Findings

Prevalence of Food Security and Hunger by Income Level

As expected, food insecurity and hunger declined sharply with increasing household income (fig. 1). The prevalence rate of food insecurity was more than six times as high among households with incomes less than 1.85 times the poverty line than among households above that line (24.6 percent vs. 3.8 percent; see table 1). Food insecurity with hunger was over seven times more prevalent for low-income households than for middle/high-income households (9.0 percent vs. 1.2 percent). However, as seen in figure 1, food insecurity and hunger did not decline to negligible levels until income rose to about five times the poverty threshold. Because such a large proportion of households were in this middle-income range, households with incomes above 1.85 times the poverty threshold accounted for a substantial share of all food-insecure households—about 20 percent—and for 17 percent of all households with hunger.

For households with annual incomes above $50,000, the prevalence of food insecurity and hunger was lower still, and these households accounted for only about 3 percent of all food insecurity and 2 percent of all hunger in the Nation.

Item-Response Patterns

The first question we address is whether response patterns of higher income households differed from those of low-income households. That is, did they typically affirm a different subset of items to get the same scale score?[6] The severities of item scores [7] indicate the typical response pattern of the population for which the scores are calculated, and similar relative severities of items in two subpopulations indicate similar response patterns. Comparing item scores based on independent Rasch-model scaling of low- and middle/high-income households

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[6] One of the assumptions of the single-parameter Rasch model is that all items discriminate equally. Given this assumption, households that affirm the same number of items (provided they respond to all items) are assigned the same scale score.

[7] See appendix for more detailed information on the meaning of item severities.

indicates that response patterns were nearly identical for the two income groups (fig. 2). Item scores were highly correlated between the two groups (r = .994), and no item had substantially different scores for the two groups. This indicates that low- and middle/high-income households registering the same level of food insecurity showed substantially identical patterns of response, generally affirming exactly the same items. The significance of this finding is that it rules out any substantial proportion of erratic or random responses—and consequent false positive classification—on the part of the middle/high-income respondents.

There were some minor differences in response patterns. Compared with low-income households with the same scale scores, middle/high-income households were slightly more likely to report that adults cut the size of meals or skipped meals,[8] ate less than they felt they should, and were hungry but did not eat. Middle/high-income households were slightly less likely to report having worried that food would run out, that children were not eating enough, that children were hungry, and that adults did not eat for whole days in 3 or more months. However, even for these items, differences between income groups were not great. The phenomenon measured by the item set, as summarized by the scaled measure, is essentially the same for the two income groups.

Comparing item-fit statistics for the two income groups provides further information on whether responses of middle/high-income households were consistent with the assumptions of the measurement model or were erratic. Two item-fit statistics, infit (information-weighted) and outfit (outlier sensitive), measure the extent to which responses to individual items are consistent with Rasch-model assumptions. In brief, the Rasch model assumes that, for a given item, the probability that a household will affirm the item increases as the severity of food insecurity in the household increases, and that the probability is related to the severity of the household's food insecurity by a logistic function.[9] The item-fit statistics measure how well each item conforms to this probabilistic expectation. In general, the information-weighted fit statistics (infit) were at least as good (i.e., near unity) for middle/high-income households as

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[8] Abbreviated descriptions of the items are used throughout the description of findings. For full wording of the questions, see appendix.
[9] The Rasch model assumes, specifically, that the log of the odds that a household will affirm a particular item is equal to the difference between the severity experienced by the household and the severity of that item.

for low-income households, indicating similar, or perhaps slightly greater, levels of consistency in response patterns by the middle/high-income households (table 2). Outfit statistics, which are sensitive to highly unexpected responses, would be high for any items that were answered erratically. In fact, on only three items did middle/high-income households register outfit statistics notably higher than those of low-income households—"Adult did not eat whole day," "Child hungry," and "Child did not eat whole day"—while the reverse was true for about an equal number of items. The dispersion of the item scores (measured either by standard deviation or mean absolute deviation) was about 5 percent smaller for middle/high-income than for low-income households. This is a measure of overall or average discrimination of the items, an indicator of how consistently response patterns reflected the severity order of the items. Substantially lower discrimination would indicate less consistent, more erratic responses, but the observed item dispersions indicated only a slight difference between the two groups.

Household infit and outfit statistics, analogous to the corresponding item-fit statistics, were also examined to assess the extent to which response patterns of middle/high-income households differed from those of low-income households. The household-fit statistics measure the extent to which a household's responses are consistent with the severity order of the items, as estimated from the responses of all households. In this analysis, response data from households in both the low- and middle/high-income groups were scaled together. All households were then ranked by their infit and outfit statistics. The highest decile of households on each fit statistic, that is, the households with the most erratic response patterns, were found to include somewhat disproportionate shares of middle/high-income households, but the disparity was not great. Households in the top decile on infit included 9.0 percent of all low-income households and 12.8 percent of all middle/high-income households. Households in the top decile on outfit included 9.5 percent of all low-income households and 11.6 percent of all middle/high-income households.

Response patterns of households with incomes above $50,000 also were quite similar to those of low-income households (fig. 3). Item scores for the two income groups were highly correlated (r = .992). Items showing significant inconsistency included the same items that

were inconsistent between low- and middle/high-income households. Compared with low-income households with the same scale score, high-income households were slightly more likely to report that adults cut the size of meals or skipped meals and that children skipped meals in more than 3 months. They were slightly less likely to report that adults did not eat for a whole day in 3 or more months. The general consistency in item scores is evidence that the phenomenon measured by the food security scale is essentially the same even when registered by households with incomes above $50,000. Item-fit statistics (not shown) were somewhat better for households with incomes above $50,000 than for low-income households, although the average discrimination of items was about 12 percent lower for the high-income households. The lower average item discrimination indicates somewhat less consistency in response patterns of high-income households. This could result from higher variability in the ways in which food insecurity is experienced and managed by these households, or it could result from a somewhat higher proportion of careless or random responses. The distribution of household-fit statistics for households with incomes above $50,000 was essentially the same as for all middle/high-income households.

Taken together, the comparisons of item scores and fit statistics across the three income groups indicate that food insecurity and hunger in middle- and high-income households are essentially the same phenomena as those measured in low-income households. While there is evidence that a few middle- and high-income households responded differently and more erratically to the items comprising the scale—potentially resulting in misclassification of food security status (consistent with hypotheses #6 and #7)—the evidence suggests that these were relatively few and had, at most, a small effect on the measurement of food insecurity and hunger in middle- and high-income households.

Household Characteristics

Household Structure

Earlier research has demonstrated that food insecurity and hunger are associated with household structure (Andrews et al., 2000; Bickel et al., 1999; Hamilton et al., 1997a; Nord

and Winicki, 2000). To assess whether this association is similar across income levels, we cross-tabulated household structure by income category and food security status. We identified nine household structural types, as follows: Households with children were classified as either (1) "two-parent with child," (2) "single male with child," or (3) "single female with child," depending on the marital status of the household reference person, or as (4) "complex household with child" if multiple family units or unrelated individuals were present in the household. Complex households are more likely to contain more than one economic unit, and therefore provide a test of hypothesis #3 (multiple economic units in residential household). Households without children were classified as (5) "multi-adult" (related adults living together, most commonly a married couple), (6) "sole male," or (7) "sole female." Sole male and female households were further subdivided into (8) elderly (age 65 and up) and (9) nonelderly.

The prevalence rates of food insecurity and hunger for each income category are compared across household types in figures 4 and 5. Allowing for the differences in overall prevalence rates among income categories, the associations of food insecurity and hunger rates with household types were strikingly similar across income categories. In all three income categories, food insecurity rates were higher for single males with children, and much higher for single females with children, than for two-parent families with children and multi-adult households. In all three income categories, rates of food insecurity and hunger were relatively low for elderly persons living alone, both male and female, and substantially higher for nonelderly men and women living alone. Complex households with children registered prevalence rates of food insecurity and hunger higher than the average for all households, and this was especially true of households with incomes above 1.85 times the poverty threshold. Among complex households in the middle/high-income range, the prevalence of food insecurity was twice the average for all middle/high-income households, and the prevalence of food insecurity with hunger was 2.5 times the average for all households in this income range.

In summary, the similar associations between household structure and food security status in all three income categories indicate that household structure affects food insecurity and hunger similarly for high-, middle-, and low-income households. This is further evidence that the phenomenon measured by the food security scale is similar across income categories,

consistent with the evidence from the scale analysis. However, among middle/high-income households registering food insecurity and hunger, a disproportionate share is complex. This provides evidence that some small proportion of middle/high-income food-insecure households conform to hypothesis #3. That is, they are classified as food insecure or food insecure with hunger in spite of a relatively high household income because there are multiple units in the residential household that do not fully share economic resources.

An Alternative Measure of Food Sufficiency and Quality

Households in the CPS were asked, in addition to the questions used to create the food security/hunger scale, a food-sufficiency question that has been used for a number of years in other surveys. The question classifies households into four categories, based on the statement that best describes the eating pattern in their household: (1) enough of the kinds of food they want to eat, (2) enough food, but not always the kinds they want, (3) sometimes not enough to eat, and (4) often not enough to eat. In addition, those who responded that they sometimes or often did not have enough to eat were asked whether this was due to any of five reasons: not enough money for food, too hard to get to the store, no working stove, no working refrigerator, or not able to cook or eat because of health problems. Respondents could affirm more than one reason. Although the answers, like those to the questions in the food security scale, provide a self-reported assessment, this is a shorter, more direct way of measuring food adequacy. Its association with the food security scale also provides a test of whether items in the scale may have been misunderstood or answered erratically. Further, the reasons given by households that did not get enough to eat provide a check on whether the scale might be picking up food insecurity or hunger not directly due to inadequate money for food.

The association of this alternative measure with the food security/hunger scale was similar for low-income and middle/high-income households (fig. 6). Of all middle/high-income households with food insecurity that fell short of hunger, 28 percent reported that they had enough of the kinds of food they wanted. This was nearly the same as the corresponding proportion for low-income households in that food security category (26 percent). Of middle/high-income households with hunger, 17 percent reported they had enough of the kinds

of food they wanted, while 41 percent reported they had enough to eat but not always the food they wanted, and 42 percent reported that they sometimes (34.6 percent) or often (7.8 percent) didn't have enough to eat. The corresponding figures for low-income households were 11, 31, and 58 percent, indicating somewhat higher levels of food stress, by this alternative measure, among the low-income households. Households with an income above $50,000 also conformed generally to the patterns of the low-income households (fig. 7).

In all three income categories, high proportions—around 90 percent—of the households that were classified as food insecure without hunger or food insecure with hunger, and who stated that they sometimes or often didn't get enough to eat, cited "not enough money" as a reason (figs. 8 and 9). Much smaller proportions of those households cited other reasons for not getting enough to eat, the most common being "too hard to get to the store" and "not able to cook or eat because of health problems." The responses of middle/high-income food-insecure households indicate that a rather small proportion of them conform to hypothesis #6: they experienced food insecurity for reasons not measured by the food security scale, rather than as a specific result of lacking enough money for food. The responses suggest, however, that the proportion of middle/high-income food-insecure households reporting reasons other than lack of money for food insecurity does not exceed 10 percent, not much larger than the proportion of low-income households giving the same reasons.

Coping Strategies To Avoid Food Insufficiency and Hunger

Middle/high-income households that gave any indication of food insecurity or insufficiency on preliminary screening questions, and all low-income households, were asked whether they engaged in a number of activities or behaviors known to be used by some limited-resource households to avoid food insufficiency and hunger. The questions were as follows:

People do different things when they are running out of money for food in order to make their food or their food money go further. In the last 12 months, did you ever:
- Get food or borrow money for food from friends or relatives?

- Send or take the children to the homes of friends or relatives for a meal because you were running out of food?
- Put off paying a bill so that you would have money to buy food?
- Get emergency food from a church, a food pantry, or food bank?
- Eat any meals at a soup kitchen?

The proportions of middle/high-income food-insecure households engaging in each of these coping strategies were similar to the corresponding proportions of low-income food-insecure households (fig. 10). Among middle/high-income households, almost 70 percent of those that were food insecure without hunger, and 80 percent of those with hunger, reported that they put off paying a bill so they would have money to buy food. These, as well as the proportions of households using other coping strategies, were generally similar to the corresponding statistics for low-income households with the same food security status and provide evidence that measured food security status was consistent with related experiences and behavior. The coping strategies reported by households with incomes above $50,000 were also generally consistent with those of low-income households, although their use of remedies other than putting off bill-paying were somewhat lower than those of low-income households (fig. 11). Most of the food-secure households were screened out of these questions, so we cannot compare their responses with those of the food-insecure households.

Participation in Welfare Programs

The proportion of middle/high-income food-insecure households participating in the major welfare assistance programs was greater than that for food-secure households in that income range, but much smaller than that of low-income households (fig. 12). Among middle/high-income food-insecure households, 7 percent received food stamps and about 9 percent received free or reduced-price school lunches. Two inferences can be drawn from these statistics. First, the generally low program participation rates validate the general income status of most of these households, since their recorded income levels would make them ineligible for most welfare programs. Second, the fact that a minority of the households in question received welfare assistance suggests that those households may conform to hypotheses # 1, #2, or #3.

That is, income was lower than control card income either during part of the reference period or for some members of the household, making the household eligible, to that extent, for assistance.

Employment of Adults in the Household

Among the middle/high-income group, the proportions of food-insecure households with only part-year or part-time workers were somewhat higher than for food-secure households (fig. 13). About three-fourths of all middle/high-income households, however, irrespective of food security status, had at least one full-time, full-year worker. This majority was even larger—about 90 percent—in high-income households (not shown).

Income in Calendar Year 1994

The CPS March file records annual income during the previous calendar year. This is a more accurate and reliable measure of income than the control card income, since it is built up from reports of income from many sources. For many households in the sample, it is also a measure of income during a slightly earlier period than that of the control card income, so that comparing the two incomes can provide an indication of income instability. About 19 percent of food-insecure households with control card income above 185 percent of the poverty line had incomes below that threshold during calendar year 1994, including about 4 percent that were below the poverty line in 1994 (fig.14). This observation provides additional evidence that a substantial minority of households conform to hypothesis #1, that is, that their income varied over time and was potentially low enough to result in inadequate purchasing power for food, during at least some part of the year. Although this pattern was less pronounced for households with annual incomes above $50,000, about 3 percent of those households that were food-insecure without hunger and 12 percent of those with hunger had incomes below 1.85 times the poverty level in the previous calendar year (fig.15).

Migration and Change in Household Composition

The March CPS file includes information on where each person (older than 1 year) was living 1 year prior to the survey. We used this information to identify households that had moved between March 1994 and March 1995 (households in which all persons older than a year had lived elsewhere 1 year earlier). For nonmoving households (those in which at least one person had not moved), we also identified those in which composition changed due to persons moving into the household.

Households that had moved during the previous year were overrepresented in both food-insecure categories of both low-income and middle/high-income groups (fig. 16). Migration and residential moves are sometimes (though by no means always) undertaken in response to job loss or to increased expenses that make it impossible to keep up with rent or mortgage payments. Thus, the overrepresentation of movers among middle/high-income food-insecure households may be taken as evidence of income change or changes in economic need during the year, consistent with hypotheses #1 (temporal mismatch/uneven income) and #4 (unusually high economic needs).

Among middle/high-income households, nonmoving households that changed composition during the year made up 4 percent of those classified as food-insecure without hunger and just over 5 percent of those with hunger, but only 2 percent of those that were food secure.[10] This suggests that, at most, 2 or 3 percent of middle/high-income food-insecure households conform to hypothesis #2 (change in household composition). This could be a slight understatement, since some proportion of households that moved would also have changed composition. Indeed, households that changed composition are likely to be overrepresented among households that moved. Even so, it seems unlikely that changes in household composition account for more than about 5 percent of middle/high-income food insecurity.

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[10] Household composition that changed due to a household member's leaving is not registered in the CPS and is, therefore, not taken into account in this analysis.

Food insecurity was not found to be associated with migration status among households with incomes above $50,000 (fig. 17). However, the substantial overrepresentation of households that changed composition among these households that were classified as food insecure with hunger was striking—15 percent, compared with 2 percent for high-income food-secure households. This suggests that changes in income or economic need during the year associated with changes in household composition were important contributing factors to hunger among these households, consistent with hypotheses #1 (temporal mismatch/uneven income) and #4 (unusually high economic needs).

Discussion and Summary

These findings shed light on most of the hypotheses as to why food insecurity is observed in households with relatively high incomes. Most important, they provide convincing evidence that the food insecurity phenomenon measured by the food security scale is essentially the same for middle- and high-income households, including the few with annual incomes above $50,000, as it is for low-income households. Item scores were highly correlated between the low-income group and each of the two higher income groups (middle/high-income and income over $50,000), indicating that response patterns were nearly identical for households with the same scale scores across the income range. The Rasch-model fit statistics indicate that the responses of middle- and high-income households fit the statistical assumptions of the model about as well as the responses of low-income households. There was evidence that the response patterns of middle- and high-income households were slightly less consistent than those of low-income households, but this was not widespread.

Substantial experiential and behavioral evidence corroborates the measured food security status of the higher income households. Food insecurity and hunger were similarly related to household structure across income groups. The alternative measure of food adequacy—the USDA/NHANES food-sufficiency measure—was as consistently associated with food security status for higher income as for low-income households. Coping strategies that are not means-tested, especially putting off paying bills to have money for food and getting food or