

Session I: Overview of Federal Activities and Monitoring

Evolution of the USDA/DHHS Food Security Measurement Project

Steven Carlson

The Food Security Measurement Project is a multi-year collaborative partnership of the public and private research community to provide rigorous and comprehensive estimates of the extent of hunger in America. I will describe its conceptual basis, certain aspects of data collection and analysis, some of its learned results, and possible future directions.

Drawing from the American Institute of Nutrition's definitions of 1990, "food security" is the assured access at all times to enough food for an active healthy life. The definition means a household has access to enough food that is safe, nutritious, and acquired in socially acceptable ways. While each of these dimensions is important, the measurement project focuses on the basic dimension of quantity. Food insecurity occurs whenever access is limited or uncertain. Hunger is the manifestation of severe food insecurity.

We approached hunger as a social rather than a medical problem, a distinction made by the President's Task Force on Food Assistance in 1984.⁵ Hunger is the inability, even if occasional, to obtain enough food. It can be present without visible clinical symptoms of deprivation. Malnutrition is a potential but not a necessary consequence of chronic food insecurity and hunger.

We measure food security because hunger is an important dimension of basic individual and family well-being. Food insecurity is undesirable in its own right and a possible precursor of more serious health and developmental problems. As the welcomers noted this morning, nearly 15 years ago, the President's Task Force on Food Assistance pointed to the widespread reports of

increasing hunger but concluded to their regret that hard data were simply unavailable to directly estimate the extent of hunger. In the absence of that information, they predicted, solutions would be elusive.

In 1990, Congress enacted the National Nutrition Monitoring Act to bolster the scientific and data resources devoted to assessing nutritional well-being. The act mandated development of a comprehensive plan and assigned the Food and Nutrition Service and National Center for Health Statistics the joint task of developing a standardized mechanism to obtain data on the prevalence of food insecurity that could be used at national, State, and local levels.

Finally, the issue of hunger measurement is entirely consistent with a focus on performance-based outcome measures embodied in the Government Performance and Results Act. As a result, the measure of food security has become a core part of the Food and Nutrition Service's strategic plan in dealing with food security and hunger.

The process for this project has always been inclusive. We started with a research conference at which experts concluded that a rigorous measure of food insecurity and hunger was feasible. A working group produced a draft survey instrument, building on pioneering research at the Community Childhood Hunger Identification Project and at Cornell's Division of Nutritional Science. We relied heavily on the expertise of staff at the Center for Survey Methods Research at the Bureau of the Census. The instrument was pretested in the summer of 1994 and then asked of a random sample of about 45,000 households in the April 1995 Current Population Survey, a nationally representative sample of American households that forms the basis for the monthly estimates of unemployment and labor force participation. At the moment, four rounds of data collection have been obtained as a supplement to the CPS: April 1995, September 1996, April 1997, and August 1998. There are plans for another round in April 1999. Our hope is that the rounds

⁵U.S. President's Task Force on Food Assistance. *Report of the President's Task Force on Food Assistance*. 1984.

continue in the spring and fall of alternating years.

The supplement itself consists of over four dozen questions, asking not only about food insecurity but also about food expenditures and sources of supplemental food such as food assistance programs, emergency feeding systems, or family and friends.

The food security items fall into four basic groups. Anxiety that the food budget may be insufficient is addressed when we ask, for example, whether the family worried that their food would run out before they got money to buy more. A group of questions concerns perceptions that the food was inadequate in quality or quantity, captured by statements like: "We could not afford to eat balanced meals." There is a group of questions about reduced food intake or its consequences for adults: "Did you or other adults in your household ever cut the size of your meals or skip meals because there was not enough money for food?" The final group of questions examines reduced food intake or its consequences for children: "Did any of the children ever not eat for a whole day because there was not enough money for food?" All questions in this set are conditioned on the family's lack of resources; we are not trying to measure hunger that results from being too busy to eat, from dieting, from illness, for any other cause except lack of sufficient resources.

Under the leadership of Chris Hamilton at Abt and with the cooperation of the working group from some Federal agencies, we began analyzing the data as part of the April 1995 supplement, with a series of linear and nonlinear factor analyses, to determine the underlying structure of the pattern of results that emerged. Based on those factor analyses, we concluded that it was possible to characterize this phenomenon as a single underlying factor, a unidimensional scale. The questions fell out in an order that was plausibly ordered by severity. The ordering is consistent with the Cornell group's notion that hunger is a managed process. At some initial level of financial stress, a household may have anxiety or concern about the food supply. If food intake is

reduced, it appears first among the adults as they shield the children. However, as limitations tighten, children too begin to experience reduced intakes. A series of tests ensured that the results were robust.

On the basis of this scaling exercise, we assigned a numerical food security score to each household. Neither the household scores nor their average have a natural interpretation for the public, and so we used a household's score to assign it to one of four categories that we developed to characterize the variety and severity of experiences based on the range of scores. The four categories are: food secure—those who show no signs or evidence of problems with food sufficiency or quality; insecure with no hunger—those in which food insecurity is evident in household concerns or adjustments to the quality of their diet but short of actual reductions in intake; insecure with moderate hunger—those with reported reductions in the intake of adults; and insecure with severe hunger—those with reported reductions in the intake of children or, in the case of households where children are not present, extensive reductions among the adults. These categories do seem meaningful, and the frequency of positive responses to the most severe questions rises quite rapidly as you move from the food secure category to the severe hunger category.

Results were announced at the First National Summit on Food Recovery and Gleaning in September 1997. For the 12 months ending in April 1995, 12 million households, 12 percent of the U.S. population, experienced some degree of food insecurity. A million of those households, roughly 4 percent of the population, experienced either moderate or severe hunger, and 800,000 households, less than 1 percent, experienced severe hunger.

We examined the validity and reliability of the estimates. Measures of statistical fit and reliability fell well within conventional standards. To test the consistency of household responses, the Census Bureau reinterviewed a sample of the April 1995 respondents to ask the same questions again of the same set of households. The food

security questions have fairly moderate reliability, consistent with the reliability of most of the CPS questions.

Scores are related to other factors in expected ways. Food security rises as income goes up. Food security rises as food expenditures go up.

The relationship between insecurity and dietary intake or nutrient availability is still not fully answered. A direct answer obviously requires that food security questions be in the same survey that is collecting information on food consumption and nutrient intake. Such a survey will be done shortly. Meanwhile, there is a clue about the likely relationship. It comes from research that the Economic Research Service published, using data from the 1989 and 1991 Continuing Survey of Food Intake by Individuals. The research compared the intakes of those who said they sometimes or often did not have enough to eat with the intake of all other households, and found that the food-insufficient households had significantly lower intakes of both calories and 13 out of the 14 nutrients that they examined. Those results are encouraging.

This work can monitor changes in the food security of the American population. The lasting value of this project is as a tool to measure this important aspect of individual and family well-

being. As part of our GPRA strategic plan and annual performance plans, we are incorporating the new measure into our thinking about the effectiveness of nutrition assistance programs in enhancing the well-being of the people these programs serve. It has been proposed to include the measure in Healthy People 2010. Food security has become one of the key national indicators of well-being for America's children, part of the Federal interagency group focusing on child and family statistics. The measure can serve as a benchmark for State and local comparisons. It is already being used in a number of State and local monitoring efforts around the country, and by other private sector researchers in the United States and Canada. We are also optimistic that it will contribute to future research into the causes and consequences of hunger.

In the recent book *Toward an End to Hunger in America*,⁶ Peter Eisinger refers to the September 1997 release of the April 1995 results when he writes: "The release of the report on Household Food Security marks a cognitive watershed in the effort to deal with American hunger. It is no longer possible to argue that the United States has failed to solve its hunger problem because Americans do not know its nature or its scope."

⁶Eisinger, Peter K. *Toward an End to Hunger in America*. Washington, DC: Brookings Institution. 1998.

Developing National Prevalence Estimates From the 1995 Food Security Supplement to the Current Population Survey

William L. (Chris) Hamilton

This work was carried out by Abt Associates, Inc. under contract with FNS, with many people collaborating, including John Cook, the principal investigator, and Chris Olson, Ed Frongillo, Jr., and Cheryl Wehler.

As previously mentioned, about 12 percent of the households in the United States in 1995 experienced some measurable level of food insecurity, about 4 percent experienced hunger, and about 1 percent experienced something that we categorized as severe hunger. My goal today will be to explain the origins and meaning of these numbers, and the process by which the food security scale was obtained from the four dozen items in the Food Security Supplement to the CPS. In doing this, I will also describe the properties and interpretation of this scale and the origin of its four categories.

The underlying food security scale is essentially a zero-to-10 measure. Zero represents food security and 10 is the most severe level of food insecurity that we measured. The scale excludes more severe types of food insecurity that may be more relevant for other countries than for the United States.

The food security scale is a household scale rather than an individual scale: questions pertain to everybody, the adults as a group, or the children as a group. The scale I will talk about is the 12-month version of the scale: questions typically ask, "At any time in the past 12 months has your household experienced the following." We do not know whether its experience was continuous or for a limited period within the 12 months. The 30-day version of the scale exists, but it seems less useful.

Questions ask whether a household has enough food. Nutritional quality is not emphasized. The scale does not consider coping mechanisms that

people take to deal with food insecurity, such as the use of soup kitchens, food pantries, or other food assistance programs. As Steven mentioned, there were some questions in the survey on those topics, but they were not included within the core scales.

The specific scaling procedure that was used is a Rasch model, which is a form of nonlinear factor analysis that fits within the general family of item response theory models. The model is widespread in educational testing where the underlying premise is that the probability that a student responds correctly increases with the student's ability and falls with the question's difficulty. The assumption of the food security scale is that the probability of affirming a question increases with the household's underlying level of food insecurity and falls as the severity of the condition measured by the particular item goes up.

In the simple case in which everybody answers the same set of questions, a household's score begins with the number of questions it answers affirmatively. The score is converted to a range from zero to 10. The converted scale value does not depend only on the number of affirmative answers. In particular, of the 18 items in the scale, only 10 apply to everybody, while 8 are applicable only to households with children. The Rasch approach derives comparable values on a single scale for households with and without children. It can handle missing responses on particular items, and it permits substituting questions in the future without losing comparability over time.

The technique derives a value called an "item calibration" that captures the severity of the conditions represented by a given item, and permits comparisons across items. Item calibrations help to break the scale into ranges, by which we develop the four categories of food security status.

The item calibrations are consistent with research showing that hunger is a managed process. Those items with less severe rankings, by and large, reflect household concerns and adjustments in food management. In the middle grouping, the items indicate reduced food intake for adults, and at the severe end, the items indicate reduced

intake for children. The severity of the individual items coincides with the results of previous literature.

We estimated the model separately for each of three groups: households with no children or elderly members, those with children, and those with elderly members but no children. Except for just one small order reversal, we found the same rankings of the items across all three groups, and the item calibration scores are quite comparable. Therefore, there is a very high level of consistency across groups, which enables us to develop a common scale for all groups.

We did many internal reliability tests, including Cronbach's Alpha and other traditional tests as well as tests done with the Rasch model itself. Reliability statistics were around 0.7, which suggests that the model is a solid descriptor of a population condition even though a higher score would be wanted before using it for clinical screening of individuals or households.

External validity tests show reasonably high correlations between food security and variables you would expect to be correlated, such as income and food expenditures.

A household that answers negatively to all 18 items is categorized as food secure. So too is a household that affirms one or two of the least severe items, which held for a plurality of cases. The category "food insecure without hunger" contains people who affirmed the first two items plus one or more of the next five items in the scale. These range from adults not eating balanced meals through indications of reduced food intake. In the last two categories are items showing conditions of hunger for one or more persons in the household, first for adults, then children.

When compared with other data, we see the prevalence of food insecurity is reduced as income increases. Interestingly, among households below 50 percent of the poverty line, 60 percent are classified as food secure. Perhaps these households remain food secure, despite very low income by experiencing significant deprivation on other dimensions of well-being. Alternatively, the measurement instrument's sensitivity may be limited in such a way that some food-insecure people are not being correctly identified. This area merits future research.

Households with children under 6 years of age have a fairly high prevalence of food insecurity. The fairly low prevalence of food insecurity among households with elderly members is surprising. Some anecdotal evidence suggests food insecurity is under-reported by elderly people. In contrast, ethnic groups' patterns match expectations.

One somewhat puzzling result is that people who are food insecure are much more likely to be participating in food assistance programs than the people who are food secure. There are reasons to expect this relationship to go in either direction. On the one hand, food insecurity should lead the households to seek out the programs. On the other hand, food insecurity should be ameliorated by participation.

I think the importance of this work lies not in the specific numbers for 1995 but in the development of a scale that enables one to observe changes over time. We can also use these numbers as a benchmark for understanding the prevalence of hunger and food insecurity within particular populations and regions.

Future Federal Plans For Monitoring Food Security

Ronette R. Briefel

In 1984, I joined the NHANES study and attended a hunger workshop in Berkeley. Ever since, the subject has been of research interest to me. My remarks today are based on input from Karil Bialostosky from NCHS, Ted Macaluso from the Food and Nutrition Service, and Bettylou Sherry with the National Center for Chronic Disease Prevention and Health Promotion at CDC.

Monitoring food insecurity relates to nutrition research and nutrition policymaking. The policy issues ultimately drive the research questions that we want to answer by collecting national survey data.

Many issues that we were struggling with 5 years ago at the first food security conference are still with us today. However, we did not then have a common definition for food security nor a standardized measurement tool for food security. We focused on research and development and produced a food security methodology for use in national nutritional monitoring. We now have a household-based tool conditioned on an economic resource constraint. We were interested in population subgroups at risk, and in incorporating the tool into national surveys to study different aspects of the problem, such as dietary intake, nutrition, and health status outcomes.

The tool's questions, the research and monitoring needs, and the policy questions are in a fluid environment. We will need to continually evaluate whether we are asking the right survey questions, the measurement tools are appropriate, and the information we are capturing is effectively answering the policy questions of the day.

During the development of the 18-item scale, national surveys were collecting information in the area of food security. The USDA food consumption survey, the Continuing Survey of Food Intakes by Individuals (CSFII), was using a single-item question that had been used over the past 20 years. The NHANES III included a bat-

tery of questions based on information derived from the CCHIP studies and the USDA question. These data will be useful to compare pre- and post-welfare reform situations with data based on the new 18-item questionnaire. The food security data will also be used to look at the prevalence of food insecurity across low-income groups, race and ethnic groups, and regions of the country and to provide a benchmark for State and local comparisons.

Several current and future national surveys will be using the 18-item scale, including the Current Population Survey with an annual estimate; the Survey of Program Dynamics; and the National Health and Nutrition Examination Survey (NHANES), which will start next month in March 1999. The NHANES and CSFII will begin to be integrated to form one National Food and Nutrition Survey beginning in 2000. This merger provides an opportunity to expand the annual sample size to between 8,000 and 10,000 individuals through low-income and race and ethnic oversampling. Full integration is expected in 2002 to 2003.

In addition, a Department of Education Early Childhood Longitudinal Study incorporated the 18-item scale along with a battery of behavioral, health, and education variables. Current national data will be used for continued research on the relationship between food program participation, food nutrient intake, and nutritional status and health, as well as the causes and consequences of hunger and food insecurity.

From the work of Katherine Alaimo and colleagues at Cornell, who used the NHANES III data for 1988-94, we find that Mexican-Americans are two times as likely as the total population to report food insufficiency. Those who did not graduate from high school are one-and-a-half times as likely, low-income persons are 1.6 times as likely and a single-parent household is twice as likely to report food insufficiency. One of the most interesting and important findings was that a single female-headed household with children is five-and-a-half times as likely to report food insufficiency, compared with other household types. More research could

focus on this particular subgroup. Those participating in the Food Stamp Program were two times as likely to report food insufficiency, and those with no health insurance were almost two times as likely, compared with those not participating in the Food Stamp Program, and those with health insurance, respectively.

About 2 years ago, a new working group on welfare reform and nutrition data needs was formed, and, to an extent, replaced the working group that developed the National Nutrition Monitoring and Related Research Program's Ten-Year Plan food security objective. The goals of the working group are to identify data gaps in national surveys, to examine the suitability of national surveys for addressing welfare-reform issues, to be a repository for current practices in food security and nutrition, and to foster interactive and interagency research. Karil Bialostosky serves as the group's executive secretary. It is co-chaired by the National Center for Health Statistics and the Food and Nutrition Service at USDA. A number of Federal agencies participate including the Health and Human Services, USDA, Census, Department of Labor, Congressional Research Service, NOAA, and Office of Management and Budget. We have State representation from the Association of State and Territorial Public Health Nutrition Directors. Individuals working on food security measurement and policy in their States came and shared their views with us. We have representatives from advocacy and private non-profit organizations.

The group has served as a communication forum for keeping up to date with legislative changes in welfare. It has provided a context for discussion on how to improve the way we monitor food security in the U.S. population and on which measurement tools should be used in national surveys. We have followed changes in welfare reform and how these changes may affect the questions we are asking in national surveys. We have encouraged the use and distribution of the 18-item food security tool and succeeded in broadening the potential surveys and applications where food security might be used in the future.

In addition, the group has worked on developing a related six-item short scale. The short scale arose from the need of some surveys that lacked space and time to ask the 18 items. Stephen Blumberg will report on this short scale later this morning.

CDC has cooperative agreements with four States (Arizona, Massachusetts, Minnesota, and Missouri) and the District of Columbia that are demonstration projects in either the Pediatric or the Pregnancy Nutrition Surveillance System. The test clinic sites are primarily WIC clinics where the single USDA food-sufficiency question and four other questions derived from the 18-item set are being tested. The 3-year long demonstration project will be completed in September 1999. It will provide information about selected food security questions in a low-income population attending WIC clinics. A review of these test data will influence decisions about the exact questions that will be fielded in a broader way in the Pediatric and Pregnancy Nutrition Surveillance System. These projects are an important step forward for testing food security and working with the States to collect data and to look at these issues. Bettylou Sherry has more information if you are interested.

The Current Population Survey uses a household framework to assess household-based food insecurity and security. We are ready to go to the next research level and to develop an individual-based measure of food insecurity. We need to retain the household measurement because the household is the economic environment in which people live, but we know that individuals within a family are often very differently affected by hunger. Surveys such as NHANES or CSFII collect information on individuals living in households. We need to study how household food insecurity affects individuals in the household. Our next research task is to develop individual-level questions that can be added to individual-based surveys. Certainly we welcome your input and discussion on this research topic.

Two other food security areas were mentioned by Linda Meyers. The welfare reform working

group provided input for the U.S. Plan of Action for Food Insecurity, a follow-up to the World Food Summit of 1996, which has as its goal to reduce food insecurity by half worldwide by the year 2015. The working group has also developed the Healthy People 2010 objective, for which the 1995 CPS data serve as a baseline. The draft Healthy People 2010 objective is to increase the prevalence of food security among U.S. households to at least 94 percent of all households. The 1995 baseline was 88 percent.

We have a comprehensive research agenda planned that includes methodological development, applied research, and policy research. We want to continue research in assessment, validation and interpretation of methods, and scaling for individual-level measures that can be used to supplement the household-based food security measure. More emphasis will be given to asking survey questions on food access and expenditures, and to analyzing data sets that include economic data. Methods development to assess food insecurity among the elderly needs more attention, including possibly tailoring existing methods for use with elderly populations. Christine Olson mentions that the elderly may under-report food insecurity, and we observed that in analyzing the NHANES III data. Finally, temporal trends of food insecurity and other cultural and behavioral aspects will continue to be examined using data sets in hand. A number of annual national surveys will continue to include the 18-item scale for trends analysis, and will be used for tracking broad population statistics over the next decade, and for tracking progress in meeting the Healthy People 2010 food security objective.

Cross-sectional studies cannot fully investigate food insecurity and hunger. We also need longitudinal studies that include the food insecurity measure to examine what happens to an individual's nutrition and health status when there are changes in a household's income, welfare benefits, or food program participation.

The working group identified low-income persons, minorities, infants and children, and pregnant and lactating females as population groups that should be targeted for food insecurity monitoring. In the aftermath of welfare reform, the 18- to 50-year-old able-bodied adults without children is a new group to monitor. Even this extensive list, which covers a large portion of the population, does not include the homeless or the institutionalized.

With the NHANES program initiated, there has been the development of a mobile examination unit that could, upon request, go out into communities with a mini-NHANES. Perhaps we could collect dietary and food security information in a short survey interview coupled with a health examination.

We need to continue to disseminate the results of survey methods research and the results of data analysis so that others can benefit from the research findings. We also need to continue to encourage comparable use of food security methodologies across national, State, and local surveys, and data systems, as appropriate. To have purposeful data collection (national monitoring), assessment tools must be continually re-evaluated to revisit the link between monitoring, to meet data needs for research and policy, and to meet the goal of improving the health and nutritional status of the population.