



Published in final edited form as:

JAMA Pediatr. 2022 April 01; 176(4): 423–424. doi:10.1001/jamapediatrics.2021.6363.

Interpreting Weight, Height, and Body Mass Index Percentiles in the US Centers for Disease Control and Prevention Growth Charts

Lara Akinbami, MD^{a,b}, Cynthia L Ogden, PhD^a

^aDivision of Health and Nutrition Examination Surveys, CDC National Center for Health Statistics, Hyattsville, MD

^bUnited States Public Health Service, Rockville, MD

A recent publication¹ presented challenges in discussing CDC growth charts with patients and families. We would like to provide some clarifying points.

Growth charts do not show individual trajectories but a population average. Therefore, back-to-birthweight monitoring should be separate from growth chart conversations except to provide reassurance that once birthweight is regained, a child will tend to grow along a trajectory. Additionally, WHO growth charts are recommended from birth to age 2². In contrast to the CDC charts (recommended for ages 2-19), these WHO charts are a growth standard based on children selected on several factors, including optimal feeding patterns.

Drs. Hendrickson and Pitt question whether CDC growth charts are a reference or a standard because NHANES III data were excluded from BMI and weight charts for age 6 and older. They are indeed a reference based on the general US population at a time before changes in diet, food supply, and physical activity led to increasing obesity. CDC BMI and weight growth charts include data from the mid-1960s through 1994 for children 2-6 and from the 1960s and 1970s for older children. BMI trends were already increasing among older children after the 1970s and including them would change the definition of obesity (BMI 95th percentile) unless a lower percentile was adopted. Stating that “20% of children have BMIs above the 95th percentile” is not a nonsensical statement but an epidemiologic observation, that is, not something that clinicians would necessarily say to parents about their child. Messages to clearly convey how a child compares to a representative sample who were weighed and measured before the obesity epidemic developed.

The authors observe that a child whose height and weight are both 97th percentile would have a BMI just above the 85th but erroneously state this is the result of ‘slightly different data sets for the different charts and the statistical weakness of the BMI formula’.¹ In 2002 Tim Cole³ showed that BMI percentile was more strongly associated with weight percentile than height percentile using both CDC and British references. Because BMI is weight over height squared, height percentile has to change faster, twice as fast, as weight percentile for BMI percentile to remain constant.

The growth charts are indeed useful and complicated, and as Hendrickson & Pitt conclude, communication with families may require new thinking remembering the limitations⁴ of using BMI as a proxy for body fat.

Acknowledgments

This report's findings and conclusions are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

References

1. Hendrickson MA, Pitt MB. Three Areas Where Our Growth Chart Conversations Fall Short-Room to Grow. *JAMA pediatrics*. Nov 1 2021;doi:10.1001/jamapediatrics.2021.4330
2. Grummer-Strawn LM, Reinold C, Krebs NF. Use of World Health Organization and CDC growth charts for children aged 0-59 months in the United States. *MMWR Recomm Rep*. 2010;59(RR-9):1–15. NOT IN FILE.
3. Cole TJ. A chart to link child centiles of body mass index, weight and height. *European journal of clinical nutrition*. Dec 2002;56(12):1194–9. doi:10.1038/sj.ejcn.1601473 [PubMed: 12494304]
4. Flegal KM, Ogden CL, Yanovski JA, et al. High adiposity and high body mass index-for-age in US children and adolescents overall and by race-ethnic group. *ajcn*.2009.28589 pii;10.3945/ajcn.2009.28589 doi. *Am J Clin Nutr*. 2010;91(4):1020–1026. NOT IN FILE. [PubMed: 20164313]