

Dietary Factors Associated With Reported Food Insecurity

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Since the 1980s, extensive work has been undertaken to clarify the meaning of food insecurity in a U.S. or Canadian context and to develop survey instruments to measure the extent of this problem. Quantitative, qualitative, psychological, and social or normative dimensions of food insecurity have been described at the individual and household levels (1), but measurement work has largely focused on the qualitative and quantitative compromises in food intake that arise with declining household resources (2 and 3). (Italicized numbers in parentheses refer to citations at the back of this paper.) Dietary intake data have often been compared with measures of food sufficiency or food security as a means to validate these measures (3 to 5), but there has been little detailed examination of the interrelationships between food security status measures and individuals' dietary intake patterns.

In this paper, specific food intake behaviors related to the severity of household food insecurity are described, and their representation in conventional descriptors of individuals' dietary intakes is explored, using data from a Canadian study of food insecurity and nutritional vulnerability among women in families using charitable food assistance programs (6 and 7). Although limited in sample size, the study is useful in that it includes contemporaneous measures of household food security and women's dietary intakes. Further, the high levels of deprivation in this sample enable exploration of intake behaviors in the context of varying levels of food insecurity.

Study Design and Methods

A full description of the study methods has been published elsewhere (6 and 7). In 1996-97, participants were recruited from a stratified random sample of 21 emergency food hamper programs in Toronto. Women were eligible to participate if they were 19 to 49 years old, had at least one child under the age of 15 living with them, were

not pregnant, had received emergency food relief at least one other time in the past 12 months, and spoke sufficient English to participate in oral interviews. Participation was voluntary and confidential.

Three interviews were conducted with each participant, on nonconsecutive days and typically on different days of the week, spanning the 3 weeks following recruitment. At each interview, the participant completed an interviewer-administered 24-hour dietary intake recall and questionnaire. The dietary recall interviews followed a multiple-pass approach, with portion size models used to prompt accurate recall of food quantities. Interviewers were instructed to record the circumstances associated with any extreme (low or high) intakes reported. Height and weight were measured at the first interview. Food insecurity was assessed at the third interview, using the 12-month and 30-day scale items from the U.S. Department of Agriculture's (USDA) Food Security Module (8), but with the omission of one question about perceived weight loss attributed to lack of food. Data on household demographics, perceived health, health-related behaviors, and food acquisition and provisioning practices were also collected. A final sample of 153 women was achieved, but the analyses presented in this paper include only data from the 145 women (95 percent of the sample) who completed all three interviews within a 31-day window, thus providing contemporaneous data on food security and dietary intake.

The 24-hour dietary recall data were converted into total energy and nutrient intakes, using the 1996 version of the Canadian Dietary Information System for food intake analysis (9). Although nutrient intakes from supplements were recorded, these data were not included in the analyses of nutrient intakes because supplement use was only reported by 19 women and use appeared inconsistent. Categorical variables were constructed to denote the severity of household food insecurity over the past 12-month and 30-day periods, using scaling methods developed by Hamilton et al. (10) for analysis of the USDA Food Security Module. Statistical analyses were

conducted using SAS/PC versions 6.10 and 6.12 for Windows (SAS Institute, Cary, NC).

Analysis of variance approaches (PROC GLM) were used to initially explore relationships between intake variables and household food security status. To examine the quantitative effect of hunger in the household on women's intakes while controlling for other possible influences on dietary intake, single-equation multivariate regression analyses were performed using PROC REG. In these analyses, 3-day mean energy and nutrient intakes were the dependent variables. The independent variables included a dichotomous variable to differentiate between households reporting hunger (moderate or severe) and those where no hunger was apparent (the reference category) over the past 30 days. Independent variables also included household-level disposable income for the month and characteristics of the individual woman found to have some association with at least one of the intake variables in prior univariate analyses, such as the woman's educational level, ethnoracial identity, smoking behavior, presence of employment income, and presence of a partner in the household. To elucidate the effect of controlling for these variables on the apparent effect of hunger on intake, a simple regression model was run, omitting all independent variables except hunger, and the resultant coefficients were compared with those from the multivariate models. (A detailed discussion of these regression analyses can be found in (7).)

To examine differences in the nutrient composition of women's intakes while controlling for differences in total food intake, nutrient intakes were expressed as nutrient densities, i.e., nutrients per megajoule—first calculated for each 24-hour recall, then averaged over 3 days—and then analyzed following the analysis of variance and regression methods described earlier. To explore the effect of the energy-adjustment method of these results, selected nutrient intake variables were also adjusted for total energy intake, using the regression technique described by Willett and Stampfer (11). The nutrient variables were first log-transformed to improve normality. Then separate regression models were constructed for

each nutrient variable, with total energy intake as the independent variable and absolute nutrient intake as the dependent variable. Residuals were extracted from the regression models and used in analyses of variance to examine differences in nutrient composition by 30-day food security status. As well, the analyses of variance were run with absolute nutrient intakes as the dependent variable, but with energy intake included as a covariate (the standard multivariate method of energy adjustment).

To further explore the relationship between the reporting of dietary intake and household food insecurity status over a 30-day period, women's reported mean energy intakes (EI) were expressed as a ratio of their estimated basal metabolic rate (BMRest) (12), and these ratios were compared across groups defined by 30-day food security status. Using this ratio (EI:BMRest), Goldberg et al. have proposed a method to estimate minimum plausible levels of intakes among normal, healthy, free-living adults for use in evaluating self-reported energy intake data (13). Following their method, the Goldberg cut-off value for EI:BMRest for individuals in this study was calculated to be 1.04 (13). The odds of falling below this cut-off value, given reported household food insecurity with hunger (grouping moderate and severe hunger classifications together) was calculated using PROC LOGISTIC.

Sample Characteristics

A full description of the study sample is presented elsewhere (6 and 7). Briefly, participants ranged in age from 19 to 48 years, with the mean age 33 ± 7 years. The mean body mass index (BMI) of women in this study was 27.7 ± 6.74 kg/m² (median 26.9 kg/m²), and 49 percent of the sample had BMI's in excess of 27 kg/m². Forty percent reported a long-standing health condition, illness, or disability, and two-thirds of these (26 percent of the sample) described the condition as activity-limiting.

The sample was heterogeneous with respect to ethnoracial identity, education, and household

composition, but remarkably similar in their poverty. Forty-six percent of women were white, 27 percent black, 11 percent Latin American, 10 percent Asian, 3 percent aboriginal Canadians, and 2 percent undefined. Most (65 percent) women had completed high school, and 41 percent had at least some post-secondary training. Sixty-five percent of the sample were presently lone parents. Household size ranged from 2 to 10, with a median of 3 persons per household. The median number of children was two. Most (69.9 percent) households were supported by social assistance programs (welfare); an additional 14.4 percent of households relied on a combination of welfare payments and employment income. Only 9.8 percent of households relied solely on employment incomes. The remaining 5.9 percent of households were reliant on savings or received income from student loans, unemployment insurance, or other sources. As a means to interpret household income relative to Canadian standards, reported income for the month was expressed as a percentage of the 1995 Statistics Canada Low-Income Cut-offs,¹ commonly referred to as “poverty lines” (14). Household incomes were, on average, 52.8 percent \pm 0.13 percent of the poverty line, and 90 percent of households had incomes which were less than two-thirds of the poverty line.

Although the extent of reported food deprivation varied widely among households, 93.5 percent reported some degree of food insecurity over the past 12 months (6). Fifty-two (36 percent) of the 145 women who comprise the analytic sample reported food insecurity with moderate hunger and 31 (21 percent) reported food insecurity with severe hunger, over the past 30 days.

¹The Statistics Canada Low-Income Cut-offs define “low income” in relation to average household expenditure patterns, and are adjusted for household size and degree of urbanization. In 1995, the cut-offs were set at dollar values below which households spent 56.2 percent or more of their gross income on the basic necessities of food, clothing, and shelter.

Evidence of Food Insecurity in Women's Dietary Intake Data

Food intake behaviors associated with food insecurity, by definition, include compromises in the selection and quality of foods consumed and reductions in the quantity of food consumed as resources become more constrained. The behaviors should, to some degree, be observable in individuals' intake data, depending on the nature of the dietary data collection and analysis and depending on intrahousehold food distribution practices. Even when households are under no apparent economic constraints, foods and nutrients are not allocated in proportion to individual members' needs; some members are more privileged than others (15 to 18). Inequities in intrahousehold food distribution appear to increase in the context of food insecurity. Poor women typically report that they deprive themselves of food so as to leave more for their children during periods of severe food shortages (19 to 23). This behavior is also suggested by studies reporting poor-quality dietary intakes among low-income women in comparison with their children (20, 24, and 25). Thus, women's intakes may be particularly sensitive to deteriorations in household food security.

Reductions in Total Food Intake

Comparing women's 3-day mean intakes with a concurrent measure of 30-day household food security status, group mean intakes for energy and most nutrients fell in a stepwise fashion as severity of household food insecurity increased (table 1).² Statistically significant differences between group means were observed for energy, protein, vitamin A, iron, magnesium, and zinc. The prevalence of inadequacy in this sample was estimated to be at or in excess of 15 percent for protein, vitamin A, folate, iron, and magnesium, suggesting that the low levels of intake associated with severe household food insecurity are in a range that could put women at risk of nutrient deficiencies (7).

²Tables are at the end of this paper.

When women's reported energy and nutrient intakes were considered in relation to the presence or absence of hunger in the household, while controlling for other economic, socio-cultural, and behavioural influences on diet, systematically lower intakes (indicated by the negative direction of the partial regression coefficients in table 2) were observed among women in households reporting moderate or severe hunger, compared with those where no hunger was apparent. The differences in mean intake levels were significant ($p < 0.05$) for energy and all nutrients examined except fat, vitamin C, and calcium. The partial regression coefficients derived from the multivariate model diminished only slightly for energy and most nutrients, when compared with those derived from the simple (uncontrolled) regression model, suggesting that the negative effect of household food insecurity with moderate or severe hunger on the food intakes of women is independent of many other influences on diet. It is noteworthy, however, that the association of hunger with two nutrients (fat or vitamin C) lost statistical significance once other dietary influences were included in the model.

Expressing individuals' mean energy intakes as a ratio of their estimated basal metabolic rates (EI:BMRest) provides another means to explore reported intakes for indications of food deprivation. Women reporting household food insecurity with severe or moderate hunger had a group mean EI:BMRest of 0.975 ± 0.411 , whereas the mean ratio for women not reporting food insecurity with hunger was 1.21 ± 0.603 . Further, the odds of having an EI:BMRest below the estimated minimum plausible level of intakes among a normal, healthy, free-living sample of adults (i.e., the calculated Goldberg cut-off level) was 2.58 (95 percent confidence interval: 1.31, 5.07) for women in households characterized by food insecurity with moderate or severe hunger when compared with those in households where no hunger was evident (7).

The observed associations between intake and household food security status, although cross-sectional in nature, imply that some women's reports of low intakes reflect reductions in food intake and/or episodes of absolute food depriva-

tion in the context of scarce household resources. This is further borne out by the heightened probability of low EI:BMRest among women in households with hunger. The intake data would appear to simply be mirroring the behaviours women have described on the Food Security Module, i.e., cutting meal sizes, skipping meals, going hungry, and going whole days without eating. The interviewers' records of the women's descriptions of extenuating circumstances in association with their reports of extreme intakes lend further credence to this interpretation. Women's subjective appraisals of household food security appear reflected in the adequacy of their own dietary intakes.

Interpretation of the associations presented here is complicated, however, by the problem of underreporting in dietary intake surveys. Underreporting has been repeatedly observed when self-reported energy intakes (assessed with 24-hour recall or food record methods) have been contrasted to biological markers of intake (e.g., the doubly labeled water technique) (26 to 30) or to calculated estimates of energy expenditure (27, 28, and 31 to 33). Further, a recent United Kingdom study has suggested that the prevalence of underreporting is inversely related to socio-economic status (34). Among low-income women, underreporting has been found to relate to low levels of literacy and high levels of body fatness (35). Although the issue of underreporting is typically discussed in terms of reported low levels of energy intakes, in fact, people must underreport food intake. Thus, problems of underreporting can confound the interpretation of observed low levels of nutrient intakes as well as energy intakes.

The low levels of food intakes reported by some women in this study and the comparison of reported energy intakes with estimated basal energy expenditures raise the question of whether the results presented here can be explained by underreporting. However, there are serious problems with the application of standard cut-off values of EI:BMRest to identify underreporting among individuals in specific population subgroups that differ markedly from the general population (7). In particular, calculation of the basal

metabolic rate (BMR) may overestimate true BMR for obese individuals. Further, the assumptions about normal levels of physical activity may be unrealistic in impoverished samples where activity limitations are likely more prevalent and opportunities for physical recreation less common. Lastly, the proposed evaluation criteria assume that habitual intake is being assessed and individuals are in energy balance during the time frame of observation. This is not a reasonable assumption in studies of dietary intake in the immediate context of severe household food insecurity.

Given evidence of the pervasiveness of underreporting in dietary surveys, it would be naive to suggest that studies of dietary intake in the context of resource constraints are somehow immune to this problem. However, additional factors underlie the reporting of low levels of energy intakes in these settings, making the application of standard population-level assumptions about energy expenditure and energy balance an inappropriate means to differentiate reporting effects in these data. Regrettably, we lack a means to differentiate underreporting from true low intakes.

Altered Food Selection Practices

Qualitative compromises in dietary intake in response to resource constraints may entail the restriction or omission of specific food items or whole classes of foods from the diet because, although desirable, the foods are deemed unaffordable. Additionally, the use of food items of substandard quality, e.g., damaged packaged goods, stale baked goods, and fresh produce that is aged or otherwise sub-optimal may increase. Insofar as household food insecurity is a managed process, qualitative compromises may precede quantitative changes in individuals' intakes, denoting less severe stages of food insecurity (36 and 37). However, as food insecurity worsens and reductions in food intake occur, the selection of foods consumed must become even more restricted. Reports of meals comprised of fried potatoes, rice, or bread with little else are not uncommon among families facing extreme constraints (21 and 23). Studies of dietary intakes in

the context of food insecurity have typically not differentiated between qualitative and quantitative compromises in intake, but the distinction is important in the formulation of effective intervention strategies.

To explore differences in the nutrient composition of women's diets, depending on their household food security status, women's nutrient intakes were first expressed in relation to total energy intake as nutrient densities and then compared across groups using analysis of variance methods (table 2). No significant difference in the macronutrient composition of women's diets was noted, and no micronutrients per megajoule (MJ) appeared to differ by food security status except vitamin A. To examine the relationship between severity of household food insecurity and nutrient density while controlling for other identified influences on dietary intake, single-equation multivariate regression analyses were rerun as described earlier, but with 3-day mean nutrient intake per MJ as the dependent variable. In examining the partial regression coefficients for hunger derived from this model, again only one significant difference in intake was observed. Women reporting food insecurity with moderate or severe hunger had a mean difference of $-1,232 \pm 572$ Retinal Equivalent of vitamin A per MJ, when compared with those not reporting hunger (p -value = 0.0332). This low level of intake may indicate a drop in women's vegetable intake, with increasing severity of food security, although it should be noted that no similar decline in folate intake was observed. The absence of significant associations for other nutrients when expressed in relation to total energy intake suggests that the observed differences in women's nutrient intakes by household food security status primarily reflected differences in absolute intake levels, rather than differences in food selection practices.

Our inability to discern more systematic differences in food selection by food security status may partly be attributed to high overall levels of deprivation in this sample. The comparisons presented here are essentially between women in households experiencing more and less severe food insecurity. Qualitative compromises in

dietary intake were probably occurring even among the most advantaged group in this sample. Perhaps a comparison of women's intakes of specific classes of foods rather than nutrients would reveal some changes in food selection with increasing severity of food insecurity. However, the absence of observable differences in all but one nutrient per MJ by food security status suggests that differences in food selection are not what is driving the systematically lower nutrient intakes observed here. It is interesting that in 1989, the results of Campbell and Desjardins' exploratory study of low-income families' management of limited food resources led them to hypothesize that "the risk of inadequate nutrient intake is more related to total calorie intake than to specific foods selected" (19). The foregoing examination of food selection practices would appear to confirm this.

The comparisons presented here may also have been affected by the particular analytic approach employed to adjust for the effect of total food intake on food selection. In the nutritional epidemiology literature, there has been considerable discussion and debate about the most appropriate analytic method to separate differences in food selection or dietary composition from differences in total food intake (31 and 38 to 42). One alternative to the use of nutrient densities is the standard multivariate method of controlling for energy by simply including energy as a covariate in analyses. In addition, Howe et al. have proposed an energy partition, or energy decomposition, method (43), and Willett and Stampfer have proposed the use of nutrient residuals derived from the regression of absolute nutrient intakes on total energy intake (11). Different approaches to energy adjustment have been demonstrated to yield different results in examinations of particular diet-disease relationships (39 and 41). Beaton has determined that the derived variables from the different procedures possess different error structures and the approaches embody subtly different assumptions about the nature of the relationship being examined (31).

To explore the effect of the energy-adjustment method on the apparent relationship between food selection and food security status, analysis

of variance comparisons were repeated for selected nutrients, using the residual method and the standard multivariate method to control for total energy intake. The apparent relationship of protein and vitamin A intake with household food security status changed, depending on the method of adjustment (table 3). This brief comparison highlights the importance of the choice of adjustment procedure, but leaves the question unresolved about which method is most appropriate for use in characterizing food selection practices in the present context.

Day-to-Day Variation in Intake

Individuals in households with severe resource constraints could be expected to exhibit very low intakes (absolute food deprivation) when resources are severely limited, and increased intakes with the influx of resources. Their day-to-day variation in intake might, therefore, be greater than the variation among individuals experiencing no resource constraints because of this additional pressure. Although the error associated with the estimation of true within-person variation from a limited number of days of intake data is substantial (44), when more than 1 day of intake data is available per person, day-to-day variation can be estimated as the individual's standard deviation or variance in intake over the days of observation. To control for differences in mean intake, within-person variation is also expressed as the coefficient of variation.

When standard deviations or coefficients of variation derived from three 24-hour recalls per woman were considered in relation to household food security status over the same time period, there is some suggestion that women in households characterized by food insecurity with severe hunger were more likely to exhibit higher day-to-day variation in energy intake (table 4). It is emphasized that the sample is small and the variance estimates must be poor given our limited sampling of days over the month in question. Nonetheless, this very crude comparison suggests that particularly high levels of within-person variation in energy intake observed in the context of severe household food insecurity might be indicative of extreme fluctuations in intake in

response to particularly desperate situations. Further research is needed to confirm this observation.

In the nutrition literature, within-person variance has traditionally been a subject of interest because it functions as a source of error in the estimation of usual intake from limited days of observation of actual intake. However, there is some work to suggest that within-person variance may be a useful indicator of environmental pressures on intake. Working with energy and protein intake data from household samples in India and the Philippines, Bhargava (45) observed that the contribution of within-person variation to total observed variation declined with household income, implying a relative increase in within-person variation among individuals in households with lower versus higher incomes. The observation is intriguing and begs the question of whether comparisons of pooled estimates of within-subject variance in other samples might reflect differences in household food security.

The study of within-person variation in intake in the context of food insecurity may be of potential importance to our field for two reasons. First, an examination of within-person variation in intake may enable us to identify specific settings and circumstances associated with episodic hunger and thus inform interventions. Second, the characterization of within-person patterns of intake in the context of varying degrees of food insecurity may yield insight into the particular health consequences of food insecurity. For example, Dietz (46) has hypothesized that the higher prevalence of obesity among low-income groups may be related to the unique pattern of energy and macronutrient intake associated with chronic food insecurity. Pursuit of this research direction, however, would require a more thorough assessment of individuals' intakes over time and the development of additional questions to capture detailed data on the duration, frequency, and depth of food deprivation experienced.

Conclusions

The foregoing analyses indicate that the severity of household food insecurity is manifested in the dietary intake behaviors of women in these settings. These analyses also have served to reveal some methodological issues that affect the identification and interpretation of particular intake behaviours in relation to food insecurity. Given differences in intrahousehold food distribution, the particular interrelationships described here cannot be generalized to other members of these households. Research into the intake patterns of children and other adults in the context of declining household food security is clearly required.

While previous work has documented relationships between household food insufficiency or insecurity and individuals' dietary intakes (5, 24, and 47), this examination of the interrelationship between household food security status and various descriptors of women's dietary intakes points to the possibility of considering both kinds of data simultaneously as a means to better describe individuals' vulnerability. The integration of dietary and food security measures to identify specific aspects of nutritional vulnerability related to resource constraints may be particularly useful in furthering our understanding of the effect of varying experiences of food insecurity on health and well-being and in informing effective policy and program responses.

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Table 1—Comparison of women’s mean energy and nutrient intakes ± SD with their 30-day household food security status (n = 145)¹

Nutrient Intake/MJ	No hunger evident	Food insecure with moderate hunger	Food insecure with severe hunger	F value ²
	<i>n</i> = 62	<i>n</i> = 52	<i>n</i> = 31	2 <i>df</i>
Energy, kJ/d	7,182.58 ± 3,207.33	6,164.08 ± 2,370.20	5,696.84 ± 2,388.81	3.29 ³
Protein, g/d (g/MJ)	67.78 ± 31.78 (168.48 ± 46.42)	55.78 ± 22.17 (160.74 ± 45.43)	47.56 ± 20.49 (152.42 ± 49.00)	6.28 ³
Carbohydrate, g/d (g/MJ)	242.61 ± 113.56 (599.46 ± 99.02)	203.81 ± 76.97 (600.89 ± 105.79)	203.07 ± 94.46 (625.11 ± 105.52)	2.46
Total Fat, g/d (g/MJ)	54.33 ± 31.62 (127.54 ± 34.27)	46.51 ± 26.91 (124.04 ± 39.41)	41.68 ± 21.25 (125.12 ± 34.90)	2.27
Vitamin A, RE/d (RE/MJ)	1,339.40 ± 1,683.93 (3,477.91±4,666.05)	594.97 ± 528.67 (1,830.44±1,749.73)	732.18 ± 641.97 (2,750.47±3,095.16)	6.80 ³
Vitamin C, mg/d (mg/MJ)	108.44 ± 82.34 (299.85 ± 257.55)	84.07 ± 68.06 (255.84 ± 186.19)	76.37 ± 61.57 (241.17 ± 219.82)	2.10
Folate, mcg/d (g/MJ)	197.69 ± 116.20 (505.64 ± 241.28)	156.32 ± 78.99 (490.58 ± 342.11)	153.08 ± 70.38 (493.06 ± 206.26)	3.02
Calcium, mg/d (mg/MJ)	560.49 ± 355.01 (1,361.25 ± 469.46)	469.05 ± 289.10 (1,354.95 ± 588.00)	440.77 ± 231.19 (1,421.44±647.81)	1.91
Iron, mg/d (mg/MJ)	11.52 ± 6.90 (27.77 ± 6.75)	9.18 ± 3.73 (27.64 ± 9.62)	8.25 ± 3.53 (26.72 ± 7.90)	4.30 ³
Magnesium, mg/d (mg/MJ)	237.49 ± 99.50 (610.42 ± 155.41)	194.13 ± 81.66 (586.50 ± 224.08)	187.99 ± 89.92 (619.30±183.49)	4.55 ³
Zinc, mg/d (mg/MJ)	9.37 ± 4.78 (23.01 ± 6.67)	7.24 ± 3.11 (21.04 ± 6.98)	6.30 ± 3.25 (19.97 ± 6.72)	7.27 ³

¹Table from (7).

²Based on analysis of transformed data in cases where the original distribution failed to approximate normality.

³Indicates statistically significant (*p* < 0.05) difference between groups defined by food security status. No significant difference was detected for the nutrient per MJ intakes (except vitamin A).

Table 2—Differences in energy and nutrient intake between women in households reporting hunger over the past 30 days and those reporting no hunger (n = 145)¹

Nutrient	Unit ²	Model adjusted for other influences on intake		Unadjusted model	
		Intake difference ³ (S.E.)	p-value ⁴	Intake difference ⁵ (S.E.)	p-value ⁴
Energy	kJ/d	-1,058.00 (484.20)	0.0307	-1,193.01 (463.32)	0.0110
Protein	g/d	-13.58 (4.65)	.0041	-15.07 (4.45)	.0009
Carbohydrate	g/d	-34.64 (16.96)	.0431	-39.08 (16.35)	.0181
Total fat	g/d	-8.45 (4.91)	.0876	-9.62 (4.70)	.0423
Vitamin A	RE/d	-634.51 (195.84)	.0015	-693.18 (198.49)	.0006
Vitamin C	mg/d	-20.29 (12.40)	.1042	-27.25 (12.28)	.0280
Folate	m/d	-35.43 (15.59)	.0247	-42.58 (15.95)	.0085
Calcium	mg/d	-73.59 (53.46)	.1071	-101.98 (51.71)	.0505
Iron	mg/d	-2.35 (.93)	.0122	-2.68 (.89)	.0030
Magnesium	mg/d	-39.02 (15.88)	.0082	-45.65 (15.30)	.0033
Zinc	mg/d	-2.23 (.69)	.0153	-2.49 (.66)	.0002

¹Table from (7).

²kJ/d is the abbreviation for kilojoules for each day, g/d is grams for each day, RE/d is retinol equivalents for each day, and mg/d is milligrams for each day.

³Differences in 3-day mean intakes between women in households with hunger and those without, while controlling for other factors affecting diet. These are partial regression coefficients estimated from a single-equation multivariate regression model in which each intake variable was regressed on an indicator of household food insecurity with hunger, disposable income (adjusted for family size and composition), presence of employment income in the household, presence of a partner in the household, and woman's level of education, smoking status, and ethnoracial identity.

⁴p-value represents the probability of these results occurring under the null hypothesis that there is no difference in intakes between women categorized by household hunger status. A p-value of 0.05 or less is generally considered grounds for rejection of the null hypothesis.

⁵Differences in 3-day mean intakes between women in households with hunger and those without, derived from a simple linear regression model in which intake was regressed on an indicator of household food insecurity with hunger.

Table 3—Results of analysis of variance to assess the relationship between women’s 3-day mean intakes of selected nutrients and 30-day household food security status as a function of the method of adjustment for total energy intake (n = 145)

Nutrient	Method of energy adjustment	Nutrient residual F value ¹ (Pr > F)	Standard multivariate F value ¹ (Pr > F)
	Nutrient density F value ¹ (Pr > F)		
Protein	1.46 (0.2352)	3.18 (0.0446)	2.83 (0.0625)
Vitamin A	4.03 (.0198)	.38 (.6850)	4.98 (.0082)
Iron	0.27 (.7649)	.40 (.6702)	.80 (.4536)

¹F value with 2 degrees of freedom, derived from analysis of variance (PROC GLM), comparing 3-day mean intakes by 30-day household food security status. In cases where the distribution of the nutrient variable failed to approximate normality, the data were transformed prior to this analysis.

Table 4—Observed distributions of women’s standard deviations and coefficients of variation in energy intake over 3-days, by 30-day household food security status

Food security status	Percentile			Percentile		
	25th	50th	75th	25th	50th	75th
	----- 3-Day standard deviation -----			----- 3-Day coefficient of variation -----		
No hunger evident (n = 62)	295.8	384.2	616.1	16.70	28.23	38.20
Food insecure with moderate hunger (n = 52)	261.0	382.4	601.8	20.54	27.19	43.68
Food insecure with severe hunger (n = 31)	242.6	449.9	699.3	18.11	37.09	54.64