Economic Determinants and Dietary Consequences of Food Insecurity in the United States¹

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ABSTRACT This paper reviews recent research on the economic determinants and dietary consequences of food insecurity and hunger in the United States. The new Current Population Study (CPS) food insecurity and hunger measure shows that hunger rates decline sharply with rising incomes. Despite this strong relationship, confirmed in other national datasets, a one-to-one correspondence between poverty-level incomes and hunger does not exist. In 1995, 13.1% of those in poverty experienced hunger and half of those experiencing hunger had incomes above the poverty level. Panel data indicate that those who are often food insufficient are much more likely than food-sufficient households to have experienced recent events that stress household budgets, such as losing a job, gaining a household member or losing food stamps. Cross-sectional work also demonstrates the importance of food stamps because benefit levels are inversely related to food insufficiency. Concern for the dietary consequences of domestic food insufficiency is well placed; recent research shows that the odds of consuming intakes <50% of the recommended dietary allowance (RDA) are higher for adult women and elderly individuals from food-insufficient households. Preschoolers from food-insufficient households do not consume significantly lower amounts than those from food-sufficient households, but mean intakes for the rest of members in those very same households are significantly lower for the food insufficient. This research highlights the importance of food insecurity and hunger indicators, further validates the use of self-reported measures and points to areas of need for future research and interventions. J. Nutr. 129: 517S–520S, 1999.

KEY WORDS: • hunger • food insecurity • nutrient intake • dietary survey • Food Stamp Program

This paper addresses the following two principal questions: 1) what are the determinants of food insecurity in the United States? and 2) what are its dietary consequences? Information on determinants provides a better understanding of which types of households are likely to be affected by the problem and what are possible interventions to reduce food insecurity. Understanding dietary correlates of food insecurity also assists in focusing our interventions, be they food assistance or nutrition education, and highlights outcomes of concern to policy makers and society in general. The two research issues encompassed by the above questions set food insecurity within a causal chain that begins with economic considerations and ends with nutritional outcomes.

ECONOMIC DETERMINANTS

Income is clearly one of the most important determinants of food insecurity and hunger. Evidence from the 1995 Current Population Survey (CPS)² shows that 17% of households with incomes <50% of the poverty level were affected by some form of hunger, whereas the rate falls to 1.4% for those with incomes >185% of the poverty level (Hamilton et al. 1997). Similar declines in food insufficiency rates with rising incomes can be seen in data from the 1988–1994 Third National Health and Nutrition Examination Survey (NHANES III) (Alaimo et al. 1998), the 1992 Survey of Income and Program Participation (SIPP), and the 1989–1991 Continuing Survey of Food Intake by Individuals (CSFII) (Rose et al. 1998). In the last-mentioned survey, 16% of households with incomes <50% of the poverty level were food insufficient, whereas the rate dropped to <1% for those above 185% of the poverty level. Despite the use of different indicators, collected by different surveys in different years with different purposes and sampling strategies, we see the same basic relationship between income and hunger indicators.³

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² Abbreviations used: CPS, Current Population Survey; CSFII, Continuing Survey of Food Intake by Individuals; NHANES III, Third National Health and Nutrition Examination Survey; RDA, recommended dietary allowance; SIPP, Survey of Income and Program Participation.

³ “Hunger” is used to refer to the conditions defined in the new CPS indicators as moderate and severe hunger. “Food insufficiency” refers to those households responding that they “sometimes or often do not have enough to eat” on either the USDA or NHANES food-sufficiency questions. Because in conceptual terms, food insufficiency is roughly equivalent to hunger, “hunger indicators” is used to refer to both food insufficiency and hunger.
The percentage of households in poverty is a commonly collected and reported statistic in the United States and was used earlier to estimate the number of households affected by hunger. It is useful, therefore, to dichotomize the income variable in order to understand the relationship of poverty-level incomes to hunger. Using multivariate logistic regression analysis, which controlled for a number of socioeconomic factors such as ethnicity, education, region of the country and household composition, we found that those in poverty were >3.5 times as likely to be food insufficient as those with incomes above the poverty thresholds (Rose et al. 1998).

Although we see strong relationships between income and hunger indicators, and between poverty and the likelihood of food insufficiency, a one-to-one correspondence between measures of food insecurity and measures of poverty does not exist. For example, 1995 CPS data show that only ~13.1% of those in poverty are affected by hunger (Hamilton et al. 1997). Similar results are seen if one considers the percentage of households in poverty that report food insufficiency, i.e., 11.8 and 9.0 for the CSFII and SIPP surveys cited previously (Rose et al. 1998). These results support the need for direct measures of food insecurity and hunger such as those based on the CPS (Hamilton et al. 1997). Use of indirect indicators such as poverty would incorrectly identify a large percentage of households as being affected by hunger.

The poverty indicator is also not very sensitive because many households that are not in poverty are food insecure. CPS data show that 50% of households affected by hunger have incomes above the poverty level. Similarly, data from the CSFII and SIPP show that 41.3 and 53.3%, respectively, of food-insufficient households are above the poverty level.

Why do so many households with incomes above the poverty level show signs of food insecurity? Income-based poverty measures may not give an accurate picture of food security because they do not take into account price differences in housing, food or health care. Nor do they consider the special needs of some households, such as those headed by single parents or those containing individuals with disabilities. Annual income-based poverty measures are also static in nature; thus they are not sensitive to sudden economic changes that may contribute to temporary bouts of food insecurity.

Some exploratory work on this issue has been done using the 1992 SIPP, a panel dataset that allowed for studying socioeconomic data for 8 mo preceding reported food insufficiency (Brown et al. 1997). Similar to an epidemiologic case-control study, all households reporting that they often did not have enough food were matched with households reporting that they had enough of the kinds of food they wanted. This matching of the "often food insufficient" with the "totally food sufficient" was done on the basis of income, household size and composition, elderly status and food stamp recipiency.

The findings from this work demonstrate the importance of looking at recent economic changes in trying to understand food insecurity. For households above the poverty level, 37.5% of the food insufficient had lost food stamps, lost a job and/or gained a household member in the previous 8 mo, whereas this was true of only 16.9% of the food-sufficient households. Combining households above and below the poverty level, the food sufficient were much more likely to have lost food stamps than the food sufficient (19.5 vs. 3.8%). The importance of recent changes to food insecurity has been shown in other work. Food insecure households in upstate New York were more likely to report unexpected expenses in the previous year (Olson et al. 1997), and research among the California population receiving Aid to Families with Dependent Children showed that food insecurity was associated with being financially worse off than in the previous year (Mauldon 1996).

All of these changes can stress household budgets. It is not surprising then that a much smaller percentage of food insufficient households in the SIPP sample were able to maintain savings throughout the period preceding reported food insufficiency, i.e., 5.3 vs. 22.9% for the food-sufficient households (Brown et al. 1997). A lower percentage of food-insecure households had savings in the New York sample as well (Olson et al. 1997).

In addition to the panel-study results, we have also found that food stamps bear an important relationship to food insecurity in our cross-sectional work, in which we used an analytical strategy that treated income and food stamps separately (Rose et al. 1998). This technique allowed us to study the differential effects of the two types of income and has been applied in other food stamp research as a means for better understanding consumer behavior. We found that in both the 1989–1991 CSFII and the 1992 SIPP there was an inverse relationship between food insufficiency and the amount of food stamps received, although this was not significant in the latter survey. This research also allowed us to quantify the effect on food insecurity for a given change in food stamp benefits. For food stamp households, a 1% decrease in benefits, holding all else constant, would result in an increase of ~0.01–0.05 percentage points in the food insufficiency rate, which represents ~4000–13,000 households.

There are a number of other factors associated with food insecurity. For example, home owners are less likely to be food insufficient, a result that has been shown in multivariate analyses of data from the 1985–1986 CSFII (Cristofar and Basiotos 1992), the 1989–1991 CSFII and the 1992 SIPP (Rose et al. 1998). Home ownership is likely to be a good proxy for asset wealth; it correlates well with other more liquid assets, such as savings accounts; such assets are clearly important because they can cushion a household in the event of unforeseen circumstances of the sort discussed previously. Lower rates of food insufficiency are also associated with households whose head completed high school or was >60 yr of age. The elderly result is a common finding, one that can be seen in the CSFII, the SIPP as well as in the NHANES III (Alaimo et al. 1998) and the CPS (Hamilton et al. 1997). This finding might be considered anomalous, even in models that control for income, because several factors are likely to increase the odds of being food insecure. The elderly are less mobile, which might prevent access to low cost food stores. Many recently widowed senior men lack knowledge about food preparation and many qualified elderly households are reluctant to obtain food stamps. But several reasons explain the finding of lower food insecurity rates among the elderly. Many elderly have life-savings that are not reflected in their income levels or, unlike other homeowners, have paid off mortgages. Both of these factors free up money for food consumption. Other explanations have more to do with our survey instruments because all of the current measures of food insecurity are based on self-assessment. For example, people who lived through the Great Depression may be less likely to consider current food deprivation as worthy of being reported (Olson et al. 1996).

Multivariate models also show that higher rates of food insecurity are associated with Hispanic households, large
households or households composed of a single adult with children (Alaimo et al. 1998, Olson et al. 1997, Mauldon 1996, Rose et al. 1998). Larger households, of course, require greater expenditures to meet consumption needs, and single parent households may have extra expenses associated with child care. Ethnicity may be related to food insecurity because language or other barriers to food shopping could limit choices and increase food costs.

**Dietary Consequences**

Important concerns for policy makers are the nutrition and health consequences of food insecurity and hunger. These consequences are likely to be mediated through changes in nutrient intake. Do the food insecure consume fewer nutrients than others? The difficulty in answering this question is that national datasets on dietary intake are cross-sectional, but the nature of food insecurity or hunger in this country is periodic. For example, we may not have interviewers visiting a household on the particular day after that household has a bout with hunger. However, with large enough samples we would expect to find lower mean intakes for the food insecure. Cristofar and Basiots (1992) found this to be true in the 1985–1986 CSFII for adult women, but less so for preschool children. We found similar results for these groups in the 1989–1991 CSFII and also found that the food-insecure elderly consumed lower quantities of a number of nutrients (Rose and Oliveira 1997a).

Many factors affect diet, including ethnicity, regional food habits, and age and education of the household head. Because these factors may be correlated with food insufficiency, they could confound simple bivariate descriptive statistics that show a relationship between intakes and food insufficiency. Therefore we estimated the mean difference in intakes between food-sufficient and -insufficient individuals, using linear regression models that controlled for these and other variables. Although there were no differences between the two groups of preschoolers, for both women and the elderly, adjusted mean intakes of 8 nutrients, including energy and calcium, were significantly lower in food-insufficient individuals. Mean calcium intake, after allowing for other influences on diet, was 10% lower in food-insufficient women, and ~14% RDA percentage points less in the elderly (Rose and Oliveira 1997a).

We also estimated the extent to which these same groups of individuals were more likely to have low intakes of energy and 14 other nutrients; we defined “low” as <50% of the individual’s RDA. For adult women, food insufficiency was significantly associated with low intakes of 8 nutrients, including energy and vitamins A, E, C and B-6. The food-insufficient elderly were also more likely to have low intakes of 8 nutrients, including protein, calcium, and vitamins A and B-6. Food insufficiency was not significantly associated with low intakes among preschoolers (Rose and Oliveira 1997a).

Almost all of the currently used food insecurity indicators are based on responses at the household level. Although nutritional concerns are better assessed at the individual level, for external validation purposes it is important to evaluate how aggregate household nutrient intakes differ by food insecurity status. The above-cited CSFII work showed that adult women from food-insufficient households had lower intakes. However, there remained an uncertainty about the rest of members in those households, especially because it was the adult women in most cases who responded to the food sufficiency question. For the food insufficient, was there a net shortfall of food for the entire household or were those answering the question reporting their own individual situation in a household with the same amount of food, but unequally distributed? Using similar multiple regression models as those described above, our investigation of 1989–1991 CSFII data revealed that mean household intakes were significantly lower for the food insufficient. After allowing for other influences on diet, intakes of energy by households reporting food insufficiency were 13% lower than those for food-sufficient households. Food insufficiency was also associated with a significantly decreased intake of 13 other nutrients, with relative differences ranging from 8 to 18% of consumption levels in food-sufficient households (Rose and Oliveira 1997b).

An assumption implicit in the new CPS food insecurity and hunger measure is that children would be the last to suffer in households experiencing food insecurity. Thus those householdsin which there is evidence of child hunger are classified as being in the worst condition, i.e., food insecurity with severe hunger. This “child preference” observation comes from ethnographic work in upstate New York (Radimer et al. 1992), which indicated that food insecurity was a managed process and that at lower levels of food insecurity, adult caregivers sacrificed their own food consumption to maintain adequate levels for their children. However, until recently, this issue had not been studied at a national level.

We investigated this intrahousehold question using a sample of 1989–1991 CSFII households (n = 999) in which there was a preschooler present, in which the household respondent had answered the food sufficiency question and in which there were 24-h dietary recall data for a majority of eligible household members (breast-feeding or bedridden individuals were excluded). We calculated the difference in mean intakes of preschoolers from food-insufficient and -sufficient households after adjusting for ethnicity, region, age and education of the household head as well as other household and survey characteristics. The results (Table 1) show that there was no particular pattern for preschooler intakes, and none of the differences between the two groups of preschoolers were significant. However, the rest of the members from the same food-insufficient households consumed intakes that were lower than their counterparts from food-sufficient households on all nutrients but one of the nutrients studied. These differences were significant for 6 nutrients, namely, energy, protein, thiamine, calcium, phosphorus and magnesium. The results are consistent with the previous ethnographic work that underlies the new food insecurity and hunger measure.

**Implications**

Information on the prevalence of food insecurity and hunger is important for monitoring the progress of efforts to ameliorate these conditions. The research reviewed here highlights the importance of using direct measures of food security because indirect measures of well-being such as poverty-level incomes are not very specific nor sensitive to the hunger condition. Indirect measures fail in part because food insecurity is not a static condition. Recent research identifies the role of specific events that stress household budgets, such as job loss, increase in household size or loss in food stamps. Research on dietary intakes further validates the use of self-reported indicators of food insecurity and hunger, both among individuals and at a household level. Analysis of intrahousehold dietary patterns also lends support for a basic construct of the new CPS measure, i.e., that a reduction in food intake by children does not occur until after sacrifice by other members in the household and thus is indicative of the most severe form of hunger.

In our research we have used food insufficiency as a proxy
Finally, the Food Stamp Program findings reported here are worth highlighting. Studies have often shown a positive association between food stamp participation and food insecurity (Alaimo et al. 1998, Cristofar and Basiotis 1992, Radimer et al. 1992), probably indicating that the food insecure are more likely to seek out program benefits. In our work, we had a panel dataset in one case, and used a flexible model in another, and showed that the loss of food stamps or a reduction in benefit amounts to current participants would result in increased food insufficiency rates. Food security measurement is not simply an academic question and these exploratory studies signal an important direction for future research. Measurement tools should be used to evaluate and strengthen the effectiveness of the very programs we have in place to eliminate hunger and food insecurity in this country.

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LITERATURE CITED


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1 Values presented in this table are based on an analytic sample (n = 999) of households from the 1989–1991 Continuing Survey of Food Intake by Individuals.

2 Difference in mean intakes of individuals from food-insufficient and food-sufficient households after controlling for other factors that affect diet. Units are in recommended dietary allowance (RDA) percentage points, except for energy, which is expressed as a percentage of the recommended energy intake for a reference person engaged in light-to-moderate activity. Negative values are instances in which intakes by the food insufficient were lower. Intakes were adjusted for the following socioeconomic control variables: age, schooling, and race-ethnicity of the household head; income, size, and structure of the household; location and ownership of the home; participation in food assistance programs; and observation day, quarter, and year.

3 For the "rest of household member" nutrient intakes of individuals were divided by their RDAs and then averaged at the household level.

for food insecurity with hunger because the existence of this indicator on detailed food consumption and socioeconomic surveys allowed us to answer questions of interest with national-level data. Future research and monitoring activities will surely benefit from more sophisticated food-security measures, such as those recently developed using CPS data. Initial observations presented here indicate that a number of the results from our "determinants" work with the food insufficiency indicator are similar to those obtained with the CPS indicator. To improve our understanding of the causes of food insecurity, it will be important to repeat the more detailed analyses with the newer indicator. The same follow-up research will be necessary with respect to the dietary consequences of food insecurity. Both types of research will be possible in the future because the CPS indicator is slated to be part of a number of ongoing surveys.