Update on the Implementation of the WHO Child Growth Standards

Mercedes de Onis

Department of Nutrition, World Health Organization, Geneva, Switzerland

Abstract
In 2006, the World Health Organization (WHO) launched new growth standards for application to all children regardless of ethnicity, socioeconomic status and feeding mode. By April 2011, 125 countries had adopted the WHO standards, another 25 were considering their adoption, and 30 had not adopted them. Reasons for adoption included: (1) providing a more reliable tool for assessing growth that is consistent with the Global Strategy for Infant and Young Child Feeding; (2) protecting and promoting breastfeeding; (3) enabling monitoring of malnutrition’s double burden, stunting and overweight; (4) promoting healthy growth and protecting the right of children to reach their full genetic potential, and (5) harmonizing national growth assessment systems. In adopting the new standards many countries switched from weight-for-age only to multiple indicators. Weight-for-age was adopted almost universally, followed by length/height-for-age (104 countries) and weight-for-length/height (88 countries). Several countries (36) reported newly introducing body mass index-for-age. Most countries opted for sex-specific charts and the z-score classification. Many redesigned their child health records and updated recommendations on infant feeding, immunization and other health messages. The scrutiny that the WHO standards have undergone is without precedent in the history of developing and applying growth assessment tools. Governments set up committees to scrutinize the new standards before deciding to adopt them and professional groups conducted thorough examination of the standards. The detailed evaluation allowed to assess the impact of the new standards and document their robustness and benefits for child health programmes. In sum, 5 years after their release, the WHO growth standards have been widely implemented. Countries have adopted and harmonized best practices in child growth assessment, and established the breastfed infant as the norm against which to assess compliance with children’s right to achieve their full genetic growth potential.

The assessment of growth in children is important for monitoring health status, identifying deviations from normality, and determining the effectiveness of interventions [1, 2]. In 2006, the World Health Organization (WHO) released new standards for assessing the growth and development of children from birth to 5 years of age to replace the National Center for Health Statistics (NCHS)/WHO international growth reference [3]. The WHO standards provide a better tool to monitor the rapid and
changing rate of growth in early infancy [4]. They also demonstrate that healthy children around the world who are raised in healthy environments and follow recommended feeding practices have strikingly similar patterns of growth [5]. The ensemble of the WHO Child Growth Standards consists of:

1. Attained growth indicators (0–60 months): weight-for-age, length/height-for-age, weight-for-length/height, BMI-for-age, head circumference-for-age, arm circumference-for-age, triceps skinfold-for-age, and subscapular skinfold-for-age.

2. Growth velocity indicators (0–24 months): weight velocity conditional on age (1-, 2-, 3-, 4- and 6-month intervals), length velocity conditional on age (2-, 3-, 4- and 6-month intervals), and head circumference velocity conditional on age (2-, 3-, 4- and 6-month intervals).

3. Windows of achievement for 6 motor development milestones (0–60 months): sitting without support, hands-and-knees crawling, standing with assistance, walking with assistance, standing alone, and walking alone.

To complement the attained and velocity growth standards for preschool age children, growth reference values for school-aged children and adolescents (5–19 years) were also developed [6], consisting of: BMI-for-age, height-for-age, and weight-for-age.

For each of the growth indicators, the values are sex-specific, constructed in both z-scores and percentiles, presented in several age groups to serve the purpose of different users, and displayed in different interfaces (tables and charts). In all cases, materials have been made available in several languages.

Similarly, a set of application tools were constructed to support the standards’ implementation. The most significant ones are:

- The WHO Anthro and AnthroPlus softwares for assessing the growth and development of children. The softwares allow to analyze growth data using the WHO Child Growth Standards (0–60 months) and the WHO 2007 growth reference (5–19 years) for both clinical and public health uses. Also available are macros for the statistical software packages SPSS, SAS, S-Plus and STATA to facilitate survey data analysis (www.who.int/childgrowth/software).

- Training course on Child Growth Assessment. Intended primarily for health care providers, the course teaches how to measure weight, length and height, how to interpret growth indicators, investigate causes of growth problems and counsel caregivers (www.who.int/childgrowth/training).

- The websites, www.who.int/childgrowth and www.who.int/growthref that house a wide range of materials and tools.

**Rolling Out the WHO Growth Standards**

Following the launch of the WHO Child Growth Standards in April 2006, countries could choose whether to adopt the new standards and replace existing growth charts. Change implied a far-reaching shift in the way child growth is conceptualized as the
WHO standards depict how children should grow, on average, in all countries, when properly fed and cared for, rather than merely describing how they grew at a particular time and place [3]. Using the application tools mentioned above, the WHO team in collaboration with a wide network of partners carried out wide scope of work to support the roll-out of the growth standards. As part of this effort, regional consultations were held in the six WHO regions with the participation of 132 countries. Thirteen regional and subregional training of trainers’ workshops were held and numerous national level training workshops continue this train of capacity building. A network of training facilitators based in the WHO regions was established and continues to support training and other technical aspects of the standards’ implementation within their own countries and regions. At global level, coordination with key partners (e.g. UNICEF, DHS, NGOs) took place to incorporate the new standards fully into child health programs. The standards have also been incorporated into preservice training programs for medical and nursing professionals in several countries.

Monitoring the Adoption and Implementation of the WHO Growth Standards

Five years after the release of the growth standards, a global survey was conducted to document their worldwide implementation [7]. Information was collected on the status of adoption, and the main reasons for nonadoption in case of a negative response; the year of adoption; the anthropometric indicators adopted; the age range covered; whether or not the charts were sex-specific; if the indicator was newly introduced; what growth reference the WHO standards replaced; the classification system applied (i.e. z-scores or percentiles), and what steps had been taken to roll out the standards.

Of the 219 countries and territories contacted, 180 (82%) responded to the questionnaire. The countries and territories that did not send responses represent in total less than 1% of the world’s under-five population [7]. Of the responding countries, 125 had adopted the WHO standards, 25 were considering their adoption, and 30 had not adopted them; representing, respectively, 75, 17 and 7% of the world’s under-five population. Figure 1 shows adoption status by geographical region. The countries that responded as not having adopted the standards by April 2011 were mainly in the European region. Preference for local references was the main reason given for non-adoption, as well as lack of resources and recent reprinting of charts in current use.

Reasons for adopting the WHO standards included: (1) providing a robust and reliable tool for assessing growth that depicts the physiological growth of healthy breastfed infants; (2) protecting and promoting breastfeeding consistent with the WHO Global Strategy for Infant and Young Child Feeding; (3) enabling monitoring of malnutrition’s double burden (i.e. stunting and overweight); (4) promoting healthy growth and protecting the right of children to reach their full genetic potential, and (5) harmonizing national growth assessment systems.
In adopting the new standards many countries switched from using only weight-for-age to using multiple indicators to better characterize growth patterns [7]. Compared to an earlier survey of growth monitoring practices [8], there has been a significant rise in the use of length/height-for-age (from 59 countries in 2000 to 104 in 2011). Similarly, many countries have introduced the indicator weight-for-length/height, which is essential to assessing severe acute malnutrition (i.e. wasting) as well as overweight and obesity. As many as 36 countries also introduced body mass index-for-age. Most countries opted for sex-specific charts and the z-score classification [7]. z-scores are preferred because they permit clinical tracking of patients whose anthropometric classification lies beyond the measurable limits of the percentile range, as happens in the case of severely undernourished or obese children. Several countries also have adopted the WHO 2007 growth reference for school-aged children and adolescents to monitor the nutritional status of children aged 5–19 years [6].

The implementation of the WHO standards has taken different pathways depending on national health systems and decision-making processes. In almost all cases, the standards have been adopted nationwide. However, for countries with decentralized systems like Australia, Belgium and Spain, some parts of the country have adopted the WHO standards while others continue to use previous charts. Generally, most countries with decentralized administrations decided to adopt the WHO standards nationally, thus harmonizing the assessment of child growth in the country.
Implications of Adopting the WHO Child Growth Standards

The intense scrutiny that the WHO standards have undergone is without precedent in the history of developing and applying growth assessment tools, whether national or international. Some governments set up committees [9–11] to review the standards and document their advantages before deciding to adopt. Professional groups, particularly those working in emergencies, initially had concerns regarding the increased case load – compared with the NCHS/WHO reference – of undernourished children selected for therapeutic and supplementary feeding programs, the utility of sex-specific standards, the replacement of the percent-of-median by the z-score classification, the change from using MUAC with a single fixed cut-off to the MUAC-for-age indicator, and even the standards’ validity for assessing breastfed infants. This detailed examination of the standards by technical and scientific groups has provided a unique opportunity to validate their robustness and to improve understanding of their broad benefits.

The WHO standards identify more children as severely wasted, including those at high risk of mortality who might otherwise be excluded from therapeutic feeding programs [12]. Besides being more accurate for predicting mortality risk [13–15], the use of the WHO standards results in shorter duration of treatment, higher rates of recovery, fewer deaths, and reduced loss to follow-up or need for inpatient care [16]. This implies less dependence on institutionalized care/therapeutic feeding and more impetus for community-based care of severe acute malnutrition.

The WHO standards confirm the dissimilar growth patterns between breastfed and formula-fed infants, and provide an improved tool for correctly assessing the adequacy of growth in breastfed infants [17–19]. They thereby reduce considerably the risk of unnecessary supplementation or breastfeeding cessation, which are major sources of morbidity and mortality in poor hygiene settings.

In addition to confirming the importance of the first 2 years of life as a window of opportunity for promoting growth, the WHO standards demonstrate that intrauterine retardation in linear growth is more prevalent than previously thought [20]. This in turn demonstrates the need to improve the nutritional status of pregnant women and women of childbearing age.

Another important feature of the WHO standards is that they demonstrate that undernutrition during the first 6 months of life is a considerably more serious problem than previously detected [19, 21], thereby reconciling the rates of undernutrition observed in young infants and the prevalence of low birth weight and early abandonment of exclusive breastfeeding [22].

The WHO standards also improve early detection of excess weight gain among infants and young children [23, 24], showing that obesity often begins in early childhood, as should measures to tackle this global time bomb. Dozens of scientific papers have been published concerning the impact of the WHO growth standards on estimates of prevalence of malnutrition and their implications for child health.
programmes. These are not included here due to space limitations but have been made available elsewhere [7].

Last but not least, the WHO standards are an important means for ensuring the right of all children to be healthy and to achieve their full growth potential. They provide sound scientific evidence that, on average, young children everywhere experience similar growth patterns when their health and nutrition needs are met (fig. 2) [5]. For this reason the WHO standards can be used to assess compliance with the UN Convention on the Rights of the Child, which recognizes the duties and obligations to children that cannot be met without attention to normal human development.

Conclusions

In 2006, the WHO launched new growth standards for children irrespective of ethnicity, socioeconomic status and feeding mode. Five years after their release, at least 125 countries (representing 75% of the world’s under-five population) have adopted the standards as the benchmark against which to assess the physical growth of their children. It is very likely that some of the countries that are currently considering adopting the standards will proceed to their implementation shortly. At the time of this writing, this has been the case for Portugal, Turkey and Zimbabwe.

The WHO standards were developed to replace the NCHS/WHO reference. We expected the new standards to be adopted mostly by developing countries using the

Fig. 2. Mean length (cm) from birth through 2 years for each of the six study sites in the WHO Child Growth Standards.
NCHS/WHO reference. It was unexpected that a developed country like the United Kingdom should become interested and eventually adopt the WHO standards in replacement of the widely used UK 1990 growth reference. This decision by a country that has a solid reputation in the area of child growth roused interest in other developed countries. The launching of the UK-WHO growth charts in 2009 spurred other western European countries to take meaningful steps towards the adoption of the WHO standards (e.g. Denmark, France, Ireland, Norway, Poland, Portugal, Spain and Switzerland). More recently, other developed countries outside the European region (e.g. Canada, New Zealand and the United States of America) followed suit.

Rolling out new growth charts is a complex task affecting all levels of a national health system. A big challenge was to implement the project in a manner that ensured maximum returns in terms of child health promotion. Resource constraints at country level (e.g. under-staffing in primary health care facilities and shortage of equipment) were a bottleneck to implementation. UNICEF and other UN agencies played significant roles in supporting the standards’ implementation but there continues to be a need for support since significant costs are involved in the mass procurement of anthropometric equipment, in printing new charts, training health personnel, and especially in developing or strengthening programs to deal with the growth problems identified through the application of the standards.

References


24 Maalouf-Manasseh Z, Metallinos-Katsaras E, Dewey KG: Obesity in preschool children is more prevalent and identified at a younger age when WHO growth charts are used compared with CDC charts. J Nutr 2011;141:1154–1158.