

## **New WHO Growth Standards for Young Children**

Anthropometric measurements are commonly used for assessing growth and nutritional status of children. These include weight for age, height for age and weight for height. Observed values are compared with standard or reference data to determine whether a child is growing normally. The terms growth standard and growth reference are used interchangeably, though their meaning is different. A standard reflects an optimum level, suggesting that all children have the potential to achieve that level, while a growth reference is simply used for comparison.

### **Current growth reference**

The NCHS/WHO growth reference(1) is currently used all over the world. However, its limitations are well recognized. The growth reference is based on formula fed children from a single community in the US. The children were measured every three months, which is not adequate to describe the rapid and changing rate of growth in early infancy. Also, shortcomings inherent in the statistical methods available at the time led to inappropriate modeling of growth patterns.

### **Growth of breastfed infants**

There are several studies to show that growth pattern of breast fed infants is different from that of formula fed infants and the current growth reference. For example, in a longitudinal study of American infants, weight for length z-scores were significantly lower in breast fed than formula fed infants from 7-24 months(2). Triceps and sub-scapular skin folds and percent body fat were also lower indicating

that breast fed infants are leaner compared to their formula fed counterparts even in populations of high socioeconomic status. The WHO working group on infant growth reviewed the available data on breast fed infants; who were exclusively breast fed for at least 4 months and continued breastfeeding for 12 months(3). Analysis of pooled data set showed that growth curves of breast fed infants deviated significantly from the NCHS reference, suggesting that these standards are not appropriate for assessing physiological growth of healthy infants. There is a need for international growth standards that will show how children should grow in all settings, rather than reflect growth pattern of children in a specific population. Recognition of this fact has led to the development of new growth standards(4).

### **WHO multi-center growth reference study**

The WHO conducted a multi-center study and collected growth data and related information on about 8500 children from diverse ethnic backgrounds and cultural settings(5,6). The participating countries included Brazil, Ghana, India, Norway, Oman, and United States. The data was collected by trained staff using a common protocol. The study was designed to combine a longitudinal follow up of children from birth to 24 months and a cross sectional study of children aged 18 to 71 months. Children were selected from communities where there were no environmental constraints to growth. They were healthy term infants who had no known illness or conditions that might affect their growth, and were breast fed as per the international feeding guidelines. The new growth reference is based on breastfeeding as the biological norm. The

measurements include weight-for-age, height-for-age and weight-for-height. Data on BMI was generated for children under 5 yrs for the first time. Other measurements include head circumference, mid-arm circumference, triceps and sub-scapular skin folds. Current references do not provide values for these parameters. In addition, six key motor milestones were measured, linking motor development to physical growth. These include sitting without support, crawling, standing with assistance, walking with assistance, standing alone and walking alone. These milestones were considered to be universal, fundamental to the acquisition of self sufficient erect locomotion, and simple to test and evaluate.

The WHO report on growth standards was released in April 2006 (6). It provides details of the growth study including study design and methodological process followed for development of growth standards. The report presents the first set of data on length and height-for-age, weight-for-age, weight-for-length, weight-for-height and BMI. Also provides comparison between the new standards and NCHS growth references. There are differences not only in the populations used, but also in the methodologies applied to construct the two sets of growth curves.

The WHO growth study and related data are also published in *Acta Paediatrica Supplement*, 2006(7). The data show great similarities in growth across all study centers. The new standards demonstrate that child populations in different regions of the world have the same growth potential. They can attain same heights and weights when their health care needs are met. However, the new standards apply to children from birth to five years of age. Genetic influence on the ultimate height in adulthood cannot be ruled out.

### **Differences between the new standards and NCHS references**

As expected, there are important differences between the new standards and NCHS references. However, these vary by age, sex, anthropometric measure and specific percentile or z- score curve. Differences are particularly important in infancy. Impact on population estimates of child malnutrition will depend on age, sex, anthropometric indicator considered and population-specific anthropometric characteristics. Thus, it will not be possible to provide an algorithm that converts prevalence values based on previous references to those based on the new standards or vice versa.

In the past, growth of breast fed infants after the first three months was judged as inadequate using the old NCHS reference. The new charts may now classify more formula fed infants as overweight. A notable effect is that stunting will be greater throughout childhood when assessed using the new WHO standards compared to the previous international reference. For wasting, the main difference between the new standards and the old reference is during infancy, up to about 70 cm length, when wasting rates will be substantially higher using the new WHO standards. With respect to overweight, use of the new WHO standards will result in a greater prevalence that will vary by age, sex and nutritional status of the index population.

### **Unique features**

The growth charts based on the new WHO standards differ from the existing standards in many innovative ways. They describe 'how children should grow', which is a prescriptive approach, not just a descriptive one. They show that all children can attain a similar standard of height and weight with adequate feeding and health care. It is a more pro-active way of

evaluating child growth. A key characteristic of the new standard is that it establishes breastfeeding as the biological norm. Furthermore, the pooled sample from the six participating countries creates a truly international standard, in contrast to the previous growth reference based on children from a single country. The new growth standards go beyond the current references and include new indicators like BMI and skin folds. These charts will be particularly useful in monitoring childhood obesity, which is relevant to both developed and developing countries.

Poor growth during infancy leads to childhood malnutrition in many developing countries, which if followed later in life by an increased intake of calories could result in overweight or obesity. It is not uncommon to see an under-nourished child in the same household as an overweight adult. The WHO standards are useful for detecting both undernutrition and obesity, thus addressing the double burden of malnutrition. Additionally, the reference data for the key motor development milestones are useful for screening developmental delays in children at the population level and perhaps as an educational tool to reinforce the importance of overall development of the child.

### Conclusion

The new WHO Child Growth Standards confirm that children born anywhere in the world and given the optimum start in life have the potential to develop within the same range of height and weight. They prove that differences in children's growth up to age five are more influenced by feeding practices, environment and healthcare rather than genetics or ethnicity.

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