GLOBAL LIVESTOCK CRSP

Do Children's Dietary Intakes Fluctuate by Season in Rural Northern Ghana?

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Food availability in rural communities is often dependent on season. Young children who are at risk of poor growth when food is scarce during the lean season may be able to improve their nutritional status when food becomes more abundant during the harvest season. This study examined seasonal differences in the diets of 190 children two to five years of age who were living in rural northern Ghana. Interviewer-administered questionnaires were used to collect information on children's diets at two time points: during the lean season before households began to harvest their staple crops of millet, maize and rice, and five months later after almost all crops had been harvested. Although children's diets tended to improve with the post-harvest season, the difference was smaller than expected, and most likely had been blunted by unexpected severe flooding that occurred between the two data collection periods. These findings demonstrate the potential influence of natural disasters in augmenting the seasonal risk of poor growth for young children and can be used to inform policy change to protect health and well-being of children in Ghana.

Background

Many rural communities in low-income tropical countries experience seasonal variation in the availability of food, resulting in periodic food scarcity (Chambers et al. 1981). Most tropical climates have little variation in temperature throughout the year so seasons are differentiated by rainfall and are divided into distinct wet and dry seasons. The rainy season is the growing season, and crop harvesting begins a few months into the rains and lasts into the first few months of the dry season. Food acquired during the harvest season must last until the next harvest or seasonal food shortage occurs. It is during the months leading to the harvesting of food, known as the pre-harvest season, that food typically becomes less available, more expensive, and less varied, and seasonal food stress occurs.

Young children are thought to be particularly vulnerable during seasonal food shortages as they need a constant supply of adequate food for growth and development, and because limited resources may be preferentially allocated away from them to more economically productive members of the household (Chambers et al. 1981; Schofield 1974).

Although there is evidence to suggest that in some communities, household coping mechanisms may minimize the detrimental effects of seasonal food shortages on children's diets (Leonard 1991), other findings show that children's dietary intakes are negatively affected during the 'lean' pre-harvest season (Graham 2003). Seasonal food shortages have been tied to deleterious effects on several health status indicators related to children in West Africa (Adams 1994).

Methods. Interviewer-administered questionnaires were used to collect dietary, morbidity and household demographic information in the pre-harvest (June and July, 2007) and post-harvest (November and December, 2007) seasons for 190 children two to five years of age living in four communities in northern Ghana. Unexpected severe flooding occurred in northern Ghana in late August and September of 2007, between the two data collection points for this study. The floods destroyed crops and food stocks, killed people and livestock, and damaged homes and infrastructure. The floods added an unexpected factor that had to be taken into account when interpreting the results.

Major Findings

During the pre-harvest season, caregivers were asked to report the months they experienced severe food shortages in the past year. There was a sharp increase in reports from February to March, a few months after harvesting ended (Figure 1). Reports of severe food shortages remained high through July, and then tapered off during the beginning of the harvesting season.

Total energy intake and percent of recommended energy intake (110.4 ± 41.6% versus 118.8 ± 37.4%,

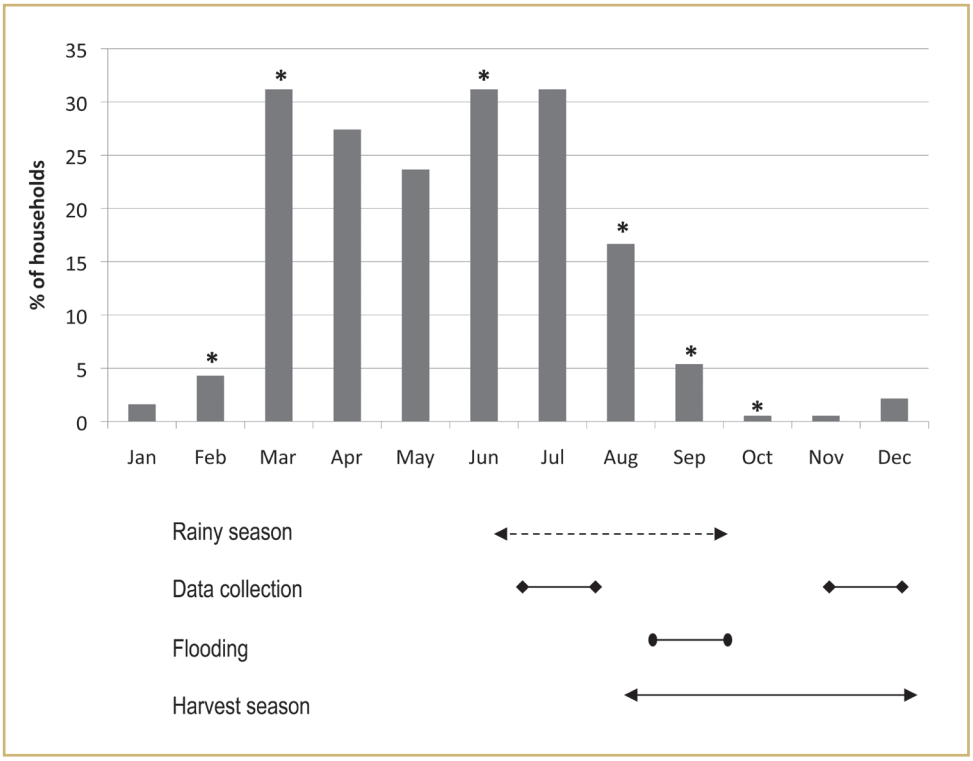


*Figure 1. Proportion of households with children two to five years of age in northern Ghana reporting monthly food shortages in the past year and timeline of rainfall, data collection, flooding and harvesting. * p<0.05; refers to comparison with previous month (McNemar's test for within-individual changes between two time points).*

p=0.032) increased from the pre- to post-harvest season; the increase relative to body weight did not reach statistical significance (Table 1). Similarly, absolute intake of protein and fat increased across seasons but the increases relative to body weight (for protein) and energy intake (for fat) did not reach statistical significance. Fat intakes in both seasons were close to the minimum end of Acceptable Macronutrient Distribution Range. Groundnuts were the major source of fat in both seasons, contributing to over 60% of total fat intake. Cooking oils were also an important source of fat and contributed to over 15% of total intake in both seasons.

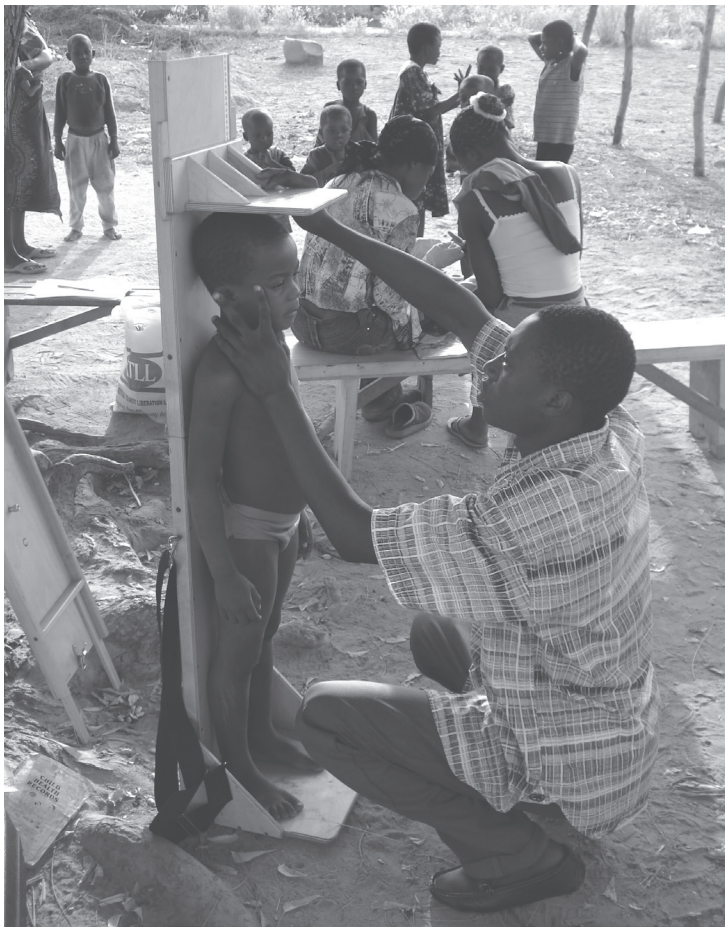
The small change in intakes across seasons seen in this study could have been due to flood-related loss of household crops in the study communities. Although small, the increases in intakes are somewhat surprising considering the extent of the observed and reported crop losses. However, when asked to whom priority is given when food is limited, almost all caregivers responded 'children.' 'They cannot withstand hunger' was a commonly reported reason. Therefore, adults in the households may have sacrificed food for the sake of their young children.

Practical Implications

It is important to note that although diets did not appear to be greatly affected, data collection occurred soon after most crops were harvested, and even though some crops and food stores were destroyed, some were salvaged. However, with

Table 1. Daily intake of energy and macronutrients for children two to five years of age in northern Ghana, by season. [1]Ranges reflect requirements of different age groups (by sex and two year age groups for energy, by two year age groups for protein, one to three and four to 18 years for fat); [2]Data collected after September 2007 flood; [3]Using paired Student's t-test; [4]Estimated requirement (FAO); [5]Mean safe level of intake (FAO/WHO/UNU); [6]Minimum end of Acceptable Macronutrient Distribution Range (IOM).

	Recommended daily intake[1]	Average daily intake (n=190)						p-value[3]
		Pre-harvest			Post-harvest[2]			
		mean ± SD						
Energy (kcal)	-	1113.5	±	391.2	1247.3	±	391.2	0.001
Energy (kcal/kg)	71.5 – 83.6[4]	87.0	±	33.5	91.9	±	29.3	0.103
Protein (g)	-	34.0	±	12.5	38.0	±	14.3	0.002
Protein (g/kg)	1.06 – 1.17[5]	2.66	±	1.08	2.80	±	1.08	0.147
Fat (g)	-	31.3	±	16.3	37.3	±	19.8	0.001
Fat (% of energy)	25 – 30[6]	24.6	±	7.4	26.2	±	9.2	0.079



A young ENAM participant is having his height measured in the post-harvest season in northern Ghana. Photo by Kimberly Harding.

reduced food stores, it is likely that the coming year's pre-harvest 'lean' season will begin earlier and be more severe than usual. This should be kept in mind when planning and executing response to this and other disasters that affect local food availability.

Understanding how season affects children's diets and nutritional status is important to inform timely and locally appropriate interventions and to prioritize interventions in settings with low-resources for health promotion and care. The knowledge that a recent flood may have diminished the normal post-harvest season increase in dietary intakes can help both governmental and non-governmental agencies plan for future natural disasters and improve the preparedness, timing, and effectiveness of response for this vulnerable population.

Flooding may be unpredictable, but if effective support systems and mechanisms are established year-round, they would be in place when regularly occurring or unanticipated changes in food availability occur. These findings can be used to inform policy change to protect health and well-being of children in Ghana.

Further Reading

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The GL-CRSP Enhancing Child Nutrition through Animal Source Food Management (ENAM) project was established in 2003 and, through research, training and outreach, monitors the multiple pathways that might increase availability, accessibility and utilization of animal source foods in the targeted communities of Ghana. The project is led by Dr. Grace Marquis, Iowa State University and McGill University. Email: grace.marquis@mcgill.ca

The Global Livestock CRSP is comprised of multidisciplinary, collaborative projects focused on human nutrition, economic growth, environment and policy related to animal agriculture and linked by a global theme of risk in a changing environment. The program is active in East and West Africa, Central Asia and Latin America.

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