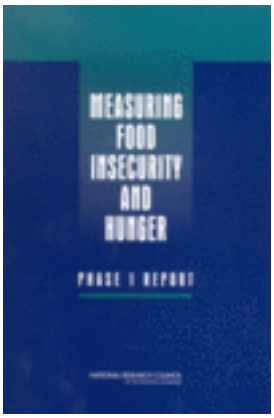

Measuring Food Insecurity and Hunger: Phase 1 Report

Panel to Review U.S Department of Agriculture's Measurement of Food Insecurity and Hunger, National Research Council

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MEASURING FOOD INSECURITY AND HUNGER

PHASE 1 REPORT

Panel to Review U.S. Department of Agriculture's
Measurement of Food Insecurity and Hunger

Committee on National Statistics

Division of Behavioral and Social Sciences and Education

NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES

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PANEL TO REVIEW U.S. DEPARTMENT OF AGRICULTURE'S MEASUREMENT OF FOOD INSECURITY AND HUNGER

JANET L. NORWOOD *(Chair)*, Independent Consultant, Chevy Chase, MD
ERIC T. BRADLOW, The Wharton School, University of Pennsylvania
J. MICHAEL BRICK, Westat, Rockville, MD
EDWARD A. FRONGILLO, JR., Division of Nutritional Sciences, Cornell University
PAUL W. HOLLAND, Research and Development Division, Educational Testing Service, Princeton, NJ
MICHAEL D. HURD, Center for the Study of Aging, RAND, Santa Monica, CA
HELEN H. JENSEN, Department of Economics, Iowa State University
NANCY MATHIOWETZ, Department of Sociology, University of Wisconsin-Milwaukee
SUSAN E. MAYER, Irving B. Harris Graduate School of Public Policy Studies, University of Chicago
DONALD (DIEGO) ROSE, Department of Community Health Sciences, Tulane University

GOOLOO S. WUNDERLICH, *Study Director*
MICHELE VER PLOEG, *Study Director (until October 2004)*
JAMIE CASEY, *Research Associate*
CHRISTINE COVINGTON CHEN, *Senior Program Assistant*
MICHAEL SIRI, *Senior Program Assistant (until November 2004)*

COMMITTEE ON NATIONAL STATISTICS
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NORA CATE SCHAEFFER, Department of Sociology, University of Wisconsin-Madison

CONSTANCE F. CITRO, *Director*

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The Panel to Review the U.S. Department of Agriculture's Measurement of Food Insecurity and Hunger acknowledges with appreciation the contributions of the many persons who gave generously of their time and knowledge to this study.

Support for the study was provided by the Economic Research Service (ERS) and the Food and Nutrition Service (FNS) of the U.S. Department of Agriculture (USDA). We particularly wish to thank Mark Prell, Chief, Food Assistance Branch, who served as project officer of the study. He and his colleagues, particularly Mark Nord and Margaret Andrews, were helpful in providing information about the research undertaken in the development and implementation of the measures of food insecurity and hunger and answering the many questions from the panel and staff. We acknowledge Susan Offutt, Administrator, and Phil Fulton, Associate Administrator, of ERS; Steven Carlson, Food and Nutrition Service; Betsey Kuhn, Director of the Food and Rural Economics Division (FRED); and David Smallwood, Deputy Director for Food Assistance Research, FRED, for recognizing the need and initiating and supporting this important study.

In addition we acknowledge the many federal and nonfederal government officials and those from the research and academic community who gave expert presentations to the panel at its initial meeting and participated in the workshop on the measurement of food insecu-

rity and hunger. We are grateful to the authors of the papers prepared for the workshop. Their names and the subjects of their papers are listed in Chapter 1. The papers were used by the panel and staff to guide them in drafting this report.

A number of people within the Committee on National Statistics (CNSTAT) and the Division of Behavioral and Social Sciences and Education (DBASSE) provided support and assistance to the study panel. We acknowledge with gratitude the contributions of the staff. The panel wishes to thank Michele Ver Ploeg, who as study director until October 1, 2004, organized the work of the panel. She was chiefly responsible for developing and organizing the workshop during the first phase of the study. Gooloo Wunderlich was responsible for preparing the drafts of the Phase 1 report and responding to the many comments from the reviewers on behalf of the panel. Michael Siri and Christine Covington Chen handled administrative matters, and Jamie Casey provided research support. We are also grateful to Jerusha Nelson Peterman, who interned with CNSTAT in the summer of 2004, for her research assistance. Jerusha researched the reporting of food security estimates by the U.S. media, as well as uses of the food security supplement in other national, state, and local surveys. Christine McShane, senior editor of the DBASSE Reports office, provided professional editing advice, and Kirsten Sampson-Snyder shepherded the report through the report review and production process.

Finally, we would like to thank the members of the panel for their generous contributions of time and expert knowledge to the deliberations and preparation of this report.

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the NRC's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process. We thank the following individuals for their review of this report: Alicia L.

Carriquiry, Department of Statistics, Iowa State University; Robert S. Chen, Center for International Earth Science Information Network (CIESIN), The Earth Institute, Columbia University; John T. Cook, Department of Pediatrics, Boston Medical Center; Barbara Devaney, Nutrition Section, Mathematica Policy Research, Princeton, NJ; Johanna Dwyer, Medicine and Community Health, Tufts University School of Medicine, Boston and Office of Dietary Supplements, National Institutes of Health, Bethesda, MD; Peter Eisinger, Department of Urban Politics and Economic Development Policy, Wayne State University, Detroit, MI; Allan L. McCutcheon, Gallup Research Center, University of Nebraska-Lincoln; and Nora Cate Schaeffer, Department of Sociology, University of Wisconsin-Madison.

Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations nor did they see the final draft of the report before its release. The review of this report was overseen by David M. Betson, Department of Economics and Policy Studies, Notre Dame University and John C. Bailar, III, Department of Health Studies (emeritus), University of Chicago. Appointed by the National Research Council, they were responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authoring committee and the institution.

Janet L. Norwood, *Chair*
Panel to Review USDA's Measurement
of Food Insecurity and Hunger

Contents

Executive Summary

The statistics on food insecurity and hunger in U.S. households, published annually by the U.S. Department of Agriculture (USDA), are based on a survey measure developed by the U.S. Food Security Measurement Project, an ongoing collaboration among federal agencies, academic researchers, and private organizations. The measure was developed over the course of several years in response to the National Nutrition Monitoring Act of 1990. One of the objectives of the development of the food security measure was to create a measure with generally agreed-on concepts, definitions, and measurement methodologies that could be used to estimate a standard and consistent indicator of the frequency and severity of problems regarding access to food in this country.

These estimates are based on data collected annually in the Food Security Supplement to the Current Population Survey (CPS). On the basis of the number of food insecure conditions that households report, respondents are classified into one of three categories for monitoring and statistical analysis of the food security status of the population: (1) *food secure*, (2) *food insecure without hunger*, and (3) *food insecure with hunger.*

The USDA estimates, published in a series of annual reports, are widely used by government agencies, the media, and advocacy groups to report the extent of food insecurity and hunger in the United States, to monitor progress toward national objectives, to evaluate the impact of particular public policies and programs, as a standard by which the performance of USDA programs is measured, and as a basis for a diverse body of research relating to food assistance programs. Despite the extensive use of the measure, some major questions continue to be raised regarding the underlying concepts, the methodology, and their use.

PANEL CHARGE

The USDA requested the Committee on National Statistics (CNSTAT) of the National Academies to convene a panel of experts to undertake a two-year study in two phases to review the concepts, methodology for measuring food insecurity and hunger, and the uses of the measures. The charge specifies that during Phase 1 of the study a workshop will be held to address the key issues laid out for the study and a short report will be prepared based on the workshop discussions and preliminary deliberations of the panel. The specific tasks to be addressed in Phase 1 of the study are:

- the appropriateness of a household survey as a vehicle for monitoring on a regular basis the prevalence of food insecurity among the general population and within broad population subgroups, including measuring frequency and duration;
- the appropriateness of identifying hunger as a severe range of food insecurity in such a survey-based measurement method;
- the appropriateness, in principle and in application, of item response theory and the Rasch model as a statistical basis for measuring food insecurity;
- the appropriateness of the threshold scores that demarcate food insecurity categories—particularly the categories "food insecure with hunger" and "food insecure with hunger among children"—and the labeling and interpretation of each category;

- the applicability of the current measure of the prevalence of food insecurity with hunger for assessing the effectiveness of USDA food assistance programs, in connection with the Government Performance Results Act performance goals for the Food and Nutrition Service;
- future directions to consider for strengthening measures of hunger prevalence for monitoring, evaluation, and related research purposes.

In Phase 2 of the study the panel will consider in more depth the issues raised in the workshop relating to the concepts and methods used to measure food security and make recommendations as appropriate. In addition, the panel will address and make recommendations on:

- the content of the 18 items and the set of food security scales based on them currently used by USDA to measure food insecurity;
- how best to incorporate and represent information about food security of both adults and children at the household level;
- how best to incorporate information on food insecurity in prevalence measures;
- needs and priorities for developing separate, tailored food security scales for population subgroups, for example, households versus individuals, all individuals versus children, and the general population versus homeless persons;
- future directions to consider for strengthening measures of food insecurity prevalence for monitoring, evaluation, and related research purposes throughout the national nutrition monitoring system.

This report addresses the panel's mandate for Phase 1 only and provides the panel's preliminary assessment of the food security measure and interim guidance for the continued production of the food security estimates. A final report with the panel's conclusions and recommendations also will be prepared.

PRELIMINARY ASSESSMENT

Appropriateness of the Definition of Hunger

Perhaps the most controversial aspect of the measurement of food security is the identification of persons as food insecure with hunger. Hunger is a politically sensitive word that conjures images of severe deprivation. The question of whether it is appropriate to identify hunger as a category at the severe end of the range of food insecurity is a conceptual one. The panel thinks that a clear conceptualization of resource-constrained hunger—both a physiological and socioeconomic construct—is not evident in the current measure of food insecurity with hunger.

The physiological aspect of hunger is an individual experience, and questions about the experience of hunger should be asked at the individual and not the household level. The socioeconomic aspect of hunger may follow from the economic resources of the household. However, it is not directly linked to an individual's experience of hunger because it is not clear how household-level resources translate into individual-level eating and hunger. The definition of hunger as both a physiological and socioeconomic concept is not made clear. USDA needs a better definition and method for measuring the concept of hunger as well as an improved measure of food insecurity.

In the panel's judgment, until further work is completed in Phase 2 to refine the concept and measurement of hunger and how it relates to food insecurity, USDA should continue the current survey but may want to use the categories of food insecurity as currently reported without using the label of hunger. This area needs more development, and the panel hopes to provide USDA with specific guidance on this subject.

Item-Response-Theory Models

USDA uses item-response-theory (IRT) models to estimate food insecurity experienced by households in the United States. The Rasch model, a specific type of IRT model, is used to estimate the food insecurity of survey respondents. This model has some attractive proper-

ties if the data fit the model's assumptions. One property of the Rasch model is that each item contributes the same amount of information to the household's propensity for food insecurity.

The use of IRT and specifically the Rasch model to measure food insecurity has been challenged in several settings. Some have questioned whether the assumptions of IRT models are violated given the data generated from the current food insecurity instrument and in particular how well the data fit the Rasch model.

The current concept of food insecurity with hunger is based on the definition of hunger as part of a continuum of food insecurity. If this is the concept that USDA is measuring, it is appropriate to consider hunger as a latent, continuous occurrence that can be measured using IRT models.

The key factor is how the construct is defined and whether this definition can be validated. To the panel's knowledge, no studies have tried to validate whether households classified as food insecure with hunger did indeed really experience hunger. A separate question about the use of IRT models is whether or not data generated from the current food insecurity supplement fit the assumptions of IRT models and the specific assumptions of the Rasch model. There is some evidence that some of these assumptions may not hold, but further research is necessary.

Given the current definition of hunger, IRT models are appropriately suited to estimate levels of food insecurity. While there is evidence that the Rasch model may not be the best model for these data, the use of other IRT models should be explored.

Threshold Scores

USDA totals the sum of affirmative responses to the food security scale questions and uses threshold scores to classify households as either food secure, food insecure without hunger, or food insecure with hunger. It is common and accepted practice to use such thresholds with IRT models. The more controversial aspect of using thresholds is how they are labeled—particularly the labeling of the most severe

threshold, food insecure with hunger. The panel has concerns that a clear conceptual basis for measuring hunger has not been articulated.

Appropriateness of a Household Interview Survey

Although a household survey may be appropriate for measuring food insecurity, the current set of questions used for these concepts combines individual-level experiences with household-level experiences. While it seems reasonable to address some of these questions only to the household respondent (e.g., were you ever hungry?), it is not clear why other questions also ask about the other adults in the household. The problem is not just the use of a household survey, but issues of questionnaire design and the selection of respondents in the participating household also need to be considered.

Theoretically, it is also reasonable to consider questions of the frequency and duration of food insecurity using a household survey. The current version of the 18-item food security scale used in the CPS does not collect much information relevant to frequency and duration. If the goal is to obtain better information about the frequency and duration of food insecurity, USDA might consider using questions on these topics from the full Food Security Supplement and not just the 18-item scale. In addition to the issue of measuring the frequency of food insecurity, there is interest in measuring the duration of food insecurity, as well as changes over time, at the individual and household levels. Including a food security supplement in a longitudinal survey, such as the Survey of Income and Program Participation, which interviews households every 4 months for 2 to 4 years, would facilitate the analysis of duration and change over time. The design of the CPS could also allow for some longitudinal analysis of food security of some households.

A household-based survey, however, is limited with respect to coverage of the U.S. population. In general, such surveys do not include persons living in group quarters, those who are institutionalized, or the homeless. There is reason to believe, therefore, that household-based surveys may not adequately cover individuals who are food insecure yet do not live in households.

Applicability for Assessing Effectivenss of Programs

As required by the Government Performance and Results Act of 1993, the 2000-2005 strategic plan of the Food and Nutrition Service—the agency with responsibility for the major food assistance programs in the United States, including the Food Stamp Program, the Special Supplemental Nutrition Program for Women, Infants, and Children, and the National School Lunch Program—states a goal for the agency, in delivering the food assistance programs, to reduce the prevalence of food insecurity with hunger among households with income under 130 percent of the federal poverty standard. At the present time, USDA uses prevalence estimates of food security to report annual performance in the execution of the strategic plan.

These prevalence estimates are not well designed for use in measuring progress toward meeting the goals of the Government Performance and Results Act for food assistance programs. Evaluating the efficacy of food assistance programs by examining fluctuations in prevalence of food insecurity has little meaning. The estimates do not measure anything directly tied to the food assistance programs (such as improved nutritional status because of program participation). Thus, effective performance of the programs cannot be directly linked to improved food security status, nor can a deterioration of food security be attributed to failure of these programs.

CONCLUSIONS AND INTERIM RECOMMENDATIONS

This interim report provides USDA with the panel's preliminary guidance on how the food security measure can be improved, based on discussions during the workshop and panel deliberations. On the basis of the panel's findings and conclusions, it presents interim recommendations for improving the food security measure during the period until completion of work in Phase 2 of the study and the completion of additional recommended research by USDA. Full discussion of the panel's conclusions and interim recommendations appears in Chapter 3.

Conclusions

Conclusion 1: The concept and definition of hunger as measured in the Food Security Supplement, and how they relate to food insecurity, are not clear. In addition, it is not clear whether hunger is appropriately identified as the extreme end of the scale.

Conclusion 2: Food insecurity is important to measure. It is a multifaceted concept, each facet of which is appropriate to consider as latent and continuous. It is appropriate to use item response theory models to measure these dimensions. However, the Rasch IRT model may not be appropriate in the current application. If the Rasch model is not appropriate, then using the sum scores of the items also is not appropriate.

Conclusion 3: Threshold scores applied to estimates provided by IRT models can be used to categorize households into levels of food insecurity. However, the appropriate categories and labels need to be examined further.

Conclusion 4: A household interview survey may be one appropriate vehicle to query households about their food security experiences and to measure the prevalence of food insecurity among households.

Conclusion 5: Prevalence estimates of food insecurity as currently obtained are not well suited for evaluation of the effectiveness of food assistance programs. It is unclear that monitoring the prevalence of food insecurity at national and sub-national levels would be suitable for evaluation of these programs.

Interim Recommendations

Interim Recommendation 1: Because the problem of hunger is important and should be measured, the USDA should refine its definition and measurement of hunger and how, and if, it relates to the concept of food insecurity.

Interim Recommendation 2: In presenting the data in the annual food security reports, USDA should prominently report frequencies of the individual items that make up the scale.

Interim Recommendation 3: Given that the concept of food insecurity is multifaceted, the USDA should consider which specific facets should be measured.

Interim Recommendation 4: USDA should explore the use of alternative or additional surveys to estimate the national prevalence of food insecurity. In the meantime, USDA should continue to measure food insecurity as currently conducted using the Food Security Supplement of the CPS.

1

Introduction

The statistics on food insecurity and hunger in U.S. households, published annually by the U.S. Department of Agriculture (USDA), are based on a survey measure developed by the U.S. Food Security Measurement Project, an ongoing collaboration among federal agencies, academic researchers, and private organizations. The measure was developed over the course of several years in response to the National Nutrition Monitoring Act of 1990. (A brief history of the development of the project is outlined in Chapter 2.)

One of the objectives of the development of the food security measure was to create a measure with generally agreed-on concepts, definitions, and measurement methodologies that could be used to estimate a standard and consistent indicator of the frequency and severity of problems regarding access to food in this country.

Each year since 1995, USDA has developed annual estimates of the prevalence of food security, food insecurity without hunger, and food insecurity with hunger for U.S. households. *Food security for a household* is defined as "access by all people at all times to enough food for an active, healthy life. Food security includes, at a minimum: (a) the ready availability of nutritionally adequate and safe foods and (b) an

assured ability to acquire acceptable foods in socially acceptable ways (e.g., without resorting to emergency food supplies, scavenging, stealing, or other coping strategies)." *Food insecurity* is defined as "limited or uncertain availability of nutritionally adequate and safe foods or uncertain ability to acquire acceptable foods in socially acceptable ways." *Hunger* is defined as the "uneasy or painful sensation caused by a lack of food; the recurrent and involuntary lack of access to food" (Anderson, 1990, pp. 1575–1576).

The USDA estimates of the prevalence of food insecurity are developed using data collected annually in the Food Security Supplement to the Current Population Survey (CPS). The full supplement appears in Appendix A. The food insecurity questions—on whether the household experienced difficulty in meeting basic food needs due to a lack of resources, the severity of food deprivation ranging from "worry about running out of food" to "children ever not eating for a whole day," and ways of augmenting inadequate food resources—are asked of all households with incomes below 185 percent of the poverty line. Thus households are presumed in USDA's annual statistical reports to be fully food secure only if their annual incomes are higher than 185 percent of the poverty line and they gave no indication of food access problems on preliminary screener questions and are not asked the questions in the food security assessment series. The questions specify that any behavior or condition must be due to a lack of economic or other resources to obtain food, so the scale is not affected by hunger due to voluntary dieting or fasting or being too busy to eat or other reasons.

On the basis of the number of food insecure conditions that households report (the number of questions the respondent affirms), respondents are classified into one of three categories for purposes of monitoring and statistical analysis of the food security status of the population: food secure, food insecure without hunger, and food insecure with hunger. USDA uses statistical methods based on a single-parameter logistic item-response-theory model (the Rasch model) to assess individual questions and to assess the assumptions that justify using the raw number of items affirmed as an ordinal measure of food insecurity. (This method is described further in subsequent chapters.)

The USDA estimates, published in a series of annual reports, are widely used by government agencies, the media, and advocacy groups to report the extent of food insecurity and hunger in the United States, to monitor progress toward national objectives, to evaluate the impact of particular public policies and programs, as a standard by which the performance of USDA programs is measured, and as a basis for a diverse body of research relating to food assistance programs. Government agencies have also adopted the estimates as targets for performance assessment. The U.S. Department of Health and Human Services (DHHS) has included the food security measure to assess the performance of its Healthy People 2010 initiative. The Food and Nutrition Service of the USDA is using the measure as a target for its strategic plan to fulfill requirements of the Government Performance and Results Act of 1993 (Wilde, 2004a).

Despite the extensive use of the measure, some major questions related to the concepts themselves, the methodology, and their use, continue to be raised.

While the USDA annual reports define the concepts of food security and the three categories of food security that are estimated and reported (food secure, food insecure without hunger, and food insecure with hunger) and provide detail about how they are measured, the terms "food security" and "food insecurity" are relatively new to both policy makers and the public and are sometimes confusing. While the term "hunger" is not new, measurement of hunger and how hunger conceptually fits into food insecurity is not completely clear. As currently construed in USDA's food security measure, hunger is considered a severe level of food insecurity. This use of the term "hunger" has been questioned by some who believe that hunger is conceptually separate from food insecurity. Because the label "hunger" is a politically potent concept, the methods used to classify households as food insecure with hunger are particularly important.

Methodological and technical issues about the measure of food insecurity generally concern the clarity, appropriateness, and design of the CPS survey questions. Critics question:

- using a relatively long (12-month) reference period,

- mixing questions focused on the household with questions focused on individuals,
- using the raw score on the module to categorize households into one of the three food security categories, and
- Using the same module to assess the food security of households with children and households without children.

Questions about the appropriate uses of the estimates of food security also have been raised. The primary use of the Food Security Supplement of the CPS is to estimate the prevalence of the categories of food security. The media and advocacy groups often interpret the prevalence estimates in language inconsistent with USDA usage. As currently measured, the estimates may not be appropriate for use in policy and program evaluations. Even if they are used, it would be helpful for their use to be consistent across federal government departments. The USDA strategic plan uses a food security target that differs from the DHHS Healthy People 2010 objectives, and the USDA annual performance reports omit the target altogether (Wilde, 2004a).

In addition, the Office of Management and Budget (OMB) has expressed concerns about the concepts and methods used by USDA for measuring food insecurity and hunger in its annual surveys. When approving the questionnaire for the conduct of the 2003 survey, OMB repeated its concerns by identifying key issues that needed to be addressed prior to the next survey.

PANEL CHARGE

The USDA's food security measures were designed a decade ago in partnership with DHHS. USDA decided that a thorough review at this 10-year mark is warranted, especially in light of the persistent conceptual and methodological concerns. The Economic Research Service of USDA through its Food and Nutrition Research program has need for a review of the conceptualization and methods for measuring food insecurity monitoring, evaluation, and related research purposes and their validity and utility for informing public policy. Promotion of food security is part of the mission of USDA's Food and Nutrition Service,

and certain food security measures constitute performance goals for that agency associated with the Government Performance and Results Act.

USDA requested the Committee on National Statistics (CNSTAT) of the National Academies to convene a panel of experts to provide an independent review of the current conceptualization and methods of measuring food insecurity and hunger in the U.S. population. The panel charge specifies that the 2-year study will be conducted in two phases. During Phase 1 of the study a workshop will be held to address the key issues laid out for the study and a short report will be prepared based on workshop discussions and preliminary deliberations of the panel. The specific tasks to be addressed in Phase 1 include:

- the appropriateness of a household survey as a vehicle for monitoring on a regular basis the prevalence of food insecurity among the general population and within broad population subgroups, including measuring frequency and duration;
- the appropriateness of identifying hunger as a severe range of food insecurity in such a survey-based measurement method;
- the appropriateness, in principle and in application, of item response theory and the Rasch model as a statistical basis for measuring food insecurity;
- the appropriateness of the threshold scores that demarcate food insecurity categories—particularly the categories "food insecure with hunger" and "food insecure with hunger among children"—and the labeling and interpretation of each category;
- the applicability of the current measure of the prevalence of food insecurity with hunger for assessing the effectiveness of USDA's food assistance programs, in connection with the performance goals pursuant to the Government Performance and Results Act (Public Law 103-62)[1] for the Food and Nutrition Service; and

[1]The Government Performance and Results Act of 1993 seeks to shift the focus of government decision making and accountability away from a preoccupation with the activities that are undertaken, such as grants dispensed or inspections made, to a

- Future directions to consider for strengthening measures of hunger prevalence for monitoring, evaluation, and related research purposes.

In Phase 2 of the study the panel will consider in more depth the issues identified in Phase 1 relating to the concepts and methods used to measure food security and make recommendations as appropriate. In addition, the panel will address and make recommendations on:

- the content of the 18 items and the set of food security scales based on them currently used by USDA to measure food insecurity;
- how best to incorporate and represent information about food security of both adults and children at the household level;
- how best to incorporate information on frequency and duration of food insecurity in prevalence measures;
- needs and priorities for developing separate, tailored food-security scales for population subgroups, for example, households versus individuals, all individuals versus children, and the general population versus homeless persons; and
- future directions to consider for strengthening measures of food insecurity prevalence for monitoring, evaluation, and related research purposes throughout the national nutrition monitoring system.

To address this two-phase request, CNSTAT appointed a panel of 12 members representing a range of expertise related to the scope of the study. This report addresses the panel's mandate for Phase 1 only and provides the panel's preliminary assessment of the food security measure and interim guidance for the continued production of the food security estimates. A final report with the panel's conclusions and recommendations also will be prepared.

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focus on the results of those activities, such as real gains in employability, safety, responsiveness, or program quality. Under the Act, agencies are to develop multiyear strategic plans, annual performance plans, and annual reports (U.S. Government Accounting Office, 2002).

STUDY APPROACH

During the first phase of the study, the panel reviewed a number of articles and papers prepared or sponsored by USDA to assess the methodological concerns about the food security measures and other published and unpublished papers.

The panel met on two occasions to deliberate on the issues listed above. The first meeting was held in March 2004. In the public part of the meeting, USDA staff and other experts in the field briefed the panel on the history of the conceptual and technical development of the measure and on the uses of the food security measure. Critics of the current measurement methodology presented their views, and USDA staff and other meeting attendees were given the opportunity to respond.

The panel held a large workshop, as called for in the contract, to obtain input from a wide range of researchers and other interested members of the public. The Workshop on the Measurement of Food Insecurity and Hunger was held on July 15, 2004. The agenda, presenters, and discussants for the workshop appear in Appendix B.

Four background papers were prepared by experts and presented at the workshop (the full text of the papers is available at http//www.nationalacademies.org/cnstat):

- *Conceptualization and Instrumentation of Food Security* by J.P. Habicht, G. Pelto, E.A. Frongillo, and D. Rose;
- *The Uses and Purposes of the USDA Food Security and Hunger Measure* by P. Wilde;
- *Item-Response Models and Their Use in Measuring Food Security and Hunger* by M.S. Johnson; and
- *Alternative Construction of a Food Security and Hunger Measure from 1995 Current Population Survey Food Security Supplement Data* by K. Alaimo and A. Froelich.

Discussants were asked to give their reactions to these papers, and open discussion sessions were set aside for general comments from participants. A roundtable discussion on the questionnaire design and cognitive aspects of the survey module was also held during the workshop.

ORGANIZATION OF THE REPORT

This interim report is limited to a preliminary examination of the tasks identified by USDA for Phase 1 of the study. The panel's findings and conclusions are based primarily on the review of the literature to date, the presentations of the invited speakers and discussants, the public comments during the two public sessions, and the expert judgments of the panel.

Chapter 2 briefly reviews the background of the development of the food security measure and explains in more detail the concepts and methods used to estimate food security.

Chapter 3 addresses the questions posed to the panel and presents the panel's findings to date, conclusions, and interim recommendations. The chapter concludes with an indication of the directions of the panel's scope of work in Phase 2.

2

The Food Security Measure

Prior to the development of the food security measure, there were widely varying estimates of the prevalence of hunger or lack of access to food and little consensus over which measure was most accurate. In 1984, the President's Task Force on Food Assistance noted in its report the lack of a definition of hunger and lack of documentation of it in the United States. The task force report articulated the need for measuring hunger as follows (pp. 37, 39):

> There is no official "hunger count" to estimate the number of hungry people, and so there are no hard data available to estimate the extent of hunger directly. Those who argue that hunger is widespread and growing rely on indirect measures. . . . We regret our inability to document the degree of hunger caused by income limitations, for such lack of definitive, quantitative proof contributes to a climate in which policy discussions become unhelpfully heated and unsubstantiated assertions are then substituted for hard information.

BACKGROUND

In 1990, the Life Sciences Research Office (LSRO) of the Federation of American Societies for Experimental Biology prepared a report

on the Core Indicators of Nutritional State for Difficult-to-Sample Populations for the American Institute of Nutrition under the provisions of a cooperative agreement with the U.S. Department of Health and Human Services (DHHS). This report was published in the *Journal of Nutrition* (Anderson, 1990). The report contains what have become the consensus definitions for food insecurity and hunger.

Also in 1990, the National Nutrition Monitoring and Related Research Act (NNMRR) was enacted (Public Law 101-445). Section 103 of the Act required the Secretaries of the Departments of Agriculture and Health and Human Services, with the advice of a board, to prepare and implement a 10-year comprehensive plan to assess the dietary and nutritional status of the U.S. population. Task V-C-2.4 in the plan specified (Federal Register 1993, 58:32 752–806):

> Recommend a standardized mechanism and instrument(s) for defining and obtaining data on the prevalence of "food insecurity" or "food insufficiency" in the U.S. and methodologies that can be used across the NNMRR Program and at state and local levels."

In response, a federal interagency working group comprising representatives from several federal agencies, academic researchers, private research institutions, and other stakeholders developed a food security survey module, a set of food security scales that combine information from sets of questions in the module, and a classification rule for characterizing the food security status of each household surveyed.

These measurement and monitoring activities had a number of policy-related objectives:

- Provide objective, standardized information on the extent and severity of food insecurity and the characteristics of persons affected by them so that allocation of public resources and development of public policies and programs can be based on informed public debate. The mission statement of the Food and Nutrition Service, which administers the food assistance programs of the U.S. Department of Agriculture (USDA), includes the goal of increasing food security: "FNS increases food security and reduces hunger in partnership with cooperating orga-

nizations by providing children and low-income people access to food, a healthful diet, and nutrition education in a manner that supports American agriculture and inspires public confidence" (U.S. Department of Agriculture, 2005).

- Provide data on household food security that can be used along with other information collected in surveys to assess the need for and effectiveness of public programs, especially food assistance programs; the causes of food insecurity at various levels of severity; and the effects of food insecurity on nutrition, health, children's development, and other aspects of well-being.
- Provide measures of food security for use in state, local, and special population surveys that can be compared meaningfully with national food security statistics.

USDA began measuring food security in 1995 with the first fielding of the Food Security Supplement to the Current Population Survey (CPS) by the U.S. Census Bureau.[1] In working together to develop the supplement, USDA and DHHS sought advice from a large group of federal agencies, academic researchers, and private organizations. In 1994, the two agencies sponsored the First National Conference on Food Security Measurement and Research, which brought together experts from government, academia, and other researchers in the field. One of the key purposes of the conference was to develop consensus on the appropriate conceptual basis for a national measure of food insecurity. It also resulted in a working agreement about the best method for implementing the measure in national surveys (U.S. Department of Agriculture, 1995).

After extensive assessment of the food security questionnaire and field testing by the U.S. Census Bureau, a food security survey questionnaire was fielded by the bureau as a supplement to the CPS.

[1]The full Food Security Supplement includes more than 50 questions about food behavior and experiences. Within this supplement is a set of 10 questions for households with no children and 18 questions for households with children, which is used to estimate the prevalence of food insecurity.

USDA undertook a considerable amount of research. It convened an interagency working group composed of representatives of academia and policy research firms through a cooperative agreement to help develop and assess the household food security scale based on the supplement, to consider technical issues that arose in the development of the scale, and to produce a measurement scale for the severity of food insecurity (Hamilton et al., 1997a, 1997b). It also sponsored several technical reviews of food security measurement. In addition, it contracted with Mathematica Policy Research to use several years of data from the CPS Food Security Supplement to consider empirical issues that had arisen, such as the stability of the measurement scale over time, temporal adjustments to the categories for classifying the severity of food security, screening issues and imputation for missing data, among others (see Ohls, Radbill, and Schirm, 2001). Also, it had IQ Solutions assess methodological issues and provide guidance with a specific focus on the first five years of CPS data collection (see Cohen et al., 2002).

Finally, USDA contracted with a group of statisticians and economists at Iowa State University to consider various statistical issues in measuring food insecurity and hunger and specifically the statistical properties of the Rasch model, which is used to scale responses to the CPS Food Security Supplement (see Opsomer, Jensen, and Pan, 2003; Opsomer et al., 2002).

In 1999, USDA and DHHS hosted the Second Conference on Food Security Measurement and Research to develop priorities for future research and published the papers and proceedings of the conference (Andrews and Prell, 2001a, 2001b).

There is also a large body of literature from researchers both internal and external to USDA and DHHS covering methodological topics related to the measurement of food security. This research has prompted further refinements to the food security questionnaire—a shorter, 6-item food security module and measure, separate adult and child food security measures, a revised 30-day measure, and the translation of the survey module into Spanish.

CONCEPTS AND DEFINITIONS

Food insecurity is a concept that refers to the social and economic problem of lack of food due to economic deprivation, not voluntary fasting or dieting or for other reasons. The standard definition used in the United States for food insecurity is that "food insecurity exists whenever the availability of nutritionally adequate and safe foods or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain" (Anderson, 1990). This definition, supported by the ethnographic research conducted by Radimer et al. (1992), Wolfe, Frongillo, and Valois (2003), Hamelin, Habicht, and Beaudry (1999), Hamelin, Beaudry, and Habicht (2002), Quandt and Rao (1999), and Quandt et al. (2000, 2001), means that food insecurity is experienced when there is (1) uncertainty about future food availability and access, (2) insufficiency in the amount and kind of food required for a healthy lifestyle, and/or (3) the need to use socially unacceptable ways to acquire food.

Consequences of uncertainty, insufficiency, and social unacceptability are assumed to be part of the experience of food insecurity. Worry and anxiety typically result from uncertainty. Feelings of alienation and deprivation, distress, and adverse changes in family and social interactions also occur (Hamelin, Habicht, and Beaudry, 1999; Hamelin, Beaudry, and Habicht, 2002; Frongillo and Horan, 2004). Management strategies that people use to prevent or respond to the experience of food insecurity are conceptually different from food insecurity but are tied to it. "Hunger, in its meaning of the uneasy or painful sensation caused by a lack of food, is in this definition a potential, although not necessary, consequence of food insecurity" (Anderson, 1990, p. 1576).

As mentioned earlier, the Life Sciences Research Office has defined and published definitions of food security, food insecurity, and hunger (Anderson, 1990. pp. 1575-1576):

> *Food security*: Access by all people at all times to enough food for an active, healthy life. Food security includes at a minimum (1) the ready availability of nutritionally adequate and safe foods and (2) an assured ability to acquire acceptable foods in socially acceptable ways (e.g., without resorting to emergency food supplies, scavenging, stealing, or other coping strategies).

> *Food insecurity*: Limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways.
>
> *Hunger*: The uneasy or painful sensation caused by a lack of food, the recurrent and involuntary lack of access to food. Hunger may produce malnutrition over time. . . . Hunger . . . is a potential, although not necessary, consequence of food insecurity.

While the developers of the USDA's food security supplement decided that food security was the most important concept to measure, some in the group charged with developing the measure of food insecurity specifically called for hunger to be part of the measurement project, because the use of estimates of the prevalence of hunger was thought to be an important device for advocacy (Habicht et al., 2004).

FOOD SECURITY MEASUREMENT

The Food Security Supplement to the Current Population Survey and the measurement scale are based on the underlying LSRO definitions. The Food Security Supplement contains a battery of questions for households responding to the CPS regarding various aspects of the availability and sufficiency of food. (The CPS is a representative national sample of about 60,000 households conducted monthly by the U.S. Census Bureau for the U.S. Department of Labor. It is based on a random sample of the civilian, noninstitutionalized population and is the primary source of information on labor force characteristics of the U.S. population.) The supplement has been conducted annually each year since 1995. From 1995 to 2000 the supplement alternated between April and August/September; beginning in 2001 it has been conducted in early December. While the full supplement includes more than 50 questions about food sufficiency and food security, only 10 (or 18 if there are children in the household) are used in the scale to estimate the prevalence of food security. These questions, asked of all households with incomes below 185 percent of the poverty line, generally ask about whether the household experienced anxiety over the lack of resources to meet basic food needs, the perception of inadequacy in quality or quantity of the diet, reduced food intake, or the feeling of hunger due to reduced food intake for adults and (sepa-

rately) for children. The questions are intended to measure both whether a household is "food secure" and the severity of food insecurity. The least severe form of food insecurity is worrying about getting enough food, and the most severe is skipping or cutting back on meals or losing weight because of lack of food. Each question references a specific time frame, either the past 12 months or the past 30 days, depending on the question. Separate scales are used for the different reference periods. The questions that comprise the food security scale are shown in Box 2-1.

BOX 2-1
Questions Used to Assess the Food Security of Households in the CPS Food Security Survey

1. "We worried whether our food would run out before we got money to buy more." Was that often, sometimes, or never true for you in the last 12 months?

2. "The food that we bought just didn't last and we didn't have money to get more." Was that often, sometimes, or never true for you in the last 12 months?

3. "We couldn't afford to eat balanced meals." Was that often, sometimes, or never true for you in the last 12 months?

4. In the last 12 months, did you or other adults in the household ever cut the size of your meals or skip meals because there wasn't enough money for food? (Yes/No)

5. (If yes to Question 4) How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

6. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food? (Yes/No)

7. In the last 12 months, were you ever hungry, but didn't eat, because you couldn't afford enough food? (Yes/No)

8. In the last 12 months, did you lose weight because you didn't have enough money for food? (Yes/No)

9. In the last 12 months did you or other adults in your household ever not eat for a whole day because there wasn't enough money for food? (Yes/No)

The questions in the food security module specify that any behavior or condition must be due to a lack of economic or other resources to obtain food. The scale, therefore, is not affected by insecurity and hunger due to voluntary dieting or fasting or being too busy to eat or other reasons, as mentioned earlier. The panel recognizes that there are other important sources of deprivation not entirely driven by economic resources, such as the quality of food intake or nutrition, or lack of access to acceptable food options. Quality is important, but beyond the scope of this report. Moreover, measurement of such an expanded

10. (If yes to Question 9) How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

(Questions 11-18 are asked only if the household included children age 0-18)

11. "We relied on only a few kinds of low-cost food to feed our children because we were running out of money to buy food." Was that often, sometimes, or never true for you in the last 12 months?

12. "We couldn't feed our children a balanced meal, because we couldn't afford that." Was that often, sometimes, or never true for you in the last 12 months?

13. "The children were not eating enough because we just couldn't afford enough food." Was that often, sometimes, or never true for you in the last 12 months?

14. In the last 12 months, did you ever cut the size of any of the children's meals because there wasn't enough money for food? (Yes/No)

15. In the last 12 months, were the children ever hungry but you just couldn't afford more food? (Yes/No)

16. In the last 12 months, did any of the children ever skip a meal because there wasn't enough money for food? (Yes/No)

17. (If yes to Question 16) How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

18. In the last 12 months did any of the children ever not eat for a whole day because there wasn't enough money for food? (Yes/No)

SOURCE: Nord, Andrews, and Carlson (2004)

definition will likely need quite different kinds of study designs and samples.

Multiple questions are used for three main reasons. First, although food insecurity as defined by USDA extends across a range of severity, the common-language descriptions of the manifestations or indicators of food insecurity extend across a narrow range of severity. For example, hunger in common-language terms refers only to a small range of the most severe conditions in the questions. Combining these descriptions or indicators in a single scale allows measurement of the phenomenon across its range of severity. Second, a general strength of multiple-question measures is that relationships of the questions to the underlying phenomenon (food insecurity) can be inferred from the relationships among the questions. Third, a set of questions provides more reliable measurement than can any single question.

Households are classified into the three categories of food insecurity for purposes of monitoring the food security status of the population. These categories are used in part because they characterize household situations that are easier for the public and policy makers to understand than an abstract number, such as an average level of food insecurity.

USDA uses the Rasch model to select and order questions by the severity of food insecurity that they indicate, so that responses can *then* be summed to arrive at the categories of food insecurity. The Rasch model is a single parameter logistic item response theory model. (See Chapter 3, pp. 7–13 for a brief description of the basics of the IRT model. For more detail the reader is referred to the paper prepared by M.S. Johnson for the workshop in 2004.) The ranges of each category and the number of affirmed items necessary to be in a given category are detailed in Box 2-2.

A primary purpose of the food security measures is to estimate the prevalence of food insecurity in the country. USDA publishes a report each year summarizing the results of the latest collection round of the Food Security Supplement.[2] Table 2-1 provides estimates of the per-

[2]The latest in this series is Nord, Andrews, and Carlson (2004).

BOX 2-2
Categorization of Food Security Status of Households According to the Number of Affirmed Items on the Food Security Scale

Households without children (based on responses to the 10 adult and household items):

- Food secure = households that denied all items or affirmed 1 or 2 items
- Food insecure without hunger = households that affirmed 3, 4, or 5 items
- Food insecure with hunger = households that affirmed 6 or more items

Households with children (based on responses to all 18 items):

- Food secure = households that denied all items or affirmed 1 or 2 items
- Food insecure without hunger = households that affirmed 3 to 7 items
- Food insecure with hunger = households that affirmed 8 or more items

centage of households and individuals who are food secure, food insecure without hunger, and food insecure with hunger for the years 1998-2002 based on the CPS survey.

For a concept that is relatively new, the food security measure has influenced policy making and the understanding of behavior and perceptions regarding the lack of resources to obtain food. The annual reports of the estimates of food security are consistently met with interest by the media. There is also growing interest in widening the use of the estimates for program performance assessments and for program evaluation.

The next chapter discusses the panel's findings to date relating to some of the tasks identifies for the panel's consideration and its preliminary assessment based on these findings. The chapter also makes some interim recommendations for USDA's consideration while the panel undertakes more extensive investigation of the issues in Phase 2 of the study.

TABLE 2-1 Prevalence of Food Security, Food Insecurity, and Hunger by Year (Percentage)

Unit	Food Secure	Food Insecure Without Hunger	Food Insecure With Hunger
Households			
1998	88.2	8.1	3.7
1999	89.9	7.1	3.0
2000	89.5	7.3	3.1
2001	89.3	7.4	3.3
2002	88.9	7.6	3.5
2003	88.8	7.7	3.5
All individuals (by food security status of household)*			
1998	86.5	9.8	3.7
1999	88.5	8.6	2.9
2000	87.9	9.0	3.1
2001	87.8	8.9	3.3
2002	87.5	9.1	3.4
2003	87.3	9.3	3.4
Adults (by food security status of household)*			
1998	88.8	7.9	3.3
1999	90.5	7.0	2.5
2000	89.9	7.3	2.8
2001	89.8	7.3	3.0
2002	89.5	7.5	3.0
2003	89.2	7.7	3.1

TABLE 2-1 Continued

Unit	Food Secure	Food Insecure (Without hunger among children)	Food Insecure (With hunger among children)
Households with children			
1998	82.4	16.7	0.9
1999	85.2	14.2	0.6
2000	83.8	15.5	0.7
2001	83.9	15.6	0.6
2002	83.5	15.8	0.7
2003	83.3	16.1	0.5
Children (by food security status of household)			
1998	80.3	18.7	1.0
1999	83.1	16.2	0.7
2000	82.0	17.2	0.8
2001	82.4	16.9	0.6
2002	81.9	17.3	0.8
2003	81.8	17.6	0.6

*The food security survey measures food security status at the household level. Not all individuals residing in food-insecure households are appropriately characterized as food insecure. Similarly, not all individuals in households classified as food insecure with hunger, nor all children in households classified as food insecure with hunger among children, were subject to reductions in food intake or experienced resource-constrained hunger.
SOURCES: Calculated by the Economic Research Service using data from the August 1998, April 1999, September 2000, December 2001, December 2002, and December 2003 Current Population Survey Food Security Supplements.

3

Preliminary Assessment

This chapter addresses the key questions posed to the panel for Phase 1 of the study. It presents the panel's preliminary findings to date on concepts and definitions, the questions used to measure food security or food insufficiency, and the design and methodology for measuring these concepts. It provides the panel's comments, conclusions, and interim recommendations based primarily on workshop discussions and panel deliberations during Phase 1 of the study, while the panel pursues these and other issues in more detail in the Phase 2 of the study.

CONCEPTS, DEFINITIONS, AND THEIR MEASUREMENT

Concepts and Definitions

The 10- and 18-item set of questions used in the Food Security Supplement of the Current Population Survey (CPS) (shown in Box 2-1) covers a range of experiences, perceptions, and behaviors concerning the adequacy of food in the household and on an individual level. The questions range in severity from anxiety about being able to buy

the desired types of food to actual shortage leading to the experience of hunger as defined by USDA. This range of severity is intended to measure and assign people to the three categories of food security, food insecurity without hunger, and food insecurity with hunger described in Chapter 2. The concepts underlying these categories are complex and multifaceted, which is why a scale based on multiple questions was chosen as the method to estimate the prevalence of food security. In the judgment of the panel, a clear conceptual basis does not exist for some of these concepts and the questions may not be well suited to measure these concepts.

Measurement of the Concepts

The measurement of food security (and insecurity) ***as currently defined*** includes three separate concepts:

1. *Uncertainty* about being able to obtain food in socially acceptable ways due to a lack of resources, causing worry and mental, emotional, and physical stress. This worry and uncertainty may also result in changes in behavior—for example, changes in the allocation of time and resources.
2. *Insufficiency* in (or lack of access to) the quantity and quality of nutritionally adequate and safe foods. This concept includes two ideas: lack of access to the nutritionally appropriate foods and lack of access to desired types of foods. It is separate and different from worrying about food, since there is an actual reduction in the quantity or quality of foods—or both. Whereas uncertainty about obtaining food in socially acceptable ways may or may not lead to changes in behaviors, insufficiency results in an actual reduction in the quantity and or quality of foods. Insufficiency does not necessarily imply hunger because one could lack access to nutritional or desired foods and still not experience hunger.
3. The definition of the concept of *hunger* used in the current food security measure incorporates both a physiological component—"the uneasy, painful sensation caused by a lack of food"

and a socioeconomic component—"the recurrent and involuntary lack of access to food."

The current set of questions used in the survey to measure food uncertainty includes questions relating to each of these concepts. Question 1 in Box 2-1 asks about food insecurity—that is, it directly asks whether the respondent worried about the food running out before there was money to pay for more. Questions 2-6 imply food insufficiency (e.g., cutting the size of meals, couldn't afford to eat balanced meals). Finally, question 7 asks directly about hunger. The remaining questions (8-10) do not specifically ask about hunger. These questions could be considered as indicating "food insufficiency" because they imply an insufficient quantity of food. They may also imply hunger.

Another important concern with food insecurity measures is that all three concepts are measured in a household survey and households are classified into the three dimensions of food security, even though the concepts themselves may not be appropriately measured at the level of the household. The concepts of food uncertainty and food insufficiency are really household-level concepts. Each implies decisions about household resource allocation (e.g., how much of a limited budget can be spent on food compared with other goods and how much of the food budget is spent for food for different household members). Worrying about having enough money to pay for food is a response that considers constraints on the household's resources. Cutting meal size and not being able to afford a balanced meal are also adaptations made with consideration of the entire household's resources. In contrast, hunger is experienced by individuals, not households, although everyone in the household could individually experience hunger.

Food uncertainty, food insufficiency, and hunger are different and separate concepts, although they are certainly related. The appropriate questions and methods to measure these concepts therefore may be quite different as well. The current method used to estimate the prevalence of food security status does not delineate these concepts, that is, responses to questions about food uncertainty and food insufficiency are totaled with responses to questions about hunger, and each response contributes equally to the estimates of the prevalence of food insecurity.

The panel is concerned that this lack of conceptual clarity contributes to controversy surrounding the use of the terms, especially the use of the term "hunger." The panel will review and comment further on these concepts in its final report at the end of Phase 2. USDA, however, needs to make important decisions *now* on some of the basic issues. Timely but preliminary assessment therefore is appropriate at this time and interim recommendations for improvements are needed now.

Appropriateness of Defining Hunger as a Severe Range of Food Insecurity

Perhaps the most controversial aspect of the measurement of food security is the identification of persons as food insecure with hunger. Hunger is a very politically sensitive word that conjures images of severe deprivation. Much of the criticism about the current food security measurement project is targeted toward this classification, specifically the cut points, and the questions to which responses confirm or deny the hunger cut point that are used to classify people as food insecure with hunger (see Bavier, 2004).

The question of whether it is appropriate to identify hunger as a category at the severe end of the range of food insecurity is a conceptual one. The panel thinks that a clear conceptualization of resource-constrained hunger—both a physiological and socioeconomic construct—is not evident in the current measure of food insecurity with hunger.

The physiological aspect of hunger is an individual experience, and questions about the experience of hunger should be asked at the individual and not the household level. The socioeconomic aspect of hunger may follow from the economic resources of the household. However, it is not directly linked to an individual's experience of hunger because it is not clear how household-level resources translate into individual-level eating and hunger.

As it is currently measured in the 10-item scale, one question (question 7) asks directly about hunger—In the last 12 months, were you ever hungry, but did not eat, because you couldn't afford enough food? (yes/no). Most people would interpret this question to reflect a

physiological aspect of hunger—the uneasy feeling caused by a lack of food. The socioeconomic aspect of the concept is not a part of this question. Other questions in the supplement ask about experiences like weight loss and the skipping of meals. These behaviors suggest hunger but they do not necessarily mean a person experienced hunger. Some of these questions are directed to the respondent only (questions 8-10), but others ask if other adults in the household also had that experience (question 6). It is not clear how each of these other questions relates to the conceptual definition of hunger on which the measure is based.

Conclusion 1: The concept and definition of hunger as measured in the Food Security Supplement, and how they relate to food insecurity, are not clear. In addition, it is not clear whether hunger is appropriately identified as the extreme end of the food security scale.

USDA has stated that the goal of food security measurement is not solely to estimate the prevalence of hunger, but rather, to obtain estimates of the prevalence of the uncertainty of having enough food or the inadequacy of the food that is available—that is, the prevalence of food insecurity and food insufficiency. The panel concurs with USDA that the goal should be to measure the broader concept of food insecurity. However, if key policy questions revolve around the issue of hunger, then the current food insecurity measure may not be appropriate. USDA needs a better definition and method for measuring the concept of hunger.

The panel's conclusion is based on the fact that, although a strong theoretical and research base exists for the conceptualization and measurement of food insecurity, we do not have a correspondingly strong base for either the conceptualization of hunger or its measurement. That is, there is now ample theoretical, conceptual, ethnographic, and quantitative work done to justify the measurement of the experience of food insecurity using a questionnaire. For the measurement of the experience of hunger to be equally credible, there needs to be a stronger base than we currently have in developing clear concepts for how we should think about hunger and in tested means to accurately elicit

information from survey respondents about whether they have experienced hunger. The panel will address this issue in depth in Phase 2 of the study.

Interim Recommendation 1: Because the problem of hunger is important and should be measured, USDA should refine its definition and measurement of hunger and how, and if, it relates to the concept of food insecurity.

In the panel's judgment, until further work is completed in Phase 2 to refine the concept and measurement of hunger and how it relates to food insecurity, USDA should continue the current survey but may want to use the categories of food insecurity as currently reported without using the label of hunger. This area needs more development and the panel hopes to provide USDA with specific guidance on this subject. Moreover, when the conceptual basis of hunger is better developed, USDA should also evaluate and test questions geared toward the measurement of hunger.

ITEM-RESPONSE-THEORY MODELS AS A STATISTICAL BASIS FOR MEASUREMENT OF FOOD INSECURITY

USDA uses item-response-theory (IRT) models to estimate food insecurity experienced by households in the United States. IRT models are a class of statistical models used to describe the responses to a set of categorical items. In the case of food insecurity, the responses to the 10 questions (18 for households with children) of the Food Security Supplement questionnaire are used to estimate the propensity of households to experience various levels of food insecurity. IRT models have commonly been used in educational testing, and the parlance about them is geared toward this—an individual's ability is the estimated propensity measure, as is the difficulty of each item on the test. IRT models rely on three assumptions: unidimensionality, conditional independence, and monotonicity.

Unidimensionality assumes that each survey respondent in the sample has a one-dimensional, latent quantity that describes the respondent's propensity to endorse the item on the survey, where pro-

pensity in this case is food insecurity. Conditional independence assumes that the items in the survey are independent of each other, given a respondent's propensity. Monotonicity assumes that the probability that an item is endorsed is a nondecreasing function of a respondent's propensity—that is, respondents with a high propensity (more food insecure) are more likely to endorse items than those with a low propensity (less food insecure).

The Rasch model, a specific type of IRT model, is used by USDA to estimate the level of food insecurity of survey respondents. (For more detail the reader is referred to the paper prepared by M.S. Johnson for the workshop in 2004; see Hamilton et al., 1997b, for a description of the application of IRT to food insecurity and how this approach was chosen.) This model has some attractive properties if the data fit the model's assumptions. One property of the Rasch model is that each item contributes the same amount of information to the household's propensity for food insecurity. In other words, under the Rasch model assumptions, the raw score over all items (i.e., the sum of all the items) is a minimal sufficient statistic for the individual's propensity. USDA uses the Rasch model assumptions and the sum of the raw scores to estimate propensity for food insecurity. To make interpretation of this propensity more easily understood, USDA uses cut points of these propensities to classify households as either food secure, food insecure without hunger, or food insecure with hunger.

The use of IRT and specifically the Rasch model to measure food insecurity has been challenged in several settings. Bavier (2003, 2004) argues that hunger is a discrete, observable phenomenon that is really a consequence of food insecurity rather than a severe range of food insecurity and that it is not appropriate to use IRT models to measure hunger. Others have questioned whether the assumptions of IRT models are violated given the data generated from the current food insecurity instrument and in particular how well the data fit the Rasch model (Froelich, 2002; Johnson, 2004; Opsomer, Jensen, and Pan, 2003; Opsomer et al., 2002; Wilde, 2004b). The panel was asked to consider the appropriateness, in principle and in application, of IRT and the Rasch model as a statistical basis for measuring food insecurity. This section first asks whether hunger is a discrete, observable phenom-

enon and then considers how well the assumptions of IRT models and the Rasch model in particular fit the data from the current food security questionnaire.

Is Hunger an Observable Phenomenon?

The panel has distinguished three separate (though related) measurement concepts—food uncertainty, food insufficiency, and hunger. The panel has concerns that the current instrument may not be a good measure of any of these concepts and that more work is needed to elucidate the concepts to be measured and to develop the instruments to measure them. The panel's argument about whether hunger is or is not a discrete, observable phenomenon is not specific to the current distinction of food insecure with hunger, but to any other conceptualization of the three experiences.

The current concept of food insecurity with hunger is based on the definition developed by the Life Sciences Research Office (see Chapter 2) adopted by the original expert panel charged with developing a food insecurity measure. This concept is based on the definition of hunger as part of a continuum of food insecurity. If this is the concept that USDA is measuring, it is appropriate to consider hunger as a latent, continuous occurrence that can be measured using IRT models.

The key factor is how the construct is defined and whether this definition can be validated. To the panel's knowledge, no studies have tried to validate whether households classified as food insecure with hunger did indeed really experience hunger. Theoretically, such a validation study might be conducted by examining the caloric and nutrient intake of individuals in households that also responded to the Food Security Supplement questions. Practically, however, such a study would face severe data requirements—for example, data on food consumption and diet would need to be collected for the same individuals over a 12-month period (since the food security survey reference period is over 12 months), and it would have to be conducted for all household members, since the questions refer to households and individuals in the households. If such a study could be conducted, one might learn how well the definition and methodology of food insecu-

rity with hunger predict actual hunger. It would also give an assessment of how well the methodology actually fits the concept of actual hunger.[1]

Do the Data Fit the Model Assumptions?

A separate question about the use of IRT models is whether or not data generated from the current Food Insecurity Supplement fit the assumptions of IRT models, and the specific assumptions of the Rasch model. There is some evidence that some of these assumptions may not hold, but further research is necessary.

Opsomer et al. (2002) found that the assumption of the Rasch model that each item contributes equally to a household's food insecurity propensity may not be met with the given data. This study found that some demographic characteristics of respondent groups were significantly associated with different responses for particular items. Wilde (2004b), using 2000 Food Security Supplement data, found results consistent with this finding, namely that those households with and without children responded differently to the adult-referenced food security items. This result means that raw threshold scores do not have equivalent meaning across the two different types of household, the method currently used to estimate the prevalence of food insecurity.

Froelich (2002) found that the assumption of unidimensionality may not hold for households with children. Using data from the 18 items of the 1995 Food Security Supplement, this study found perhaps two dimensions according to whether the item was an adult/household item or an item for children. Nord and Bickel (2002) also found

[1]Bhattacharya, Currie, and Haider (2004) examined how well the food security questions predict nutritional outcomes of individuals. Although the outcomes they examined are not actual hunger, one would expect some relationship between hunger and poor nutritional outcomes. The authors found that for children ages 2-5, the food security questions are poor predictors of child health; for adults ages 18-64, the food security questions can predict some nutritional outcomes as expected; and for adults over the age of 65, the food security measure is a very good predictor of nutritional outcomes. Other research has studied outcomes of food insecurity and could be evaluated to help address this issue.

evidence that the child and adult items are not on the same dimension and that this could result in an underestimation of the prevalence of hunger among children by about 20 percent at the national level.

Johnson (2004) fit a 2-parameter logistic model instead of a Rasch model to the data from the 2002 Food Security Supplement. This model allows the discrimination parameter to vary across items. He found that the discrimination parameter is largest for the question on whether the respondent was ever "hungry, but didn't eat," suggesting that assuming that every item contributes the same amount of information on the household's propensity for food insecurity (which the Rasch model assumes) may be not be appropriate, depending on the consequences of violating the assumption, given the intended purpose.

Given the current definition of hunger, IRT models are appropriately suited to estimate levels of food insecurity. While there is evidence that the Rasch model may not be the best model for these data, the use of other IRT models should be explored. Even if further efforts are made to make clear any definition of hunger, it is still appropriate to use IRT models to probabilistically link the propensity for hunger (and food insecurity) to responses to a questionnaire on hunger (and food insecurity). Any definition and its measurement through a survey will not be an absolutely perfect set of questions, and respondents will interpret the same questions differently. Measurement error, the problem of recall error, and the social stigma of reporting a lack of access to food will also result in imprecision of any estimate of hunger. This is far from a fatal weakness in the use of a survey to measure food insecurity and hunger—many other concepts are measured this way (e.g., intelligence). Furthermore, any alternative to measuring hunger in a more direct way would be prohibitively costly and invasive and still would not address the socioeconomic component of hunger.

Conclusion 2: Food insecurity is important to measure. It is a multifaceted concept, each facet of which is appropriate to consider as latent and continuous. It is appropriate to use item-response-theory models to measure these dimensions. However, the Rasch IRT model may not be appropriate in the current application. If the Rasch model is not appropriate, then using the sum scores of the items also is not appropriate.

Appropriateness of Threshold Scores to Demarcate the Categories of Food Security

USDA totals the sum of affirmative responses to the food security scale questions and uses threshold scores to classify households as either food secure, food insecure without hunger, or food insecure with hunger. The thresholds for these scores are shown in Box 2-2. It is common and accepted practice to use such thresholds with IRT models.

Johnson (2004) raises concerns specific to the use of the Rasch model for the use of these thresholds. He also explains that other IRT models can be used to generate scores to use with thresholds. The more controversial aspect of using thresholds is how they are labeled—particularly the labeling of the most severe threshold, food insecure with hunger (Bavier, 2003, 2004). The panel has concerns that a clear conceptual basis for measuring hunger has not been articulated.

Conclusion 3: Threshold scores applied to estimates provided by IRT models can be used to categorize households into levels of food insecurity. However, the appropriate categories and labels need to be examined further.

The panel has examined the use of IRT models to generate scores to use with thresholds of food insecurity. The more controversial aspect of using thresholds is how they are labeled—particularly the labeling of the most severe threshold, food insecurity with hunger.

Interim Recommendation 2: In presenting the data in the annual food security reports, USDA should prominently report frequencies of the individual items that make up the scale.

APPROPRIATENESS OF A HOUSEHOLD INTERVIEW SURVEY TO ESTIMATE THE PREVALENCE OF FOOD INSECURITY

Food uncertainty and insufficiency are household-level concepts. It is appropriate to ask one household respondent regarding worry about food running out or whether members of the household had ever cut the size of meals. These questions can be asked of a large representative sample of households to provide estimates of food security

for the entire population and for subgroups of the population. The agencies that developed the questionnaire were diligent in developing a relatively short instrument that could be attached to a number of household surveys, including the Current Population Survey. Other major household surveys also have included versions of the instrument. Some examples are the National Health and Nutrition Examination Survey, the Survey of Program Dynamics, the Early Childhood Longitudinal Survey, and the Panel Study of Income Dynamics.[2]

Conclusion 4: A household interview survey may be one appropriate vehicle to query households about their food security experiences and to measure the prevalence of food insecurity among households.

Theoretically, it is also reasonable to consider questions of the *frequency and duration* of food insecurity using a household survey. The current version of the 18-item food security scale used in the CPS does not collect much information relevant to frequency and duration. Respondents are generally asked whether they experienced an event or perception "often, sometimes, or never" over the past 12 months. These broad categories do not provide enough detail to give a clear picture of frequency. Also, these broad categories are not used when the answers are scaled to classify individuals as food secure, food insecure without hunger, or food insecure with hunger. Instead, responses are coded as either affirming the question or not. The only question in the instrument that does ask for more detail concerning how often the respondent or other adult in the household did not eat for the whole day (question 10 for households without children and question 17 for households with children; see Box 2-1) is also limited to broad response categories concerning the number of months in which this occurred. Responses are coded as affirming if it is "almost every month" or "some months but not every month" and not affirming if it is only "only 1 or 2 months." These responses are used in the scale.

The full Food Security Supplement containing 54 questions in-

[2]See Wilde (2004a) for a more thorough list of surveys to which the Food Security Supplement has been attached.

cludes additional questions not used to determine food security status. It includes questions about behavior and experiences related to food security in the past 30 days and questions about how often and the number of days that it happened. This information has been used by some researchers to give a better sense of the frequency of food insecurity (Nord, Andrews, and Winicki, 2002). If the goal is to obtain better information about the frequency and duration of food insecurity, USDA might consider using questions from the full supplement and not just the 18-item scale.

In addition to the issue of measuring the frequency of food insecurity, there is interest in measuring the duration of food insecurity, as well as changes over time, at the individual and household levels. Including the supplement in a longitudinal survey, such as the Survey of Income and Program Participation, which interviews households every 4 months for 2 to 4 years, would facilitate the analysis of duration and change over time. In addition, the design of the CPS could also allow for some longitudinal analysis of the food security of some households. The survey interviews the same households for 4 months, does not interview them for the next 8 months, and again interviews them for 4 months following the 8-month break; a portion of the households could receive the Food Security Supplement twice while they are part of the CPS sample. The panel intends to explore these and other options for assessing the frequency and duration of food security in Phase 2 of the study.

Also, a household-based survey is limited with respect to coverage of the U.S. population. In general, such surveys do not include persons living in group quarters, those who are institutionalized, or the homeless. There is reason to believe, therefore, that household-based surveys may not adequately cover individuals who are food insecure yet do not live in households. The homeless population is an important group to include in estimates of the prevalence of food insecurity. Although USDA has attempted to compensate by including in its latest annual report of food security estimates of the use of food pantries and emergency kitchens (Nord, Andrews, and Carlson, 2004), much work in this area needs to be done.

Although a household survey may be appropriate for measuring

food insecurity, the current set of questions used for these concepts combines individual-level experiences with household-level experiences. For example, questions 4 and 9 ask whether the respondent or other adults in the household ever cut the size of or skipped meals or did not eat for a whole day, while questions 6-8 ask only whether the respondent ate less, went hungry, or lost weight and do not ask about other adults in the household (see Box 2-1). While it seems reasonable to address some of these questions only to the respondent (e.g., were you ever hungry?), it is not clear why other questions also ask about the other adults in the household. The problem is not just the use of a household survey, but issues of questionnaire design and the selection of respondents in the participating household also need to be considered.

The panel has raised a number of issues about the questions in the CPS Food Security Supplement. For example, these questions mix references to the household, adults in the household, and the individual respondent. Furthermore, the 12-month reference period is too long and may make accurate respondent recall difficult. The panel urges USDA to build on the evaluation of these questions that was conducted at the onset of the food security measurement project and initiate a program to further test and improve the currently used questions.

Interim Recommendation 3: Given that the concept of food insecurity is multifaceted, USDA should consider which specific facets should be measured.

APPLICABILITY OF THE FOOD SECURITY MEASURE FOR ASSESSING THE EFFECTIVENESS OF FOOD ASSISTANCE PROGRAMS

The Government Performance and Results Act of 1993 requires that federal departments and agencies within departments develop a strategic plan for multiple years and annual performance plans with specific targets, and then report annually on the agency's success in meeting those targets. The 2000-2005 strategic plan of the Food and Nutrition Service—the agency with responsibility for the major food assistance programs in the United States, including the Food Stamp

Program, the Special Supplemental Nutrition Program for Women, Infants, and Children, and the National School Lunch Program—states a goal for the agency, in delivering the food assistance programs, to reduce the prevalence of food insecurity with hunger among households with income under 130 percent of the federal poverty standard.[3] At the present time, USDA uses prevalence estimates of food security to report annual performance in the execution of the strategic plan. The panel was asked to comment on the applicability of the food security measure for such purposes.

Estimates of the prevalence of food insecurity status are best used as a tool for monitoring the well-being of a population of interest. These estimates can show how a population is faring over time, whether its food insecurity status is improving, deteriorating, or remaining the same. These estimates can also serve as an important surveillance tool for identifying whether specific subgroups are doing poorly (e.g., the elderly, rural versus urban groups, regions and states, family and household structures). Such monitoring efforts are important because they may help identify where additional assistance is needed or where further investigation is needed to understand why the program or policies may or may not be working.

These prevalence estimates, however, are not well designed for use in measuring progress toward meeting the goals of the Government Performance and Results Act for food assistance programs. Evaluating the efficacy of food assistance programs by examining fluctuations in prevalence of food insecurity has little meaning. The estimates do not measure anything directly tied to the food assistance programs (such as improved nutritional status because of program participation). Thus, effective performance of the programs cannot be directly linked to improved food security status, nor can a deterioration of food security be attributed to failure of these programs. Many factors can result in a change in food security status (e.g., changes in the economy of the nation, other programs or policies, demographic changes). For ex-

[3]See Wilde (2004a) for a discussion of the use of the food insecurity measure for other performance assessment tools—for example, use with Health People 2010 goals.

ample, if USDA's goal is to promote the food security of households below a certain level of poverty, and if the economy goes into a serious recession so that the food security of these households decreases, then USDA may not meet its goal of reducing food security even if the existing food assistance programs were very effective. The panel recognizes that finding appropriate measures of performance is difficult in general, but as currently fielded in national surveys, the food security estimates are not well suited for this purpose.

Conclusion 5: Prevalence estimates of food insecurity as currently obtained are not well suited for evaluation of the effectiveness of food assistance programs. It is unclear that monitoring the prevalence of food insecurity at national and subnational levels would be suitable for evaluation of these programs.

With the appropriate evaluation design, estimates of the prevalence of food insecurity could potentially be used as an outcome measure in studies assessing the effect of participation in food assistance programs, although they may not fully capture the effects that programs may have. But such studies would require finding a suitable comparison group to which such an outcome of program participation could be compared. Wilde (2004a) details some of the results of studies that have attempted to set up comparison groups or exploit longitudinal data to attempt to control for nonrandom participation in food assistance programs. If an experimental design was chosen so that participants in the food assistance program were randomly assigned to a new program or component of a program, then the food insecurity measure could potentially be used as an outcome. To date, however, such an experimental design has not been implemented in evaluation of food assistance programs.

SURVEY OPTIONS FOR MEASURING FOOD INSECURITY

As stated earlier, USDA bases its annual report and estimates of the prevalence of food insecurity on data collected from the Food Security Supplement to the CPS. The food security questions that are included in the CPS also appear on a number of other nationally rep-

resentative surveys, for example the National Health and Nutrition Examination Survey, the Survey of Program Dynamics, and the Early Childhood Longitudinal Survey. Attaching the food security questions to the CPS for the official estimates has several advantages. The CPS is the largest of these surveys and comes closest to fulfilling one of the key needs for the project—state-level monitoring of food security. Data from the CPS are produced regularly and released on a timely basis. There are however, reasons to consider other surveys as the primary vehicle for, or to augment, a food security supplement.

For example, the National Health and Nutrition Examination Survey (NHANES) collects detailed anthropometrical, medical, and nutritional information on all sample persons. These data are very valuable for understanding the links between food insecurity and health and food insecurity and diet. Food security and sufficiency have been measured in NHANES since NHANES III. From 1999 to 2001 the food sufficiency question was expanded to include food adequacy. The 18-item household food security survey module used in the CPS—which was developed by USDA in collaboration with an expert panel and a federal interagency working group that included NCHS—has been included in NHANES since 1999. This module has been used in a number of other surveys. Beginning in 2000, NHANES included questions about the individual-level hunger of participants age 16 and over and of a proxy regarding children under age 12. Beginning in 2005, NNHANES will ask 12–16 year olds these questions. These are questions that ask about the individual's experience, in contrast to the household level questions, which just ask about anyone in the household. These individual level responses can then be assessed in relation to individual measures from other examination components. NHANES staff has been involved in developing a short version of the module—six items rather than 18 items.

NHANES used to be conducted on a periodic basis, but it is now conducted on a continuing basis and two years of data are cumulated and published every two years The NHANES samples 5,000 households annually, so it is not large enough for annual estimates or for subgroup or state analysis.

The National Health Interview Survey collects basic health infor-

mation for monitoring the health of the population. It has a larger sample of 40,000 households, approximately 100,000 people. Most of the information, however, is obtained on a sample adult or child. It could also be considered as a potential vehicle for a food security supplement, although the data that it collects on income and demographic factors are somewhat different from those in the CPS. In Phase 2 of the study, the panel will further consider whether the CPS is the most appropriate vehicle to attach the food security supplement or whether other surveys should be used instead of, or in conjunction with it.

An issue related to the design of the survey used to measure food security is the measurement of the frequency and severity of episodes of food insecurity and their duration. As noted earlier, it is difficult to assess the frequency, severity, and duration of episodes of food insecurity by using the CPS data. Only a few of the questions ask how often events related to food insecurity happen, and those questions ask very little detail about how intense they were or how long they lasted. Such data would be important to understand the mechanisms that cause and may help reduce food insecurity. It is possible that the questions could be better designed for assessing frequency and duration. The use of longitudinal surveys, such as the Survey of Income and Program Participation, could also be used to assess frequency and duration. The panel urges USDA to conduct further work to develop ways to measure the frequency and duration of food insecurity.

Interim Recommendation 4: USDA should explore the use of alternative or additional surveys to estimate the national prevalence of food insecurity. In the meantime, USDA should continue to measure food insecurity as currently conducted using the Food Security Supplement of the Current Population Survey.

Such exploration should include the assessment of the extent of coverage bias in estimates of food insecurity and hunger based on a household sample frame. Issues of the level of accuracy and precision also should be explored. Discussion of these issues, including ample size, periodicity of survey and therefore the estimates, and response

burden, will be addressed in Phase 2 of the study before any specific recommendations can be made.

CONCLUDING REMARKS

The panel commends USDA and DHHS for the careful and extensive work that has gone into the development of the food security measure. The panel further recognizes USDA's continuing efforts to evaluate and improve the measure. Overall, the panel thinks that the highest research priority is to develop a clear conceptual definition of hunger and to continue and expand the evaluation and testing of the questions in the current CPS Food Security Supplement.

This Phase 1 report provides USDA with the panel's preliminary guidance, based on discussions during the workshop and panel deliberations, for improving the food security measure. It also has made interim recommendations as guidance to USDA for the interim period until completion of the panel's work in Phase 2 of the study and the completion of additional recommended research by USDA.

The panel in its final report will examine in more depth the issues raised in the workshop relating to the concepts, definitions, measurement issues, and analytical methods used to measure food security; possible alternative survey vehicles for measuring the concepts instead of or supplemental to the CPS; and the problems of special populations. In addition, the panel will address and make recommendations as appropriate on the tasks specified for Phase 2 and listed in Chapter 1.

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Appendix A

Current Population Survey Food Security Supplement Questionnaire, December 2003

I. FOOD EXPENDITURES

These first questions are about all the places at which you bought food LAST WEEK. By LAST WEEK, I mean from Sunday through Saturday.

1. First, did (you/anyone in your household) shop for food at a supermarket or grocery store LAST WEEK?
2. Think about other places where people buy food, such as meat markets, produce stands, bakeries, warehouse clubs, and convenience stores. Did (you/anyone in your household) buy food from any stores such as these LAST WEEK?
3. LAST WEEK, did (you/anyone in your household) buy food at a restaurant, fast food place, cafeteria, or vending machine? (Include any children who may have bought food at the school cafeteria).
4. Did (you/anyone in your household) buy food from any other kind of place LAST WEEK?

Now I'm going to ask you about the ACTUAL amount you spent on food LAST WEEK in all the places where you bought food. Then, since LAST

WEEK may have been unusual for you, I will ask about the amount you USUALLY spend.

5. How much did (you/your household) ACTUALLY spend at supermarkets and grocery stores LAST WEEK (including any purchases made with food stamps)?

How much of the (amount from last question) was for nonfood items, such as pet food, paper products, detergents, or cleaning supplies?

6. How much did (you/your household) spend at stores such as meat markets, produce stands, bakeries, warehouse clubs, and convenience stores LAST WEEK (including any purchases made with food stamps)?

How much of the (amount from last question) was for nonfood items, such as pet food, paper products, detergents, or cleaning supplies?

7. How much did (you/your household) spend for food at restaurants, fast food places, cafeterias, and vending machines LAST WEEK?

8. How much did (you/your household) spend for food at any other kind of place LAST WEEK?

(Let's see, it seems that (you/your household) did not buy any food LAST WEEK. /Let's see, (you/your household) spent about (fill with S8O) on food LAST WEEK.) Now think about how much (you/your household) USUALLY (spend/spends). How much (do you/does your household) USUALLY spend on food at all the different places we've been talking about IN A WEEK? (Please include any purchases made with food stamps). Do not include nonfood items such as pet food, paper products, detergent, or cleaning supplies.

II. MINIMUM SPENDING NEED TO HAVE ENOUGH FOOD

9. In order to buy just enough food to meet (your needs/the needs of your household), would you need to spend more than you do now, or could you spend less?

10. About how much MORE would you need to spend each week to buy just enough food to meet the needs of your household?

11. About how much LESS could you spend each week and still buy enough food to meet the needs of your household?

III. FOOD PROGRAM PARTICIPATION

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.

12. In the last 12 months, since December of last year, did you ever run short of money and try to make your food or your food money go further?

13. In the past 12 months, since December of last year, did (you/anyone in this household) get food stamp benefits, that is, either food stamps or a food-stamp benefit card?

14. In which months of 2003 were food stamps received?

15. On what date in November did (you/your household) receive food stamp benefits?

16. How much did (you/your household) receive the last time you got food stamp benefits?

17. During the past 30 days, did (your child/any children in the household between 5 and 18 years old) receive free or reduced-cost lunches at school?

18. During the past 30 days, did (your child/any children in the household) receive free or reduced-cost breakfasts at school?

19. During the past 30 days, did (your child/any children in the household) receive free or reduced-cost food at a day-care or Head Start program?

20. During the past 30 days, did any (women/women or children/children/women and children) in this household get food through the WIC program?

21. How many (women/women or children/children/women and children) in the household got WIC foods?

IV. FOOD SUFFICIENCY AND FOOD SECURITY

The next questions are about the food eaten in your household in the last 12 months, since December of last year, and whether you were able to afford the food you need.

22. Which of these statements best describes the food eaten in your household—enough of the kinds of food we want to eat, enough but not always the *kinds* of food we want to eat, sometimes not enough to eat, or often not enough to eat?

Now I'm going to read you several statements that people have made about their food situation. For these statements, please tell me whether the statement was OFTEN true, SOMETIMES true, or NEVER true for (you/your household) in the last 12 months.

23. The first statement is "(I/We) worried whether (my/our) food would run out before (I/we) got money to buy more." Was that OFTEN true, SOMETIMES true, or NEVER true for (you/your household) in the last 12 months?

Did this ever happen in the last 30 days?

24. "The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more." Was that OFTEN, SOMETIMES or NEVER true for you in the last 12 months?

Did this ever happen in the last 30 days?

25. "(I/we) couldn't afford to eat balanced meals." Was that OFTEN, SOMETIMES or NEVER true for you in the last 12 months?

Did this ever happen in the last 30 days?

26. "(I/we) relied on only a few kinds of low-cost food to feed ((my/our) child/the children) because (I was/we were) running out of money to buy food. Was that OFTEN, SOMETIMES or NEVER true for you in the last 12 months?

Did this ever happen in the last 30 days?

27. "(I/we) couldn't feed ((my/our) child/the children) a balanced meal, because (I/we) couldn't afford that." Was that OFTEN, SOMETIMES or NEVER true for you in the last 12 months?

Did this ever happen in the last 30 days?

28. "((My/Our) child was/The children were) not eating enough because (I/we) just couldn't afford enough food." Was that OFTEN, SOMETIMES or NEVER true for you in the last 12 months?

Did this ever happen in the last 30 days?

29. In the last 12 months, did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?

How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

30. Now think about the last 30 days. During that time did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?

How many days did this happen in the last 30 days?

31. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?

How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

Did this happen in the last 30 days?

32. In the last 30 days, how many days did you eat less than you felt you should because there wasn't enough money to buy food?

33. In the last 12 months, since December of last year, were you ever hungry but didn't eat because you couldn't afford enough food?

How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

Did this happen in the last 30 days?

34. In the last 30 days, how many days were you hungry but didn't eat because you couldn't afford enough food?

35. In the last 12 months, did you lose weight because you didn't have enough money for food?

Did this happen in the last 30 days?

36. In the last 12 months, since last December, did (you/you or other adults in your household) ever not eat for a whole day because there wasn't enough money for food?

How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

37. Now think about the last 30 days. During that time did (you/

you or other adults in your household) ever not eat for a whole day because there wasn't enough money for food?

How many times did this happen in the last 30 days?

The next questions are about (your child/children) living in the household who are under 18 years old.

38. In the last 12 months, since December of last year, did you ever cut the size of (your child's/any of the children's) meals because there wasn't enough money for food?

How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

Did this happen in the last 30 days?

39. In the last 30 days, how many days did you cut the size of (your child's/the children's) meals because there wasn't enough money for food?

40. In the last 12 months, (was your child/were the children) ever hungry but you just couldn't afford more food?

How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

Did this happen in the last 30 days?

41. In the last 30 days, how many days (was your child/were the children) hungry but you just couldn't afford more food?

42. In the last 12 months, did (your child/any of the children) ever skip a meal because there wasn't enough money for food?

How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

43. Now think about the last 30 days. Did (your child/the children) ever skip a meal during that time because there wasn't enough money for food?

How many days did this happen in the last 30 days?

44. In the last 12 months, since December of last year, did (your child/any of the children) ever not eat for a whole day because there wasn't enough money for food?

Did this happen in the last 30 days?

V. WAYS OF COPING WITH NOT HAVING ENOUGH FOOD

45. During the past 30 days, did (you/anyone in the household) receive any meals delivered to the home from community programs, "Meals on Wheels," or any other programs?

46. During the past 30 days, did (you/anyone in the household) go to a community program or senior center to eat prepared meals?

47. In the last 12 months, did (you/you or other adults in your household) ever get emergency food from a church, a food pantry, or food bank?

How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

Did this happen in the last 30 days?

48. Is there a church, food pantry, or food bank in your community where you could get emergency food if you needed it?

49. In the last 12 months, did (you/you or other adults in your household) ever eat any meals at a soup kitchen?

How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

Did this happen in the last 30 days?

Appendix B

Workshop Agenda

Workshop on the Measurement of Food Insecurity and Hunger

July 15, 2004

Panel to Review USDA's Measurement of
Food Insecurity and Hunger
Committee on National Statistics

The Keck Center of the National Academies
500 5th Street, N. W., Washington, DC

Thursday, July 15

8:30 **Continental breakfast available**

9:00 **Welcome and introductions**

Janet L. Norwood, *Chair*
Panel to Review the USDA's Measurement of Food Insecurity and Hunger

Phil Fulton, *Associate Administrator, Economic Research Service, U.S. Department of Agriculture (USDA)*

9:15 **Session 1 Conceptual issues in measuring food insecurity and hunger**

Session Chair: Susan Mayer, *University of Chicago*

Presenters: Jean-Pierre Habicht, *Cornell University*
Gretel Pelto, *Cornell University*
Edward Frongillo, *Cornell University*
Diego Rose, *Tulane University*

Discussants: Mark Nord, *Economic Research Service, USDA*
Richard Bavier, *Office of Management and Budget*
Steven Haider, *Michigan State University*

10:45 Break

11:00 **Session 2 Purposes and uses of the USDA food insecurity and hunger measure**

Session Chair: Helen Jensen, *Iowa State University*

Presenter: Parke Wilde, *Tufts University*

Discussant: Sandra Hofferth, *University of Maryland*
Steven Carlson, *Food and Nutrition Service, USDA*

12:15 Working Lunch

1:15 **Session 3 Alternative ways to construct a measure and indicator of food insecurity and hunger from the food security supplement**

Session Chair: Edward Frongillo, *Cornell University*

Presenters: Katherine Alaimo, *Michigan State University*
Amy Froelich, *Iowa State University*

Discussant: Valerie Tarasuk, *University of Toronto*

2:15 Break

2:30 **Session 4 Cognitive aspects of the food security supplement questions: A panel discussion**

Session Chair: Nancy Mathiowetz, *University of Wisconsin-Milwaukee*

Panelists: Kathy Radimer, *National Center for Health Statistics*
Nora Cate Schaeffer, *University of Wisconsin-Madison*
Eleanor Singer, *University of Michigan*

4:00 **Session 5 Item-response-theory models and their use in measuring food insecurity and hunger**

Session Chair: Janet L. Norwood

Presenter: Matthew Johnson, *Baruch College*

Discussant: Allen Schirm, *Mathematica Policy Research*

5:00 Open Discussion

Session Chair: Janet L. Norwood

5:30 Workshop Adjourns

Appendix C

Biographical Sketches of Panel Members

JANET L. NORWOOD *(Chair)* is a counselor and senior fellow at the Conference Board, where she chairs the Advisory Committee on the Leading Indicators. She served as U.S. Commissioner of Labor Statistics from 1979 to 1992 and then was a senior fellow at the Urban Institute until 1999. She is a past member of the Committee on National Statistics and the Division of Engineering and Physical Sciences of the National Research Council. She chairs the advisory committee for the Bureau of Transportation Statistics and serves on the Board of Scientific Counselors at the National Center for Health Statistics. She is a fellow and past president of the American Statistical Association, a member and past vice president of the International Statistical Institute, an honorary fellow of the Royal Statistical Society, and a fellow of the National Academy of Public Administration and the National Association of Business Economists. She has a B.A. from Rutgers University and M.A. and Ph.D. degrees from the Fletcher School of Law and Diplomacy of Tufts University. She has received honorary LL.D. degrees from Carnegie Mellon, Florida International, Harvard, and Rutgers universities.

ERIC T. BRADLOW is associate professor of marketing and statistics at the Wharton School of the University of Pennsylvania. He also serves as associate editor for the *Journal of Computational and Graphical Statistics* and *Psychometrika* and as senior associate editor for the *Journal of Educational and Behavioral Statistics.* He has won numerous teaching awards and his research interests include Bayesian modeling, statistical computing, and developing new methodology for unique data structures. His current projects center on optimal resource allocation, choice modeling, and complex latent structures. He has a Ph.D. in mathematical statistics from Harvard University.

J. MICHAEL BRICK is senior statistician, vice president, and associate director of the statistical staff at Westat. He has 25 years of experience and expertise in sample design and estimation for large surveys, the theory and practice of telephone surveys, the techniques of total quality management and survey quality control, nonresponse and bias evaluation, and survey methodology. He has contributed to the statistical and substantive aspects of numerous studies and to statistical methodology research in several areas, including education, transportation, and product injury studies. He is a fellow of the American Statistical Association, an elected member of the International Statistical Institute, and a research professor in the Joint Program in Survey Methodology at the University of Maryland. He has a B.S. in mathematics from the University of Dayton and M.A. and Ph.D. degrees in statistics from American University.

EDWARD A. FRONGILLO, JR., is associate professor in the Division of Nutritional Sciences, director of the Program in International Nutrition, and director of the Office of Statistical Consulting at Cornell University. His current research activities include the Multicentre Growth Reference Study of the World Health Organization, the Food and Nutrition Technical Assistance Project of the U.S. Agency for International Development, and conceptualization and measurement of food insecurity in elders and in developing countries. He is a member of the editorial board of the *Journal of Nutrition.* He has an M.S. in

biometry, an M.S. in human nutrition, and a Ph.D. in biometry, all from Cornell University.

PAUL W. HOLLAND holds the Frederic M. Lord chair in measurement and statistics at the Educational Testing Service (ETS). His association with ETS began in 1975 as director of the Research Statistics Group, and in 1986 he was appointed its first distinguished research scientist. He left ETS in 1993 to join the faculty at University of California, Berkeley, as a professor in the Graduate School of Education and Department of Statistics but returned in 2000 to his current position at ETS. His research interests include psychometrics, causal inference of educational interventions in nonexperimental studies, discrete multivariate data analysis, and the analysis of social networks. He was designated a national associate of the National Research Council in 2002. He has an M.A. and a Ph.D. in statistics from Stanford University (1966) and a B.A. in mathematics from the University of Michigan (1962).

MICHAEL D. HURD is a senior economist and the director for the RAND Center for the Study of Aging. His expertise concerns aging and the elderly; savings, wealth, and retirement; and U.S. labor markets and social security. Previously he chaired the Department of Economics at the State University of New York at Stony Brook. He was a visiting senior scientist at the Institute for Social Research at the University of Michigan and a visiting associate professor of economics at Stanford University. He is a member of the Behavior and Sociology of Aging Review Subcommittee at the National Institutes of Health. He is also a member of the Scientific Committee of the Center for Research on Pensions and Welfare Policies at the University of Turin, Italy. He is a consultant to the English Longitudinal Study of Aging and a consultant to the Survey on Health, Aging, and Retirement in Europe. He has a Ph.D. in economics from the University of California, Berkeley.

HELEN H. JENSEN is professor of economics and head of the Center for Agricultural and Rural Development's food and nutrition policy research division at Iowa State University. Her research addresses food

assistance and nutrition policies, food security and the economics of food safety and food hazard control options. She is on the editorial boards of *Agricultural Economics*, *Food Economics*, and *Agribusiness: An International Journal* and was elected chair of the Food Safety and Nutrition Section of the American Agricultural Economics Association. She is currently serving on the Institute of Medicine's Committee to Review the WIC Food Packages and the National Research Council's Committee on Assessing the Nation's Framework for Addressing Animal Diseases. She has been a member of the National Research Council's panel on animal health and food safety and expert panels related to food safety, food insecurity and hunger, and food programs. She has a Ph.D. degree in agricultural economics from the University of Wisconsin-Madison.

NANCY MATHIOWETZ is associate professor of sociology at the University of Wisconsin-Milwaukee. She was previously an associate professor at the University of Maryland's Joint Program in Survey Methodology. Her research interests include the assessment and reduction of measurement error in surveys and the use of survey data in the development of public policy. She is co-editor of *Survey Measurement of Work Disability: Summary of a Workshop*, one of the reports of the Committee to Review the Social Security Administration's Disability Decision Process Research, a joint project of the Institute of Medicine and the National Research Council. She serves as associate editor of *Public Opinion Quarterly* and the *Journal of Official Statistics*. She has an M.S. in biostatistics and a Ph.D. in sociology, both from the University of Michigan.

SUSAN E. MAYER is dean and associate professor at the Harris Graduate School of Public Policy Studies and the College at the University of Chicago. She also serves as a faculty affiliate with the University's Center for Human Potential and Public Policy. She is past director of the Northwestern University/University of Chicago Joint Center for Poverty Research. Her current research is on the effect of economic mobility across generations and the role of noncognitive skills on social and economic success. She is author of the book, *What Money Can't Buy:*

Family Income and Children's Life Chances, and co-editor of *Earning and Learning: How Schools Matter*. She has a Ph.D. in sociology from Northwestern University.

DONALD (DIEGO) ROSE is associate professor in the Department of Community Health Science at Tulane University. He has worked on food and nutrition programs and policies in both domestic and international contexts. Previously he was project director/nutritionist for the WIC nutrition program in a farmworker clinic in rural California, as well as a research team leader with the U.S. Department of Agriculture's Economic Research Service, studying the determinants and consequences of household food insecurity in America, the nutrition and health impacts of food assistance programs, and the evaluation of low-income nutrition education projects. He also worked on food security and nutrition issues in Mozambique with Michigan State University's Food Security Project and in South Africa with the University of Cape Town's Medical School. He has an M.P.H. in public health nutrition and a Ph.D. in agricultural economics from the University of California, Berkeley.