

Debate on the paper by Schlüssel et al.

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john.cook@bmc.org***A life course approach yields breakthroughs in understanding food insecurity and obesity among Brazilian females**

Household food insecurity, lack of consistent access to adequate healthy food for all household members to lead active healthy lives, can be both a cause and consequence of poverty. However, food insecurity is not synonymous or congruent with poverty, and the preponderance of evidence supports treating it primarily as a consequence of poverty, and other factors¹. Food insecurity has been associated with a large number of adverse physical and mental health outcomes in adults and children¹.

Changes in relationships among household income levels, food insecurity, and health as a country's economy grows include well-documented "nutrition transitions" wherein diets change as household incomes increase and a broader variety of both healthful and non-healthful foods become affordable for an increasing proportion of the population^{2,3}. Economic growth and rising household incomes are usually also accompanied by greater availability and variety of processed, packaged foods and "fast foods". Heavily-advertised processed and fast foods tend to be hyper-palatable, less expensive, more energy-dense and nutrient-sparse, and more obesogenic overall than fresh fruits and vegetables, whole grain products, and foods prepared "from scratch" and eaten at home. Increased prevalence of overweight and obesity often accompany the economic and dietary changes referred to as nutrition transitions⁴.

The nature of food insecurity's influence on diet, weight status, and overall health among different age groups during nutrition transitions in developing economies has not been conclusively determined. Thus the article by Schlüssel et al. in this volume is a particularly important contribution because it sheds light on food insecurity's influence in nutrition transitions and provides a biologically plausible framework for understanding observed differences in obesity across age intervals in developing economies.

Even more important, the findings reported in this article also suggest that food insecurity may be an important factor contributing to emergence of "dual burden" households during nutrition transitions. Dual burden households are those in which both underweight and overweight coexist within the same households, with some household members overweight or obese while others are underweight⁵. A study of dual burden households in seven countries that include Brazil found 12.3% of children *versus* only 5.7% of adults underweight, but 9.4% of children *versus* 31% of adults overweight in the Brazilian population⁵. Those results are consistent with findings from the research by Schlüssel et al. reported in this volume, which offers one plausible pathway through which food insecurity could contribute to such dual burdens.

Research on associations between food insecurity and obesity among children in the United States remains inconclusive, yielding mixed results that include positive associations, negative associations, and no associations¹. The results reported by Schlüssel et al. are in line with the research on U.S. children, and these authors findings related to adolescent girls add a critical increment to our understanding of how obesity develops across the life cycle.

The obesity pandemic poses unprecedented threats to global health and well-being. As evidence on and understanding of the childhood origins of adult disease grow, diet and nutrition during the perinatal period, infancy, and early childhood are receiving increasing attention as factors influencing health and disease across the lifespan⁶. Evidence on effects of *in utero* nutrition programming on adiposity and associated morbidity in adolescence and young adulthood raises increasing concerns about adverse impacts of mothers' diet and nutrition during pregnancies on health of offspring throughout their lives⁷.

Tantalizing recent evidence suggests that adiposity in later childhood and adolescence can be significantly influenced by food insecurity during infancy through its adverse impacts on mothers' depression and subsequent impairment of infant feeding behaviors⁸. This pathway of influence for food insecurity on adolescent obesity is generally consistent with the results observed by Schlüssel et al. in the Brazilian population.

In 2003, Brazil's President, Luiz Inácio Lula da Silva launched an ambitious program called Zero Hunger (Fome Zero), with the support of the United Nations Food and Agriculture Organization (UN FAO). Its goal was to eliminate hunger (severe food insecurity) from Brazil's population. In its report on *The State of Food Insecurity in the*

World – 2010, the UN FAO reported improvement in food security in Brazil with the “proportion of undernourished in total population” declining from 9% in 2000-2002 to 6% in 2005-2007. The weighted prevalence estimate of severe food insecurity in households with children reported by the current authors from the *2006 Brazilian Demographic and Health Survey* (DHS) of 5.7% is consistent with the more general decline reported by UN FAO. Yet it is notable that overall food insecurity prevalence among households with children in the 2006 DHS remained at 48.6% (mild food insecurity = 29.4%, moderate = 13.5%, severe = 5.7%). Even though food insecurity has not been shown conclusively associated with obesity in children, a large body of evidence indicates food insecurity even at the least severe levels is detrimental to children’s health and development¹.

While their life course approach provides important new information, additional questions are raised by the results presented by Schlüssel et al. regarding the mechanisms whereby food insecurity influences overweight and obesity at different stages of the life course. Evidence from food security research in the U.S. indicates that adults in food-insecure households with children usually attempt to spare their children from reductions in dietary intake, and often succeed by reducing the quality and/or quantity of their own food intake. Moreover, U.S. research indicates greater likelihood of severe food insecurity among young children if older children are also present in the household. It would be useful to know more about how such “rationing” behaviors operate in Brazilian households, and how they associate with overweight and obesity in members of different age and sex.

An additional question in need of further enquiry is raised by the finding in the current study of positive association between severe food insecurity and overweight among adolescent girls. The authors posit several possible explanations, but leave the question open. It would be useful to know more about patterns of physical activity (and sedentary behavior) among adolescent girls, for example, and how they are associated with adiposity.

In general the findings regarding greater likelihood of overweight and obesity in adult Brazilian women in moderately food-insecure households are consistent with research on U.S. women. In some U.S. studies adult women in moderately food-insecure households experience higher likelihood of overweight, while those in severely food-insecure households experience other health problems related to undernutrition. It would be useful to expand food insecurity re-

search in Brazil to examine associations between severe food insecurity and other adverse health outcomes among all age groups.

Successful adaptation of the U.S. Food Security Measurement Module to the Brazilian population has enabled a very rich body of research on the causes and consequences of food insecurity and hunger in the Brazilian population. The research reported in this issue by Schlüssel et al. exemplifies the great potential for productive exploitation of data from Brazil’s rich national surveys to further clarify the nature of food insecurity and hunger in Brazil and to inform policies to successfully address these conditions and the serious health problems with which they are associated.

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