

References

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The relationship between wasting and stunting: a retrospective cohort analysis of longitudinal data in Gambian children from 1976 to 2016

Summary of research¹

Location: *Gambia*

What we know: There are gaps in understanding the relationship between wasting and stunting that often concur in populations and may concur in the same child.

What this article adds: A retrospective cohort analysis on growth-monitoring records from clinics in rural Gambia (1976 to 2016; 5,160 children under two years old) examined whether wasting is a risk factor for stunting, and vice versa; whether the season of birth influences future wasting and stunting; and whether there are gender differences in growth deficits in Gambia. Wasting was defined as weight-for-length z-score (WLZ) <-2. Stunting was defined as length-for-age z-score <-2. Wasting prevalence peaked at 12% (girls) and 18% (boys) at 10-12 months of age, and at 37% (girls) and 39% (boys) at 24 months of age. Wasted children were 3.2 times more likely to be stunted three months later, and children currently stunted were 1.5 times more likely to be wasted three months later. Infants born at the start of the annual wet season (July-October) showed early growth faltering (WLZ) and increased risk of subsequent stunting. Boys were more likely to be wasted, stunted and concurrently wasted and stunted than girls, and were more susceptible to seasonally-driven growth deficits. Results suggest that stunting is in part a biological response to previous episodes of being wasted. Where significant levels of wasting and stunting exist, treatment and prevention interventions should consider joint approaches. More understanding is needed of the physiologic mechanisms and environmental factors of seasonal vulnerabilities and gender differences in wasting and stunting.

Each year, around 800,000 deaths in children under five years of age are in part attributable to wasting; 60% of which are attributable to severe wasting. In addition, over one million child deaths are attributable to stunting, although this association remains poorly understood. Even though progress is being made in decreasing undernutrition in low- and middle-income countries, stunting and wasting during childhood continue to burden people in the poorest regions in the developing world. Although both forms of undernutrition occur together in children in many contexts and may co-occur in the same child

(referred to as “concurrency”), wasting and stunting are often considered separately with respect to how they are managed clinically and programmatically and how they are researched. The rationale behind this conceptual separation of stunting and wasting in terms of etiology and programming has been questioned in several recent reviews and publications (Briend, Khara and Dolan, 2015; Khara and Dolan, 2014). These publications highlight outstanding gaps in understanding the interrelationship between these two forms of undernutrition as a result of insufficient examination of data; in particular from longitudinal cohorts.

The authors of this paper contribute to filling this gap by describing the interrelationships between wasting and stunting in children under two years old through a retrospective cohort analysis, based on growth-monitoring records spanning four decades from clinics in rural Gambia. Three broad research questions were tested: 1) is wasting a risk factor for stunting, and vice versa? 2) does the season of birth influence future wasting and stunting;? and 3) are there gender differences in growth deficits in the Gambia? Anthropometric data collected at scheduled infant-welfare clinics between May 1976 and September 2016 were converted to z-scores, comprising 64,342 observations on 5,160 subjects (median: 12 observations per individual). Children were defined as “wasted” if they had a weight-for-length z-score (WLZ) <-2 against the WHO reference and “stunted” if they had a length-for-age z-score (LAZ) <-2.

Results reveal that prevalence of wasting and stunting were high in this population. The prevalence of stunting increased with age, peaking at 37% (girls) and 39% (boys) at 24 months of age. Wasting showed an early decline in the first three months (reflecting a period of positive weight gain in the months immediately postpartum), followed by a peak at around one year of age (18% in boys, 12% girls). The prevalence of children with concurrency peaked at 9% in boys and 5% in girls, also at around one

¹ Simon M Schoenbuchner, Carmel Dolan, Martha Mwangome, Andrew Hall, Stephanie A Richard, Jonathan C Wells, Tanya Khara, Bakary Sonko, Andrew M Prentice, Sophie E Moore. The relationship between wasting and stunting: a retrospective cohort analysis of longitudinal data in Gambian children from 1976 to 2016. *The American Journal of Clinical Nutrition*, Volume 110, Issue 2, August 2019, Pages 498–507, <https://doi.org/10.1093/ajcn/nqy326>

year of age. Infants who were wasted in the first wet season of their life were more likely to be wasted in their second wet season, even after controlling for recovering during the intervening dry season (OR:3.2; 95% CI:2.3, 4.4).

Infants born at the start of the annual wet season (July–October) showed early growth faltering in WLZ, putting them at increased risk of subsequent stunting. Time-lagged observations show that being wasted was predictive of stunting (OR: 3.2; 95% CI: 2.7, 3.9), even after accounting for current stunting. The reverse also holds: children currently stunted are 1.5 times more likely to be wasted three months later, even after accounting for currently wasting status. Boys were more likely to be wasted, stunted, and concurrently wasted and stunted than girls, as well as being more susceptible to seasonally-driven growth deficits.

This analysis highlights several key issues of relevance to our understanding of the relationship between wasting and stunting in early childhood. First, in this highly seasonal, rural environment with high rates of exclusive breastfeeding, there is a seasonally-driven risk among young infants

of poor growth. This indicates the need to provide more targeted support to breastfeeding mothers and increase attention to infant feeding during periods of seasonal stress. Second, results demonstrate that being wasted leads to increased risk of subsequent stunting. This suggests that stunting is in part a biological response to previous episodes of being wasted and that stunting may represent a deleterious form of adaptation to more overt undernutrition (wasting). Stunted children are not just short, but are children who were earlier more seriously malnourished and who are survivors of a composite process. Third, children who are wasted in one wet season are more likely to be wasted in a subsequent wet season even after recovery, suggesting a continued vulnerability across seasons. Further understanding is needed of related physiologic mechanisms and environmental factors. Fourth, and consistent with much of the global literature, boys are more likely to be wasted or stunted or to have concurrent wasting and stunting; all of which convey added risk of mortality. There is a need to understand this gender difference in vulnerability so that the policy and practice communities can take this into account.

Results indicate that, where there are levels of wasting and stunting of public health significance in a given context, there are compelling reasons for both treatment and prevention interventions to consider wasting and stunting jointly and with awareness of the relation between them. The separation of the wasted infant/child and the stunted infant/child in terms of policies, programmes and research risks opportunities being missed to detect and intervene to prevent both forms of undernutrition in this highly-vulnerable population group. The attainment of World Health Assembly and other global targets remains a very strong global and country-level intent, but these targets will not be achieved where approaches to infant and child undernutrition remain siloed.

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Scurvy outbreak among South Sudanese adolescents and young men – Kakuma refugee camp, Kenya, 2017-2018

Summary of research¹



Refugees wait while food is being prepared in the kitchen of Kakuma refugee camp reception center

Location: Kenya

What we know: Refugee populations dependent on food assistance are at risk of micronutrient deficiencies.

What this article adds: An outbreak of scurvy among 45 adolescent and young adult male South Sudanese refugees suspected cases was confirmed by Centers for Disease Control and Prevention (CDC) in 2018. Those affected had been provided a partial food ration consisting of cereal, pulses, fortified corn-soy blend (CSB+) and vitamin A-fortified oil, plus electronic cash to support dietary diversification to supplement their diets in Kakuma refugee camp, Kenya between 2017 and 2018. From 2015, there were shortages of food assistance commodities and funding shortfalls. Rather than purchasing fresh foods rich in vitamin C, the investigation found those affected selected more calorie-dense cereal and pulses to supplement the energy-deficient food ration. Symptoms resolved after vitamin C treatment. Vitamin C retention of CSB+ after preparation was <16%; insufficient to prevent scurvy. Findings show that food and cash assistance based on average household composition is insufficient for refugees with higher caloric needs; in this instance, adolescents and young adult male refugees.

Background

Scurvy is a relatively rare micronutrient-deficiency disease that can occur among refugees dependent on food assistance due to inadequate access to fresh fruits and vegetables. Kakuma refugee camp in Kenya’s Turkana district is home to 148,000 refugees, mostly from Somalia and South Sudan, who receive food assistance. In August 2017, a number of South Sudanese adolescent and young adult male refugees were evaluated for calf pain, chest pain and gingival (gum) swelling. No diagnosis was initially made due to non-specific symptoms and some patients received antibiotics and analgesics. All were managed as outpatients, but

¹ Ververs, M., Wambugu Muriithi, J., Burton, A., Wagacha Burton, J., Oman Lawi, A. (2019). Scurvy outbreak among South Sudanese adolescents and young men – Kakuma refugee camp, Kenya, 2017-2018. *Morbidity and Mortality Weekly Report (MMWR)* US Department of Health and Human Services/Centers for Disease Control and Prevention, January 25, 2019. Vol. 68/ No. 3.