

## EDITORIAL

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**Promoting short-term and long-term health: keep the growth track!**

Maternal undernutrition is a major cause of foetal growth restriction and child undernutrition, which, in turn, are the underlying causes of 3.1 million annual deaths before the age of five years (1). Undernutrition is an outcome of insufficient food intake, repeated episodes of infectious diseases and other factors that result in underweight for age, shortness for age (stunting), thinness (wasting) or vitamin and mineral deficiencies. Globally, 165 million children are stunted with a height-for-age below -2SD of the reference median from the World Health Organization (WHO). The scope of malnutrition is even more significant: in addition to the burden of undernutrition, rising proportions of mothers and children are overweight and obese, with increasing risks of reproductive outcomes, diabetes and chronic diseases in adulthood (1). As a consequence of the rapid nutrition transition in many low-income and middle-income countries, a double burden of malnutrition is frequently found in individuals, within families or over the course of life, namely the coexistence of undernutrition along with overweight and obesity and their consequences (2).

This issue of *Acta Paediatrica* includes two papers that provide different perspectives on child growth and its consequences. Nilsen et al. (3) analysed whether deviations in body mass index (BMI) in Swedish children aged 7–19 years had an impact on their final height, while Hermanussen et al. (4) explored the auxology hidden in 19th and early 20th-century medical journals on German library shelves.

Linear growth is influenced by the complex interactions between the individual's genetic growth potential and environmental influences and epigenetic modifications to determine the expression of genes in response to the environment. This fact is illustrated by changes in adult height over time or differences in height between populations in different contexts (5). Children in low-income and middle-income countries usually have birth sizes that are similar to the WHO growth reference, but with an early and rapid growth faltering in weight and length from three to 18–24 months of age (6,7). An exception may be children in South Asia, where growth faltering frequently starts in foetal life (7).

Deviations from the child growth trajectory may lead to undesirable consequences later in life. Nutritional insults in critical periods in early life may influence metabolism, growth rate and body composition and increase the risk of adult cardiovascular disease, type 2 diabetes and metabolic syndrome (1). Growth-restricted children adopted from low-income settings, who experience rapid



linear catch-up growth, may have an early puberty, resulting in a lower adult height (8). In contrast, the general pattern that is observed is that stunted children partly compensate for their slow growth by later pubertal development than their nonstunted peers (9). Stunted girls often become short and low-weight mothers who give birth to stunted children, creating a vicious intergenerational cycle of undernutrition and poverty. In the paper by Nilsen et al. (3), we learn that a BMI reduction of 10% or more from the previous growth trajectory of Swedish children did not influence the final height of their cohort. It should be noted that the chosen age window for BMI deviations, namely 7–19 years, falls after the early life period, when environmental conditions influence the child's growth trajectory more easily (10). The authors remark that this lack of association at a group level does not preclude that individual children with major downward anthropometric deviations may permanently change track and end up with a lower adult height, just like many stunted children in low-income settings.

The review of child growth literature from the 19th to early 20th century, presented by Hermanussen et al., adopted an unconventional style (4). It is not systematic and presents its findings without the critical scrutiny usually seen in scientific reviews. These differences may reflect the way that science was presented 100 or more years ago, as an essay or written in a journalistic style. The authors compare child growth in Europe at that time with present-day low-income countries. That may be an unfair comparison, as there are still major differences when we look at the determinants and consequences of child growth across present-day, low-income settings. Child growth is, to a large extent, influenced by the context of the mother and child (11). Hermanussen et al. convey the impression that the current global understanding of undernutrition and child stunting is limited to inappropriate feeding and dietary intake. On the contrary, our present knowledge of these problems embraces the complexity and proposes actions before and after birth, with an emphasis on the first

1000 days of life (1,10). The review also includes a message from the past that echoes current experiences: do not expect high success in community-based feeding programmes when treating established stunting in young children (11). The window of opportunity is before and during the first 1000 days of life.

The WHO has adopted a resolution on maternal, infant and young child nutrition that includes a global target to reduce stunting by 40% by 2025 (10). The proportion of stunted children has started to decline, probably because of improvements in maternal health and nutrition and reductions in low birthweight babies (1). The accumulated knowledge on maternal and child undernutrition has influenced global policies that aim to tackle the life cycle of malnutrition (10). These policies need to influence practice further by providing an increased emphasis on interventions before and during pregnancy.

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## References

- Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, de Onis M, et al. Maternal and child undernutrition and overweight in low-income and middle-income countries. *Lancet* 2013; 382: 427–51.
- Demaio AR, Branca F. Decade of action on nutrition: our window to act on the double burden of malnutrition. *BMJ Glob Health* 2018; 3(Suppl 1): e000492.
- Nilsen BB, Yngve A, Werner B. Do substantial BMI reduction episodes among Swedish schoolchildren have any impact on their final height? *Acta Paediatr* 2018. <https://doi.org/10.1111/apa.14258>.
- Hermanussen M, Bogin B, Scheffler C. Stunting, starvation and refeeding: a review of forgotten 19th and early 20th century literature. *Acta Paediatr* 2018. <https://doi.org/10.1111/apa.14311>.
- Silventoinen K, Kaprio J, Lahelma E, Koskenvuo M. Relative effect of genetic and environmental factors on body height: differences across birth cohorts among Finnish men and women. *Am J Public Health* 2000; 90: 627–30.
- Victora CG, de Onis M, Hallal PC, Blössner M, Shrimpton R. Worldwide timing of growth faltering: revisiting implications for interventions. *Pediatrics* 2010; 125: e473–80.
- Svefors P, Rahman A, Ekstrom E-C, Khan AI, Lindström E, Persson LÅ, et al. Stunted at 10 Years. Linear growth trajectories and stunting from birth to pre-adolescence in a rural Bangladeshi cohort. *PLoS One* 2016; 11: e0149700.
- Proos L, Gustafsson J. Is early puberty triggered by catch-up growth following undernutrition? *Int J Environ Res Public Health* 2012; 9: 1791–809.
- Parent A-S, Teilmann G, Juul A, Skakkebaek NE, Toppari J, Bourguignon J-P. The timing of normal puberty and the age limits of sexual precocity: variations around the world, secular trends, and changes after migration. *Endocr Rev* 2003; 24: 668–93.
- de Onis M, Dewey KG, Borghi E, Onyango AW, Blössner M, Daelmans B, et al. The World Health Organization's global target for reducing childhood stunting by 2025: rationale and proposed actions. *Matern Child Nutr* 2013; 9(Suppl 2): 6–26.
- Stewart CP, Iannotti L, Dewey KG, Michaelsen KF, Onyango AW. Contextualising complementary feeding in a broader framework for stunting prevention. *Matern Child Nutr* 2013; 9 (Suppl 2): 27–45.