Adolescent-Reported Household Food Insecurity and Adolescents' Poor Mental and Physical Health and Food Insufficiency in Kenya

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ABSTRACT

Background: Assessing adolescents' experiences of food insecurity in households is important for promoting healthy development. Although parental reports have been traditionally used, emerging research highlights the importance of child and adolescent reports of the household food environment.

Objectives: Extending research from high- and upper-middle-income countries, this study of adolescent compared with adult reports of household food insecurity in Kenya, a lower-middle-income country, examined *1*) prevalence of and correspondence between adolescent and adult reports of household food insecurity, and *2*) associations of adolescent and adult reports of household food insecurity with adolescent nonnutritional and nutritional outcomes.

Methods: Using data from the Kenya Violence Against Children Surveys ($n = 1182$), we assessed prevalence of household food insecurity reported by adolescents (ages 13–17 y) and adults, with McNemar χ^2 and κ analysis of correspondence between reports. Ordinal and binary logistic regression assessed associations between adolescent and adult reports and adolescent mental health and self-rated physical health and food sufficiency outcomes.

Results: Household food insecurity was reported by 36% of adolescents and 63% of adults; 36% of adult reports were discordant with adolescent reports ($\kappa = 0.333$). Odds of adolescent mental health difficulties were highest with adolescent-only report (OR = 2.11, $P = 0.02$), followed by adult and adolescent (OR = 1.83, $P = 0.001$) and adult-only (OR = 1.06, $P = 0.77$) report. Odds of poor adolescent self-rated physical health were highest with adult and adolescent report (OR = 2.47, $P < 0.001$) followed by adolescent-only (OR = 2.04, $P = 0.08$) and adult-only (OR = 1.37, $P = 0.20$) report. Odds of adolescents eating ≤ 1 meals the previous day were highest with adult and adolescent (OR = 21.38, $P < 0.001$) followed by adult-only (OR = 7.44, $P = 0.01$) and adolescent-only (OR = 2.31, $P = 0.34$) report.

Conclusions: Measuring household food insecurity with both adolescent report and adult report is important for having a comprehensive understanding of household resources and needs and of the nonnutritional (mental and physical health) and nutritional (diet and food) outcomes of household food insecurity for adolescents.   *Curr Dev Nutr* 2022;6:nzac117.

Keywords: household food insecurity, low- and middle-income countries, Kenya, adolescent mental health, adolescent physical health, child food insecurity, adolescent food insecurity

Introduction

The experiences of food insecurity by members of a household are influenced by the overall food resources available to and accessible by the household as well as the intrahousehold allocation of those food resources. Intrahousehold food allocation can be affected by whether the household is male-headed, de facto female-headed (i.e., the man lives away but regularly contacts the family and sends remittances), or de jure female-headed (i.e., the woman heads the household being a widow, divorced, or separated) (1). In a polygamous household, food allocation and experiences of food insecurity also can be affected by the rank of the women (2, 3). Intrahousehold food allocation can affect the

food insecurity experiences and nutrition of children and adolescents (1, 4, 5).

Promoting the healthy development of children and adolescents experiencing food insecurity requires identifying which young people are at risk and responding to the mechanisms through which that risk unfolds. Traditionally, assessment of children and adolescents experiencing food insecurity has relied on parent or caregiver reports of their offspring's food experiences (6–8), whereas intervention responses have centered on providing increased food supply or food access to households so that adults can better meet children's and adolescents' nutritional needs (9). This assessment method and response to household food provision have limitations. A 2009 study of Ethiopian youth

found that adolescents were not being adequately protected from household food insecurity by adults, but instead were actively experiencing food insecurity and its consequences (10). Recent research in the United States and Venezuela draws into question the adequacy of relying on adult-only reports for assessment and the responses, emphasizing the importance of children's and adolescents' own reports of their food insecurity for accurate assessment (11–15) and of attending to the nonnutritional as well as nutritional mechanisms through which food insecurity compromises children's and adolescents' well-being (16–18).

Parents play a central role in household food management but have limited knowledge of how their offspring experience the household food environment, often believing children and adolescents to be protected from food-related hardships when young people themselves report both awareness and negative consequences (11, 13–15). This discrepancy is reflected in poor correspondence between adult and offspring reports of offspring's food insecurity, with parents substantially underreporting offspring food insecurity (14, 15). In part this discrepancy is because children and adolescents experience food insecurity not just through the amount and type of food they eat but also through psychosocial processes involving worries, anxiety, anger, shame, stigma, and social isolation. These nonnutritional consequences of food insecurity are harder for parents to observe because they are either internal to their offspring (19, 20) or unfold in the offspring's social interactions often outside the household context. Inadequate nutrition during childhood and adolescence can have serious and enduring negative consequences (21) and so can their exposure to stress and psychosocial strains, which are associated with later mental health, behavioral, and physical health problems (22–27).

Most studies focusing on child and adolescent reports of their food insecurity and its consequences have been conducted in relatively resource-rich contexts where few children and adolescents are subject to severe food shortages. For instance, undernourishment is rare in both North America (<2.5%) and South America (5.5%) compared with the world overall (22.2%) or Eastern Africa (30.8%) (28). It is therefore not yet known if recent studies focusing on the perspectives of children and adolescents have shed light on dynamics that characterize only resource-rich contexts or on more universal dynamics and experiences that can be drawn on to guide global monitoring and intervention efforts. The current study therefore extends analysis of adult compared with adolescent reports and nutritional and nonnutritional mechanisms to Kenya, an Eastern African country where 26% of children experience chronic malnutrition (29). Using data from the Kenya Violence Against Children Surveys (VACS; $n = 1182$), we first determined the prevalence of adolescent and adult reports of food insecurity and the correspondence between these reports. Next, we examined nonnutritional and nutritional adolescent outcomes, assessing which reports (adolescent or adult) of food insecurity are better predictors of which adolescent outcomes.

Methods

Study design

This study used secondary analysis of data from 1182 Kenyan noninstitutionalized males and females aged 13–17 y and the adult respondent in their home using data from the VACS. The VACS aims to

measure and monitor violence against children and youth, including information about the contexts in which violence occurs. Contextual variables assessed in the Kenya VACS survey include information about food insecurity from both adult and adolescent perspectives, making these data appropriate for the purposes of this study (30). The VACS are cross-sectional, nationally representative household surveys of adolescents and young adults in low- and middle-income countries (31). Data were collected in 2019. A 3-stage cluster sampling design was used. Because survey questions asked about gendered violence, the samples for male adolescents and female adolescents were obtained from different communities to protect respondents. Household response rates were 91% for both male and female adolescents. VACS data collection processes adhered to WHO recommendations on ethics and safety related to the study of violence against women, children, and adolescents (32). The procedures also involved adaptations within each country to ensure cultural relevance, and to provide appropriate responses related to the emotional sensitivity of topics discussed, including linking respondents to resources and services relevant to challenges that were identified during the survey process (32). Data were collected using in-person interviews with both the individual adolescent and the adult respondent (33). Interviewers obtained informed consent from all participants (33).

Context

The Republic of Kenya is a sub-Saharan East African nation with >47 million residents. Kenya is ethnically diverse, with >70 tribal and ethnic groups and subgroups, and >500,000 refugees and asylum-seekers (34). About 36% of Kenyans live below the international poverty line (equivalent to US$1.90/d) (35). Although Kenya has invested heavily in national health infrastructure, ~83% of Kenyans lack financial protection from health costs, and >1.5 million Kenyans fall below the poverty line due to health-related expenses (36, 37). Although UNICEF ranks Kenya as a nation with high levels of social, community, and family support, 2.6 million Kenyan children have experienced parental death and/or separation (38), primarily due to the HIV/AIDS epidemic (39).

The United States Agency for International Development (USAID) and the United Nations World Food Program have identified 1.3 million people in Kenya experiencing "crisis or worse levels of acute food insecurity" in 2020, down from 2.6 million people the year prior, according to the integrated phase classification system of the famine early warning system (29). Over the last 5 y (since 2015), Kenyans have been particularly vulnerable to food insecurity due to drought, locusts, and other threats to food production (29) as well as insufficient roads, limited transportation infrastructure, economic challenges, and other threats to food distribution (40). This context was foundational in determining study variables and analyses.

Measures

Food insecurity for an individual means "not having physical, social, and economic access to sufficient, safe, and nutritious food which meets dietary needs and food preferences for an active and healthy life" (41). "Food insecurity for a household means access by all members at all times to enough food for an active, healthy life" (42). Adolescent-reported household food insecurity was measured in the survey by the focal adolescent's response to a single item: "Do you think this

TABLE 1 Descriptive statistics (*n* = 1182)

Variable		*n*	%
Adolescent's gender	Female	506	42.8
Adolescent's age, y	13	298	25.2
	14	247	20.9
	15	237	20.1
	16	219	18.5
	17	181	15.3
Adolescent reports household food insecurity	Yes	430	36.5
Adult respondent reports household food insecurity	Yes	749	63.4
Adolescent ate ≤1 meals yesterday	Yes	75	6.35
Adolescent reports fair or poor physical health	Yes	210	17.0
Adolescent report of poor mental health (0–5)	0	530	45.3
	2	245	21.0
	3	328	28.1
	4	37	3.17
	5	29	2.48

household has enough money for basic things such as food?" and dichotomized (yes = 0, no = 1). Adult-reported food insecurity was measured by the adult respondent's response to the single item: "How often during the last 12 months did you have problems getting enough food for the household?" and dichotomized (never = 0, sometimes, often, or always = 1).

Outcome measures reflect both nonnutritional and nutritional mechanisms through which food insecurity has been found to impact adolescents' well-being (43). Adolescent health (nonnutritional path) was measured by the adolescent's response to the question: "In the last 30 days, would you say that in general your health is excellent, very good, good, fair, or poor?" and dichotomized (excellent, very good, or good health = 0, compared with fair or poor health = 1). Adolescent mental health (nonnutritional path) was measured by summing adolescents' responses to 2 questions: "During the past 30 days, about how often did you feel so sad or unhappy that nothing could cheer you up?" and "About how often during the past 30 days did you feel nervous, tense or worried?" Each question had response options of: none of the time (= 0), some of the time (= 1), most of the time (= 2), or all of the time (= 3), which were summed for a combined scale of 0 to 6. Food sufficiency (nutritional path) refers to having an adequate amount of food and was indicated by the adolescent's report of number of meals eaten yesterday, dichotomized to contrast ≥2 meals (= 0) compared with ≤1 meals (= 1). These measures of mental health and physical health were selected because of their fit with existing knowledge about the multidomain impact of food insecurity on adolescent well-being and development and their availability in the dataset.

Because parental and adolescent experiences can differ based on adolescent age and gender identity, and because an adolescent's gender can influence food-related household responsibilities, all analyses adjusted for adolescent age and adolescent gender. Age was measured by the question: "How old are you now?" (in years). Adolescent gender (male = 0, female = 1) was reported by the adult respondent as part of the sampling plan.

Statistical analyses

To address our aim regarding the prevalence of adolescent and adult reports of food insecurity and their correspondence, we used standard descriptive statistics for each prevalence and McNemar χ^2 and analyses for paired data to assess the relation between adolescent-reported food insecurity and adult-reported food insecurity within the same household. The κ statistic was used to quantify concordance correcting for chance.

To address our aim regarding adolescent compared with adult reports of food insecurity as predictors of adolescents' nutritional and nonnutritional outcomes, we used ordinal (mental health outcome) and binary (adolescent self-rated physical health and food sufficiency outcomes) logistic regression. We ran a model for each outcome with the predictor variable categorized as: *1*) both adolescent- and adult-reported food security (reference category), *2*) adolescent-reported food insecurity only, *3*) adult-reported food insecurity only, and *4*) both adolescent- and adult-reported food insecurity. We adjusted for adolescents' age and gender. Sample weights were calculated using the variables of gender, age, and region, accounting for poststratification population adjustment and nonresponse (44). We included sampling weights in the analyses and accounted for clustering using a robust sandwich estimator. Statistical analyses were conducted using Stata/IC version 16.0 (45).

Results

Nearly half of adolescents identified as female (43%, **Table 1**). Adolescents' ages ranged from 13 to 17 y (25% were age 13, 21% age 14, 20% age 15, 19% age 18, and 15% age 17). About 6% of adolescents ate ≤1 meals the day prior, 17% reported fair or poor self-rated physical health, and 55% reported some mental health symptoms.

About two-thirds (36.5%) of adolescents reported household food insecurity whereas 63.5% of adults reported household food insecurity (**Table 2**). More than one-third (35.8%) of adolescent and adult reports of household food insecurity were discordant, with adolescents (36.5%) less likely to report household food insecurity than adults (63.3%). The κ statistic for concordance, correcting for chance, was 0.333, which is fair concordance. Most adolescents who reported household food insecurity (87.7%) lived in households where the adult also reported food insecurity. Among households in which the adult reported food insecurity, adolescent reports were split nearly evenly between reporting household food security and insecurity.

TABLE 2   Concordance of adolescent and adult reports of household food insecurity[1]

Adolescent reports	% Across	Adult reports No	Yes	Total
No	Row	50.7	49.3	100
	Column	87.7	49.5	63.5
Yes	Row	12.3	87.7	100
	Column	12.3	50.5	36.5
Total	Row	36.7	63.3	100
	Column	100	100	100

[1]Differences between adolescent and adult reports: McNemar χ^2 = 240.6; P < 0.001; Agreement: κ = 0.333.

In multivariable analyses, households in which only adults reported food insecurity had 6% higher odds (OR = 1.059, P = 0.768) of adolescents experiencing mental health difficulties and 37% higher odds (OR = 1.370, P = 0.199) of adolescents experiencing self-rated health difficulties, compared with households with no reports of insecurity (**Table 3**). Adolescents in households in which only adults reported food insecurity were >7 times more likely to have eaten ≤1 meals the preceding day (OR = 7.441, P = 0.008), compared with households with no reported food insecurity. In households where only adolescents reported food insecurity, adolescents were about twice as likely to experience mental health difficulties (OR = 2.109, P = 0.019), self-rated health difficulties (OR = 2.036, P = 0.082), and eating ≤1 meals the preceding day (OR = 2.305, P = 0.339), compared with households with no reported food insecurity. In households where both the adult and adolescent reported food insecurity, the odds of adolescents experiencing mental health difficulties, self-rated health difficulties, and eating ≤1 meals the preceding day were, respectively, 83% higher (OR = 1.832, P = 0.001), 2.5 times higher (OR = 2.470, P < 0.001), and 21 times higher (OR = 21.379, P < 0.001), compared with households with no reported food insecurity.

Discussion

The prevalence of food insecurity among Kenyan families was high, with almost two-thirds of adults reporting that during the past year they had had difficulties getting enough food for their household, and over one-third of adolescents reporting that their household did not have enough money for basic things like food. Consistent with findings from the United States (14, 15) and Venezuela (12), this Kenyan sample demonstrated only fair concordance between adolescent and adult reports of food insecurity. Unlike the US and Venezuelan

studies (12, 14, 15), however, adolescents in the Kenyan sample reported less rather than more frequent food insecurity than did adults in their household, consistent with Hadley's work in Ethiopia where adolescents reported less food insecurity than did their parents (46). In contrast to the Ethiopian study, for which adolescents reported on their own individual food insecurity, in our study adolescents reported on the household food environment. So, rather than finding that adolescents were less likely to be food insecure than adults, we found that adolescents were less likely to report household food insecurity than their parents.

Extending prior findings that child reports of child food insecurity are the best predictors of child outcomes (12), in this study adolescent reports of the household food environment were important for predicting adolescent outcomes. Household food insecurity was, as expected, associated with negative adolescent nonnutritional and nutritional outcomes. Adolescents in households that struggled to afford enough food experienced more sadness, worry, nervousness, and/or tension, felt less physically healthy, and ate fewer meals. Adolescents' reports of their household's food insecurity best predicted adolescent mental health, suggesting that it is the adolescent's awareness of and feelings about the household food environment that leads to experiences of anxiety and depression. Adolescent and adult agreement that the household was food insecure predicted poor adolescent self-rated physical health, but adolescent-only report had a similar OR. Adult-only reported food insecurity was not associated with the odds of adolescent mental or physical health problems, suggesting that household food security about which adolescents are not aware is less likely to contribute to these child outcomes. These findings fit with the growing body of research suggesting that children and adolescents are the best reporters of their experiences of food insecurity (11, 13, 14) and that both household food insecurity and children's individual food insecurity are linked to children's mental, behavioral, and physical health (47–51).

TABLE 3   Association of food insecurity reported by adolescents and adults with mental health, physical health, and food insufficiency

	Poor mental health OR	P value	Poor physical health OR	P value	One or fewer meals OR	P value
Food insecurity[1]						
Adult-reported only	1.059	0.768	1.370	0.199	7.441	0.008
Adolescent-reported only	2.109	0.019	2.036	0.082	2.305	0.339
Adult- and adolescent-reported	1.832	0.001	2.470	<0.001	21.379	<0.001
Age, y	1.281	<0.001	1.230	0.015	1.094	0.638
Gender (female)	1.102	0.582	2.129	<0.001	1.719	0.229

[1]Reference category for food insecurity was both adolescent- and adult-reported food security.

The odds of an adolescent eating ≤1 meals the previous day were 3 times greater when both adolescents and adults reported household food insecurity (OR = 21.379) than when only the adult reported household food insecurity (OR = 7.441); adolescent-only report was associated with much smaller odds for this outcome. The greater importance of adult-reported household food insecurity in explaining food insufficiency is an expected finding because adults often manage household meals and food budgets, so adult awareness of household food insecurity can be reflected in how adults distribute food resources, including to adolescents, and thus is relatively well aligned with adolescents' experiences of how much they eat. Our measure of food insufficiency tapped only severe food hardship, however, contrasting adolescents who ate ≤1 meals with those who ate >1 meal a day. More nuanced assessment of food sufficiency, including measures of specific micro- and macronutrient intake, might have been more sensitive to adolescent-reported household food insecurity rather than adult-reported household food insecurity, and this should be examined in future research. Nevertheless, this study indicates that adult report of household food insecurity could be an important predictor of severe food deprivation in adolescents, whereas adolescent reports are important to predict experiences of health and mental health problems associated with household food hardships.

Several study constraints limit the scope of our findings. First, although this study relied on both adult respondent and adolescent reports of household food insecurity, the question on household food insecurity was asked differently to adults and adolescents (e.g., adults were asked "How often during the last 12 months did you have problems getting enough food for the household?" and adolescents were asked "Do you think this household has enough money for basic things such as food?"). Asking these household food insecurity questions differently could have influenced the results in terms of discordance between adolescent report and adult report and in terms of associations with adolescent mental and physical health. Second, these single items that were available in the dataset did not tap all the domains (e.g., cognitive, emotional, and physical awareness of food insecurity) through which food insecurity impacts adolescents' growth and development (11, 13) and focused on reports of household food insecurity rather than the adolescent's own food insecurity, which is likely more strongly associated with adolescent outcomes. Furthermore, a single item is less reliable than a set of items. For example, we did an ancillary analysis of data from a prior study in western Kenya (52) and found that using a single item for household food insecurity instead of the full 9 items that had been used would have resulted in about one-third greater unreliability. Unreliability would have overestimated discordance between adolescent and adult reports of household food insecurity and underestimated the true associations between the reports of household food insecurity and other outcomes for both adolescent and adult reports. Third, as mentioned previously, our measure of food insufficiency dichotomized adolescents who ate ≤1 meals daily with adolescents who ate >1 meal daily, which might not adequately capture the complexities associated with insufficient energy and nutrient intake. Finally, due to limitations in the data, a limited set of variables were adjusted in our analyses. The relations between food insecurity and child outcomes could appear diminished if we had adjusted for household income or other socioeconomic factors. The goal, however, was to compare adult with adolescent reports in relation to adolescent outcomes, to better understand the utility of these

different sources of information for identifying challenges to adolescent well-being, not to explain ultimate causes of these challenges. Despite these limitations, findings from this study provide valuable insight into adolescent-reported and adult-reported household food insecurity in Kenya.

Adolescent reports add important information for predicting outcomes of serious food hardships. When we expand our focus from food insufficiency to include the mental and physical health problems that can hinder adolescents' growth and development, adolescent report of food insecurity is necessary because adult-only reports were not strongly associated with these adolescent outcomes. To better assess the holistic impacts of food insecurity and inform the targeting of resources and interventions, global monitoring should when possible include adolescent reports of their experiences related to food insecurity.

This study adds to the growing body of research indicating that household food insecurity is associated with critical nonnutritional and nutritional outcomes for children and adolescents. The finding that food insecurity among Kenyan households is high and is associated with harms to adolescents underscores the need for additional research, programs, and services to promote child and family well-being in Kenya. Understanding adolescents' experiences of food insecurity could inform investments, food programs, and policies in 2 ways. First, measuring household food insecurity with both adolescent report and adult report could lead to a more comprehensive understanding of household resources and needs. Second, because child and adolescent food insecurity is associated with both nonnutritional and nutritional outcomes, efforts to address food insecurity should consider the dietary consequences of food assistance interventions, the ways in which those interventions can influence children's and adolescents' physical and mental health, and additional or alternative interventions that directly mitigate mental and physical health difficulties. For instance, food assistance interventions that protect child, adolescent, and family privacy; avoid stigma; and attend directly to health and mental health needs could achieve better outcomes than those that do not.

Data Availability

Data from the Violence Against Children Study (VACS) are available from the US CDC and Together for Girls but restrictions apply to the availability of these data. VACS data are available from the authors upon reasonable request and with permission of the CDC and Together for Girls at https://www.togetherforgirls.org/violence-children-surveys/.

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