Gender Differences in Food Insecurity and Morbidity Among Adolescents in Southwest Ethiopia

WHAT'S KNOWN ON THIS SUBJECT: The associations between food insecurity and child well-being have been well studied on the basis of household levels of food insecurity, as reported by heads of households.

WHAT THIS STUDY ADDS: Household measures, however, may not capture gender biases in food insecurity and morbidity. This study assessed adolescents' own experience with food insecurity and how it was associated with morbidity and the effect of gender in this process.

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KEY WORDS

gender, morbidity, food insecurity, adolescent, Ethiopia

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abstract

OBJECTIVE: Several studies have shown the adverse health consequences of food insecurity on household members. To what extent this relationship is mediated by gender among adolescents has not been documented. We hypothesized that the health consequences of food insecurity would be more pronounced in girls compared with boys.

METHODS: We used the first-round data from a 5-year longitudinal family survey of 2084 adolescents aged 13 to 17 years from urban, semiurban, and rural areas of southwest Ethiopia. Stratified random sampling was used to select households and adolescents. Multivariable logistic regression was used to compare self-reported morbidity according to food-security status and gender after adjusting for nutritional and socioeconomic covariates.

RESULTS: Overall, 29.9% of girls and 19.2% of boys reported illness during the previous 1 month before the survey. Food-insecure girls were twice as likely to report suffering from an illness ($P < .01$) compared with boys, and the risk of reported illness tripled when girls were food insecure and were part of food-insecure households ($P < .01$). Girls were 7.4 and 7.0 times more likely to report difficulties with activities because of poor health and having a feeling of tiredness/low energy compared with boys, respectively ($P < .001$).

CONCLUSIONS: We report that in a food-insecure situation, gender is an important predictor of an adolescent's self-reported health status. Food-security interventions should consider gender as a key variable to narrow the gap in health between boys and girls. *Pediatrics* 2011; 127:e398–e405

Although adolescents are considered to be the relatively healthy segment of the population, they are vulnerable to illness in constrained situations such as food insecurity.[1–3] Food insecurity is associated with a range of poor health outcomes in adolescents, adults, and children. It also affects both psychosocial and physical health outcomes[4,5] and leads to overall poorer health among members of food-insecure households.[1,2,6,7] However, gender inequalities in health have been consistently documented.[3,8] Because gender is a measure of socially constructed differences based on biological sex, it is likely that health inequalities between male and female subjects reflect disparities in exposure to gender-related factors.

Biological, behavioral, and sociocultural mechanisms have been proposed for the gender differences in morbidity and mortality.[9] Biologically, female subjects have an advantage for better health and longer survival because of the role of sex hormones in modulating lipid levels and increasing immune response.[10–12] In addition, the difference in morbidity and mortality between boys and girls is further related to individual lifestyle, the use of health care, and health and illness behaviors and practices.[13–15] For example, adolescent boys are more likely to smoke and have higher propensities of taking greater risks that expose them to injury.[13,16]

Although female subjects have biological and behavioral advantages, established gender norms and values in developing countries contribute to the loss of the "female advantage" throughout the life cycle.[16] While the effect of sociocultural factors is potentially less visible in societies with egalitarian attitudes toward gender, women and girls have little decision-making power and enjoy less freedom and resources in constrained situations.[1,17] We previously reported how in the Ethiopian cultural milieu, boys were more buffered from food insecurity than girls.[1]

The associations between food insecurity and child well-being to date have been based on household levels of food insecurity, as reported by heads of the households.[2,3,18–20] Household measures, however, may not capture gender biases in intrahousehold buffering of children against food insecurity because parents may be unwilling or unable to report such biases. To understand differences in morbidity among food-insecure boys and girls, it is essential to measure how adolescents experience the effect of food insecurity on their health.[1,21] Little if any research has been conducted to assess how adolescents experience food insecurity, how this is associated with morbidity, and the effect of gender in this process. Previously, we reported how girls suffered from food insecurity more than boys and how food insecurity was associated with poorer health outcomes in Ethiopia.[1] In this article, we document gender differences in health status among food-insecure adolescents. We hypothesized that the health consequences of food insecurity are more pronounced in girls than boys.

SUBJECTS AND METHODS

This report is based on data from 2084 adolescents enrolled in the first round of the 5-year longitudinal study of adolescents in the Jimma zone in southwest Ethiopia. The study area was stratified into urban (Jimma City), semiurban (small towns), and 6 rural communities ("kebeles") adjacent to the towns and represents a range of ecological and developmental contexts. A census was conducted to generate a list of all households in each site that produced a sampling frame of 5795 households. A 2-stage sampling plan was used to select a sample of 2100 adolescents of age. As a first stage, 3700 households comprising at least 1 male or 1 female adolescent were randomly selected from the list. The sample size for each study site was allocated on the basis of probability proportional to size. In the second stage, 1 adolescent aged 13 to 17 years (boy or girl) was randomly selected from each household in the sample using a Kish table.[22] This age group was selected for follow-up to capture life events that happened as boys and girls transitioned to adulthood. This sampling plan produced a representative sample of households and adolescent boys and girls.

Measurements

Structured household and adolescent questionnaires were used to collect data. The household and adolescent interviews were completed in mid-2005 to 2006. This timing corresponds to the rainy (hunger) season and the spring season, which is relatively better in terms of food security. The questionnaires were interviewer administered and translated to the local languages (Amharic and Oromifa), and their consistency was checked by another person who spoke both languages. Both adolescent and household food insecurity were measured with items adapted from household food-insecurity scales that were previously validated for use in developing countries.[23–25] The details of the methods used to assess adolescent and household food insecurity are described elsewhere.[1] Food security is defined as the situation when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life.[26]

Dietary diversity was assessed with a food-frequency questionnaire contain-

ing 30 food items that are commonly consumed in the study area. Participants were asked to report the frequency of consumption of each food using the past 3 months as a reference.[27] Given the large variation of dietary habits in the local community over the days of the week, the consumption of each food item per day[28] was not taken as a cutoff point for defining consumers. Adolescents were coded as a "consumer" of a food item if he/she had consumed the food item at least once per week.[29] The food items were grouped according to the MyPyramid classification.[30] A dietary-diversity score was calculated as the sum of these food groups consumed over a week. The means of the dietary diversity score were used to compare boys and girls.

Height was measured to the nearest 0.1 cm using a stadiometer (SECA, Hannover, Germany), and weight was measured to the nearest 0.1 kg using digital scales (SECA). Age- and gender-adjusted BMI *z* scores were calculated by using World Health Organization Anthro-Plus software.[31]

Adolescent self-reported morbidity was assessed using 3 questions. Adolescents were asked (1) "In the past 30 days, how often has a feeling of tiredness or not having enough energy been a problem for you?" (2) "Overall in the past 30 days, how often have you had difficulties with school, work or household activities because of poor health?" (3) "When was the last time you were sick with any illness?" The possible responses to the first 2 questions were "very often," "sometimes," "rarely," and "never." For this analysis, we coded responses for both questions as "very often/sometimes" and "rarely/never" because the subjects who reported "very often" were few. Reponses to the last question were coded as "yes" for "within the last 1 month" and as "no" for both "no illness" or "illness before last 1 month." Self-reported health status over a reference period of 4 weeks has been indicated to be a reliable measure of objective health.[32,33]

The questionnaire was pretested on 200 adolescents selected from a community in Jimma City that was not included in the main study and modified on the basis of the pretest observations. The interviewers were given an intensive training for 1 week before the pretest, and an additional training was given with the final version of the questionnaire for 1 week before the beginning of the actual interviews. Supervisors kept track of the field procedures and checked the completed questionnaires everyday to ensure accuracy of the data. The research team supervised the data-collection team every week by physically going to the field site and checking questionnaires and discussing any problems that happened over the previous 5 days.

The study was cleared by the ethical review boards of both Brown University (United States) and Jimma University (Ethiopia). Informed verbal consent was obtained both from the parents and each respondent before the interview or measurement. The head of the household was interviewed by using the household questionnaire.

Data Analysis

The data were double entered, checked for missing values and outliers, and analyzed using SPSS 16.1 (SPSS Inc, Chicago, IL). First, bivariate analyses were conducted and means and proportions were compared using the *T* and χ^2 tests after checking all the assumptions. To identify the predictors of morbidity, a multivariable logistic regression model was fitted for self-reported illness and other covariates. Variables that showed a significant association with illness, difficulties in activities, and feeling tiredness/having low energy in the bivariate models were entered in the adjusted logistic model using the enter method. For illness during the previous 1 month, the model was constructed for the different scenarios including when both the household and adolescents are food secure, when adolescents are food insecure, and when both adolescents and households are food insecure. For all scenarios, illness and gender were first entered to find unadjusted effects, and then other covariates were entered sequentially to find independent effects. A similar procedure was followed to analyze the predictors of reporting difficulties with activities because of poor health and having a feeling of tiredness/low energy. Interaction between different variables was checked with the criteria for the significance of interaction term ($P < .05$). All tests were 2-sided, and *P* values of $<.05$ were considered statistically significant.

RESULTS

Of 2100 adolescents included in the study, complete data were available for 2084, providing a response rate of 99.2%. A total of 428 (20.5%) adolescents were classified as food insecure (25.5% for girls and 15.8% for boys, $P < .001$).

As presented in Table 1, gender-stratified bivariate analyses showed that a significantly ($P < .001$) higher proportion of food-insecure girls reported illness during the previous 1 month (29.9% of girls versus 19.2% of boys), whereas no significant difference in self-reported morbidity was observed between the food-secure boys and girls ($P > .05$). Household food insecurity was significantly associated with reporting having had an illness ($P < .001$), difficulties with activities because of poor health ($P < .001$), and feeling tiredness/low energy ($P < .001$) in girls, but such a difference was

TABLE 1 Self-reported Illness, Having Difficulties Attributed to Poor Health, and Feeling of Tiredness/Having Low Energy Among Adolescents According to Sociodemographic and Environmental Variables and Household and Adolescent Food Insecurity, Southwest Ethiopia

Variable	Illness During the Previous Month[a]			Difficulties With Activities Attributed to Poor Health[a]			Feeling of Tiredness/Low Energy[a]		
	Boys ($N = 121$)	Girls ($N = 168$)	*P*	Boys ($N = 66$)	Girls ($N = 330$)	*P*	Boys ($N = 85$)	Girls ($N = 384$)	*P*
Age, mean (SD), y	14.7 (1.4)	14.7 (1.3)	>.05	14.7 (1.5)	14.7 (1.3)	>.05	14.6 (1.5)	14.8 (1.3)	>.05
BMI, mean (SD)	17.1 (2.3)	18.2 (2.6)	<.05[b]	17.0 (2.0)	18.5 (2.8)	>.05	17.1 (2.1)	18.7 (2.7)	>.05
Place of residence, %									
Urban	13.6	11.9	—	7.4	35.0	—	9.7	39.6	—
Semi urban	11.6	18.1	<.01[b]	4.7	30.0	>.05	6.6	36.8	>.05
Rural	9.4	20.1		6.4	30.0	—	7.6	35.4	—
Adolescent food security, %									
Food insecure	19.2	29.9	<.01[c]	12.6	44.4	<.001[c]	18.0	50.6	<.001[c]
Food secure	10.0	11.8	—	5.0	28.0	—	6.2	33.0	—
Dietary diversity score, mean (SD)	4.4 (1.1)	4.3 (0.93)	<.01[b]	4.0 (1.1)	4.4 (0.9)	<.001[c]	4.0 (1.0)	4.2 (0.9)	<.001[c]
Household food security, %	—	—	—	—	—	—	8.7	46.2	<.001[b]
Food insecure	11.1	21.7	<.001[b]	7.5	41.2	<.001[b]	7.6	31.8	—
Food secure	11.7	12.9	—	5.4	26.3	—	—	—	—
Household income, tertiles, %	—	—	>.05	—	—	>.05	—	—	>.05
Lower	31.4	31.5	—	34.8	33.3	—	34.1	31.8	—
Middle	33.9	36.3	—	33.3	29.4	—	38.8	32.0	—
Higher	34.7	32.1	—	31.8	37.3	—	27.1	36.2	—
Garbage disposal, %									
Proper	12.6	13.7	<.01[b]	6.1	21.6	<.001[b]	7.6	44.3	<.001[b]
Open field	9.7	19.9	—	6.5	42.1	—	8.3	32.2	—
Cooking place, %	—	—	—	—	—	—	—	34.5	—
Sleeping room	11.5	15.5	<.05[b]	6.4	28.4	—	10.2	43.9	>.05
Kitchen connected to the living room	11.2	23.4	—	7.0	38.0	>.05	11.6	36.5	—
Separate place	11.5	14.9	—	6.0	31.6	—	6.4	—	—
Place of animals at night, %									
Another place	11.6	16.1	>.05	6.6	32.6	>.05	8.3	37.9	>.05
In same room with people	10.4	18.3	—	4.3	29.6	—	6.7	34.5	—

Tabulated *P* values refer to the difference between boys and girls who reported the problem with their peers of the same gender who did not report the illness, tiredness, of difficulties with activities attributed to poor health.

[a] Percentages are calculated out of the row totals only for boys and girls who reported the illness, tiredness, or difficulties with activities because of poor health.

[b] Significant only for girls on gender-stratified analysis.

[c] Significant for both boys and girls on gender-stratified analysis.

not observed in boys. The proportion of girls who reported an illness increased when the place of residence changed from urban to rural areas ($P < .01$), whereas this was not the case for boys ($P > .05$). Open-field garbage disposal also was associated with reporting an illness ($P < .01$), having difficulties with activities ($P < .001$), and feeling tiredness/low energy ($P < .001$) only in girls.

For the multivariable analyses, household and adolescent food insecurity increased the risk of morbidity significantly among girls than boys. We adjusted for dietary diversity, BMI, place of residence, cooking place, and garbage disposal to isolate the effect of gender on illness. There was no difference ($P > .05$) in the risk of illness among boys and girls when both households and adolescents were food secure (Table 2). As shown in Fig 1, girls were twice as likely to report an illness when they were food insecure ($P < .01$) and 3 times more likely than boys to report an illness when they were food insecure and a member of a food-insecure household ($P < .01$). The other predictors or self-reported illness in food-insecure boys and girls were BMI ($P < .05$), rural residence ($P < .05$), and open-field garbage disposal ($P < .05$).

Food insecurity also was associated with the functionality of adolescents in the study area. Female gender ($P < .001$), adolescent food insecurity ($P < .001$), household food insecurity ($P < .01$), dietary diversity ($P < .001$), and open-field garbage disposal ($P < .001$) were independent predictors of reporting difficulties with activities because of poor health (Table 3). Girls were 7.4 times more likely to report difficulties with activities because of poor health in the previous month compared with boys.

Independent of other predictors, the probability of reporting feeling tiredness/having low energy was nearly 7.0 times higher in girls ($P < .001$), 2.0 times more in food-insecure adolescents ($P < .001$), 1.3 times higher in adolescents who were members of food-insecure households ($P < .05$), 1.3 times higher in households that dispose garbage in an

TABLE 2 Predictors of Adolescent Self-reported Illness During the Previous Month According to Food-Security Status, Southwest Ethiopia

Predictors of Illness During the Previous 1 mo	Both Adolescent and Household Food Secure			Adolescent Food Insecure			Both Adolescent and Household Food Insecure		
	β	Adjusted Odds Ratio (95% Confidence Interval)[a]	P	β	Adjusted Odds Ratio (95% Confidence Interval)[a]	P	β	Adjusted Odds Ratio (95% Confidence Interval)[a]	P
Gender									
Male	—	1.00	—	—	1.00	—	—	1.00	—
Female	0.07	1.07 (0.70–1.65)	.752	0.75	2.11 (1.23–3.62)	.007	1.22	3.39 (1.56–7.33)	.002
BMI for age, *z* scores	−0.06	0.94 (0.83–1.07)	.334	−0.15	0.86 (0.75–0.98)	.027	−0.21	0.81 (0.68–0.96)	.014
Dietary diversity	0.00	1.00 (−0.81 to 1.24)	.997	−0.40	0.96 (0.74–1.24)	.756	−0.05	0.95 (0.68–1.33)	.768
Place of residence									
Urban	—	1.00	—	—	1.00	—	—	1.00	—
Semiurban	0.16	1.18 (0.72–1.92)	.509	0.33	1.38 (0.76–2.53)	.293	0.37	1.44 (0.67–3.10)	.346
Rural	−0.19	0.83 (0.48–1.42)	.491	0.81	2.26 (1.22–4.18)	.010	0.55	1.73 (0.76–3.94)	.192
Cooking place									
In the sleeping room	—	1.00	—	—	1.00	—	—	1.00	—
In a kitchen connected to the living room	−0.75	0.47 (0.21–1.09)	.079	0.33	1.39 (0.61–3.17)	.439	0.59	1.80 (0.52–6.23)	.353
Separate place	−0.50	0.61 (0.32–1.16)	.133	−0.02	0.98 (0.43–2.21)	.958	0.26	1.30 (0.39–4.34)	.668
Garbage disposal									
Proper	—	1.00	—	—	1.00	—	—	1.00	—
Open field	−0.09	0.92 (0.61–1.39)	.680	0.61	1.85 (1.14–2.99)	.013	0.50	1.65 (0.88–3.11)	.121

[a] Adjusted odds ratio from multivariable logistic regression models. Variables with $P < .05$ in the bivariate models (Table 1) were included in the adjusted model.

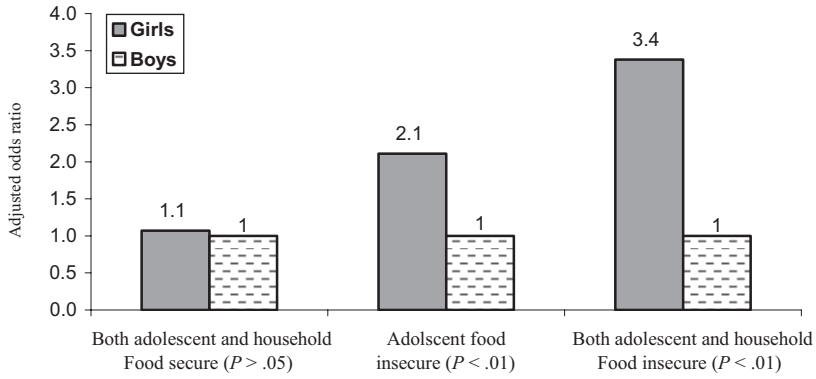

FIGURE 1
Risk of self-reported morbidity within the previous 1 month among adolescents in southwest Ethiopia according to food-security status and gender.

TABLE 3 Predictors of the Probability of Adolescents Having Difficulties With Activities Because of Poor Health in the Previous Month, Southwest Ethiopia

Predictors of Difficulties With Activities	β	Adjusted Odds Ratio (95% Confidence Interval)[a]	P
Gender			
Male	—	1.00	—
Female	2.00	7.35 (5.50–9.83)	<.001
Adolescent food security			
Food secure	—	1.00	—
Food insecure	0.51	1.67 (1.27–2.20)	<.001
Dietary diversity	−0.36	0.70 (0.61–0.79)	<.001
Household food security			
Food secure	—	1.00	—
Food insecure	0.40	1.49 (1.16–1.91)	.002
Garbage disposal			
Proper (incineration, municipality)	—	1.00	—
Open field	0.57	1.77 (1.39–2.25)	<.001

[a] Adjusted odds ratio as obtained from a logistic regression model; variables with $P < .05$ in the bivariate analyses (Table 1) were included in the adjusted model.

open field, and 0.71 times more in adolescents who consumed diet with higher diversity ($P < .001$), as shown in Table 4. None of the interaction terms was significant in any of the models.

DISCUSSION

We report that although both boys and girls are likely to report an illness in food-insecure situations, food-insecure girls report higher frequencies of illnesses, difficulties with their work because of poor health, and feelings of tiredness/low energy compared with boys, independent of their nutrition status, dietary diversity, and socioeconomic parameters. There are several possible explanations for this gender disparity. First, studies have shown that female subjects report worse self-rated health compared with male subjects.[34,35] A common notion is that female subjects, being less enduring of illnesses and more cautious of their health than men, are likely to report mild illnesses.[35,36] Although this explanation does not address why boys and girls reported differences in health conditions in our study, it can potentially contribute to the gender

TABLE 4 Predictors of Reporting Feeling Tiredness/Low Energy During the Previous 1 Month in Adolescents, Southwest Ethiopia

Predictors of Feeling Tiredness/Having Low Energy	β	Adjusted Odds Ratio (95% Confidence Interval)[a,b]	P
Gender			
Male	—	1.00	—
Female	1.94	6.97 (5.36–9.07)	<.001
Adolescent food security			
Food secure	—	1.00	—
Food insecure	0.65	1.91 (1.47–2.48)	<.001
Dietary diversity score	−0.35	0.71 (0.62–0.80)	<.001
Household food security			
Food secure	—	1.00	—
Food insecure	0.28	1.32 (1.04–1.67)	.021
Garbage disposal			
Proper (incineration, municipality)	—	1.00	—
Open field	0.29	1.34 (1.06–1.68)	.013

[a] For the adjusted odds ratio, variables with $P < .05$ in the bivariate models (Table 1) were included in the adjusted model.
[b] Confidence interval parameter estimates were obtained from a logistic regression model.

differences in self-rated health. However, our findings did not show a similar difference between food-secure boys and girls who were members of food-secure households. This supports the argument that when resources are available and decisions do not have to be made over scarce resources, a gender bias is not present.

Sociocultural differences in how genders are treated could account for the disparities in the self-reported morbidity observed in our study. In many societies of developing countries, female subjects often find themselves in a subordinate position compared with men and are socially, culturally, and economically dependent, having little or no decision-making power on resources and their health issues.[16,37] Sons are perceived to have an economic, social, or religious utility, whereas daughters often are felt to be an economic liability because of the social reasons.[16,38] More specifically, there is a belief that male subjects are physically more productive and are better in defending the family from unfavorable circumstances compared with female subjects. The Ethiopian context also presents these characteristics.[39] As a result, differences are observed with regard to the allocation of household resources on the basis of power or position within the household, mothers often favor their daughters, whereas fathers give priority to their sons.[40] In many of these settings, women are disadvantaged because of cultural practices that value them less than men.[41] This gender bias also may be reflected in the allocation of resources for children[42] and in their access to health.[43] For instance, boys were found to have an advantage in the allocation of nutrients in the Philippines,[44] in preferential buffering from food insecurity in Ethiopia,[1] and in the distribution of food resources in India,[45] Nepal,[46] and Guatemala.[47] Societal norms toward culturally specific gender roles and preferences put girls at a disadvantage with regard to health and health care.[43] Other studies[16,43] show that gender inequalities have led to a systematic neglect of women's health. The impact of factors, such as education and income on health, was reported to be considerably smaller than the social construct of gender.[3]

In the study area, food insecurity is significantly higher among girls compared with boys, which could be because of the selective availability of the limited food resources for boys than girls.[1] The fact that a boy or a girl was sampled from each household did not allow for actual exploration of intrahousehold dynamics related to the treatment of boy and girl adolescents, especially about intrahousehold allocation of food and other resources through pairwise comparisons.

The higher probability of reporting illness coupled with higher prevalence of food insecurity[1] among girls leads to decreased physical growth and a consequent reduction of potential for productivity and survival. Girls are likely to be trapped in the state of stunting[48] that resonates through generations because of the double burden of food insecurity[1] and morbidity.

Lower BMI and rural residence were other predictors of self-reported illness in food-insecure boys and girls observed in our study. Although low BMI is an indicator of malnutrition, an increase in BMI may not always lead to better health.[49–51] Some reports have shown that a higher BMI in adolescents is associated with having poor health-related quality of life.[49,50] In our study area, however, the mean BMI is low, and an increase in BMI was associated with lower probability of self-reported illness.

Our analysis also shows a significant association between open field garbage disposal and self-reported morbidity, having difficulties with work and feeling of tiredness/having low energy, which is similar to another study.[52] Garbage harbors infectious agents that can increase the frequency of illness.

Dietary diversity might be associated with food insecurity, which could introduce collinearity in the models. The correlation coefficient between dietary diversity score and adolescent and household food security was 0.15 and 0.10, respectively, and variance inflation factors in the models were generally low (the highest we obtained

was 1.32), which indicates no substantial collinearity in our analysis. Similarly, we cannot rule out that the gender of the respondent household head might have biased our findings with regard to the apparent food-security status of the household. In our sample, 18% of the household heads were female subjects. However, when gender of the household head was introduced in the models, it remained insignificant ($P > .05$) in all models, which indicates that the bias was minor.

We used a food-frequency questionnaire to assess the dietary intake. This enabled us to capture the dietary intake of adolescents over a longer range of time and its association with health, thereby reducing errors introduced by estimating usual intake from the day-to-day variability in 24-hour recalls.[53] The use of a consumer-based definition of the quantities of food consumed is a limitation of our analysis. This may have potentially lead to an over estimation of consumers and food consumed. On the other hand, people who might have consumed a food item more than once per week also were categorized with those who consumed only once per week, which might underestimate the quantity consumed. Designing food-frequency questionnaires that are valid in populations that consume from a common bowl or share food from the same plate is a challenge for dietary assessment[54] and requires additional research.

CONCLUSIONS

As in many other developing countries, food insecurity is a chronic problem in Ethiopia,[55] and the size of the youth population is growing. The study highlights that in food-insecure situations (but not food-secure situations), girls suffer more frequently from adverse health consequences of food insecurity compared with boys. This is an important result because it suggests that 1 way to reduce gender disparities is to remove resource constraints. This might be somewhat easier than shifting population-level norms around gender. Interventions addressing food security should incorporate gender issues and pay special attention to girls to narrow the gap in health between boys and girls.

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