Hunger and Injury in School Age Children in Zambia: A Sub-Analysis of the Global School-based Health Survey

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Introduction

- Injury is a major contributor to the burden of disease in Zambia. **The country loses 2,597 disability adjusted life years (DALYs) per 100,000 person years due to trauma**, with children under 14 contributing 691 per 100,000 person years.[1]
- Identification of risk factors for injury in children is important given the age makeup of Zambia. Forty-five percent of the population is under 14 years of age, 65% of the population resides in rural areas with limited access to emergency health care. [2,3]
- In addition to injury, hunger affects a large proportion of the Zambian population. Nearly one third (28.1%) of Zambian children reported going hungry most of the time or always, and other work has demonstrated **53% of households in Zambian report severe food insecurity**.[4,5]
- The Global School-based Health Survey (GSHS) was conducted in Kenya, Namibia, Swaziland, Uganda, Zimbabwe and Zambia in 2004 with the goal of providing data on health behaviors and protective factors among students in order to help countries develop priorities across programs and advocate for resources, school, and youth health policies.[4]
- In light of the relatively high rates of hunger and food insecurity, and high rates of injury and intentional injury in Zambian children, the goal of this study was to further explore the relationship between hunger, injury, and violence in Zambian children.[3]
- While this study does demonstrate an association between hunger and injury, the results are not sufficient to demonstrate a causal relationship between hunger and injury.

Methods and Materials

Analysis

- The survey asked students**, "During the last 30 days, how often did you go hungry because there was not enough food in your home?"** Students were invited to answer, "Never," "Rarely," "Sometimes," "Most of the time," "Always." These responses were divided into a binary outcome variable (frequent hunger= "Always" or "Most of the time"). Previous uses of this survey have utilized a similar method of creating this binary variable, and it is reported in this manner in the CDC summary of results.[3,4]
- For analysis of risk by cause of injury in children reporting frequent hunger, multivariate logistic regression was used to generate odds ratios and 95% confidence intervals and adjust for gender. The causes of injury (i.e. MVC, fighting, or assault) were obtained in response to the question**, "Over the past 12 months what was the cause of the most serious injury that happened to you?"**
- For analysis of results of injury, one stratum was created for children who reported frequent hunger and another for children with "infrequent hunger" ("Never," "Rarely," or "Sometimes.") Contingency tables were created for responses to each injury outcome resulting from the question, "Over the past 12 months what was the cause of the most serious injury that happened to you?" Fisher's exact test was used to test for true differences between the two groups.

Methods and Materials (cont)

Survey

- The GSHS is a self-administered, school-based survey developed by the World Health Organization in collaboration with the United Nations Children's Fund, United Nations Educational, Scientific and Cultural Organization, and the Joint United Nations Programme on HIV/AIDS with technical and financial assistance from the United States Center for Disease Control and Prevention (CDC).
- It was administered to 2,257 children in grades 6-10 in the six countries listed above in 2004.[4]. Subsequently, the raw de-identified data been made available through the CDC.[4]

Results

- The frequent hunger and infrequent hunger groups were identical with regard to median age (14.6 years) and mean BMI (22.21). **Girls were 26% more likely to report going hungry at home always or most of the time (OR =1.26, 95% CI 1.04-1.52).**
- **Individuals who were victims of assault were especially likely to have reported going hungry at home (OR = 2.41, 95% CI 1.32-4.42) without gender adjustment.**
- These values were unchanged when adjusting for gender (OR = 2.65, 95% CI 1.41-4.99).
- Children who were injured either due to fighting (OR =1.65, 95% CI 0.99 -2.76) or motor vehicle crash (OR = 1.35, 95% CI 0.92 – 1.98) had increased odds of having reported frequent hunger at home that approached, but did not achieve significance.

	Children reporting infrequent hunger N (%)	Children reporting frequent hunger N (%)	p value
Female	741 (49.5%)	323 (55.3%)	0.02
Injured 1 or more times	444 (39.1%)	221 (77.2%)	< 0.01
Broken Bone	100 (14.0%)	44 (16.2%)	0.42
Cut, puncture or stab wound	87 (12.2%)	37 (13.6%)	0.59
Lost Consciousness or Neck Injury	55 (7.7%)	32 (11.8%)	0.06
Gunshot wound	23 (3.2%)	8 (3.0%)	1.00
Burn	32 (4.5%)	19 (7.0%)	0.14
Amputation or Partial Amputation	34 (4.8%)	31 (11.4%)	< 0.01

Table 1. Total and proportion of characteristics of children in each of the two hunger groups and associated p values for true differences between the populations.

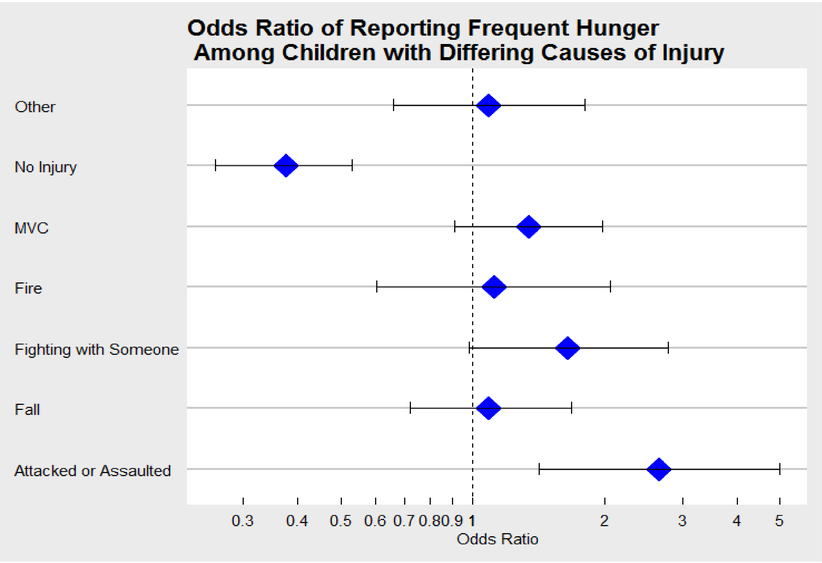

Figure 1. Odds Ratios and 95% CI for cause of injury in children reporting going hungry always or most of the time over the last 30 days, adjusted for gender and plotted on a logarithmic scale.

Discussion

- The interaction of injury, assault, and hunger can play into a toxic overall environment during childhood, which may be related to adverse health consequences that can extend into adulthood.[6,7]
- While questions regarding hunger referred to a period of 30 days prior, the recall period for injury stretched to 12 months. Previous work by Mock et al. demonstrated that accurate injury recall is generally limited to approximately 30 days, therefore, future work in this area should shorten the time period of injury recall.[8]
- Within this dataset we were unable to fully separate the effects of hunger and poverty and their relationship to childhood injury. Questions regarding family circumstances were limited. The survey included questions of hygiene behaviors, but did not include whether students' homes had running water. Parental involvement with homework was included, but no questions were asked regarding parental employment or number of siblings. The survey was administered in both urban and rural schools, but this information was not included in the publicly available dataset.
- **The delineation of the specific effects of hunger and food insecurity as separate from general poverty is an important direction for future work. This study should serve as a reminder of the importance of preventative measures for the reduction of childhood trauma that take into account the entire socioeconomic framework of children's communities.**

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References

1. IHME. GBD Compare, Viz Hub. Institute for Health Metrics and Evaluation; 2013.
2. Seidenberg P, Cerwensky K, Brown RO, et al. Epidemiology of injuries, outcomes, and hospital resource utilization at a tertiary teaching hospital in Lusaka, Zambia. *African Journal of Emergency Medicine* 2014; **4**(3): 115-22.
3. Peltzer K. Injury and social determinants among in-school adolescents in six African countries. *Injury prevention : journal of the International Society for Child and Adolescent Injury Prevention* 2008; **14**(6): 381-8.
4. Zambia Global School Health Survey. In: Ministry of Health Moe, editor. 2004 ed. online: CDC; 2004.
5. Kapungwe AK. Household food security and coping strategies in Zambia: 1991-1998: Zambia Social Investment Fund; 2004..
6. Johnson SB, Riley AW, Granger DA, Riis J. The science of early life toxic stress for pediatric practice and advocacy. *Pediatrics* 2013; **131**(2): 319-27.
7. Shonkoff JP, Garner AS, Siegel BS, et al. The lifelong effects of early childhood adversity and toxic stress. *Pediatrics* 2012; **129**(1): e232-e46.
8. Mock C, Acheampong F, Adjei S, Koepsell T. The effect of recall on estimation of incidence rates for injury in Ghana. *International Journal of Epidemiology* 1999; **28**(4): 750-5.