

Garza C. **Fetal, Neonatal, Infant, and Child International Growth Standards: An Unprecedented Opportunity for an Integrated Approach to Assess Growth and Development.** *Adv Nutr* 2015; 6, 383-390.

Introduction

The first 1000 days of life from conception to 2 years of age are a critical period of time when nutritional needs must be ensured to enable both short- and long-term growth, health and development. About a decade ago, the World Health Organization (WHO) recommended new Child Growth Standards for early childhood derived from the Multicenter Growth Reference Study (MGRS) (1-3). Since the first publication in 2006, the Growth Standards have been adopted in >125 countries (4). The International Fetal and Newborn Growth Consortium for the 21st Century Project (INTERGROWTH-21st) Project aimed to fill the gap by providing international fetal growth standards and anthropometric measurements throughout gestation and at birth (5-7). Together, these growth standards enable growth monitoring from early pregnancy (around 9 weeks of gestation) through 5 years of age.

This issue of NNA summarizes a review article by Garza published in *Advances in Nutrition* reflecting on the methodology used in both growth standard studies and opportunities these two growth standards provide (4).

Methods

Both sets of growth standards were derived from data collected at multiple international community-based study sites using strict inclusion/exclusion criteria and rigorous research methods. The INTERGROWTH-21st Project was implemented in 8 sites: Brazil, China, India, Italy, Kenya, Oman, the United Kingdom, and the United States and included 3 different studies: 1) a cross-sectional survey to construct newborn standards (n=20,486 eligible newborns), 2) a longitudinal fetal growth study using ultrasound scans every 4-6 weeks among healthy pregnant women (n=4607), and 3) a postnatal longitudinal growth study of infants who were born prematurely.

The WHO MGRS was implemented in 6 study sites: Brazil, Ghana, India, Norway, Oman and the United States. It included 1) a longitudinal growth study from 0 to 24 months of age (n=1743) and 2) a cross-sectional study of children 18-71 months of age (n=6697). In both projects, study sites were selected with the goal of identifying healthy populations free of disease, practicing current health recommendations and living in environments that are unlikely to limit growth. In an effort to define healthy growth, both studies used stringent criteria to define optimal nutrition, environments and care of eligible study participants. During data collection, carefully standardized equipment, training and monitoring were implemented for quality control.

Results and Conclusions:

The recommended growth standards are remarkably consistent at their ages of intersection. Table 1 provides an overview of some of the anthropometric measurements and indices derived from the INTERGROWTH-21st and MGRS studies. Garza points out the following three key messages (4): 1) Both studies show that the primary source of variability in growth during gestation and early childhood was due to the variability between individuals and much less due to the variability between study sites. 2) Both studies found good agreement between anthropometric measurements at birth and 2 yrs of age. 3) Both studies amassed high quality datasets thanks to rigorous methods. Because of the strict eligibility criteria used to define optimal nutrition and health practices, these findings highlight the universal potential of physical growth from early gestation to at least 5 years of age in healthy human populations.

Table 1: Overview of selected anthropometric standards derived from the International Fetal and Newborn Growth Consortium for the 21st Century Project and the WHO Multicenter Growth Reference Study

| Anthropometric measurement/ index | Age range | Study | Ref |
|---|------------------|------------------------------|------------|
| Fetal crown-rump length for gestational age | 7-15 wks | INTERGROWTH-21 st | (5) |
| Head circumference for gestational age | 14 wks to birth | INTERGROWTH-21 st | (6) |
| Femur length for gestational age | 14 wks to birth | INTERGROWTH-21 st | (6) |
| Weight for gestational age at birth | Newborn | INTERGROWTH-21 st | (7) |
| Length for gestational age at birth | Newborn | INTERGROWTH-21 st | (7) |
| Head circumference for gestational age at birth | Newborn | INTERGROWTH-21 st | (7) |
| Weight for age | 0-60 mo of age | MGRS | (1) |
| Length or height for age | 0-60 mo of age | MGRS | (1) |
| Weight for length or height | 0-60 mo of age | MGRS | (1) |
| BMI for age | 0-60 mo of age | MGRS | (1) |
| Mid upper arm circumference for age | 0-60 mo of age | MGRS | (1) |
| Triceps skinfold for age | 0-60 mo of age | MGRS | (2) |
| Head circumference for age | 0-60 mo of age | MGRS | (2) |

INTERGROWTH-21st, International Fetal and Newborn Growth Consortium for the 21st Century Project; MGRS, WHO Multicenter Growth Reference Study

Source: Garza, *Advances in Nutrition*, 2015 (4)

Conclusions and policy Implications:

Together the INTERGROWTH-21st and MGRS studies provide new growth standards as an international norm for early growth that is consistent with healthy growth. Growth faltering is caused by numerous risk factors such as poor nutrition, infections, environmental and socio-economic risk factors and thus restricted growth is not a specific indicator for any particular causal factor. Nevertheless, together these standards allow us to monitor the growth of populations and individuals during the most vulnerable first 1000 days of life. This is particularly important considering the short- and long-term consequences of inadequate growth on future health and development.

NNA Editor's Comments *

The WHO Child Growth Standards have been widely adopted by many countries over the past decade. Thanks to the participation of study sites across the world and the high quality data collection and analyses, the new INTERGROWTH-21st fetal and neonatal growth standards provide international norms which complement the WHO Child Growth Standards. Efforts are ongoing to raise awareness of these new standards and to encourage their use among health care professionals and governmental agencies. More information including training toolkits for health care professionals are available on the website of the INTERGROWTH-21st Project:

<https://intergrowth21.tghn.org/>

*These comments have been added by the editorial team and are not part of the cited publication.

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