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Household food group expenditure patterns are associated with child anthropometry at ages 5, 8 and 12 years in Ethiopia, India, Peru and Vietnam

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ABSTRACT

Population-level analysis of dietary influences on nutritional status is challenging in part due to limitations in dietary intake data. Household expenditure surveys, covering recent household expenditures and including key food groups, are routinely conducted in low- and middle-income countries. These data may help identify patterns of food expenditure that relate to child growth.

Objectives: We investigated the relationship between household food expenditures and child growth using factor analysis.

Methods: We used data on 6993 children from Ethiopia, India, Peru and Vietnam at ages 5, 8 and 12y from the Young Lives cohort. We compared associations between household food expenditures and child growth (height-for-age z scores, HAZ; body mass index-for-age z scores, BMI-Z) using total household food expenditures and the "household food group expenditure index" (HFGEI) extracted from household expenditures with factor analysis on the seven food groups in the child dietary diversity scale, controlling for total food expenditures, child dietary diversity, data collection round, rural/urban residence and child sex. We used the HFGEI to capture households' allocations of their finances across food groups in the context of local food pricing, availability and pReferences

Results: The HFGEI was associated with significant increases in child HAZ in Ethiopia (0.07), India (0.14), and Vietnam (0.07) after adjusting for all control variables. Total food expenditures remained significantly associated with increases in BMI-Z for India (0.15), Peru (0.11) and Vietnam (0.06) after adjusting for study round, HFGEI, dietary diversity, rural residence, and whether the child was female. Dietary diversity was inversely associated with BMI-Z in India and Peru. Mean dietary diversity increased from age 5y to 8y and decreased from age 8y to 12y in all countries.

Conclusion: Household food expenditure data provide insights into household food purchasing patterns that significantly predict HAZ and BMI-Z. Including food expenditure patterns data in analyses may yield important information about child nutritional status and linear growth.

Abbreviations: BMI-Z, body mass index-for-age z score; FAO, Food and Agricultural Organization; HAZ, height-for-age z score; WAZ, weight-for-age z score; WHO, World Health Organization; WHZ, weight-for-height z score; y, year(s); YL, Young Lives study.

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1. Introduction

Globally, 165 million children are stunted and 50 million children are wasted (Black et al., 2013a). Stunted and wasted children suffer short- and long-term consequences (Walker et al., 2005; Crookston et al., 2011; Victora et al., 2008; Behrman, 2014); therefore, improving children's nutrition is a global priority (United Nations, 2014; United Nations, 2016). Food intake is one of the causes of undernutrition. It is difficult to identify through population-level analyses what aspects of food intake drive poor nutritional status, in part because information on influences on the food choices that determine consumption is often lacking. Heterogeneities in food consumption may be considerable across households because of variations in preferences, food prices, food availabilities and resource constraints. Investigating patterns in food expenditures at the household level may provide a novel tool for assessing child and household nutritional risk. Furthermore, accurate quantitative measures of dietary intake are time-consuming to obtain, and require extensive food composition databases and nutritional expertise for data collection and analysis (Willett, 1998; Gibson, 2005; Magarey et al., 2011; Fiedler et al., 2013). Additionally, when researchers, program planners and evaluators collect data on foods and liquids consumed in the previous 24 h, this information may not reflect usual intake (Sempos et al., 1985). Because policy makers lack access to information on usual patterns of dietary intake, it is challenging to determine best approaches for improving individuals' consumption of food.

Data on household food expenditures (defined as market purchases, gifts and foods drawn from own production or stocks consumed by the household) reflect periods longer than 24 h (often 2 weeks) and are consistent, for example, with Living Measurement Surveys conducted by The World Bank and national statistical bureaus (Long et al., 2007). Field workers collecting household expenditure data need to be trained. Similarly, individuals who collect and analyze data using 24-h recalls need specialist training. However, in contrast to use of expenditure data, analysis of dietary intake data requires regular, time-consuming updates of food data bases with information on food preparations, corrections for cooking, waste and portions (Gibson, 2005). Additional advantages and disadvantages of 24-h recall data and expenditure data are outlined in Box 1.

Many governmental and non-governmental organizations conduct household consumption and expenditure surveys (HCES) that include information on how much households spend on key food groups. They conduct these surveys every 3–5 years in more than 125 low- and middle-income countries (Fiedler et al., 2012a). Several studies demonstrate significant relationships between

Box 1. Advantages and disadvantages of dietary intake data relative to household food expenditures data.

Survey	Advantages and disadvantages
Quantitative measures of dietary intake including 24-hour recall (as well as longer recall periods)	Advantages: • Approach is well known and commonly used by researchers and staff from NGOs and government • Because the recall period is short, there is less risk for recall bias Disadvantages: • Time consuming to obtain accurate quantitative measures of dietary intake • Extensive food composition databases and nutritional expertise for data collection and analysis are needed and must be updated regularly • Data from 24-hour recall may not reflect usual dietary intakes
Household food expenditures including Living Measurement Surveys (LMS) and Household Consumption and Expenditure Surveys (HCES)	Advantages: • Reflect periods longer than 24 hours and may better approximate a usual diet • Consistent with other data collection efforts including the LSMS • Contain information on how much households spend on key food groups • HCES is conducted every 3-5 years in more than 125 countries Disadvantages: • Requires training in both data collection and analysis of expenditure data • Expenditure on food groups does not necessarily mean that particular individuals (e.g., children) actually consume the food (researchers must make assumptions about intra-household food allocation)