Growth Faltering in the United States, 1897-2014

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Introduction and objectives
Childhood growth is now widely used as an indicator of population health and nutrition in lower and middle income countries. Stunting and growth faltering are widespread globally in lower and middle income countries (Victora et al., 2010). However, growth faltering has only been studied since the 1980s. There is no evidence on long-term trends.

The objective of this paper is to assemble consistent long-term measures of growth faltering, stunting and anthropometric failure for the United States for children aged 0-6.

Measuring anthropometric failure
When children do not grow as fast as their potential, they can fall short of reference standards for height, weight, or both (Nandy et al. 2005). The key measures of anthropometric failure are:

- **Stunting** is height 2 or more standard deviations below age-specific growth norms.
- **Wasting** occurs when children are acceptably tall and heavy, but have a weight-for-height score 2 or more standard deviations below the norm.
- **Underweight** occurs when children are 2 or more standard deviations below age-specific weight norms.

Growth faltering is a population-level trend where mean height-for-age and weight-for-age scores are close to reference norms at birth, but decline between the ages of 3 and 36 months.

Growth norms are from the WHO 2009 references, and calculated using -zanthro- in Stata.

Very little microdata has survived. We obtained monthly and quarterly growth data from the pediatric literature (Holt 1897, Crum 1916, Woodbury, 1921, Ayres-Burgess, 1937 Jackson and Kelly 1945).

We created a microdata set of height and weight for more than 14,000 children from a 1918 health survey in Saint Paul (Roberts and Warren 2017). 10,000 children were linked to the 1920 census to obtain socio-economic and demographic information.

Collecting new microdata on growth

Millions of individual measurements of children were made in the United States before World War II (Baldwin 1921, Burgess 1937).

National representative data

Height and weight for age averages from Saint Paul were nearly identical to national norms from the same survey.

Growth faltering existed in the past

American children’s height and weight scores declined with age in the early twentieth century. However, mean height-for-age and weight-for-age scores were high compared to modern developing countries.

Growth faltering continues today

Stunting and wasting are uncommon in the United States today. However, a pattern of declining height- and weight-for age scores through age 3 is still observed. Stunting rates have declined from 15% in 1918 to 2% today.

Contribution and conclusions

- A long-term perspective shows it is possible to reduce stunting, but it may take several generations.
- American children continue to be relatively large in infancy, and smaller as toddlers and pre-schoolers.
- Children in the US have a different growth pattern than international norm growth norms imply.

References

- Baldwin BT. The physical growth of children from birth to maturity. Iowa City: University of Iowa Child Welfare Research Station; 1921;