

Growth faltering in rural Gambian children after four decades of interventions: a retrospective cohort study

Summary of Research¹

Nabwera HM, Fulford AJ, Moore SE and Prentice AM. (2017). *Growth faltering in rural Gambian children after four decades of interventions: a retrospective cohort study*. *The Lancet Global Health*, Volume 5, No.2, e208-e216, February 2017. Available open access at: <http://thelancet.com/journals/langlo/>

Location: Gambia

What we know: Growth faltering remains common in children in sub-Saharan Africa; factors to alleviate this remain poorly understood, limiting intervention design.

What this article adds: A retrospective cohort study using routine growth-monitoring data for children under two years assessed trends in growth faltering in rural Gambia over four decades. Those studied received unprecedented investments in healthcare and nutrition-related infrastructure. Over 40 years, underweight or stunting proportions at two years of age halved and growth parameters improved. However, prevalence of low birthweight (12%), childhood stunting (30%), and underweight (22%) remained high. Wasting prevalence did not change and growth faltering between three months and 21 months was only marginally attenuated. A high threshold for water, sanitation and hygiene (WASH) improvements is likely necessary to impact growth faltering; environmental enteropathy may provide a missing link. More understanding is needed of missing contributors to growth faltering to guide development of new interventions.

Growth faltering remains common in children in sub-Saharan Africa and is associated with substantial morbidity and mortality. Rates of stunting have been declining, but there are still 159 million stunted children worldwide (WHO, 2017). The prevalence of stunting has declined most slowly in sub-Saharan Africa and the absolute number of children with stunting has increased due to population growth (WHO, 2017). Key elements of progress that alleviate growth faltering are poorly understood, thus limiting the design of interventions and the targeting of health and development inputs.

A retrospective cohort study was carried out using routine growth-monitoring data for all children whose date of birth had been recorded to assess trends in growth faltering in children younger than two years in the West Kiang region of Gambia during the past four decades. Three rural villages in the region (Keneba, Manduar and Kantong Kunda) have benefited from free healthcare provided by the UK Medical Research Council (MRC) for the past 40 years. Since the 1970s, there have been increasing levels of support and interventions such that these villages have benefited from unprecedented levels of nutrition-specific and nutrition-sensitive interventions compared with other such communities in rural, low-income settings.

Routine growth data from birth to two years of age were available for 3,659 children between 1976 and 2012. Z scores for weight-for-age (WAZ), length-for-age (LAZ), weight-for-length (WLZ), mid-upper-arm circumference (MUAC) and head circumference (HC) were calculated using the WHO 2006 growth standards. Seasonal patterns of mean Z scores were obtained by Fourier regression. Growth faltering was defined as fall in Z score between three months and 21 months of age.

Results

Results reveal secular improvements in all postnatal growth parameters (except weight-for-length), accompanied by declines over time in seasonal variability. The proportion of children with underweight or stunting at two years of age halved during four decades of the study period, from 38.7% (95% CI 33.5–44.0) to 22.1% (19.4 to 24.8) for underweight and 57.1% (51.9–62.4) to 30.0%, (27.0–33.0) for stunting. However, prevalence remained unacceptably high. Postnatal growth faltering also persisted, leading to poor nutritional status at 24 months (LAZ -1.36 , 95% CI -1.44 to -1.27 , WAZ -1.20 , -1.28 to -1.11 , and HC Z score -0.51 , -0.59 to -0.43). These infants characteristically were born small and continued to fall away from the WHO standard length centiles throughout the first two years of life, despite weight showing early catch-up while the infants were still fully breastfed and largely protected from infections (the trend for which is magnified in their WLZ due to simultaneous decline in length). MUAC and head circumference were similarly resilient. Growth failure is markedly seasonal in this environment, with greater deficits occurring in the rainy season. The incidence of diarrhoea, malaria and bronchiolitis in the children younger than 12 months fell by 80% during the four decades studied, while the incidence of pneumonia seemed to increase.

Discussion

During almost four decades, the MRC has made sustained investments in healthcare and nutrition-related infrastructure in the core study villages; these inputs are unparalleled across rural Africa and would be prohibitively expensive for governments of low-income countries to roll out nationwide. These villages have access to antenatal and postnatal care and round-the-clock access to clinicians and nurses in a well-equipped and efficient primary healthcare clinic. All health services are free of charge. All children are fully vaccinated, receive vitamin A, mebendazole and other health interventions as per WHO protocols. Breastfeeding rates are among the best worldwide and are further supported by baby-friendly community initiatives, accompanied by regular messaging in support of exclusive breastfeeding for six months.

Open defecation and water obtained from contaminated open wells have been universally replaced by latrines in all compounds and tube well water supplied through clean pipes to standpipes around the villages. Studies have shown that these interventions have had a profound effect on mortality in children under five years old (Rayco-Solon et al, 2004) and the incidence of most diseases, especially diarrhoea, which has previously been implicated as a major cause of growth failure (Poskitt et al, 1999).

In addition, children attend regular well-baby checks with growth monitoring and a dedicated treatment centre for severely malnourished children is provided to treat those who do become malnourished. The remittance economy from village members who have migrated overseas, together with incomes from employment at the MRC, have greatly improved food security and attenuated the stress of the so-called hungry season, as reflected in the reduction in the amplitude of seasonal growth faltering in the region. This increased wealth has also improved housing conditions and dispersed families over a wider area, reducing overcrowding. Child mortality has fallen, birth spacing has increased and family size has decreased.

Despite the unprecedented levels of investment, the prevalence of low birthweight (12%), childhood stunting (30%), and underweight (22%) remains high. The prevalence of wasting has not changed and growth faltering between three months and 21 months has only been marginally attenuated. These data suggest that the refractory stunting must be caused by factors beyond the improvements and interventions provided in the study villages. Environmental enteropathy affecting almost all children in low-income settings has been proposed as the mechanism linking growth failure with WASH (water, sanitation and hygiene) deficits (Dangour et al, 2013). Results suggest that there is a very high threshold for WASH improvements that must be achieved before growth faltering can be eliminated. Improved housing conditions, including piped water, might be a necessary step. More understanding is needed of the missing contributors to growth faltering to guide development of new interventions.

A comment on this study is also published in the same issue. Crane, R. J. and Berkley, J.A. (2017) Progress on growth faltering. The Lancet Global Health, Volume 5, No.2, e125-e126, February, 2017. Available open access at: <http://thelancet.com/journals/langlo/>

References

Dangour AD, Watson L, Cumming O, et al. *Interventions to improve water quality and supply, sanitation and hygiene practices, and their effects on the nutritional status of children*. Cochrane Database Syst Rev 2013; 8: CD009382.

Poskitt EM, Cole TJ and Whitehead RG. *Less diarrhoea but no change in growth: 15 years' data from three Gambian villages*. Arch Dis Child 1999; 80: 115–19.

Rayco-Solon P, Moore SE, Fulford AJ and Prentice AM. *Fifty-year mortality trends in three rural African villages*. Trop Med Int Health 2004; 9: 1151–60.

WHO Global Nutrition Targets 2025.

www.who.int/nutrition/publications/globaltargets2025_policybrief_overview/en/ (accessed Jan 2, 2017).

Taken from Field Exchange 54

PDF generated 13 July 2017

www.ennonline.net/fex/54/growthfalteringgambiacohort

© 2017. ENN is a registered charity in the UK no. 1115156, and a limited company no. 4889844.