
Household Food Security in the United States in 1995: Results From the Food Security Measurement Project

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The need for a reliable measure of U.S. hunger and food insecurity has been recognized since the early 1980's. This paper describes the development of such a measure and presents initial findings from data collected for USDA by the Census Bureau. A unidimensional scale of severity, based on survey responses, was used to identify food security status; household weights were then applied to estimate the prevalence of food insecurity and hunger in three designated severity ranges. The large majority of American households (88 percent) were food secure in the year ending April 1995. Hunger was evident in 4.1 percent of all households. The paper concludes with a discussion of future nutrition monitoring and research directions for food security measurement.

Despite the recent economic recovery that has lowered unemployment and poverty rates in the United States, many American families still struggle to meet basic needs. This was the context for Vice President Gore's announcement in September 1997 at the National Summit on Food Recovery and Gleaning of new U.S. Department of Agriculture (USDA) estimates of the extent of food insecurity and hunger in U.S. households. Based on a state-of-the-art measurement

method developed through a broad collaborative effort, the new estimates indicate that nearly 12 million households experienced food insecurity in the 12 months prior to April 1995, while one or more persons in about 4 million of these food-insecure households experienced hunger due to resource constraints during the period. Although efforts to estimate the level of hunger in the United States have been made previously (7,10,28,31,33), the new USDA estimates are the first based

upon specially designed data collected from a large, nationally representative sample and subsequently validated to show strong statistical properties of internal validity and reliability. The new estimates thus represent the first reliable, standard national measure of food insecurity and hunger for the United States.

The availability of a standard national measure of hunger and food insecurity provides a powerful tool for monitoring changes in the food situation of U.S. households. It may be particularly useful in tracking the effectiveness of the Federal Government's efforts through food assistance and food recovery programs to help ensure that all Americans are able to obtain adequate food. In a time of tight Federal budgets and with welfare reform shifting increased responsibility for social welfare to the States, this monitoring function is especially important. This paper provides a brief introduction to the genesis of the new measure, including its conceptual basis and methodology, presents brief summary findings from the baseline estimates for 1995, and discusses implications of the measure for future research on family nutritional and general well-being.

Background

Federal interest in developing a hunger measure can be traced from at least 1984 when the President's Task Force on Food Assistance recognized the distinction between the concept of hunger in the traditional medical usage and a more socially oriented, common-sense meaning. The report noted: "To many people hunger means not just symptoms that can be diagnosed by a physician, it

bespeaks the existence of a social, not a medical, problem: a situation in which someone cannot obtain an adequate amount of food, even if the shortage is not prolonged enough to cause health problems" (23). The Task Force also noted the absence of any reliable measure of hunger in this latter commonly understood meaning and the resulting inability of policymakers to verify or negate claims of increasing hunger. This lack of an accepted standard measure of hunger prevalence was cited by the Task Force as posing a continuing policy conundrum.

After the 1984 Task Force report, State and local researchers increased efforts to develop soundly based survey measures (22). The Food Research and Action Center sponsored and obtained major funding for the Community Childhood Hunger Identification Project (CCHIP) (12,30-32) and researchers at the Cornell University Division of Nutritional Sciences sought to develop independent hunger scales (8,25,26).

At the Federal level, USDA began the process, in the mid 1980's, of analyzing the significance of the single survey question on the adequacy of household food supplies that had been added to its regular national food consumption surveys beginning in 1977 but had not been analyzed in depth (4,11). A similar household food sufficiency question and several others adapted from the CCHIP instrument were included in the Third National Health and Nutrition Examination Survey sponsored by the National Center for Health Statistics (NCHS) (1,6). Finally, the Federal Government's commitment to develop a standardized measure of food insecurity or food insufficiency for the United States

took definitive shape in 1990-92 when USDA's Food and Nutrition Service (FNS)¹ and NCHS were assigned joint responsibility to carry out this task under the Ten-Year Comprehensive Plan for the National Nutrition Monitoring and Related Research Program (NNMRRP) Act of 1990.

FNS took lead responsibility for developing the measures; it established an Interagency Working Group for Food Security Measurement to maintain a collaborative process for the project. As a key part of its conceptual basis, the project adopted the authoritative definitions of food insecurity and hunger developed by a special expert panel convened by the American Institute of Nutrition (AIN) and reported by the Life Sciences Research Office of the Federation of American Societies for Experimental Biology (3). According to these definitions, food insecurity occurs when a household does not have access to enough food, at all times, for an active, healthy life. Hunger, defined as "the painful or uneasy sensation that results from not having enough food" is a potential but not necessary consequence of food insecurity.²

¹FNS was renamed Food and Consumer Service (FCS) in 1994 in the context of broader USDA agency reorganizations. The original name was restored in December 1997.

²For a description of the conceptual basis of the Government's measure, including its debt to the body of prior research and an extensive bibliography of the literature to that point, see reference 5. For further discussion of this conceptual basis and its operationalized form and testing in the Government's new measure, see references 14, 15, and 24. For recent validation studies and related work within the same general approach, see references 2, 13, 16-18, and 21.

Methods

The subsequent operational development of the hunger and food security measure was also a broad-based, cooperative venture. At an early stage, FNS enlisted the expertise of the Census Bureau for developing and administering a national food security questionnaire. In January 1994, FNS and NCHS jointly sponsored a Conference on Food Security Measurement and Research, bringing together a wide range of experts in the field. Participants discussed their previous experiences with measuring hunger and food insecurity and then organized into working groups to provide continuing advice and critique to FNS in developing a baseline draft questionnaire (29).

In the next stage, the Census Bureau worked closely with FNS and its collaborators to analyze, field test, and refine the food security questionnaire. The draft version from the research conference was revised after review by an expert panel convened by the Census Bureau's Center for Survey Methods Research. The questionnaire was field tested and analyzed in the autumn of 1994 (27) and, with some further revision, was administered for the first time as a Supplement to the Current Population Survey (CPS) in April 1995. With minor revisions, the food security supplement was administered with the CPS again in September 1996 and April 1997.

The data collection in April 1995 produced some 45,000 usable interviews. In September 1995, FNS contracted with Abt Associates, Inc. (Abt) to analyze these data in a cooperative venture with FNS staff and other researchers involved in developing the questionnaire. From the beginning,

FNS expected the analysis to produce a scaled measure of food insecurity and hunger that would allow the government to identify households experiencing problems providing adequate food for all members.³The Abt team was selected because it had developed an innovative analysis design that applied state-of-the-art scaling methods that were used most widely in the educational testing industry. (See reference 15 for technical details of the scale estimation.)

The initial Abt procedure used standard factor analysis techniques to perform a systematic set of exploratory analyses of the 1995 survey results. The preliminary work found that, with one important area of exception, most of the food security indicators in the questionnaire fit a single-dimensional measurement scale. A few items failed to meet the rigorous fit criteria for inclusion and were dropped from the scale. However, one general type of indicator also did not fit the single-dimensional measure of severity of food insecurity: those items dealing with the coping strategies that a food-insecure or at-risk household might engage in to improve its food supply from emergency sources (e.g., getting food from a food bank or borrowing money for food). This is understandable given that all households do not face the same set of choices for coping with an inadequate food supply.

³The choice of household-level as opposed to family-level unit of analysis was due in part to the sampling frame of the Current Population Survey; it also reflects the objective of developing a comprehensive measure encompassing the entire U.S. residential population. In the March 1995 CPS sample, 70 percent of households were family households including two or more persons residing together and related by birth, marriage, or adoption; 20 percent were single-person households; and 5 percent consisted of two or more unrelated persons residing together.

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Once it was established that a core set of food security and hunger items could be scaled along a single dimension, subsequent analyses used the Rasch model, conceptually the most basic form within the general class of item-response-theory (IRT) statistical scaling models. Initially the Rasch model was applied to a subset of the sample including only households with children. The resulting scale was subjected to further analyses that showed it to be robust for other household types as well. Various reliability indicators were calculated and found to be within accepted ranges.⁴ Item response stability measures for individual items on the scale and for the overall scale were judged to be acceptable by the Census Bureau using data from some 1,100 quality control re-interviews that were performed in the week following the regular April 1995 CPS interviews (20).⁵

⁴A general discussion of potential sources of error in the food security measure is presented in the Summary Report volume (14). More extensive treatment is provided in the Technical Report (15). Based on three traditional measures of reliability (Spearman-Brown's and Rulon's split-half reliability estimates and Cronbach's alpha), the estimated reliability values ranged from .86 to .93 for the 12-month measurement scale. Since the distribution of household scale scores is highly skewed (56.5 percent of sample households passing the income and food security screener had zero score), a further dichotomized split-half test was conducted, collapsing the split-half scales into the dichotomous variable "answered all questions negatively" and "answered one or more questions affirmatively." On this test, the level of agreement between paired subscales was 84.8 percent for households with children and 85.8 percent for households without children, while the corresponding kappa statistic (showing the extent of agreement beyond mere chance) was .70 and .69 for the respective household types.

Table 1. Sequenced items and food security status categories for food security measurement scale

Sequenced questions in scale	Food security status
Q53 Worried food would run out	<i>Food secure</i>
Q54 Food bought didn't last	
Q55 Unable to afford balanced meals	<i>Food insecure</i>
Q58 Child fed few low-cost foods	
Q24 Adult cut size or skipped meals	
Q56 Couldn't feed child balanced meals	
Q32 Adult eat less than felt they should	
Q25 Adult cut size or skipped meals, 3+ months	<i>Food insecure with moderate hunger</i>
Q57 Child not eating enough	
Q35 Adult hungry but didn't eat	
Q38 Respondent lost weight	
Q40 Cut size of child's meal	<i>Food insecure with severe hunger</i>
Q28 Adult not eat whole day	
Q47 Child hungry	
Q29 Adult not eat whole day, 3+ months	
Q43 Child skipped meal	
Q44 Child skipped meal, 3+ months	
Q50 Child not eat for whole day	

The 18 items included in the scale are shown in abbreviated form in table 1 with their original question numbering. The scale items are ordered according to increasing levels of severity. The least severe items (Q53 and Q54) ask whether the household respondent has

worried about or experienced a situation within the past 12 months where food was running out, and there was no money to buy more. Subsequent items indicating experiences or perceptions of inadequate food intake in terms of both quality and quantity (Q32, Q55, Q56, Q57, Q58) fall in the low to intermediate ranges of severity measured by the scale. Items dealing with reduced food intakes and hunger for adults (Q24, Q25, Q35, Q38) fall in the intermediate range of severity measured, and those indicating reduced food intakes and hunger for children in the household (Q40, Q43, Q44, Q47, Q50) or more severe hunger for adults (Q28, Q29) fall at the severe end of the scale. All items refer to the 12-month

⁵In this analysis of response variance, 17 percent of the continuous variables and 9 percent of the categorical questions with enough cases to be analyzed exhibited "low" variance, 75 percent and 68 percent respectively showed "moderate" variance, and 8 percent and 24 percent showed "high" variance. Thus, 76 to 92 percent of the two question types exhibited "low to moderate" response variance while the food insecurity scale overall showed "moderate" response variance. The authors noted, "[t]his distribution is typical of response variance results for households surveys" (20).

period preceding April 1995, and all ask respondents to report only experiences, perceptions, or behaviors that result from a lack of financial resources. Thus, instances of hunger or meals skipped due to dieting, illness, or busy schedules are excluded by design. Each household in the sample received a scale score between zero and 10 under the Rasch measurement model, based on its particular pattern of responses to all 18 items. These detailed household scores indicate the distinct levels of severity of food insecurity experienced by U.S. households across the full range of severity captured by the measure.

The scaled measure provides much greater detail about the nature and extent of this poverty-linked phenomenon than ever before available. However, the very detail of the nearly continuous severity measure makes it inappropriate to serve, in itself, as a useful measure of the prevalence of food insecurity and hunger. For this purpose, several well-defined, broad subranges of severity level need to be designated and a simpler, categorical measure created based on these specified severity ranges.

To provide this second type of measure, FNS worked with Abt and other collaborators to develop a categorical measure that would classify the food security status of households in terms of several broad subranges of the measured severity levels indicated by their scale scores (15). The four designated status categories are illustrated in table 1. Households with complete responses to all 18 items were classified as food secure if the respondent answered affirmatively to fewer than 3 of the 18 questions on the

scale,⁶ while those with 3 or more positive responses were assigned to one of the food-insecure groups. Those with 3 to 7 positive answers were classified as food insecure without evident hunger, those with 8 to 12 as food insecure with moderate hunger, and those with 13 or more as food insecure with severe hunger. Locating the initial threshold (scale cutpoint) of each designated severity-range category was done by identifying the second or third item in sequence indicative of the salient conditions characterizing the category.⁷

It should be noted that the main role of the categorical measure is to provide an established, consistent basis for comparison of food insecurity and hunger prevalence over time and across population subgroups. In this sense, the exact placement of the category boundaries (scale-score cutpoints, in operational terms) is a matter primarily of identifying severity-range categories that have relevance to ongoing program objectives and policy discussion. In a deeper sense, locating the category boundaries or thresholds is a matter of identifying the

⁶Two groups of households were classified as food secure on the basis of zero scale scores: higher income households (≥ 185 percent poverty) that were screened from the food security portion of the interview on the basis of consistent negative responses to three broad food security screening questions, and both high- and low-income households that passed the screener but then gave no affirmative response to any food security scale item.

⁷In contrast to the underlying scale estimation, which is fully determined by the measurement model and the data, locating the designated category thresholds involved judgment as to how many indications of a given severity subrange should be present and across how broad a range of measured severity they should be observed.

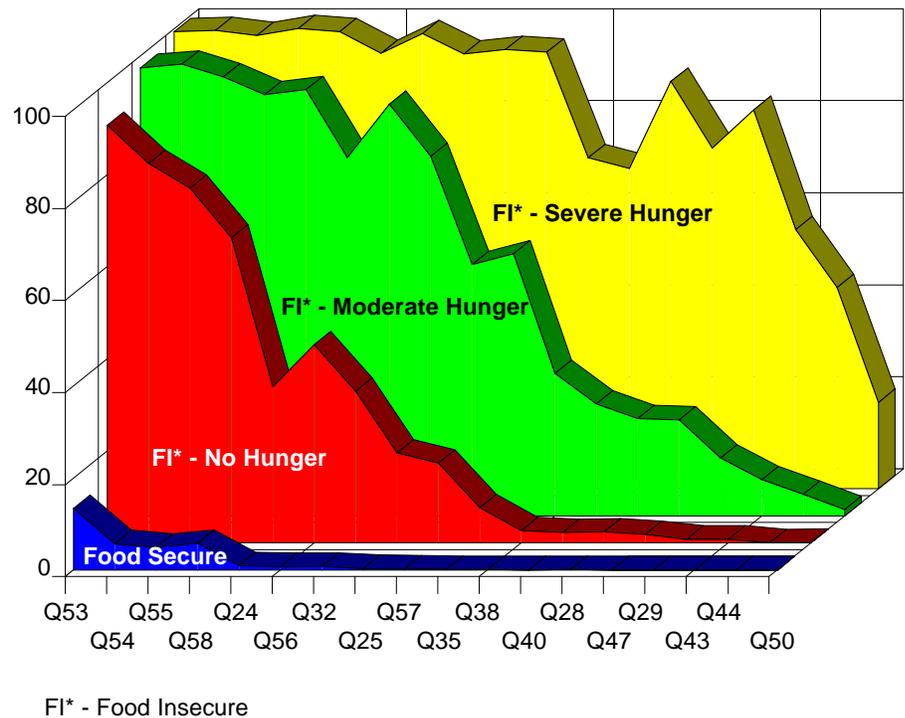
...food insecurity is more prevalent among Black and Hispanic households (almost twice the levels for Whites), households with children, households under the poverty level, and households in central city metropolitan areas.

important distinctions (conceptual and in reality) between the several subranges of severity level encompassed within the full range of food insecurity observed for contemporary U.S. households.⁸

The sequenced pattern of items on the scale reflects the underlying commonality among otherwise diverse households of the conditions and experience of food insufficiency in relation to basic need and the available set of potential household responses to such conditions—what Radimer termed “hunger as a managed process.” In measurement terms, this predominant sequential response pattern means that the typical household answering positively to any given scale item will also have answered affirmatively to all less severe items. For the entire CPS sample, 76 percent of households exhibited this common ordering of responses and were termed the “modal group” of households. While not all the April 1995 respondents followed this common ordering pattern perfectly, most of the non-modal households did not diverge very far from the common pattern.⁹

⁸The names applied to the designated severity level subranges, or food insecurity status categories, are nominal only and intended to reflect U.S. social reality as articulated; for example, in the 1984 President's Task Force Report on Food Assistance. Clearly, the names chosen for relevance to the U.S. context are not intended to suggest, and do not reflect, the much deeper severity ranges of food insecurity and hunger that are relevant to underdeveloped countries subject to famine conditions. In principle, the form of measurement scale developed from contemporary U.S. data could be extended, with a similar data set collected in poorer countries, to encompass the deeper levels of food insecurity and hunger severity experienced in those circumstances within the same unidimensional measurement construct. For a similar food-security scale developed for urban subsistence dwellers in Kampala, Uganda, see reference 19.

Figure 1. Item response patterns for food security status groups



The response patterns for the four food security status groups are illustrated in figure 1 where the questions in the scale are ordered sequentially and the proportion of affirmative responses to each item within each status group is projected onto the vertical axis. Overall, the response pattern shows the expected contrast among the food security status groups.

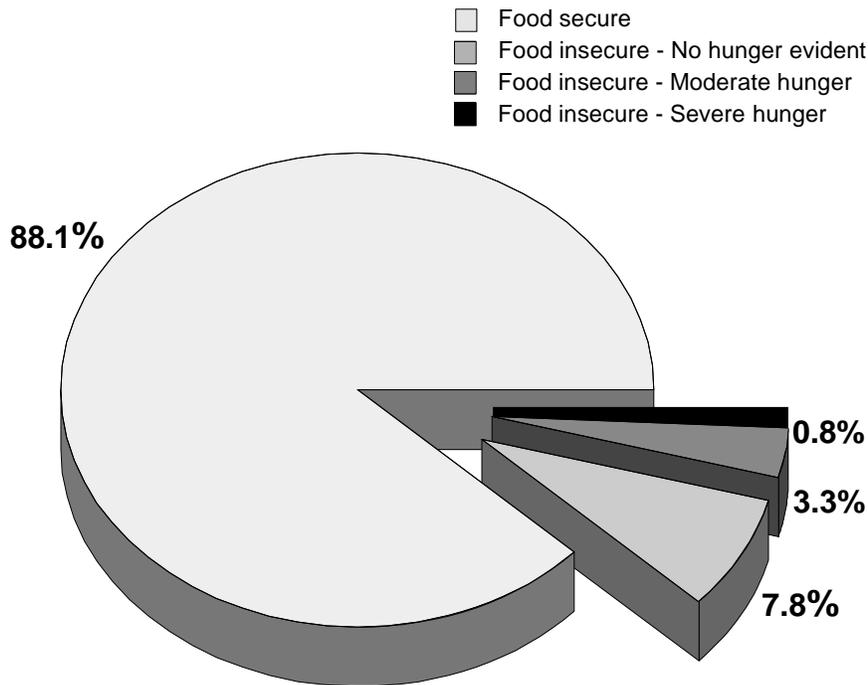
⁹Of those households with at least one positive response to a scale item, the proportion following the modal pattern was only 32 percent for households with children and 48 percent for households without children. Nonetheless, the fit statistics produced in estimating the Rasch model indicate an acceptable degree of conformance of their responses to the modal pattern. Detailed analysis of the non-modal response patterns is one of the areas of research now opened up and expected to be fruitful in helping identify constellations of conditions and behaviors occurring in highly stressed household settings.

Findings

By classifying survey responses according to food security status and applying household weights provided by the Census Bureau, Abt used the supplement data to estimate the prevalence of food insecurity and hunger within the specified severity range categories in the United States for the 12 months preceding the April 1995 survey. As can be seen in figure 2, the large majority of American households (88 percent) were found to be **food secure** in the year ending April 1995.

About 11.9 million (of approximately 100 million) households experienced food insecurity as a consequence of limited resources during that period.

Figure 2. Distribution of U.S. Households, by food security status level, 1995



Most of the food-insecure households were *food insecure without hunger* (7.78 million households), meaning that they reported experiencing concerns about the adequacy of their food supply, substituted cheaper food items, and reduced the quality and variety of their diets, but without significantly reducing food intakes. There were 3.34 million households classified as *food insecure with moderate hunger*, where some reduction in food intake due to inadequate household resources was evident for one or more household members, primarily adults.

An additional 817,000 households were identified as *food insecure with severe hunger*. In these households, reductions in food intake were observed for both children and adults, and one or more of the adults was likely to have experienced an extensive reduction in food intake (i.e., going whole days without food) due to inadequate resources.¹⁰

¹⁰ For the modal household group, children's hunger indicators appear only within the severe hunger range of household level food insecurity measured by the scale. Among the non-modal households, however, children's hunger may appear within other food insecure categories as well. Analysis of the CPS data is continuing to identify the extent of such cases.

Table 2 shows that household food insecurity is more prevalent among Black and Hispanic households (almost twice the levels for Whites), households with children, households under the poverty level, and households in central city metropolitan areas.

The number of households where hunger due to inadequate resources was experienced during the period can be estimated by combining the number of households assigned to the two most severe levels of food insecurity. This yields an overall estimate of 4.16 million households where one or more members experienced some level of hunger in the 12-month period preceding the April 1995 survey.

The number of individuals affected by hunger is not easily extrapolated from these estimates. Because the data were collected in a household survey, homeless individuals are not included. Furthermore, for many households (i.e., those with more than one adult or with more than one child), the structure of the questionnaire does not allow accurate determination of the food security status of each adult or each child in the household. An upper bound for the number of individuals affected by hunger is given by the total population of persons living in those households that were classified into either of the two hunger categories. From the April 1995 survey, this number is 11.2 million individuals, most of them adults.

For most of the food insecure households with children (and for all such households fitting the modal response pattern), the children are not likely to be seriously affected unless the household has reached the overall severity level required to classify it as experiencing food insecurity

Table 2. Prevalence of household food security status, by selected characteristics, 1995

Characteristics	Food secure		Food insecure— without hunger		Food insecure— moderate hunger		Food insecure— severe hunger	
	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>
All households	88,266	88.1	7,783.4	7.8	3,343.3	3.3	816.8	0.8
Household composition								
Household with children under age 18	31,434	82.5	4,676.2	12.3	1,670.6	4.4	331.9	0.9
Household with elderly but no children	26,155	94.1	1,124.1	4.0	436.2	1.6	89.9	0.3
Household with no children or elderly	30,677	89.5	1,983.1	5.8	1,236.4	3.6	394.9	1.2
Race/ethnicity								
White	76,129	90.0	5,653.7	6.7	2,298.1	2.7	534.0	0.6
Black	9,104	75.8	1,779.4	14.8	895.4	7.5	233.8	1.9
Other	3,032	84.6	350.6	9.8	150.1	4.2	49.4	1.4
Hispanic ¹	5,725	74.3	1,360.2	17.7	501.0	6.5	115.6	1.5
Income-to-poverty ratio ²								
Under 0.50	3,240	58.4	1,365.0	24.6	688.4	12.1	270.9	4.9
Under 1.00	10,230	64.7	3,500.7	22.1	1,587.6	10.0	489.5	3.1
Under 1.30	14,841	68.1	4,367.9	20.0	2,032.7	9.3	567.7	2.6
Under 1.85	25,914	73.8	5,952.6	17.0	2,568.0	7.3	680.4	1.9
Over 1.85	62,352	95.8	1,830.8	2.8	775.3	1.2	136.3	0.2
Area of residence								
Central city metropolitan area	20,172	83.9	2,494.4	10.4	1,102.5	4.6	286.5	1.2
Other metropolitan area	33,115	90.5	2,244.3	6.1	976.4	2.7	265.8	0.7
Nonmetropolitan area	20,007	88.0	1,906.2	8.0	802.8	3.4	161.2	0.7
Census geographic region								
Northeast	17,443	89.7	1,335.6	6.9	524.6	2.7	142.6	0.7
Midwest	21,113	89.4	1,614.6	6.8	743.9	3.2	150.9	0.6
South	31,311	87.5	2,959.2	8.3	1,244.6	3.5	285.5	0.8
West	18,399	86.2	1,874.0	8.8	830.3	3.9	237.7	1.1

¹Persons of Hispanic ethnicity can be of any race.²Income and poverty status refer to household income in a recent 12-month period, varying among rotation groups in the CPS sample.

with severe hunger. Thus, a preliminary estimate for the number of children who experienced hunger during the period is given by the number of children living in households classified into the severe hunger category.¹¹ This preliminary approximation indicates that 692,000 children were living in households where severe hunger was experienced in the 12 months prior to the April 1995 survey. (Further information on household and individual estimates can be found in reference 14.)

Discussion

The development of the food security and hunger measures as described here provides the baseline from which the Government can improve its capacity to monitor the food adequacy of U.S. households. As such, the true importance of the estimates can only be known in the future, when consistent comparisons can be made over time against the baseline numbers.

To the extent possible, the new measures are being implemented at the national level by all Federal agencies cooperating in the National Nutrition Monitoring and Related Research Program. USDA plans to continue annual collection of the basic household data needed to replicate the baseline hunger and food security measures through regular supplements to the Current Population Survey. The core set of survey questions needed to

estimate the scaled measures are planned for inclusion in the Fourth National Health and Nutrition Examination Survey (NHANES-IV) and the next round of USDA's Continuing Survey of Food Intakes by Individuals (CSFII), scheduled to be merged with NHANES-IV beginning in the year 2000. The Centers for Disease Control and Prevention, Division of Nutrition (CDC), NCHS, and FNS are working together to test subscales of the 18-item scale that can be used to measure food insecurity and hunger in State surveillance systems such as NCHS's State and Local Area Integrated Telephone Survey and CDC's Pediatric Nutrition Surveillance System.

Food security modules are also planned for the Census Bureau's Survey of Program Dynamics to be fielded for 5 consecutive years beginning in 1998 and the Early Childhood Longitudinal Study being conducted by the U.S. Department of Education, National Center for Educational Statistics. The University of Michigan Panel Survey of Income Dynamics included the food security module in a special supplement on women and children in 1997, and this module is being considered for implementation. FNS has collected food security and household food-use data in a national sample of low-income households. As these data emerge, researchers will begin to expand beyond the basic monitoring function to explore the causation and consequences of household food insecurity and hunger across the various levels of severity at which they are experienced and measured.

Aside from their incorporation in various research settings and the Government's use in nutrition monitoring, the new measures will provide a baseline for assessing food assistance program performance under the requirements of the Government Performance and Results Act. Specifically, USDA has proposed using the number of households experiencing poverty-linked hunger as a performance measure for assessing the extent to which the agency is succeeding in its goal *to enhance food and nutrition security for low-income Americans*.

Finally, ongoing food security and hunger measures will provide a direct measure of unmet need, which may prove useful for researchers interested in exploring alternative measures of material deprivation. While the Census Bureau's annual estimate of the number of households living below the poverty line has been the standard measure of the extent of material deprivation, the poverty measure has been criticized as increasingly inadequate for this task (9). Future explorations of the relationship of food security and hunger measures to other social and economic indicators of basic needs and resources may be fruitful in this area.

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¹¹The estimate is approximate and preliminary for two reasons. First, as noted, the number of children living in households classified to the severe hunger category provides only an upper bound to the number of children experiencing hunger within that category of households. Second, an undetermined number of children living in some of the (non-modal) households classified to the moderate hunger category also experience hunger, but are excluded from the preliminary approximation.

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