how children should grow when their needs are met.

Characteristics	Explanation
2. How were the WHO standards created?	WHO undertook the Multicentre Growth Reference Study (MGRS) between 1997 and 2003. The MGRS combined a longitudinal follow-up of children from birth to 24 months of age and a cross-sectional survey of children aged 18 to 71 months. Primary growth data and related information were gathered from 8,440 healthy breastfed infants and young children from diverse ethnic backgrounds and cultural settings (Brazil, Ghana, India, Norway, Oman and the USA). The MGRS was purposively designed to produce a standard by selecting healthy children living under conditions likely to favour the achievement of their full genetic growth potential. The study population lived under socio-economic conditions favourable to growth. Furthermore, the mothers of the children selected for the construction of the standards engaged in fundamental health-promoting practices, namely breastfeeding and not smoking. Lactation counselling was provided by trained lactation counsellors to the mothers enrolled in the study. By selecting privileged, healthy populations the study reduced the impact of environmental variation. These child growth standards also support the notion that given the same environmental conditions, growth potential is independent of ethnic origin; therefore, these standards can apply in any country.
3. Which indicators are available and which are the population groups that the WHO standards target?	The WHO standards include sex-specific percentiles and Z-score for the following indicators, for children 0-60 months: - Weight-for-length - Weight-for-height - Length/height-for-age - Weight-for-age - Body Mass Index (BMI)-for-age - Head circumference-for-age - Arm circumference-for-age - Sub scapular skin fold-for-age - Triceps skin fold-for-age - Motor development milestones (sexes-combined windows of achievement) To complement these, WHO has published the WHO 2007 Reference for school aged children and adolescents, comprising: BMI-for-age and height-for-age, for 5-19 years, Weight-for-age, for 5-10 years

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4. Who is using the WHO Standards?	As of late 2008, 75 countries had officially adopted, or partially adopted, the new WHO standards. Another 60 countries were in the process of adopting them. The WHO standards were also being used for Demographic and Health Surveys (DHS) and MICS surveys. Some NGOs and UN agencies were also using the standards in the field in emergency settings, most often to report prevalence in survey reports and to a lesser extent, though growing, for admission into selective feeding programmes. The IASC Global Nutrition Cluster is developing a database on the application of the WHO standards in emergencies, by encouraging country nutrition cluster coordinators to report on the level of their use.

WHAT ARE THE IMPLICATIONS OF THE USE OF THE WHO STANDARDS AS COMPARED TO NCHS REFERENCE?

Characteristics	Explanation
5. How do WHO standards affect prevalence of acute malnutrition and number of children eligible for selective feeding programmes?	Studies indicated that a switch in weight-for-height Z-score from the NCHS reference to the WHO standards using the same cut offs has little effect on the overall prevalence of global acute malnutrition (wasting and/or oedema) or moderate acute malnutrition but results in a significant increase in the prevalence of severe acute malnutrition (severe wasting and/or oedema).[1,2,3] This translates to a median increase of 4.3 fold (range 1-30)[4] in the number of children 6-59 months that would be eligible for admission to therapeutic feeding programmes.

[1] Myatt M & Duffield A (2007) Assessing the impact of the introduction of the WHO growth standards on the measured prevalence of acute malnutrition and the number of children eligible for admission to emergency feeding programmes. *Background paper*

[2] de Onis M & al (2006) Comparison of the World Health Organization (WHO) Child Growth Standards and the National Center for Health Statistics/WHO international growth reference: implications for child health programmes. Public Health Nutrition 9: 942-947

[3] Seal A & Kerac M (2007) Operational implications of using the 2006 World Health Organisation growth standards in nutrition programmes: secondary data analysis. British Medical Journal. Doi:10.1136

[4] Seal A (2007) Assessing the impact of the introduction of the WHO growth standards on feeding centre admissions, performance and resources needed, and reviewing the available software for calculation of acute malnutrition prevalence using WHO growth standards. B*ackground paper*

Characteristics	Explanation
6. How does the use of WHO standards affect outcomes of acutely malnourished children?	Studies showed that there was little difference in the screening power of NCHS reference versus WHO standards for detecting the risk of death among children in the community or admitted to feeding programmes, with a small advantage of WHO standards, being slightly more sensitive and specific.[5], [6] In relation to age, the WHO standards Z-score is able to better identify younger children, who have a high risk of death, than the NCHS reference Z-score. Weight-for-height with a cut-off of -3 Z-score for defining severe acute malnutrition, using the WHO standards, will select more children who have a high risk of death and who will benefit from treatment with therapeutic diets, compared to using the NCHS reference. Severely malnourished children will be identified earlier and therefore, receive treatment earlier in their disease course, which is likely to make it easier to reverse the damage of worsening nutrition status. Also fewer complicated cases requiring inpatient treatment are expected. A study of nutrition programme beneficiaries in Niger showed that[7]: - All children identified with a weight-for-height < 70% of the median NCHS were also indentified with a weight-for-height < - 3 Z-score of the WHO standards. - Eight times more children were identified as severely malnourished according to weight-for-height < - 3 Z-score of the WHO standards compared with weight-for-height < 70% of the median NCHS. - Children identified according to weight-for-height < - 3 Z-score of the WHO standards tended to have a higher weight-for-height and were younger on admission, compared to those identified by weight-for-height < 70% of the median NCHS. - Treatment duration was shortened, recovery rate was higher, fewer cases required referral to inpatient care and weight gain was, on average, lower, but still substantial, for children identified according to weight-for-height < - 3 Z-score of the WHO standard compared to those identified with weight-for-height < 70% of the median NCHS.
7. What are resource	An analysis of 560 nutrition surveys showed a median increase of 4.3 fold

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[5] Garenne M (2007) Comparing the screening power of NCHS and WHO anthropometric norms systems: A case study in Niakhar, Senegal. *Background paper*

[6] Lapidus N, Gaboulaud V & Grais RF (2007) Relationship between anthropometric status and the risk of death of children admitted in MSF nutritional programmes. *Background paper*

[7] Isanaka S, Villamor E, Shepherd S, Grais RF (2009) Assessing the Impact of the Introduction of the World Health Organization Growth Standards and Weight-for-Height z-Score Criterion on the Response to Treatment of Severe Acute Malnutrition in Children: Secondary Data Analysis. Pediatrics 2009;123 (1):e54–e59

Characteristics	Explanation
implications of the transition?	(range of 1-30) in the number of children 6-59 months that would be eligible for admission to therapeutic feeding programmes, when switching from weight-for-height 70% of the median NCHS reference to weight-for-height - 3 Z-score WHO standards, as admission criterion.[4] As the average duration of treatment would be shorter for a child admitted and discharged with weight-for-height Z-score WHO standards than for a child admitted and discharged with weight-for height % of the median NCHS, a 4-fold increase in the number of patients would only translate in the doubling of the median cost of treatment. The additional resource requirement might therefore be less than the absolute additional number of potential patients.

Although the relative increase in resources that would be required might vary widely depending on setting, it is clear that a substantial increase in funding to enable the additional therapeutic feeding programme patient load to be managed effectively will be required in most situations. To facilitate a smooth transition a number of related steps would be needed. One of these would be to engage donors with a clear explanation of the advantages of the new diagnostic criteria, including explaining that the new figures for severe acute malnutrition generated using the WHO standards do not reflect a deterioration in the nutrition situation when compared to the NCHS figures, rather that the numbers include more children identified earlier in their malnutrition, and are more sensitive than the NCHS reference. This is especially true for the youngest children who are at higher risk of death. A clear understanding will provide the justification for increase in cost of emergency nutrition programmes, and thus, for additional funding. |
| *HOW TO USE THE WHO STANDARDS?* ||
| **8. How to use the WHO standards for calculating and reporting prevalence of acute malnutrition?** | Prevalence of acute malnutrition should be reported using both the NCHS reference and the WHO standards until the WHO standards have been universally implemented. Initially, the main results would continue to be given in NCHS reference with the results in WHO standards also reported. Results should clearly indicate if they are obtained by using the WHO standards or the NCHS reference.

It is suggested that a full change over to WHO standards as the primary results could occur from June 2009 assuming adequate sensitization. However this will vary by country.

For past surveys, it would be important to recalculate the prevalence of global and severe acute malnutrition with the WHO standards to be able to analyse trends and make national and international comparisons. As far as possible, raw data should be used to recalculate prevalence. If not available, a conversion factor can be used to convert prevalence estimates (only available for moderate malnutrition and therefore global acute malnutrition |

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	but not for severe wasting/severe acute malnutrition) between the two norms,[8] but conversion will be imprecise due to the complexity of the relationship between the 2 norms. This conversion factor is only available for moderate malnutrition and therefore global acute malnutrition but not for severe wasting/severe acute malnutrition.
9. Which cut-offs should be used for admission/discharge into nutrition programmes?	Weight-for-height Z-score using the WHO standards for children 6-59 months is to be used as admission and discharge criteria to therapeutic and supplementary feeding programmes. Separate boys and girls reference charts for admission and discharge should be used until further evidence supports using sexes combined. *Admission and discharge criteria for therapeutic feeding programmes* Recommended admission criteria for therapeutic feeding programmes are: -Weight for height < -3 Z-score of the WHO standards. - MUAC < 115 mm for children from 6 months of age. MUAC continues to be used as an independent criterion for admission. However, it is recommended that current cut-off for severe acute malnutrition be revised at MUAC < 115 mm instead of MUAC < 110 mm. This recommendation follows the release of WHO standards for MUAC-for-age, which showed that in a well-nourished population there are very few children aged 6-59 months with a MUAC < 115 mm. Children with a MUAC < 115 mm also have a highly elevated risk of death compared to those who are above. - Bilateral pitting oedema and other clinical factors, as previously. Recommended discharge criteria for therapeutic feeding programmes: - Percentage weight gain of 15%. This criterion can be used for all children admitted to therapeutic feeding programmes, either on weight-for-height or on MUAC. It is especially recommended for children admitted with MUAC as there is no reliable threshold established for minimum MUAC for discharge. - Weight-for-height > -1 Z-score WHO standards. This criterion can be used when children are admitted according to weight-for-height. - For children with oedema, the same discharge criteria should be applied using the weight after oedema has disappeared as the baseline. For children who have a weight-for-height above -3 SD or a MUAC above 115 mm after

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[8] Yang H, de Onis M. Algorithms for converting estimates of child malnutrition based on the NCHS reference into estimates based on the WHO Child Growth Standards. BMC Pediatrics 2008, 8:19 doi:10.1186/1471-2431-8-19

Characteristics	Explanation
	oedema has disappeared, a discharge two weeks after oedema disappeared is usually sufficient to prevent relapse. *Admission and discharge criteria for supplementary feeding programmes* Recommended admission criteria for therapeutic feeding programmes are: -Weight for height ≥ -3 & < -2 Z-score of the WHO standards. - MUAC ≥ 115 mm & < 125 mm, for children from 6 months of age. Recommended discharge criteria for supplementary feeding programmes: There is an urgent need to review discharge criteria for supplementary feeding programmes. In the interim, it is recommended to continue using current guidelines, based on minimum length of stay and/or using cut-offs in WHO standards equivalent to that in NCHS reference.

10. Which types of software are available to be used with the WHO standards?	Tools (freely downloadable) which automatically generate results of nutrition surveys both using NCHS reference and WHO standards include:
	
	   - ENA (Emergency Nutrition Assessment) software for SMART :
	   http://www.nutrisurvey.de/ena/ena.html
	ENA for SMART focuses on analysis for Emergency Nutrition Assessments. It is user-friendly and easy to use and includes automatic reporting facilities.
	
	   - EPI Info : http://www.cdc.gov/epiinfo/
	   and ENA for EPI Info :
	   http://www.cdc.gov/NCEH/ierh/ResearchandSurvey/enasoftware.htm
	Epi Info contains a module for making questionnaires and has much more sophisticated statistical functions than ENA for SMART. Therefore software (ENA/EpiInfo) which combines the advantages of both systems was developed.
	
	   - WHO Anthro: http://www.who.int/childgrowth/software/en/
	 This software facilitates deriving individual and population based estimates of child nutritional status. Among its special features are graphical display and standard analysis of results.
	
	WHO also provides macros which enable the use of WHO standards with SAS, S-Plus, SPSS and STATA:
	http://www.who.int/childgrowth/software/en/

11. What are the practical requirements to use the WHO	Staff will need to be trained on how to interpret weight-for-height using the WHO standards Z-score. Selective feeding programme will have to be

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standards?	adapted and use the revised admission/discharge criteria, including expecting a higher case load and therefore plan for increased human and other resources.
12. Which growth charts of the WHO standards should be used and where can they be found?	Until further examination of the risk of mortality and response to treatment in boys and girls, individual charts and tables by sex should be used. These are available on the WHO website: http://www.who.int/childgrowth/standards/weight_for_length/en/index.html http://www.who.int/childgrowth/standards/weight_for_height/en/index.html Infants and children under 24 months of age should have their lengths measured lying down (supine). Children 24 months of age and older should have their heights measured while standing. If age is unknown, children equal or over 87 cm in height should be measured standing. Infants and children under 87 cm should be measured lying down. This is a change compared to NCHS reference where children 85 cm was the cut-off for measuring length or height. WHO Anthro software allows for automatic conversion of height to length and vice versa when age is known.
	ADDITIONAL RESOURCES
13. Where can resources on the WHO standards be found?	Links to the MGRS documents describing the sample and methods used to construct the standards, training documents, software, as well as publications and peer-reviewed articles pertaining to the WHO standards can all be accessed on the WHO website: http://www.who.int/childgrowth Link to the report of an informal meeting convened by the IASC Global Nutrition Cluster in June 2008 to document the possible implications of the introduction of the WHO standards for emergency nutrition programmes, and related document can be found at: http://ocha.unog.ch/humanitarianreform/Default.aspx?tabid=74