

Introduction¹

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Charts that depict expected ranges and trajectories of anthropometric measurements and indicators, e.g., length/height-for-age, weight-for-age, and BMI (kg/m²) are among the principal tools used by researchers, clinicians, and policymakers to assist in assessing the health and nutritional well-being of individuals at nearly all life stages and/or the general well-being of communities and broader populations. The utility of these charts to diverse professional groups and the interest of parents, children, and the general population in the information that they convey make a strong case for assuring that growth charts are scientifically robust and effective for educational purposes and in advocacy arenas to motivate improved individual or population health.

The articles that follow focus on a global effort to develop a new international growth standard to assess infant and young child growth and to establish an initiative that explores how best to respond to an increasing need for new tools that can assess growth in older children and adolescents. The WHO released a new growth standard for infants and young children in April 2006 (<http://www.who.int/childgrowth/en/>). The new standard is a response to the recognition of significant flaws in the previous international growth reference (1). The previous international growth reference was hampered by an inadequately low frequency of measurements during infancy (when growth is most rapid and dynamic) and outdated analytical methods. The new standard is based on the WHO Multicentre Growth Reference Study (MGRS) that was designed specifically to construct a standard (2,3).

MGRS participants were of widely differing ethnic backgrounds and cultural settings (Brazil, Ghana, India, Norway, Oman, and the USA). The multiethnic, international design was motivated by the desire to create a single international standard reflective of the global community and to test the strong likelihood that infants and young children from diverse ethnic groups grow very similarly for the first 5 y of life (4,5) when their care needs are met. The study's focus on a global sample of

affluent children enabled the MGRS to move away from the creation of a reference (i.e., a tool that can be used effectively for comparative purposes but does not enable value judgments) to a standard (i.e., a tool that can be used more effectively to assess interventions and health policies) (6). This prescriptive approach was designed to identify children whose growth is reflective of current health recommendations. Thus, the approach broadens the definition of health beyond the absence of clinically overt disease to the adoption of practices and behaviors associated with good health outcomes, e.g., breast-feeding and appropriate complementary feeding, access to preventive and curative health care, sanitary environments, and mothers who do not smoke during pregnancy or after birth.

Among the most salient findings of the MGRS was a striking similarity in linear growth across the diverse populations that were studied. An evaluation of the differences in length of participants from birth to 2 y of age within and among the MGRS sites demonstrated that 70% of the total variance in length was due to interindividual differences and only 3% was due to intersite differences (7). These results are consistent with genomic comparisons among diverse continental groups indicating that 85–90% of total genetic variability resides within populations, whereas only 10–15% resides among populations (8). This and other design features, described in detail elsewhere, provide a strong rationale for the use of a single, international reference that can be applied to all children (2,3). The striking similarity in growth is relevant not only to the global community but also increasingly for countries that are, or are becoming, multiethnic in composition such as Canada, the United Kingdom, the United States, and others.

To implement a new standard, however, is far from trivial. The relation between a new standard and the local reference that it may replace must be described, and the new tools' clinical robustness requires field testing to guide the early phases of its implementation. The first 2 articles in this symposium address these 2 important areas. The first compares the new WHO growth standard with the CDC 2000 reference, the reference that replaced the previous 1977 NCHS growth reference and that served both the U.S. for domestic uses and the WHO for international uses (9). The differences between the 2 assessment tools are significant and the implications for individual assessments and wider policy decisions merit careful consideration. It is likely that similar comparisons between the new standard and existing references used by other countries will yield similar challenges.

The second article summarizes results of field tests designed to examine relations between clinical assessments of stature and weight status and classifications based on the new standard

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(10). Field tests were conducted in 2 relatively affluent settings, Argentina and Italy, and 2 more economically stressed populations, the Maldives and Pakistan. The objective of presenting these 2 articles is to contribute to discussions within and among countries regarding the possible adoption of the new international standard for domestic clinical and policy purposes.

Among the questions that have been raised regarding the adoption of the new standard is its truncation at 5 y of age. The growing global obesity epidemic has raised significant issues regarding the shortcomings of available references to assess the health and nutritional well-being of school-aged children through adolescence. Undoubtedly, the inclusion of these older age groups in the MGRS would have been ideal; however, resources and other constraints, and the increased vulnerability of younger age groups, focused initial attention on children below 5 y of age. Experience with the MGRS, both practical and what it teaches regarding the biology of human growth, makes it timely to ask 2 questions: can a single international reference be developed for school age children through adolescence and, regardless of whether the answer is yes or no, is it possible to devise a "prescriptive approach" that would be analogous to that used by the MGRS for the development of a new growth "standard" for these age groups?

The United Nations University (UNU), in collaboration with the WHO and other UN agencies, assembled a group of experts to review available data relevant to answering these 2 questions. Twelve reviews were commissioned to assess theoretical, biological, and pragmatic issues pertinent to both questions. The third article in the symposium reviews the information that was considered and the conclusions that were reached by this group (11). Importantly, the assembled group thought that a single international reference could be developed for these age groups, despite apparent differences in pubertal growth among selected ethnic populations and that a prescriptive approach likely could be developed for this purpose.

Thus, what are the next steps in the global effort to enhance growth assessments? Clearly, the MGRS will be following 2 tracks: one will provide technical assistance at a global level to support the adoption and effective use of the new standard. Technical tools to facilitate its use, and training materials to support its adoption, have been developed and no doubt will undergo an intensive iterative process for their improvement as experience is gained by clinicians, researchers, and policymakers through the use of the new standard. Thus far, WHO has released tools to assess only length/height-for-age, weight-for-age, weight-for-length or height, and BMI-for-age. Head circumference-for-age, triceps and subscapular skinfold thickness-for-age, and arm circumference-for-age should be released by early 2007. A process has been initiated to develop standards for growth velocity based on the longitudinal data of the MGRS (3). The completion and release of tools to assess growth velocity is projected for 2008. The most exciting aspect of the velocity standards is the potential for effective tools to identify children who are in "the process of becoming overweight, or undernourished" rather than making the diagnosis after such states are reached.

As for new standards for older children, the group convened by UNU, WHO, and others recommended that relevant scientific groups be surveyed for the availability of data that potentially could be used to develop an interim reference, at least for BMI. The group provided guidance for how such an effort could overcome, at least in part, the shortcomings identified in available references. These are reviewed in the symposium's third article (11).

The new "prescription based" international child growth standard offers opportunities to link growth assessments with interventions designed to act on the information such assessments provide. Moreover, the new WHO standard from birth to 5 y of age provides a base for obtaining more accurate population-level assessments of well-being. This base, in turn, enables assessments of the status quo, effectiveness of intervention programs designed to prevent or treat malnutrition, and global progress in addressing the double burden of malnutrition, i.e., overweight and obesity and undernutrition. The firm demonstration that all infants and young children share similar growth potentials raises international accountability for assuring that all children have the best start and provides a path for assuring that health and economic policies sustain the accessibility of good health.

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