

Relationships between wasting and stunting and their concurrent occurrence in Ghanaian pre-school children

Summary of research^{*}

Location: Ghana.

What we know: Wasting is a short-term health issue, but repeated episodes may lead to stunting (long-term or chronic malnutrition). This may occur in resource-poor settings, where poor dietary intake and infectious disease are highly prevalent and persistent.

What this article adds: A reanalysis of the 2014 Ghana Demographic and Health Survey (DHS)¹ assessed the magnitude of and relationship between concurrent wasting and stunting among 2,720 pre-school children aged 0-59 months, along with factors associated with both conditions. Results found children who had low WHZ scores were at higher risk of stunting, especially children aged less than three years. The study confirms that wasting relates to linear growth, moderated by child age. Wasting and stunting share many common risk factors.

Background

Ghana's most recent Demographic and Health Survey (DHS) found a fall in stunting among pre-schoolers (28% in 2008 to 19% in 2014), though masking great regional disparities, with the highest prevalence of 33.1% in Northern Region. Many countries, including Ghana, have information on the prevalence and factors associated with chronic and acute undernutrition, but lack knowledge of the factors that contribute to the development of their concurrence within the same children and the magnitude of these factors. This study investigated the relationships between wasting and stunting and associated factors in the Ghanaian population.

Methods

The study involved reanalysis of the 2014 Ghana DHS dataset of 2,720 pre-school children aged 0-59 months. The main outcome variable was the nutritional status of the child measured as stunting (height-for-age z score (HAZ)), wasting (weight-for-age z score (WHZ)), and concurrent wasting and stunting. The independent variables were maternal weight and height, reproductive factors (parity, level of education, place of delivery, and prenatal care utilisation), child characteristics (e.g., sex and birth weight), malarial infection, child dietary intake, and household wealth index. The analyses included other household characteristics such as household wealth, region of residence, urban/rural, source of drinking water, type of toilet facilities, and educational level of the mother/caretaker. The wealth variable categorised respondents into quintiles according to the household score on the DHS wealth index, which is based on household amenities, assets and living conditions.

All data were coded for weighted analysis to take into account the complex design of multi-stage cluster surveys, and to ensure the sample data were statistically valid. Effect modification (where wasting and stunting is moderated by the age of the child) was identified and adjusted for effect through multiple regression analyses.

Results

Results showed that malnutrition prevalence among the study population was 17.9% stunting (HAZ <-2); 4.7%

wasting (WHZ <-2); and 10.8% underweight (weight-for-age z score (WAZ)<-2). National prevalence of concurrent wasting and stunting was low at 1.4%, but with geographical variations. The Upper East Region had the highest prevalence of 3.2%; the lowest prevalence was in the Volta Region, with 0.5%. Further analysis of undernutrition according to age group, gender and geographical location indicate that: both wasting and stunting frequently occur as early as 0-5 months; levels of global acute malnutrition (GAM) were highest among the 6-11 months age group, and in the Upper East Region; and stunting was highest among children aged 24-35 months in the Northern Region and lowest among children aged 0-5 months.

The study confirmed that the relationship between wasting and stunting is moderated by child age; a 1-unit increase in WHZ was associated with a 0.07 standard unit increase in HAZ [$\beta = 0.071$ (95% CI: 0.03, 0.15)].

Predictors of stunting and wasting

Predictors of stunting were more common than wasting, with some factors associated with both. The greatest predictors of stunting (accounting for 17.8% variability) were: low maternal height, low birth weight (LBW), whether child is wasted or not, child age, low utilisation of antenatal care (ANC) services, poverty, and increased parity. The only amenable behavioural variable was utilisation of ANC services. Key predictors for wasting were LBW, age of child, wealth index and living in rural areas (accounting for 10% variance). Low percentage of variance accounted for in stunting and wasting suggests that there are a larger number of possible variables that were not measured in the study. Three variables – LBW, age of child and household wealth index – were found to be significant common predictors of wasting and stunting. Children whose birth weight was less than 2.5kg were about 2.0 times more likely to be wasted and 2.7 times more likely to be stunted than children with normal birth weight (>2.5kg).

Discussions and recommendations

The authors discuss and compare their findings with other research and make recommendations.

Low national prevalence of concurrent wasting and stunting (1.4%) among the Ghanaian study population may partly be due to seasonal variations in wasting prevalence, depending on when the data was collected.

WHZ relates to linear growth, but the nature and strength of the association was moderated by child age. The association was strongest among children aged 0-5 months and 12-23 months. Consistent with other studies, the study found that increasing child age is associated positively with stunting but negatively with wasting.

Cross-sectional studies at the population level have demonstrated conflicting views on the relationship between wasting and stunting in childhood. Some have found little or no association, whereas others have found evidence that ponderal growth faltering can increase the risk of linear growth faltering. Findings in this study confirm this.

There is no clear mechanism by which wasting may lead to stunting. Some studies suggest that growth in height only takes place when the body has a minimum level of energy reserves. Body fat plays a critical role in regulating bone mass, but although fat stores are needed to promote linear growth, they are not sufficient, since stunting and overweight can co-exist in some populations (and individuals). The relationship between fat stores and stunting requires further investigation.

This study shows that predictors of stunting were more common than those for wasting, but this may be due to the lower prevalence of wasting compared to stunting in the same population, therefore statistical power to detect significant associations between wasting and other variables was low. All the risk factors for wasting were also associated with stunting, apart from rural/urban residence.

Low maternal height and household wealth index were strongly associated with child nutritional status. Household wealth index was a common predictor of both stunting and wasting, confirming that child undernutrition is strongly

associated with poverty. Low maternal height (below 45cm) increased the risk of stunting but not wasting; interventions should focus equally on children and mothers to improve child health.

LBW was the most consistent risk factor for both WHZ and HAZ for all ages, which concurs with other research from birth cohorts and longitudinal studies. LBW infants should be a focus for intervention.

Wasting affects 52 million (19 million severe wasting) and stunting affects 165 million children under five years old each year. Wasting and stunting frequently co-exist in the same population (sometimes in the same child), but they are usually separated in terms of policy, guidance, programming and financing. Both forms of undernutrition share causal factors such as infectious diseases, poor diet and suboptimal infant feeding and caring practices, yet the physiological relationship between them and how interventions

* Mahama Saaka and Sylvester Zackaria Galaa, *Relationships between Wasting and Stunting and Their Concurrent Occurrence in Ghanaian Preschool Children*, Journal of Nutrition and Metabolism, vol. 2016, Article ID 4654920, 11 pages, 2016. doi:10.1155/2016/4654920.

¹ dhsprogram.com/pubs/pdf/FR307/FR307.pdf

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