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Three Years of Food Security Measurement Research in Hawaii

Joda P. Derrickson, Ph.D., R.D.
Executive Director
Full Plate, Inc.
E-mail: laniwai4@pixi.com

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Summary

Food security has been defined as *"access by all people at all times to enough food for an active, healthy life*." In 1997, the federal government released the first national food security measure called the Core Food Security Module (CFSM). The purpose of the 18-item CFSM is to measure the extent and degree of household food security status during the last 12 months. The CFSM actually consists of two measures, a scale measure based on Rasch item-response theory and the CFSM categorical measure. The categorical measure is used to estimate the prevalence of household food insecurity and hunger. Each respondent's sum of affirmative responses is used to categorize households. Zero to two affirmative responses yields classification as food secure. For households with children, three to seven affirmative responses leads to classification as food insecure without hunger, eight to 12 affirmative responses as food insecure with moderate hunger, and 13 or more affirmative responses as food insecure with severe hunger. A subscale of six food security items has also been proposed as a food security monitoring tool.

The purpose of this manuscript is to consolidate findings and synthesize recommendations from three years of food security measurement research completed in Hawaii. A practical outcome of this research has been the development of an effective food security monitoring tool for use in Hawaii.

Five samples and various methodological approaches were employed to study measurement of food insecurity in the ethnically diverse state of Hawaii:

- a qualitative study to assess the conceptual framework of the CFSM with white, Filipino, Hawaiian and part-Hawaiian, and Samoan charitable food recipients (n=61);
- a pilot stability study of 77 recent charitable food recipients who completed the CFSM twice over the phone (n=61);
- a series of quantitative studies to assess the CSFM scale measure, the CFSM categorical measure, and the individual-level CFSM; this sample consisted of 1,664 respondents;
- a qualitative study documenting Hawaii's food security stakeholders' perceptions of definitions of food insecurity and hunger, what and how hunger should be measured, how stakeholders interpreted reports on the CFSM and the alternative Face Valid Food Security Measure, and the value of specific indicators; the sample consisted of 19 WIC nutritionists, ten food pantry providers, four Hawaii Foodbank board members, four social workers, three legislators, and three providers of food to homeless persons; and

- a statewide "food security monitoring pilot study" which used six of the CFSM indicators (n=4,351).

To the extent possible, findings were compared with previous food security research and/or to the CFSM technical research report released in 1997.

Among its key findings, this first comprehensive, independent assessment of the CFSM:

- confirmed the face validity of the CFSM with Asians and Pacific Islanders in Hawaii;
- indicated that the CFSM yields valid and reliable scale measures among Asians and Pacific Islanders in Hawaii, except possibly with American Samoans (n=18);
- questioned the CFSM categorical algorithm: 27 percent of 111 households identified as food secure with one or more affirmative responses replied affirmatively to the "unable to afford to eat balanced meals" item, and only 50 percent of 64 households classified as experiencing moderate hunger responded affirmatively to the "respondent hungry" item;
- confirmed the importance of reducing response burden of the 18 items for hungry households with children;
- documented the alternative "face valid" categorical algorithm—in which one affirmative response was classified as "at risk of hunger" and affirmative responses to either the "respondent hungry" item or the "adults didn't eat for a whole day" item were classified as "adult hungry," and to the "children hungry" item classified as "child hunger"—as a more sensitive way to categorize affirmative responses;
- questioned the effectiveness of the recommended six-question food security subscale. An alternative Simple Food Security Monitoring Tool (SFSMT) based on the "face valid" algorithm was found to have strong Rasch goodness-of-fit statistics and to be more consistent with the information desired by Hawaii's food security stakeholders. The SFSMT estimates the number of households experiencing food anxiety as well as hunger among adults and hunger among children. The SFSMT can be used to approximate the CFSM. A similar tool was used in the Hunger and Food Insecurity in Hawaii, Hawaii Health Survey study in 1999.

Recommendations generated by a comprehensive assessment of these findings have been grouped into three categories:

1. **Continue ongoing food security research efforts.** Continue to support research that discerns how robust the CFSM is across diverse population groups, develop simple measures of individual-level hunger, develop measures of duration of household food insecurity and individual hunger among adults and children, and develop and use shorter tools that effectively capture what policymakers and food assistance program managers need to know to ameliorate household food insecurity in their local communities.

2. **Reassess fundamental aspects of the national food security monitoring tool.** Consider the intended purpose of food security monitoring tools and the definitions used, the importance of

measuring “food insecurity” versus “food insufficiency,” the importance of measuring the psychological element of food insecurity, adding items to the scale measure which confirm food security, revising wording of the general balanced meal indicator (“unable to afford to eat balanced meals”), and the value of face (content) validity of the CFSM categorical measure.

3. **Support local/state food security monitoring**. Use a simple food security measurement tool, seek the best food security survey methods to ensure the accuracy of household food security prevalence data, and consider how to use the national food security monitoring tool to screen “at risk” households.

Prudence must be exercised when extending findings to ethnic groups and areas not studied. Findings warrant further assessment of the purpose of food security monitoring and how food security monitoring can be implemented most effectively at the state or local level to make progress on the Healthy People 2010 food security objective, and ultimately to end resource-constrained hunger in the United States.

Three Years of Food Security Measurement Research in Hawaii

INTRODUCTION

Food security is defined as *"access by all people at all times to enough food for an active, healthy life"* (Life Sciences Research Office [LSRO], 1990; Table 1). Food security is recognized nationally and internationally as a key to nutrition security and health (Center for Nutrition Policy and Promotion, 1996; Willis et al., 1997). Conceptually, food insecurity is understood as an experience of resource constraints initially producing emotional strain and decreased diet quality and quantity of food consumed (Radimer, 1990; Bickel, Andrews, and Klein, 1996). "Increase food security among U.S. households and in so doing reduce hunger" is now a U.S. Healthy People 2010 objective (Office of Disease Prevention and Health Promotion, 2000). In 1996, $35.6 billion in federal funds supported food assistance programs to families and single persons (Hamilton et al., 1997a). The overall goals of assistance programs such as the Food Stamp Program, the Special Supplemental Nutrition Program for Women, Infants and Children (WIC), and the national school breakfast and lunch programs have recently been modified to "enhance food and nutrition security" (Food and Nutrition Service, U.S. Department of Agriculture, 1998).

The importance of food security measurement was officially recognized in the "Ten-Year Comprehensive Plan for Nutrition Monitoring and Related Research Programs" (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 1993). The plan contained a specific initiative related to food security assessment:

> 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 [National Nutritional Monitoring and Related Research] Program.

To meet this charge, the U.S. Department of Agriculture (USDA), the Centers for Disease Control and Prevention, the National Center for Health Statistics (NCHS), and noted food security experts oversaw the development of both scale and categorical household food security measures. They are referred to as the Core Food Security Module (CFSM: Carlson, Andrews, and Bickel, 1999). A summary

report of this landmark research effort (Hamilton et al., 1997a), a technical report outlining development of the national food security measures (Hamilton et al., 1997b), and a guide to implementing the CFSM (Price, Hamilton, and Cook, 1997; Bickel et al., 2000) document this extensive original research effort. State and national food security status estimates for 1995 (Hamilton et al., 1997a) and for 1996–1998 (Nord, Jemison, and Bickel, 1999) are based on the CFSM.

Core Food Security Module. The purpose of the CFSM is "to measure the extent and severity of household food insecurity over a 12 month period" (Carlson, Andrews, and Bickel, 1999). The creation of the CFSM involved at least two major steps. First, a determination of which food security items created the best respondent food security scale measure was completed using Rasch scaling methodology (Rasch, 1966; Wright and Stone, 1979). After the 18 items were chosen and the scale measure completed (Figure 1), a method of categorizing respondents was created for food security monitoring. Table 2 depicts how the conceptual understanding of food insecurity was operationalized into the CFSM categorical measure (Radimer, 1990; Bickel, Andrews, and Klein, 1996; Hamilton et al., 1997b). The categorical measure divides respondents into four categories: food secure, food insecure without hunger, food insecurity with moderate hunger, and food insecurity with severe adult hunger and hunger among children. The CFSM research team developed "threshold questions" to operationally define the boundaries of each category. These thresholds were based on the following:

- definitions of food insecurity and hunger (LSRO, 1990; Table 1);
- the CSFM scale measure (Hamilton et. al, 1997b; Figure 1);
- the original CFSM modal response pattern (Hamilton et al., 1997b; Figure 1); and
- "previous research in the areas of physiology, clinical nutrition and food security measurement" (Hamilton et al., 1997b, pp. 58–59).

As depicted in Table 2 and Figure 1, the modal response pattern is simply the hierarchy of item response rates from the most frequently affirmatively answered item. It starts with question 2 (Q2), "Worried that food would run out," and ends with the least frequently affirmatively answered item, Q16,

"Children didn't eat for a whole day." It is generally expected that when a participant has responded affirmatively to an item that s/he has also responded affirmatively to all previous items (Wright and Stone, 1979). A nonmodal response pattern occurs when a participant responds "No" to one or more items, but then responds "Yes" to a more severe item.

Threshold items, identified from the modal response pattern, were used to define the boundaries between food security categories—Q4, "Unable to eat balanced meals," for food insecurity; Q8a, "Adults cut the size or skip meals for three or more months in the last year," for moderate hunger; and Q12, "Adults didn't eat for a whole day," for severe hunger are deemed "threshold items. Q14, "Children hungry," was also considered a threshold indicator of the severe hunger category but was not chosen since it could not be used to classify households without children (Hamilton et al., 1997b). Thus, to categorize a household as food insecure, a minimum of three affirmative responses was needed to confirm food insecurity, regardless of which three questions a household responded to. A similar rationale was used to categorize households as experiencing food insecurity with moderate or severe hunger.

A subset of six questions (Q3, Q4, Q8, Q8a, Q9, Q10; see Table 2:) has also been recommended as a shorter tool for food security monitoring (Blumberg et al., 1999; Bickel et al., 2000). This subset can only be used to approximate the food security/food insecurity threshold and cannot be used to accurately estimate hunger among adults or children.

PURPOSE

This paper consolidates findings and synthesizes recommendations from three years of food security research in Hawaii.[1] The practical purpose of these research studies was to develop an effective

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[1]Years 1 and 2 reflect the first author's doctoral work completed at Colorado State University under the direction of Dr. Jennifer Anderson, Department of Food Science and Human Nutrition, and Dr. Anne Fisher, a Rasch expert in the Department of Occupational Therapy. Years 2 and 3 were funded, in part, through an Economic Research Service grant from the Institute for Research on Poverty, although the authors' salary was also supported in part by the University of Hawaii at Manoa. Significant ideas and collegial critique were contributed by Rachel

food security monitoring tool to use in Hawaii to assist in alleviating food insecurity and hunger (Baker et al., 2001). In years 1 and 2 (1997–1999) the primary research question was:

> *Does the 18-question CFSM, and the conceptual framework it is based on, accurately and reliably describe food insecurity and hunger in Hawaii, a state where 50 percent of the population is of Asian and/or Pacific Island ancestry?*

We hypothesized that the CFSM would not be adequate, and that an alternative question set would be needed to accurately measure food insecurity among Asian and Pacific Islanders.

In year 3 (1999–2000), two related research questions were pursued:

> *Does the categorical algorithm of the national food security measure capture what state stakeholders (policymakers, program managers and local nutrition and surveillance experts) want to measure in an accurate and reliable manner? If not, can a more valid and reliable categorical algorithm be created from the 18 food security questions?*
>
> *Is the proposed six-question food security monitoring tool proposed by NCHS the most reliable, valid, and useful instrument to use to measure the extent and severity of food insecurity in Hawaii? If not, what food security monitoring tool would be better?*

It was hypothesized that neither the CFSM categorical measure nor the six-question food security monitoring tool proposed by NCHS would meet food security monitoring needs in Hawaii.

METHODS

As outlined in Table 3, a total of five samples using both qualitative and quantitative research methods were utilized during this three-year project. A summary of each sample, data collection methods, and data analysis techniques is given in Tables 3 and 4; detailed descriptions of each study can be obtained from the various publications of Derrickson and colleagues (see References). Direct quotes from qualitative study participants, and quotes from published manuscripts are in italics.

Novotny, Kathy Radimer, Dena Herman, Mark Nord, and Edward Frongillo. This work would not have happened without extensive initial mentoring from Gary Bickel or without the extensive collaboration from the State Department of Health, SMS Research, and many charitable food providers in Hawaii. The author also acknowledges her role as a community nutritionist dedicated to enhancing food security and nutritional status in Hawaii and as a mother.

The 12 recommendations outlined in this paper (Table 5) represent a thoughtful compilation of previous recommendations. Preliminary recommendations were presented at the Second Food Security Measurement and Research Conference in February 1999 (Derrickson, Anderson, and Fisher, 2001). Since, the Economic Research Service (ERS) identified "priority areas" for food security research immediately after the February 1999 conference (ERS, 1999), recommendations outlined in this paper were specifically designed either to confirm the importance of existing research priorities or to address possible new priority areas. The recommendations have three major thrusts:

1. continue ongoing food security research efforts (ERS, 1999);
2. reassess fundamental aspects of the national food security monitoring tool; and
3. support local/state food security monitoring.

The text of each recommendation follows this set sequence:

- a brief background relevant to the specific recommendation;
- a summary of research and applied findings, including comparisons to relevant food security research documents; and
- a brief summary discussion of the recommendation and implications.

Although an attempt was made to minimize duplicate reports of findings, some duplication was necessary to enhance understanding of the rationale that supports each recommendation. Several primary documents were used to compare findings:

- The technical report describing development of the CFSM (Hamilton et al., 1997b)
- The conceptual framework of the CFSM (Bickel, Andrews, and Klein, 1996)
- Kathy Radimer's original doctoral work that is the basis of the Radimer/Cornell food security measure (Radimer, 1990)
- The work of the Community Childhood Hunger Identification Project (Wehler, Scott, and Anderson, 1992)
- The current priorities for food security monitoring and research (ERS, 1999)

Tables and figures summarizing key findings are also provided. For additional information on each study or table, readers are referred to the specific paper describing the reference study, and the literature cited in each paper. Readers are also encouraged to read the technical report summarizing the original methods and rational used to create the CFSM (Hamilton et al., 1997b) and to contact the author if they have specific questions. For more information about Rasch analysis, see Wright and Linacre (1991), Wright and Stone (1979), and Wright and Masters (1982).

DISCUSSION OF KEY FINDINGS BY SPECIFIC RECOMMENDATIONS

Caveats

This report should not be received as a negative review of the national food security measure in the context of measuring national food security status. The measurement of food security status is an evolving art and science; it involves perceptions and judgements as well as statistical techniques. The federal government has been in the awkward position of having to apply initial research findings (Hamilton et al., 1997b) prior to completing extensive research to confirm the validity and reliability of the CFSM across diverse populations. Furthermore, the focus of the work discussed in this paper was on developing an effective monitoring tool for use in Hawaii. It does not address the different needs and limitations of national food security monitoring.

Despite the "trustworthiness" of multiple research approaches used (qualitative, quantitative, Rasch scale methods) with diverse audiences (charitable food recipients, statewide sample, food security status stakeholders), and although findings generally compare to the relevant research literature, all results are truly representative of food insecurity only in Hawaii (Department of Business, Economic Development and Tourism, 1997).

Recommendation 1. Continue ongoing food security research efforts (ERS, 1999).

This group of interrelated recommendations summarizes much of the research that has already been presented or published and that provides further support of the "food security research" priority areas of the Economic Research Service. Recommendation 1a most directly addresses the initial research question pursued. Recommendations 1b and 1c address "burgeoning" areas of food security measurement that merit focused attention. Recommendation 1d—to continue to develop shorter "food security monitoring tools"—provides linkages to Recommendations 2 and 3.

Recommendation 1a. Continue to support research that discerns how robust the CFSM is across diverse population groups.

Background. The underlying premise of this research was that the CFSM would not be an appropriate food security measure to use in Hawaii, where 50–55 percent (Department of Business, Economic Development and Tourism, 1997) of the population is of Asian or Pacific Islander descent. All samples included at least 50 percent Asian and Pacific Islanders, including Japanese, Chinese, Koreans, Filipinos, Hawaiians, Samoans, and other Pacific Islanders. The percentage of Asian and Pacific Islanders throughout the United States has grown from 3 percent of the U.S. population in 1990, to 3.7 percent in 1996, and is expected to increase to 5.1 percent by 2010 and to 8.7 percent by 2050 (U.S. Department of Commerce, Economics and Statistics Administration, 1996a, 1996b, 1996c). Yet, Asian and Pacific Islanders were not included in conceptual and applied studies of food security measurement (Radimer, 1990; Wehler, Scott, and Anderson, 1992); they constituted less than 2 percent of the national sample used to create the CFSM (Hamilton et al., 1997b).

Rationale Based on Findings: Overall, findings supported the conceptual framework of the CFSM, outlined in Table 2, and the CFSM scale measure, outlined in Figure 1, in Hawaii. However, when the CFSM categorical measure was applied to various Hawaii data sets, it did not appear to have adequate sensitivity to the hunger and food security situation in Hawaii.

- Findings confirmed the conceptual framework of the CFSM with three Asian and Pacific Islander groups residing in Hawaii (Bickel, Andrews, and Klein, 1996, Table 2; Derrickson and Anderson, 2000). Differences in perceptions of the definitions, causal factors, and consequences of food insecurity between ethnic groups did not appear likely to affect results of the CFSM. There were, however, notable differences in coping behaviors between groups, e.g., more extensive sharing among Samoans, perceptions of eating disorders only among Caucasians.

- The CFSM scale measure fit as well with the Hawaii data as it did with national data. In our assessment of the internal scale validity of the CFSM scale measure (Derrickson, Anderson, and Fisher, 2000a) we reported that:

  Overall, the CFSM scale measure fit as well with the Hawaii data as it did with national data, although identified limitations may affect food security monitoring and research (Derrickson, Anderson, and Fisher, 2000a; Tables 6 and 7). *An examination of the "goodness-of-fit of the respondents to the expectations of the Rasch model" indicated acceptable "person response validity" except possibly for Samoans, although sample size (n=18) limits any conclusions about this ethnic group in Rasch analysis*.

- Differences in modal response pattern between Hawaii and national samples were noted (Derrickson, Fisher, Anderson, and Brown, 2001). In our assessment of the CFSM categorical measure (Derrickson, Anderson, and Fisher, 2000a), we reported differences in the modal response pattern or hierarchy of items between the 1995 national data and the 1998 Hawaii data. Differences appeared to affect the application of the food security categorical algorithm outlined in Tables 2 and 4. We also reported findings that questioned the face validity of the CFSM (Table 8) and dependence on the 1995 modal response pattern as the basis of categorization:

  Only 129 (36 percent) of the 364 respondents with one or more affirmative responses followed the Hawaii modal response pattern: 100 (77 percent) of the 129 had five or fewer affirmative responses. Also, 32 (52 percent) of the 62 respondents with only one affirmative response comprised 25 percent of the respondents who followed the Hawaii modal response pattern. Twenty-four (39 percent) of these 62 respondents affirmatively answered either Q3 (12) "food bought didn't last", or Q4 (12) "could not afford to eat balanced meals", not Q2 "worried about food." Only eight (10.5 percent) of the 76 households with eight or more affirmative responses followed the Hawaii modal response pattern (Derrickson, Fisher, Anderson, and Brown, 2001).

In the 1995 national food security data set, 49 percent of households responding to at least one question affirmatively followed the national modal response pattern (Hamilton et al., 1997b, p. 45). Differences may be attributed to the relatively greater food insecurity of the Hawaii sample. However, they may also be attributed to an experience (food insecurity) that is not uniformly reported in the same manner.

- Food security status stakeholders in Hawaii reported their perceptions that the CFSM was potentially underreporting the extent of hunger, and that the Face Valid Food Security Measure

(FVFSM) better captured what Hawaii food security stakeholders wanted to know (Derrickson and Brown, 2001a):

So with what knowledge you've given us yours [the FVFSM] is much more accurate as far as seeing the picture properly. [Food pantry provider]

Based on what we said earlier they [those classified as food secure by the CSFM] *shouldn't all be considered food secure.* [Food pantry provider]

Discussion. This work represents the first time the "operationalized" framework and CFSM scale and categorical measures have been independently assessed both with ethnically diverse samples and with a sample living with a high proportion of food-insecure individuals, e.g. recent food pantry recipients (Table 9). Although the sample was relatively small and the ethnic groups studied were not inclusive of all Asians and Pacific Islanders, initial qualitative findings (Derrickson and Anderson, 2000) suggested potential "universal" application of the instrument and conceptual framework across different ethnic groups in the United States. For various reasons outlined in the following pages, the value of the CSFM categorical measure in applied settings is questioned, particularly with ethnically diverse audiences who experience the whole spectrum of the food insecurity scale. However, the critical question is whether findings can be replicated in other ethnic samples, or if differences in ethnic heritage can explain findings. This question cannot be fully answered until similar research is completed with Native Americans, Hispanics, African Americans, and other Asians to confirm or refute these findings. The basic methodologies used by this research team are recommended as a starting point (Derrickson and Anderson, 2000; Derrickson, Anderson, and Fisher, 2000a; Derrickson, Fisher, Anderson, and Brown, 2001; Derrickson and Brown, 2001a). Research with Hispanics in California is under way (pers. comm., Lucia Kaiser, University of California, Davis, October 2000). However, additional work assessing perceptions of more food-secure households, and with more conservative food security stakeholders on the value of categorical algorithms based on a "pattern of affirmative responses" versus specific affirmative responses, is needed.

Recommendation 1b. Continue to work on simple measures of individual-level hunger.

Background. CFSM is a household food insecurity measure, not an individual-level measure of food security status. Therefore, statements about the "numbers" of people experiencing food insecurity or hunger made from the CFSM indicators should be limited to phrases such as "number of people in households experiencing hunger among children" in the last 12 months, rather than "number of hungry children." The CFSM currently contains items—Q9, "eat less than you should," and Q10, "respondent hungry because of not enough money for food"—that, unlike items asked about the entire household, are asked only of the respondent. Thus, Q9 and Q10 could be considered individual-level items, but they only reflect severe food insecurity of the respondent. Efforts are under way by USDA researchers to measure the extent of hunger among children using the eight questions that pertain only to households with children, rather than the entire set of 18 questions (pers. comm., Mark Nord, USDA, 2000). In an effort to arrive at individual-level estimates of hunger, the Individual-Level Core Food Security Module (ICFSM) was created. As indicated in Table 10, the ICFSM includes a maximum of 31 questions for households with extreme hunger among children.

Rationale Based on Findings:

- Qualitative findings from food security status stakeholders support measurement of hunger, particularly hunger among children (Derrickson and Brown, 2001a).

  I think I would be much more concerned about child hunger. [Hawaii Foodbank (HFB) board member]

- Findings do not support use of the ICFSM (Derrickson, Fisher, and Anderson, 2000). Interviewers found the ICFSM questions to be threatening and demeaning to the respondents, particularly the series of questions about hunger among children. As indicated in Table 11, when the six key individual items (8I, 12I, 13I, 14I, 15I, 16I) were added to the 18 original CSFM indicators, the scale they created did not conform to expected item hierarchy outlined in Table 2 and Figure 1. Specifically, although Rasch goodness-of-fit statistics met standard criteria (Hamilton et al., 1997a), each of the six individual-level items had item calibration values that were "less severe" or lower than item calibration values for its corresponding original CFSM indicator (e.g., Q8I was less severe than Q8). However, although the individual-level items did not scale appropriately when added to the 18-item scale, they formed an adequate scale separately by themselves (Derrickson, Fisher, and Anderson, 2000).

Discussion. Findings do not support recommendations of the ICFSM, but do support measurement of individual-level hunger. Because this work marks the first time the ICFSM was used, findings should be considered preliminary. The sample of households that adequately completed sufficient ICFSM items to test the entire set of ICFSM items was small (n=29). Sampling limitations could be due in part to a relatively small number of highly food-insecure individuals, but were also due to the constraints imposed by Rasch methods (which require one or more affirmative responses, but not all affirmative responses [Wright and Stone, 1979]). Rather, since Q9, "respondent ate less than s/he should," and Q10, "respondent hungry," are current CFSM indicators that are asked of the respondent, and have acceptable goodness-of-item fit statistics (Derrickson, Anderson, and Fisher, 2000a), use of these two items to measure adult-level hunger is recommended for inclusion in simple food security monitoring tools. These two items are currently included in the Simple Food Security Monitoring Tool (SFSMT) discussed in more detail in Recommendation 1d. Children aged 8 and older, with grade-level reading ability, may be able to respond adequately to simple questions pertaining to adequate food intake because of perceived resource constraints. Investigation of individual-level hunger measures for school-age children is recommended as an alternative to parent reporting of child hunger (Q7 and Q13–Q18). However, the ability of children of this age to discriminate "resource-constrained hunger" from appetite is unknown.

Recommendation 1c. Continue to work on measurement of duration of household food insecurity and individual hunger among adults and children.

Background. At this time the "duration" of food insecurity experienced is only captured in the CFSM through "temporal duration follow-up" questions (Q8a, Q12a, Q15a) that query how often the experience occurred in the last 12 months (only 1–2 months, or in 3 or more months of the last 12 months). Responses to these three temporal duration questions are included in the sum of affirmative responses used to categorize households, but they are not used to report the duration of the food insecurity experienced. Measurement of duration of hunger has been identified by the ERS as a priority research

area and is currently under study by the federal government (ERS, 1999; pers. comm., Mark Nord, ERS, August 2000). The duration for which a household experiences food insecurity or hunger, as measured in number of days or months over a set time period, would be expected to be positively correlated with a myriad of negative consequences on health status.

Rationale Based on Findings. At no time during this three-year research project was measurement of the duration or frequency of hunger a specific research objective or purpose. Therefore, this research team cannot report on research completed on the measurement of the duration or frequency of hunger. However, various findings raised questions that directly apply to the CFSM and suggested that measurement of the duration of hunger/food insecurity is critical to the effectiveness and acceptance of a national food security measure.

- The CFSM may underreport the extent of food insecurity (Derrickson, Fisher, Anderson, and Brown, 2001). Hawaii food security stakeholders consistently noted reasons why they thought the CFSM might underreport the extent of food insecurity. Many of the reasons were simply concerns that the sample did not include those who were homeless, or for Hawaii food security monitoring, did not include households without phones. However, there was also a genuine perception that the algorithm and questions themselves would yield lower estimates.

  Based on what we said earlier they [those classified as food secure by the CSFM] *shouldn't all be considered food secure?* [Food pantry provider]

  They are not going to admit it because they think their kids are going to be taken away. The survey must be confidential. [Homeless food provider]

  Hawaii people are very different. They're probably gonna try to give you the best answer but they don't want to embarrass themselves . . . so they'll give a pretty good answer. And that's the thing about reliability and polling Hawaii people, I think, culturally, the tools on the national level don't ah [work well]. . . . I think it's hard to extract from the local population their true feelings. . . . When you talk about something so core as hunger, basically it's underreported. [State legislator]

As depicted in Table 9, comparisons of food security status prevalence estimates between the CFSM categorical measure and alternative food security measures (an adapted Radimer/Cornell measure, an adapted measure of the Community Childhood Hunger Identification Project [CCHIP], and the face valid measure) yielded a 5.6 percentage point difference in the extent of food insecurity in a statewide

sample (93.2 percent food secure with CFSM vs. 87.6 percent with all three alternative measures), and a 12.5 percentage point difference in a more food-insecure sample of food pantry recipients (Derrickson, Fisher, Anderson, and Brown, 2001). Given that both the adapted Radimer/Cornell and the adapted CCHIP measures have been used extensively in the past for local food security monitoring and research, and that all three alternative measures yielded "higher" estimates of food insecurity, these concerns were thought to warrant further investigation. Concerns regarding the "threshold" for food insecurity classification is further addressed in Recommendation 2e.

- Food security status stakeholders in Hawaii reported a desire for duration information (Derrickson and Brown, 2001a).

  So I think it would be important to know to what extent people are or are not missing meals on a consistent basis and what it's doing in terms of their health. [State legislator]

  Differentiate the chronically hungry from the periodically hungry. [HFB board member]

- Temporal duration questions Q8 and Q8a may be redundant (Derrickson, Anderson, and Fisher, 2000a). We found Q8a, a temporal duration follow-up question, to be redundant with Q8 (Table 6: infit and outfit mean square [MnSq] residual values < 0.7 and outfit Z score values ≤ –2). Similar questionable fit statistics indicating redundancy between Q8 "adults skip or cut the size of meals" (outfit MnSq = 76, Z = –4.6) and the follow-up question Q8a. "how often" (outfit MnSq = .77, Z = –2.6) were noted in the original national scale fit (Hamilton et al., 1997a).

  However, in unpublished work using national data sets, Nord has found that while use of temporal duration items violates basic Rasch assumptions and thereby poor fit statistics, the fit of the item by itself (when the other item is removed from the scale) is acceptable (pers. comm., Mark Nord, ERS, October 2000).

Discussion. The author speculates that if estimates of the duration/frequency of food insecurity experienced were available from the CFSM (along with severity estimates currently available), then the current algorithm of requiring two affirmative responses to definitively categorize a household as food insecure (Hamilton et al., 1997a) could be more confidently modified. Likewise, the rationale for changes in food security classification and revised prevalence estimates, if released along with duration estimates, may be more favorably reviewed by the public and by skeptics. Thus, information about the duration of hunger may "compensate" for perceptions of underreporting. However, the criterion for how long a

household has to experience a phenomenon to be labeled as "food insecure or hungry" has not been established. Nord has suggested that the responses to the food security items could be modified in such a way as to capture duration information in every response, e.g., instead of yes or no, all response could have some time frame—most of the time, sometimes, rarely, or never—embedded in the response (pers. comm., Mark Nord, ERS, October 2000). The extent to which these responses would need to be quantified further to be reliable indicators of food insecurity is not clear.

Recommendation 1d. Continue to develop and use shorter tools to effectively capture what policymakers and food assistance program managers need to know to ameliorate household food insecurity in local communities and across the nation.

Background. The federal government has been charged with recommending a food security monitoring tool as one part of the national nutritional monitoring and research program (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 1993). At this point the CFSM is the recommended food security measure. A shorter six-question tool that includes six of the 18 items (Table 2: Q3, Q4, Q8, Q8a, Q9, and Q10) has been recommended by researchers at the NCHS for use in differentiating the food secure from the food insecure (Blumberg et al., 1999). This measure has been officially adopted by the USDA as an alternative measure (Bickel et al., 2000).

Rationale Based on Findings. Overall, food security research completed in Hawaii strongly supports use of a shorter food security monitoring tool, but not the set of six items currently recommended as a shorter alternative to the 18 items.

- Response burden of households with hungry children is likely significant and should be minimized to the extent possible (Derrickson, 1999). In telephone interviews of about 100 households, respondents in households with children, who were required to respond to Q13–Q16, asked the Project Investigator, "Why are you asking me this again?" All interviewers sensed respondent concern and loss of dignity. Many respondents commented that they were perturbed at being repeatedly asked questions that made them feel that they were poor parents. A knowledgeable Hawaii food security stakeholder has also reported that respondents perceived the entire questionnaire to be "threatening" despite sensitive interviewers and appropriate interviewing techniques (pers. comm., George Chee, O`hana Community Food Service, Hauula, HI, June 1998). Other food security stakeholders in Hawaii (Derrickson and Brown, 2001a), and other researchers using the CFSM (pers. comm., Kristine Siefert, Poverty Research Center, University of Michigan, October 19, 2000) have also reported similar concerns about the

response burden of the CFSM. It should pointed out that all of the above evidence is based on perceptions of knowledgeable researchers and food providers. Because documentation of these concerns was not an objective of any of specific project, findings are not quantifiable.

- Food security status stakeholders in Hawaii support a shorter measure (Derrickson and Brown, 2001a).

  For telephone interview purposes the shorter the time span you can commit someone to the telephone I think their involvement, the less questions the better, and I think if you can cut to the chase and get some real good data from the telephone conversation on hunger. For the layperson out there that you're really going to talk to 9 out of 10 times, they can give a yes or no answer. So, I guess it's a better system. [State legislator]

- Findings do not support use of the recommended subset of six items for food security monitoring in Hawaii (Derrickson, Anderson, and Fisher, 2000a).

  a. The inclusion of both Q8 and Q8a does not appear to be a wise use of a limited number of items:

  Given that the item calibration of Q8 in the Hawaii sample was more than 2.0 logits different than in the original national sample (Table 7: –0.78 Hawaii and –1.72 national), that Q8 and Q8a are redundant in both samples (Table 6), and because of the previously mentioned issues with Q4, dependence on these three items (without rewording Q4) in a subscale of only six items appears problematic (Derrickson, Anderson, and Fisher, 2000a).

  b. The currently recommended six-item scale does not capture hunger among children, e.g., Q14, "children hungry," nor Q2, "worried that food would run out before we had money to buy more" (Derrickson and Brown, 2001a). Both of these elements were particularly valued by Hawaii food security stakeholders:

  Any risk of hunger is a concern especially in a child. It's very helpful to have it broken down [HFB board member]

  What we find at the food pantry is that a lot of people come to the food pantry. . . . So I'm worried about food running out, that's why they come, the pretense, they're saying they're worried about their food running out. [Food pantry provider]

  c. When Rasch scale statistics were applied to our 1998 data set of (n=1,664), three of the six items (Q4, Q8, and Q8a) did meet Rasch criteria for acceptable "goodness-of-fit." The scale or range of six items, as illustrated in Figure 2 and Table 12, although not adjusted, was substantially shorter than the scale of 18 items. In conclusion, the recommended six-item scale is sensitive in measuring the lower (milder food insecurity) and more severe food insecurity (hunger among children) that are of interest to food security stakeholders in Hawaii.

- A simple food security monitoring tool (SFSMT) was proposed as an alternative food security monitoring tool (Derrickson and Brown, 2001a). Thoughtful state legislators spearheaded the creation of the draft SFSMT (Table 13) to be an effective monitoring tool in Hawaii. This tool was designed to measure the full extent of food insecurity ranging from only anxiety about the

adequacy of food (Q2, "worried food would run out before we had money to buy more") to severe hunger among children (Q14, "children hungry"). It contains four (Q3, Q4, Q9, Q10) of the six items in the recommended subscale food security measure. Its categorical algorithm is based on the FVFSM, which we previously documented had strong concurrent validity and acceptable stability (Derrickson, Fisher, and Anderson, 2000). Thus, earlier research documenting the validity and reliability of the FVFSM, as well as comparisons to the CFSM scale measure, applies directly to the SFSMT. In essence the FVFSM and SFSMT measure food security in the same manner using the same key items (Derrickson, Fisher, Anderson, and Brown, 2001; Derrickson, Fisher, and Anderson, 2000). Figure 3 outlines how the Rasch scale of 18 items for national data (Hamilton et al., 1997a) compares to the SFSMT with Hawaii data. A comparison of Rasch item fit statistics of the SFSMT is also available in Table 14. These findings indicate that the SFSMT scale of items not only better meets Rasch goodness-of-fit statistics than the recommended set of six items, but also measures a greater range of the severity of food insecurity. This is most easily observed through a visual comparison of Figure 2 (six-item scale) with Figure 3 (seven-item SFSMT). [To make the comparison, hold the two figures next to each other.] In summary, qualitative and statistical evidence suggests that the SFSMT, at least in Hawaii, provides a more effective food security monitoring tool than the nationally recommended six-item measure, and because it reduces respondent burden of hungry households is an effective alternative to the 18-item CFSM.

- Data from the SFSMT can also be analyzed to generate approximations to the national food security measure using the same categorical thresholds as the six-question subscale (excluding Q2, "worried food would run out"). Or, if the worried item is included, the same food insecurity threshold as the CFSM (Bickel et al., 2000) can be applied. Thus, the simple food security monitoring tool can allow local food security monitoring teams to approximate the national food security measure and still capture more sensitive estimates of food insecurity and hunger through applying the recommended SFSMT "face valid" categorical algorithm.

- Use of the SFSMT was found to be feasible for local food-security monitoring (Baker et al., 2001). In collaboration with the State Department of Health, Office of Health Status Monitoring, we have used the SFSMT in Hawaii with a data set collected through the Hawaii Health Survey in 1999 (Baker et al., 2001). The preliminary SFSMT (without Q2, "worried food would run out") was used in the first year of food security surveillance in Hawaii. The 18-item CFSM was thought by local interviewers to be unacceptable (Derrickson, 1999), nor was it affordable to State Department of Health leaders who had to separately fund every single food security question asked.

Discussion and Recommendations. This may be the only study where the project investigator has been the CFSM interviewer in nine focus groups with charitable food recipients (Derrickson and Anderson, 2000) and in 100+ telephone interviews (Derrickson, 1999), as well as the moderator of focus groups with food security status stakeholders, and then has completed Rasch scale analysis with the CFSM items. This lengthy and diverse research experience is likely to have enhanced the trustworthiness (dependability) of these recommendations, the author's empathy for the respondents, and awareness of

the limitations of the CFSM. Findings suggest that researchers who oversee national food security monitoring must create food security monitoring tools that maintain the delicate balance of statistical strength, respondent burden, credibility, and practical application. Use of recommended skip patterns (skipping over severe items for households who are less food insecure, see Price, Hamilton, and Cook, 1997) is recommended for applied studies but not for research studies (Derrickson, Anderson, and Fisher, 2000a). To minimize response burden while maintaining acceptable levels of sensitivity and specificity of the survey instrument, additional research with shorter monitoring tools is recommended. The SFSMT is recommended for local food security monitoring, in any study where response burden is high, and when precise Rasch food security household scale measures are not needed. However, if the SFSMT is used, researchers should note that it is an alternative to the national food security measure which is more sensitive to food insecurity. Application of the analytical method which approximates the national food security measure (Bickel et al., 2000) must be done for comparisons to state-level statistics available from the CFSM (Hamilton et al., 1997a; Nord, Jemison, and Bickel, 1999).

Recommendation 2: Reassess fundamental aspects of the national food security monitoring tool.

This next group of related recommendations address critical aspects of national food security monitoring that the author believes merit further consideration prior to altering the 18-item CFSM or before expending a great deal more federal resources on food security research or monitoring.

Recommendation 2a. Consider reassessing the intended purpose of food security monitoring tools, and the definitions used to operationalize food security monitoring.

Background. According to Singleton and colleagues, the initial step in measurement should be the "clarification of the concepts embedded in one's hypothesis with words and examples, ultimately arriving at precisely stated definitions" (Singleton, Straits, and Straits, 1993). Theoretical definitions provide a basis for judging the quality of measures and enable reviewers to evaluate the meaning of one's work. Yet one of the greatest obstacles to measurement of hunger and food insecurity has been the lack of agreed-

upon definitions of terms (Margne and Neuhauser, 1987). USDA has chosen to use food insecurity and hunger definitions derived from a report by the Life Sciences Research Office (LSRO, 1990) of the American Institute of Nutrition. However, as illustrated in Table 1, various other hunger definitions are still being used today. Thus, findings between hunger studies are unfortunately not directly comparable. Based solely on the LSRO definition of food insecurity, the 18 items in the CFSM encompass the psychological (Q2), qualitative (Q4, Q6), and quantitative aspects (all remaining items) of food insecurity, but not the social acceptability of food acquisition, nor the safety of foods acquired.

Rationale Based on Findings. Although assessment of the definitions of food insecurity and hunger were never a specific research objective, due to the nature of the research questions pursued, the definitions of hunger and food insecurity were assessed across all studies completed. Findings generally supported measurement of the term "hunger," which at least in Hawaii is perceived to include emotional elements not encompassed in the more physiologically defined LSRO definition of hunger, "the uneasy or painful sensation caused by lack of food."

- Charitable food recipients interpreted "anxiety" about food inadequacy as "hunger" (Derrickson and Anderson, 2000). When asked to define what the word hunger meant, recipients included the psychological element of food insecurity:

  When you lower your pride and go to the Foodbank.

  When you don't know when your next meal is coming. Or where it's coming from. Or how.

- Food security stakeholders in Hawaii indicated that the term hunger contains an emotional element (Derrickson and Brown, 2001a). In contrast to the LSRO definition of hunger, Hawaii food security stakeholders, when asked to define hunger, included elements of food insecurity, particularly psychological or emotional themes:

  [There's an] emotional part 'cause if you can't feed your family . . . it produces a whole different atmosphere at home. There's the fear of it so there's an element of fear. [Food pantry provider]

  Shame is a big part. Ashamed to ask for it, ashamed they can't take care of their own children themselves . . . because there's no assistance. [Food pantry provider]

  Lack of satisfaction—meaning you don't have enough. [WIC nutritionist]

  With our office you can hear it in their voice when they ask for assistance. It's like you know I never had to do this before and I really need help for my family and it's just like total shame and

total embarrassment. You know and just for them to make that initial call they've got their back against a wall at a bad point so I think that [Q2 in a shorter measure] *does need to be included.* [Food pantry provider]

Similar emotional themes have also been reported by Radimer (1990) in her qualitative study with white women.

When asked to define food insecurity, food security stakeholders in Hawaii named all the key aspects included in the LSRO definition of food insecurity but, emphasized aspects of "the acceptability of foods":

Comfort zone. That's food security. Food security means that you're going to the food pantry, and your going to get the same food that you got when your weren't homeless or without resources. And if you don't see that food there then you don't have food security. [If] you don't have security—it's suppression. [Food pantry provider]

I kind of like what she said about society and maybe to add what society portrays as the expectations of what we should be eating. That people desire the items that are being put out in the media that are advertised and if they are not buying those items themselves then there may be a problem with people that have kids too. 'Cause, if Pokeman cereal comes out tomorrow then everyone has to get Pokeman. [Food pantry provider]

Acceptability of foods was also a theme mentioned by Radimer (1990) in her initial qualitative work.

- Hawaii food security stakeholders wanted more information from CFSM than is currently available through national food security reports (Derrickson and Brown, 2001a). When asked what they wanted to know about food insecurity and hunger, food security stakeholders in Hawaii wanted details on the number of food-insecure households including the severity, duration, and demographics of the "food insecurity" situation in a local community; and information on causes and their linkages to other assistance programs, so that food-security monitoring information "can be used to help clients." (See Recommendation 3.)

  I guess if there are geographic discrepancies that way we can target resources if that is the case or at least work with community resources like schools. . . . [State legislator]

  It should be noted that while some of these issues are addressed by the SFSMT, larger state samples are needed to accurately capture demographic and geographic information.

- LSRO definitions of food insecurity/food security are not lay friendly (Derrickson and Brown, 2001a).

  Yeah Yeah. Food insecurity. I mean the word insecurity is almost a psychological term whereas hunger is more of a biological physical term. And a lay person can easily grasp . . . . Why do you make it so unsure or lay person unfriendly? Why is it so technical? [State legislator]

- Categorical criteria should depend on how the data are used (Derrickson and Brown, 2001a). Social workers and public health professionals (e.g., 0–5 programs, public health nursing, and nutrition educators with WIC, the Expanded Food and Nutrition Education Program, and Head

Start) could potentially use a short food security screening tool with "risk criteria" for assistance, or as a measure of program effectiveness. However, to be useful there must be clarity of terms and a scientific rationale that makes sense to stakeholders who apply the information for decision making:

I think a lot has to do with how the data is to be used. If it is used as a screening tool for direct service programs then one question should be sufficient and there should be follow-up. If it's being used to measure "hunger" in a geographic area then I think one question is not sufficient statistically or scientifically and there needs to be follow-up questions. [WIC nutritionist]

- The term "social acceptability of food" is questioned (Derrickson and Brown, 2001b). Use of socially unacceptable food acquisition methods is thought to be one of the hallmarks of food insecurity (Wehler, Scott, and Anderson, 1992). Use of a "food pantry" and "going to a neighbor or family member's house for food" were two items included in the USDA's "resource augmentation index" that did not adequately "scale" with the other 18 CFSM items (Hamilton et al., 1997b). This occurred perhaps because these two items represent a different "dimension" of food insecurity than the food insufficiency primarily measured by the CFSM.

Specific clarification of the term "socially acceptable foods" was not an a priori objective of research with food security stakeholders. However, because clarification was asked by stakeholders in the first and second focus groups, the question was then asked in all other focus groups. Specifically, respondents in each focus group were asked to define which food acquisition methods they thought were socially acceptable and which were not socially acceptable. When asked to define what the "social acceptability" of foods means, Hawaii food security stakeholders described a "continuum" of social acceptability illustrated in Figure 4. "Occasionally going to a friend's or family member's house for a meal or borrowing" was thought generally acceptable in Hawaii. Furthermore, the social acceptability of government and charitable food assistance programs appeared to depend on "the eye of the beholder." It is perceived by many users as acceptable, although there is still perceived shame among some users. Others will never perceive reception of assistance as socially acceptable. Findings appeared to vary among ethnic groups, as well as by the generation of the user. For example, use of assistance programs may not be thought acceptable among seniors, but may be completely acceptable among third-generation users who perhaps have used assistance programs all their lives.

Discussion. Findings suggest that the CFSM may not currently capture all elements of hunger and food insecurity desired by policymakers and food assistance providers in Hawaii. Findings also suggest that neither the CFSM nor the LSRO definition of hunger captures the complex perception of anxiety and insecurity perceived by those who say they have experienced "hunger," or by those who provide assistance to this population. Although it was not consistently assessed across all groups studied, stakeholders in Hawaii supported use of the term "at risk of hunger," rather than the term food insecurity. This term was originally used in the CCHIP measure before the broader term "food insecurity" was defined. The "at risk of hunger" term in included in the FVFSM and the SFSMT. Findings suggest that a thoughtful reassessment of food security and hunger definitions, and clarification of the purpose of food security monitoring, may be warranted, with particular attention to creating a tool that can guide policy decisions related to household and community food security status.

Recommendation 2b. Consider reassessing the importance of measuring "food insecurity" vs. "food insufficiency."

Background. To meet the need for measuring food security, Activity V-D-2.4 of the "Ten-Year Comprehensive Plan for Nutrition Monitoring and Related Research Programs" (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 1993) contained a specific initiative related to food security assessment:

> *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 [National Nutritional Monitoring and Related Research] Program.*

Thus, for national nutrition monitoring, it appears to be acceptable to measure either food insecurity or food insufficiency. By definition food insecurity contains elements of uncertainty of the food supply, nutritional adequacy, food safety, and acceptability of foods and food acquisition methods, in addition to food sufficiency:

- *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* (LSRO, 1990)

- *Food insufficiency is defined as inadequate amount of food intake due to lack of money or resources* (Briefel and Woteki, 1992).

The four-part food insufficiency question is: Which of these statements best describes the food eaten in your household in the last 12 months, that is, since (month, year)?

1. We always have enough and the kinds of foods we wanted.
2. We have enough to eat but NOT the KINDS of foods wanted.
3. Sometimes we don't have ENOUGH to eat.
4. Often we don't have enough.

Respondents with either the third or fourth response are classified as *food insufficient*. This question, or a similar three-part question that combines the third and fourth responses, has been used in the Nationwide Food Consumption Survey (1977–78, 1987–88) and the Continuing Survey of Food Intakes by Individuals (1985–86, 1989–91) (Rose, Basiotis, and Klein, 1995). Prevalence estimates of food insufficiency have varied from 3.1 percent (1977–78) to 3.6 percent (1987–88) to 2.5 percent (1989–91) in the total U.S. population versus 1995 CFSM estimates of 7.8 percent of households deemed "food insecure without hunger" and 4.1 percent of households with moderate or severe hunger (Hamilton et al., 1997a). Historically, researchers have questioned the relatively low estimates of food insufficiency yielded by this question, and the reliability of a single measure (Frongillo et al., 1997). Thus, although the CFSM is now available, excellent research continues to be done with the food insufficiency question, or an abbreviated three-question measure (Gunderson and Gruber, 2001; Alaimo et al., 1998), perhaps because its simplicity facilitates incorporation into national surveys.

Furthermore, the food insufficiency question is not included in the 18-item CFSM. It is, however, part of the survey module as the initial question (Q1) used for screening households.

Rationale Based on Findings:

- The food insufficiency question is considered too abstract and not a measure of resource-constrained food insufficiency. McGuiness (1996) reported that responses to the food insufficiency question were not consistent and recommended that it not be used. His rationale was that it is a complex and confusing question. Like McGuiness, this author has found the food insufficiency question to be abstract and difficult for even highly educated individuals to answer, perhaps because it simultaneously forces respondents to consider both qualitative and quantitative aspects of foods consumed. The question is completely based on self-perception of what is "adequate quality" and "adequate quantity." Furthermore, compared to the definition of food insufficiency, the four-part food sufficiency question contains judgments of food quality/acceptability. Yet, food quality is not included in the definition of insufficiency. Alternatively, "resource constraints" of food selection are implied or assumed, but not directly confirmed, in the food insufficiency question. In Hawaii, the author perceives that many people sacrifice more expensive, higher "quality" foods—e.g., fresh fish, organic produce—to maintain financial integrity. In other words, with or without a "qualifier indicating resource constraint," many people make food choices that affect perceived "quality" of foods consumed in order to "stay within their budget."

- Food insufficiency status is not an adequate proxy of food insecurity or hunger (Derrickson, Anderson, and Fisher, 2000b). As indicated in Table 15, the four-part food insufficiency question was significantly related to food security status (X^2=595, df=12, p=0.00) in a chi-square test. Eighty-eight percent of respondents appeared to be correctly identified as food secure (reported having enough food and the kinds of foods wanted) when compared to the CSFM. However, only 44 percent appeared to be correctly identified as "at risk of hunger" (enough food but not always the kinds wanted), and only 29 percent appeared to be correctly identified as experiencing hunger (either sometimes or often not enough food). Thus, the two measures appear to classify different groups of food-insecure individuals.

- Q2 and Q4 do not fit well with other food insufficiency items (Derrickson, Anderson, and Fisher, 2000a). Q4, "unable to eat balanced meals," had relatively poor "outfit statistics" in both the national and Hawaii studies (Derrickson, Anderson, and Fisher, 2000a: national outfit mean square statistic of 1.61, Z of 7.9). Q2, "worried food would run out," also had a relatively erratic fit in the national study (Hamilton et al., 1997a: mean square statistic of 3.04, Z of 9.4). [A Z statistic is similar to a Student's *t* statistic, and if greater than +2 or less than –2, may be interpreted as being a statistically significant difference.] These findings suggest that Q2 and Q4 do not adequately fit with the remaining indicators that primarily focus on the food insufficiency of the household and respondent.

Discussion. Although never tested directly, food security research findings in Hawaii do not support use of the food insufficiency question as a measure of resource-constrained hunger. However, the value of a single measure that can be used for long-term food security surveillance is indisputable. It also does not appear to be clear to the public how and when the CFSM should be used, and alternatively how

and when the "food insufficiency" question should be used. Further consideration of issues related to food insufficiency versus food insecurity is warranted.

Author's Opinion. Food insecurity is a complex, multidimensional situation that is not always experienced in the same manner, particularly in the "earlier stages of food insecurity." Therefore, food insecurity measurement requires multiple indicators to accurately classify all households. The experience of households which are only worried that food will run out would seem vastly different from that of a household whose food supply does run out each month, whose diet quality is affected not by choice, and which has begun to cut back on the size of meals. Thus, if we are truly interested in capturing the severity of the food insecurity spectrum, multiple items must be used to capture dimensions of emotional stress (Q2), and diet quality (Q4), in addition to hunger among adults (Q10) and children (Q14). However, if the greater value is placed on food insufficiency defined as inadequate amount or quantity of food consumed, then a much smaller measure could be used, possibly only Q3, Q8, Q9, Q10, Q12, and Q14, although Q9 and Q10 measure respondent, not household, hunger. If a research team wishes to use only one question to approximate household food insufficiency status, the author recommends Q3, "food ran out before we had money to buy more." This recommendation is based on the strong face validity of the question (Derrickson and Anderson, 2000; Derrickson and Brown, 2001a) and strong "goodness-of-fit" in the CFSM scale measure (Derrickson, Anderson, and Fisher, 2000a, Table 6; Hamilton et al., 1997a).

Recommendation 2c. Consider the importance of measuring the psychological aspects of food insecurity (Q2 , "worried")

Background. Radimer (1990) documented the psychological or emotional aspects of food inadequacy as a fundamental dimension of food insecurity. At present, Q2, "worried food would run out before we had money to buy more," is the only CFSM item to capture the "emotional" aspects of food insecurity. This indicator is also used in the Radimer/Cornell measure as the least severe indicator of food insecurity (Radimer et al., 1992), although it is not included in the CCHIP hunger measure (Wehler, Scott, and Anderson, 1992). At a policy level, based on the LSRO definition of food insecurity used by

the federal government, it is unclear whether documentation of only the psychological aspect of food insecurity translates to needed policy actions.

Rationale Based on Findings. Findings suggest that "uncertainty of one's food supply" (an affirmative response to Q2) is a key part of being "at risk of hunger," and that measurement of "uncertainty" is an element of food insecurity that Hawaii stakeholders value (Derrickson and Anderson, 2000; Derrickson, Anderson, Fisher, and Brown, 2001; Derrickson and Brown, 2001a).

- Limited resource audiences in Hawaii indicate "uncertainty about one's food supply" is equivalent to their perception of hunger (Derrickson and Anderson, 2000). When food gatekeepers (those who purchase and/or prepare food) in Hawaii were asked how they defined hunger, they clearly indicated an insecurity about food acquisition.

  When you don't know when your next meal is coming. Or where it's coming from. Or how.

- Statistically significant differences were noted between households with no affirmative responses (food secure) and households with only a single affirmative response to Q2 (Derrickson, Anderson, and Fisher, 2000a). As depicted in Tables 16–18, compared to households with no affirmative responses, a much higher percentage of "only worried" respondents reported income < $5,000 (67 percent worried versus 2.6 percent food secure), suggesting that worry was in part due to financial constraints. Respondents who were "only worried" reported significantly higher use of resource augmentation behaviors (mean of 1.2 versus 0.2, out of a possible total of 8), lower daily mean vegetable intake (1.4 servings versus 2.0 servings), and significantly greater reliance on a low-cost dry noodle product called Saimin (10.4 times a month versus 3.7 times a month) than did respondents who answered no CFSM items affirmatively. Findings suggest that even a single affirmative response to Q2, "worried food would run out," is consistent with the conceptual expectations of food-insecure households.

- Hawaii food security status stakeholders value information on "anxiety stemming from perceived food inadequacy" (Derrickson and Brown, 2001a). In short, the overall impression from Hawaii food security stakeholders was that Q2, "worried that food would run out," with no other affirmative responses was an adequate indicator of food insecurity, but not of hunger. A series of questions about Q2 and its use in the CFSM were asked:

  What are your perceptions of affirmative responses to Q2, "worried food would run out?"

  Moderator: Are they food insecure?

  Oh, Yeah! [Pantry provider]

  Moderator: Question 2, worried, is that an indicator of being at risk of hunger?

  I think so. Because when food will run out that means that you have a certain quantity of food and maybe it's between paychecks and you want to know if you can stretch the bag of rice to feed

the three kids and the hungry husband and the grandparents in the household and the can of corned beef, can you spread it out. [State legislator]

How should responses to only Q2 be categorized?

What we find at the food pantry is that a lot of people come to the food pantry. . . . So I'm worried about food running out, that's why they come, the pretense they're saying they're worried about their food running out. [Food pantry provider]

Is only one response an adequate measure of food insecurity?

One is enough. Using Q2 is enough. Use Q2 as indicator of risk of food insecurity, which is a problem. Others don't agree since they are not at the forefront. The key is to identify those at risk so we can prevent it from happening. [Social workers]

- People don't always worry about their food situation, although they otherwise report signs of food insecurity. Despite "modal pattern" expectancy that almost all households who are food insecure would respond affirmatively to Q2, almost 40 percent of households with only one affirmative response answered Q4 or Q3 rather than Q2 (Derrickson, Anderson, and Fisher, 2000a).

  Twenty-four (39 percent) of 62 respondents affirmatively answered either Q3 (12), "food bought didn't last," or Q4 (12), "could not afford to eat balanced meals," **not** Q2, "worried about food."

  Discussions with a legislator on this issue, revealed his perception that older people don't worry like other people about their food situation (Derrickson and Brown, 2001a):

  Particularly older people, they are not as worried . . . somebody's going to take care of me. You know why? It's because they've gone through it. [State legislator]

Limitations. It is also noteworthy that, in addition to its generally high cost of living, Hawaii was just coming out of an economic recession in 1999. Unlike most of the rest of the nation, estimated rates of household food insecurity in Hawaii were higher in 1996–1998 than in 1995 (Hamilton et al., 1997a; Nord, Jemison, and Bickel, 1999). Therefore, at the time of study it is conceivable that people in Hawaii were more worried about "food running out for financial reasons" than were citizens residing in the continental United States, and because of this worry may have had enhanced sensitivity to Q2 (Derrickson and Brown, 2001a).

I guess where I'm coming from is that people in Hawaii are more worried because you know working families are juggling expenses maybe more so than they are on the mainland. [WIC nutritionist]

Discussion. By definition, it would seem as though reported anxiety about the inadequacy of one's food supply would be tantamount to the "uncertain ability" aspect of food insecurity. Yet at present, households reporting only food anxiety, or food anxiety and one other affirmative indicator (which may be Q9, "respondent ate less than should," Table 8), are categorized by the CFSM measure as food secure. Clarity on the importance of measuring "anxiety" and measuring the diverse components of food insecurity versus food insufficiency is needed prior to any discussion on reassessment of the CFSM categorical measure. Since the CFSM has provided benchmark food security prevalence estimates (Hamilton et al., 1997b; Nord, Jemison, and Bickel, 1999), changes in the national food security categorical measure may be problematic. Nevertheless, our findings indicate that households with only one affirmative response demonstrate behaviors consistent with the experience of food insecurity. The first step in reassessing the CFSM thus may be reclassifying households with one or two affirmative response as some mild form of "food insecurity without hunger" (Derrickson, Anderson, Fisher, and Brown, 2001).

Recommendation 2d. Consider adding items to the scale measure that confirm food security.

Background. As illustrated in Table 2, the CFSM contains 18 items that ask about different aspects and severity of food insecurity. The categorical label "food secure" is currently given to all households with 0, 1, or 2 affirmative responses. Using Rasch scaling programs such as Bigsteps (Wright and Linacre, 1991) with raw food security data enabled the creation of both a CFSM "person response measure" for each respondent and an "item calibration measure" for each CFSM item. These two measures are placed on the same logit scale ranging from approximately –4.5 to +4.5 (relatively food secure to extreme child hunger). Rasch scaling methods can only be used for data with one or more affirmative responses. Therefore, data from households which either answered no questions affirmatively or answered all questions affirmatively are not available for analysis (Wright and Stone, 1979; Wright

and Masters, 1982), and scale measures can only be created for about 20–25 percent of a typical population sample.

Rationale Based on Findings. Various findings using the CFSM measure suggest that indicators which positively confirm food security status should be included (Derrickson, Anderson, and Fisher, 2000a).

- Lack of CFSM "respondent scale measures" for many food-secure households compromises criterion-mediated research (Derrickson, Anderson, and Fisher, 2000a, 2000b). Of the 1,664 households with food security data, only 362 (22.6 percent) had a "respondent scale measure" calculated from Rasch data analysis. As illustrated in Table 18, when we attempted "criterion-mediated" analysis of the CFSM scale measure with other variables, the sample available represented only 22.6 percent of the total sample. Therefore, because the samples in criterion-mediated analysis with the CFSM scale measure (n=362) and analysis with the CFSM categorical measure (Tables 16–18) were not the same, findings could not be compared. Therefore, no conclusive findings could be drawn.

- The CFSM may not be adequate for differentiating food security from food insecurity (Derrickson et al., 2000b). If the purpose of the CFSM is "to accurately identify the extent and severity of food insecurity of the respondents" (Carlson, Andrews, and Bickel, 1999), findings outlined in our study assessing the internal scale validation of the CFSM indicated that the CFSM scale measure may not be adequate in differentiating food security from relatively mild food insecurity. Though this may not appear to matter in food insecurity monitoring, because the current CFSM food insecurity threshold cutoffs are based on the CFSM scale measure, findings directly apply if one values the content of the items. Specific concerns include:

    1. There are no items which confirm food security, only items which address food insecurity. Therefore, the categorization of household food security is made by the default position of no affirmative responses. In an ideal scale of items, a clear majority of respondents would answer one or more questions affirmatively, but not all questions asked, and food security status would be positively confirmed.

    2. As illustrated in Figure 1, a bulk of respondents—those with one or more affirmative responses—were classified at the least food-insecure end of the scale. This is the same location of a relatively large gap (.75 of a logit) in item calibration values occurring between Q2 "worried" (–4.18) and Q3 "food did not last" (–3.43). To our knowledge, data on the respondent measures from the national samples have not been published, so comparisons could not be made with national data.

    3. A respondent separation index of 1.51 indicated that respondents were reliably classified into only two categories, rather than the four categories proposed by the CFSM categorical measure.

Thus, if one of the goals of the CFSM is to distinguish the food secure from the food insecure, targeting of items appears less precise where it needs to be strongest.

Discussion and Recommendations: Findings question whether the current CFSM scale measure is the "gold standard food security reference measure." It would appear that if the scale measure is to be considered the standard reference measure of food security status—based on LSRO definitions of food security and hunger—then additional items indicative of food security and mild food insecurity are warranted. In addition, the practical implications of identified weaknesses in the scale measure (erratic responses to Q2 and Q4, and redundancy of Q8 and Q8a) must be considered. The following "food secure" and "mild food insecure" indicators may be worthy of further consideration:

- We can afford to eat what we want to eat.
- We are confident that we have the resources and ability to buy the food we need.
- When we run out of food, we have the resources and ability to buy more.
- The type or quality of foods we eat is affected because we don't have enough money for food.

The response format "Most of the time," "Sometimes," or "Almost never" could be used with any new items to maintain consistency with other food insecurity responses.

Recommendation 2e. Consider allowing local revisions to the wording of the general balanced meal indicator (Q4, "unable to afford to eat balanced meals").

Background. Poor diet quality is a measurable indicator of food insecurity (Tarasuk and Beaton, 1999). Not being able to eat balanced meals is thought to be a "threshold indicator" of household food insecurity status in the United States (Hamilton et al., 1997a). Q4, "unable to afford to eat balanced meals," is the only "diet quality" food insecurity indicator asked of all households (Q6 is asked only of households with children).

Rationale Based on Findings. Various findings (Derrickson and Anderson, 2000; Derrickson, Anderson, and Fisher, 2000a Derrickson, Sakai, and Anderson, 2001; Derrickson and Brown, 2001a)

suggest that if the wording of the "balanced meals" indicators is not changed, then at least in Hawaii the validity and reliability of both the responses to Q4 and the CFSM categorical measure (which is based on a sum of responses) may be compromised.

- "Balanced meals" is an ambiguous term (Derrickson, Anderson, and Fisher, 2001). In the initial cognitive testing (Derrickson and Anderson, 2000) of the CFSM, participants asked, "What does balanced meals mean?" When asked in return what they thought it meant, respondents almost uniformly described a meal with meat, starch, and vegetables (not fruit or dairy). In a follow-up telephone study, respondents were asked, "What does the word balance, as in balanced meals, mean to you," after they responded to Q4, "We were unable to afford to eat balanced meals." As indicated in Table 19, responses were quite diverse: 41 (53 percent) indicated a balanced meal consisted of at least three food groups, 31 (40 percent) indicated something other than three food groups; five (6 percent) had no idea what a balanced meal meant. Preliminary findings from Herman (pers. comm., Dena Herman, UCLA graduate student, April 2000), whose sample included ethnically diverse WIC clientele, indicate similar, perhaps ethnic-specific, perceptions of the balanced meal term.

- The general balanced meal indicator (Q4) did not have acceptable goodness-of-fit to the CFSM scale (Derrickson, Anderson, and Fisher, 2000a). Previously, we examined the items associated with a higher percentage of misfitting individuals and/or unacceptable goodness-of-fit statistics (Derrickson, Anderson, and Fisher, 2000a). We found Q4, "(un)able to eat balanced meals" to be ambiguous, with responses that are likely to cause random errors and lower response rates (item calibration of 1.61; Z = 7.9). Q4, "unable to eat balanced meals," was the only item to have unacceptable reliability, with a misfit rate of 6.7 percent (24 of 357 measurable responses). Similar findings have been noted with the original national study (Hamilton et al., 1997a). Preliminary work indicated a relatively low correlation of responses to Q4 over time (r=0.3, p=0.04, n=59) (Derrickson, 1999), suggesting potentially poor item stability of this item.

- Food security stakeholders in Hawaii indicated potential "Western bias" of this question and suggested revision without the word "balance" (Derrickson and Brown, 2001a).

  Balance is really an individual perception. We don't use that term. Having dessert would be balance. [Homeless providers]

  It's a very cultural thing, too. . . . Balance from whose prospective? From the Western perspective? 'Cause even my idea of balanced might be different than most people. It could be that in the poor families they're looking to the Western eating style as balanced as their own eating style. Because they don't really have a good definition of balanced. It varies with each person. I suppose somebody from the Midwest might eat something like potatoes, corn and beef. . . . I don't even know if it's a legitimate question to be honest, or a fair question. [Dialog among social workers]

  While many people connotate a relatively nutritious selection of three or more food groups, many people don't. Some people don't know food groups, particularly immigrants, thus it may be best to take out the word balanced. [HFB board member]

Q4 the word balanced has a judgment involved with it and [pause] maybe they should just leave it out . . . [and use] just cannot afford meals. [Food pantry provider]

Discussion and Recommendations: A more precise and vernacular wording of the term "balanced meals" may enhance the validity and reliability of responses to food security indicators containing the term "balanced meals" and ultimately improve the national food security monitoring system. Since a majority of respondents indicated consumption of foods from at least three or more food groups is needed for a meal to be balanced (Derrickson, Sakai, and Anderson, 2001), it appears that rewording the "balanced meal" question to *"Unable to afford to eat a meal containing a starch like bread or rice (or culturally appropriate starch), a protein-rich food like meat, milk, fish or beans, and a fruit or a vegetable*" would enhance the reliability of responses and capture what the majority of people perceive a minimum "balanced meal" should include. In ongoing research, interviewers in Hawaii, nutritionists, and other food assistance providers have reported support of this rewording of the general "balanced meal" item (Derrickson and Brown, 2001a). However, consumption of three or more food groups does not necessarily indicate nutritious food selections, e.g., unfortified rice, salted meat, and iceberg lettuce are commonly consumed in Hawaii. Thus, one would not want to use the general balanced meal indicator as a single measure of compromised diet quality, but as only one of several food security status indicators. Alternatively, Nord has suggested the possibility of using wording such as "Eat the kind of foods we thought we should" (pers. comm., Mark Nord, ERS, October 2000).

Recommendation 2f. Consider the value of "face (content) validity" in the CFSM categorical measure.

Background. As indicated in Tables 2 and 4, the CFSM categorical measure requires three affirmative responses for classification of household food insecurity. Alternatively, the Radimer/Cornell food insecurity measure, the CCHIP hunger measure, and the FVFSM (SFSMT) require only one affirmative response. The CFSM measure is fundamentally based on the definitions of food insecurity and hunger (LSRO, 1990), the CSFM scale measure, the original CFSM modal response pattern, and

"previous research in the areas of physiology, clinical nutrition and food security measurement" (Hamilton et al., 1997b, pp. 58–59). The CFSM research team developed threshold questions to operationally define the boundaries of each category. The modal response pattern was the item hierarchy from the April 1995 Food Security Supplement to the Current Population Survey. The modal response pattern, exhibited in Figure 1 and Table 2, outlines the item hierarchy. The cutoffs for the CFSM pattern were established at three "threshold indicators": Q4, "unable to afford balanced meals," for food insecurity classification; Q8a, "adults cutting the size or skipping meals in three or more of the last 12 months," for moderate hunger classification; Q12, "adults not eating for an entire day," for severe hunger classification. The reasoning behind these judgments is summarized in the technical report describing the CFSM (Hamilton et al., 1997b, pp. 50–59). The research team was looking for items that would hold for households with and without children; face validity was not a priority (Bickel, 2001). A pattern of sequential affirmative responses was thought to provide stronger evidence than an affirmative response to one or two specific items.

> *Determining the initial threshold of each designated severity range was done by identifying the second or third item in sequence that conceptually indicates the continuous characterizing of the category.* (Carlson, Andrews, and Bickel, 1999)

This principle was also employed to minimize response error.

Rationale Based on Findings: Findings indicate that the face or content validity of individual questions is valued by food security stakeholders in Hawaii (Derrickson and Brown, 2001a). Therefore, in part because of the requirement of three affirmative responses for classification as food insecure, some Hawaii food security stakeholders indicated they felt that the CFSM "underreports" the extent of food insecurity (Derrickson and Brown , 2001a). Quantitative analysis also backs up qualitative discomfort with the CFSM categorical measure and algorithm (Derrickson, Fisher, Anderson, and Brown, 2001).

- The CSFM modal response pattern is not accurate or reliable enough to use as the basis of categorization (Derrickson, Fisher, Anderson, and Brown, 2001). Findings indicate that differences in modal response patterns between samples can affect the reproducibility of the CFSM categorical algorithm if differences in sequencing involve a threshold item. In a

comparison, between the Hawaii modal response and the national modal response pattern (Hamilton et al., 1997a), as illustrated in Figure 1, Q14 "children hungry" was 14th in the CFSM modal response pattern, but 12th in the Hawaii modal response pattern. This implies that households with children in Hawaii who followed the Hawaii modal response pattern and responded affirmatively to Q14, with affirmative responses to no other severe-hunger items (Q13, Q15, Q16), would be classified as experiencing "moderate hunger" rather than the "severe hunger" conceptually associated with hunger among children (Radimer et al., 1992).

- The face validity of categorizing based on a sum of affirmatives response is questioned (Derrickson, Fisher, Anderson, and Brown, 2001). If face validity of an affirmative response is valued, as it is in Hawaii, then the CFSM categorical measure may underreport the severity of food insecurity and hunger. As outlined in Table 8, this issue was explored through comparisons of affirmative response rates to selected items across the four CFSM categories, although only two categories are illustrated here (Derrickson, Fisher, Anderson, and Brown, 2001):

  Food secure. *[A] relatively high percentage of the 111 [food secure households with one or more affirmative responses] had an unexpected response pattern: 30 (27 percent) responded affirmatively to Q4, "unbalanced meals," and 7 (6.3 percent) responded affirmatively to Q9, "adult not eating enough."* [Thus 7 of 111 households categorized as food secure by the CFSM had respondents who reported they "didn't eat enough because of not enough money for food."]

  Food insecure. *Seventeen of the 158 (10.8 percent) households classified as food insecure responded affirmatively to Q10, "respondent hungry"; 5 (3.2 percent) to Q12, "adults did not eat for a whole day; and, 4 (2.5 percent) to Q14, "children hungry."* [Thus, hunger was confirmed in at least 10 percent of households that were categorized by the CFSM as food insecure without hunger.]

These findings, if affirmative responses to the content of the questions is considered an adequate indicator of food insecurity, could suggest that the CFSM systematically underreports the severity of food insecurity and hunger. Likewise, we must consider what denial of responses (never true or no) means, particularly whether food security can be assumed by denial of food insecurity items.

- Food insecurity prevalence estimates between the CFSM and three other measures are notably different (Derrickson, Fisher, Anderson, and Brown, 2001). As depicted in Table 9, in a sample of 1,664 households, a 6.7 percentage point difference was noted in the overall rate or percentage classified as food secure between the CFSM categorical measure and other measures in our total sample.

- Food security stakeholders reported that the CFSM underreported food insecurity (Derrickson and Brown, 2001a):

  They are not going to admit it because they think their kids are going to be taken away. The survey must be confidential. [Homeless food provider]

  Based on what we said earlier they shouldn't be considered food secure? [Food pantry provider]

Hawaii food security stakeholders did not generally question the CFSM when the categorical measure was discussed, but only "realized" potential problems when the alternative FVFSM was presented. Overall, there was a general impression that:

So with what knowledge you've given us yours is much more accurate as far as seeing the picture properly. [Food pantry provider]

Seems to be more sensitive, it captures the hidden hunger like hidden homeless. [Social worker]

It's much clearer and it makes a lot more sense and actually I would say yes this does look pretty valid to me, more valid than just counting yes responses. I think the questions themselves are significant. [WIC nutritionist]

The categorization of child hunger was also thought to be critical:

"Any risk of hunger is a concern, especially in a child. It's very helpful to have it broken down." [HFB board member]

In addition, all groups agreed that hunger was the preferred term:

"People can relate to hunger. Insecurity I don't know." [State legislator]

Limitations: We have not assessed the perceived value of "a series of affirmative responses," nor assessed the perceived value of the CFSM with very conservative audiences. Additional research in this area is needed.

Discussion and Recommendations: Face validity places value on the content of affirmative response. Face validity assessment seeks to answer the question of whether survey indicators and the criteria for categorization are appropriate for stakeholders (policymakers and program managers) who use the information, given their perception of the problem and the intended use of the information. Findings question the face validity of the CSFM categorical algorithm and suggest that the face validity of a national food security measure may be critical to the acceptance and broader use of the measure. Thus, findings suggest that a reassessment of the CFSM categorical measure is warranted and should consider the value of the face validity of CFSM prevalence reports and reassess the intended purpose(s) of the measure. At this point, the author cannot recommend use of the CFSM categorical measure in Hawaii, but does recommend use of the Simple Food Security Monitoring Tool, which places value on the content of

affirmative response (Derrickson and Brown, 2001a, Table 13). However, as useful as a shorter "face valid" measure may be, it still does not capture knowledge about the duration of hunger as desired by food security stakeholders (Derrickson and Brown, 2001a).

Recommendation 3: Support local/state food security monitoring.

The final two recommendations were drafted in an effort to encourage local food security monitoring that yields "effective information." As defined by Habicht and Meyers (1991):

> To be effective, the information derived from a survey must be used to make decisions that affect policies and programs. . . . [A] survey is more likely to be effective if face validity issues are reviewed with the user during the survey planning. . . . One now needs to ascertain to what degree the measures that do seem to be related to hunger have face validity for those who must use the information, that is the politicians and their constituents, as well as other policy makers. This is the question amenable to scientific inquiry. (pp. 403–405)

Effective is defined as "having the power to cause results." The intended results are improvement of household, individual, and community food security status throughout the nation.

Recommendation 3a. Support local/state food security monitoring using a shorter food security monitoring tool.

Background. At this time, although various state- and community-level "hunger studies" have been done throughout the nation, limited state food security monitoring or surveillance has been completed. Various food security measures are used to assess hunger at the community level (Wehler, Scott, and Anderson, 1992; VanAmdeburg, 1997; Baker et al., 2001).

Rationale Based on Findings. When asked what food security/hunger information they would like, Hawaii food security stakeholders indicated that detailed information about hunger in their community would assist them in "really helping the needy." Such information would include:

- The numbers and percentage of the population who were food insecure:

  The percent of the population who are on a very regular basis not having the means to (1) get food, (2) make nutritious choices. [HFB board member]

I would like to know what's the true numbers, what's the true extent. [State legislator]

- The severity of the problem (child hunger):

  I think I would be much more concerned about child hunger. [HFB board member]

- Duration of the problem or differentiating chronic from periodic hunger:

  So I think it would be important to know to what extent people are or are not missing meals on a consistent basis and what it's doing in terms of their health. [State legislator]

  Differentiate the chronically hungry from the periodically hungry. [HFB board member]

- Demographics, including food security status, age of household members, household size and composition, ethnicity of household members, financial status, geographical residence:

  I guess if there are geographic discrepancies, that way we can target resources if that is the case or at least work with community resources like schools. [State legislator]

- Food security linkages to other programs:

  I'd like to know how welfare reform in Hawaii has affected our clients in terms of their food stamp allotments and their financial allotments. [WIC nutritionist]

  I think I'd like to know more about like the foodbank and other institutions and other agencies that are filling the gap and providing services for those with insecurities. [State legislator]

- Local health officials desired a short tool to use in conjunction with state health monitoring.

In 1998, the project investigator was asked by department heads at the Hawaii State Department of Health to come up with "around six" food insecurity indicators that could be incorporated into the Hawaii Health Survey (HHS). The HHS is a telephone interview survey of 4000+ households each year that is used to gather health surveillance data. It is modeled after the National Health Interview Survey conducted by the National Center for Health Statistics. Households are chosen randomly from local phone books.

In 1999 and 2000, the HHS included six of seven food insecurity questions recommended in the SFSMT (Q3,Q4, Q9, Q10, Q12, and Q14; see Table 13). Data were analyzed by statisticians with the Department of Health's Office of Health Status Monitoring with technical assistance from the project investigator. Using the recommended approximation of the national food security measure (Bickel et al., 2000), findings were also compared with national estimates of household food security status estimates in

Hawaii (Nord, Jemison, and Bickel,1999; Hamilton et al., 1997a). Estimates of the total number of individuals who lived in households experiencing food insecurity became available for the first time in Hawaii. A map depicting the geographical areas with the highest percentage of individuals living in food-insecure households was also completed (Figure 5). Plans are under way to use this new information in a comprehensive community food security assessment in Hawaii.

- The respondent burden of the 18-question instrument has been questioned (Derrickson, 1999), as discussed in detail under Recommendation 1d.

Discussion and Recommendations: It is likely that the information desired by Hawaii food security stakeholders is similar to information desired by local food security stakeholders across the country. It appears that to be most effective in assisting the food-insecure population, food security monitoring must be completed at the state and/or local level. Local officials must be able to confidently estimate the geographical areas and populations in greatest need in order to maximize limited resources. To acquire the information desired by Hawaii stakeholders, a comprehensive and integrated local food security surveillance system would be needed.

This project investigator has found that the CFSM is not a simple measure to use, even with valuable guidelines for application (Bickel et al., 2000). It is difficult to convince any survey official that 18 questions are needed to classify three categories of food security status (secure, insecure without hunger, insecure with hunger). It is harder still to ask a series of questions pertaining to hunger among children. As demonstrated (Derrickson, Fisher, Anderson, and Brown, 2001), the CFSM is not an intuitive measure because it does not categorize based on the content of affirmative responses. Furthermore, despite their recognized value, Rasch scaling techniques are quite complicated. Specialized training is needed to use and interpret Rasch data, and the techniques are not available in standard statistical packages. As a result Rasch scaling is of limited value in monitoring situations. Thus, researchers may be tempted to use different subsets of items and/or change the wording of items to "adjust" the CFSM to fit their needs. However, as Nord (pers. comm.) has indicated, if monitoring experts

want to change the number and/or wording of the items, then relatively sophisticated analytical techniques need to be used to make accurate comparisons of research data to national data.

It would appear to this investigator that directing funds and technical support to simple but effective food security monitoring, because it will enable and empower local communities, is a most cost-effective strategy in making progress in the Healthy People 2010 food security objective.

Recommendation 3b. Consider defining the best food security survey methods to use to ensure the accuracy of household food security prevalence data, and consider how to use the national food security monitoring tool to screen at-risk households.

Background. This recommendation addresses additional technical issues which warrant further consideration to ensure that food security monitoring effectively supports efforts to end hunger and/or enhances community food security. The CFSM is a measure of household food security status. It is designed to be used to gather information on the extent and severity of food insecurity in households over the last 12 months due to resource constraints. An alternate measure using a 30-day time frame is available (Hamilton et al., 1997a). However, both are household, not individual, measures, and both rely on perceptions of an individual respondent to represent an entire household. Neither measure is designed to capture hunger due to poor food choices, disordered eating, or illness.

Nationally, data of the national food security prevalence estimates are gathered over the phone, and when necessary in person. However, because of the sample sizes needed to confidently have food security data available by smaller geographical areas—counties or smaller regions are really needed—state-level food security monitoring will be relatively costly if it involves direct interviews of randomly selected households. Phone interviews are relatively inexpensive when compared to in-person interviews, but a household must have a phone. Many households that are "economizing" may choose to disconnect their phone service in order to pay the rent and utility bills or to buy food and medicine. Many of the unsheltered homeless do not have phones. Therefore, sampling methods relying primarily or exclusively on telephone interviews may yield incomplete prevalence estimates of food security status.

Health-related screening involves using a survey or criteria to identify those at higher risk of disease, and/or at greater need for designated services. This is similar to the concept of medical "triage" that allows health professionals to quickly and effectively identify those they can help the most given limited time and resources.

Rationale Based on Findings. This two-part recommendation for applied uses of the CSFM is presently based only on qualitative data with food security stakeholders in Hawaii (Derrickson and Brown, 2001a).

- Hawaii food security stakeholders desire accurate "prevalence estimates" that include reports on the number of hungry adults and children by geographical area. They also generally perceive current estimates of the CFSM, which do not generally include many households without phones or the homeless, to underestimate food insecurity

  Give up the telephone, it doesn't include homeless or households without phones. [HFB board member]

  To reach the needy you need to go to them. [Food pantry provider]

  When asked for 'a "ballpark figure" of the extent to which their clients do not have phones, social workers indicated, "*I'd say more like a fourth or less. . . . You must go do door to door surveillance like we did in the 1960s and 1970s."* Along the same lines of potential underreporting, a savvy homeless food provider noted, "*They are not going to admit it because they think their kids are going to be taken away. The survey must be confidential*." Alternatively, a legislator understood the value, if not necessity, of telephone surveys but focused on the need for short and specific questions:

  For telephone interview purposes the shorter the time span you can commit someone to the telephone I think their involvement the less questions the better, and I think if you can cut to the chase and get some real good data from the telephone conversation on hunger. For the layperson out there that you're really going to talk to 9 out of 10 times, they can give a yes or no answer. So, I guess it's a better system. [State legislator]

Limitation. At the time focus groups were conducted, the moderator was not able to confirm the extent to which the federal government used direct interviewing techniques, but indicated that surveys were "primarily conducted over the phone." For budget reasons, state-level monitoring is also almost always done over the phone.

- Outreach workers desire tools that can be used to screen individuals at higher risk:

  Moderator: *Anything else that might be useful in your work?*

  Yeah. Identify a family who does not . . . well how would you identify hungry families or hungry children if you don't have them actually saying to you that they are hungry? . . . What are the clues that we can use as tools to identify these families? [Social workers]

  Are there any food behaviors that indicator hunger, i.e hording sweets, apathy? . . . Hording carries over even now to a feast or famine approach especially with the elderly and with teens. [Social workers]

Discussion and Recommendations. Ideally, the national food security monitoring tool(s) should be relatively easy, effective, and inexpensive for researchers and state health surveillance staff to implement across diverse settings. The end product should include estimates of the total number of people suffering from different degrees of food insecurity. Estimates on the number of individuals experiencing household food insecurity should not only more accurately depict the true extent of the problem but also allow for more accurate description of the dimensions of the problem (e.g., by age, by ethnicity, and in associative analysis). Currently, it is not clear, how to count or consider the homeless or others who live in a temporary shelter in food security prevalence estimates. What measure, if any, should be used with the homeless, or could the homeless be counted reliably and all be considered food insecure?

In addition, use of a food security subscale for screening purposes has not been fully explored. Documentation outlining how the national food security monitoring tool can be used to implement effective state prevalence estimates, and for screening purposes, will further facilitate use of the recommended measure. Guidance on sampling methods that include households without phones and/or the homeless would also be needed to obtain accurate estimates of the full extent of hunger and food insecurity. Ideally, information on how to apply shorter food security measurement tool(s), and what survey methods to use, would be also be available in documents outlining community food assessment. These documents, in turn, if used appropriately, should lead to improvements in national food security status.

IMPLICATIONS

Food security monitoring is needed to appropriately guide U.S. domestic food and nutrition policy and to enhance the accountability of federal assistance programs. Nutrition research, nutrition monitoring, and nutrition policy are all interdependent (Briefel, 1996). Research lays the groundwork for effective monitoring, monitoring yields information for policy, and policy determines what research is needed. Significant progress has been made by the federal government in the last 10 years to better monitor food security status (Bickel, Andrews, and Klein, 1996; Hamilton et al., 1997a; ERS, 1999; Nord, Jemison, and Bickel, 1999). In essence, research findings in Hawaii reaffirm many existing food security research priority areas (ERS, 1999). They also bring to light aspects of the national food security measure that have not been formally addressed and provide preliminary evidence of how the CFSM works in applied settings. Rather than just "marching on" with a diverse food security measurement research agenda (ERS, 1999), findings suggest that it is time to "step back" to reassess fundamental aspects of the national food security measure, so that as a nation we will "leap" forward in improving community and household food security status. We need a national food security monitoring system so simple and effective that the information it yields will stimulate the necessary local and national strategies to make progress toward the Healthy People 2010 food security indicator, and ultimately to end hunger in the United States of America.

Table 1
Selected Definitions

USDA Definitions

- **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. (LSRO, 1990)

- **Food insufficiency** is defined as inadequate amount of food intake due to lack of money or resources. (Briefel and Woteki, 1992)

- **Food security** is access by all people at all times to enough food for an active, healthy life and includes at a minimum: (a) the ready availability of nutritionally adequate and safe foods and (b) the assured ability to acquire acceptable foods in socially acceptable ways (without resorting to emergency food supplies, scavenging or other coping strategies). (LSRO,1990)

- **Hunger** is … (an) uneasy or painful sensation caused by a lack of food. Hunger and malnutrition are potential, although not necessary, consequences of food insecurity. (LSRO, 1990)

- **Nutrition security** is, in addition to food security, the provision of an environment that encourages and motivates society to make food choices consistent with short- and long-term good health (Center for Nutrition Policy and Promotion, USDA, 1996, p. 3).

Second Harvest definition of hunger: "the inability to purchase enough food to meet basic nutrition needs."

CCHIP definition of hunger: "mental and physical condition that comes from not eating enough food due to insufficient economic, family or community resources." (Wehler et al., 1992, p. 30S)

Radimer/Cornell definition of hunger: "the inability to acquire or consume an adequate quality or sufficiency of food in socially-acceptable ways, or the uncertainty that one will be able to do so." (Radimer et al., 1992, p. 39S)

Nutrition monitoring has been defined as "an on-going description of nutrition conditions in the population, with particular attention to subgroups defined in socio-economic terms, for the purposes of planning, analyzing the effects of policies and programs on nutritional programs, and predicting future trends." (Mason et al., 1984)

Table 2

Operationalized Framework of the Core Food Security Module[a]

Category	Sequence of 18 items answered affirmatively by modal households[b]	Expected behaviors
Food secure Sum: [c] <3	2. Worried food would run out 3. Food bought didn't last	Diminished household food resources force economizing in food spending: running short of money, substituting cheaper, dietary monotony.
Food insecure Sum: 3-7	4. Family couldn't afford balanced meals 5. Relied on a few low-cost foods 8. Cut size of meals/ skip meals - adults 6. Could not afford balanced meal - children 9. Adults ate less than felt they should	Food insecurity short of actual hunger: extreme food acquisition and management coping strategies, use of socially non-normative food resources. Nutritional quality of diets and health impacted.
Moderate hunger Sum: 8-12	8a Adult cut size or skip meals for 3 or more months in the last year 7. Child not eating enough 10. Adult hungry but didn't eat 11. Adult lost weight 13. Cut size of child's meals	Managing insufficient resources. Adult hunger in household, for at least some members, some times.
Severe Hunger Sum: 13-18	12. Adult didn't eat for whole day 14. Child hungry 12a Adult didn't eat for whole day - 3+/ 12 months 15. Child skips meals - short term 15b. Child skips meals - 3+/ 12 months 16. Child didn't eat for a whole day	Severe hunger in household and hunger among children.

[a] Adapted from Bickel, Andrews, and Klein, 1996.

[b] "Modal" households are those whose responses to the 18-item questions exactly fit the common pattern determined by the Rasch measurement model to the 1995 national survey data. (Hamilton et al., 1997b). For each item, respondents were asked "in the last 12 months . . . (item). . . because of not enough money for food."

[c] Sum refers to the total number of affirmative responses of the CFSM for households with children.

Source: Derrickson, Fisher, Anderson, and Brown, 2001.

Table 3
Methodological Abstract by Study (page 1 of 3)

Study Description/	Objectives	Sample Description	Survey Instruments and Analytical Techniques Utilized
Year 1, 1997-1999: Assessment of the operational framework of the CFSM			
1. Qualitative study assessing the CFSM conceptual framework with low-income food gatekeepers in Hawaii.	To provide face validation of CFSM among Asian and Pacific Islanders in Hawaii, and to explore predictors of food security status. **Source:** Derrickson and Anderson, 2000.	Participants included 61 food gatekeepers of Caucasian, Hawaiian or Part-Hawaiian, Filipino, or Samoan ethnicity reached through nine focus groups. Twenty-four (39%) were categorized by the CFSM as food insecure without hunger, and 21 (34%) classified as food insecure with either adult or child hunger.	Focus group questions included participants' perceptions of 1) definitions of hunger, 2) causal factors, 3) mediating factors, and 4) consequences of hunger. Participants completed the CFSM in a group and were then debriefed. Transcripts were analyzed using constant comparative analysis between ethnic groups and with the operationalized framework of food insecurity (Bickel et al., 1996).
Year 2, 1998-1999: Independent validation of the Core Food Security Module with Asian and Pacific Islanders			
2. Pilot study with low-income charitable food recipients	To assess the stability of the CFSM with at least 50 respondents who completed the survey twice, 10-14 days apart **Sources:** Derrickson, 1999; Derrickson, Anderson, and Fisher, 2001.	Households were randomly selected from a database of recent charitable food recipients. Of the 195 respondents who were called, 77 (40%) completed the survey at time 1. Of the 77 first survey respondents, 61 (80%) also completed the survey at time 2, a mean of 11 days later (range 9-14).	Households completed CFSM through a telephone interview. Food security data was categorized according to CFSM guidelines (Price et al., 1997). Internal consistency of data was assessed using Chronbach's alpha; stability was assessed using correlation analysis of numerical values, and chi-square analysis of the CFSM categorical measure over time.
	To quantify interpretations of the term "balanced meals" used in food security status assessments. **Source:** Derrickson, Anderson, Fisher, and Brown 2001.	The sample consisted of 77 ethnically diverse respondents, 65 (84%) of whom were women. Twenty (26%) were classified as food secure, 37 (48%) as food insecure without hunger, and 20 (26%) as experiencing hunger.	Telephone interviews included 77 charitable food recipients in Hawaii. After participants first responded to "We couldn't afford to eat balanced meals," they next defined what a "balanced meal" meant. Qualitative responses were categorized into common themes.

Table 3
Methodological Abstract by Study (page 2 of 3)

Study Description/	Objectives	Sample Description	Survey Instruments and Analytical Techniques Utilized
3. Quantitative studies: a. Assessment of CFSM scale measure	To determine whether the CFSM scale measure is a reliable and valid food security measure for use in Hawaii, where at least 50% of the population is of Asian or Pacific Islander descent. **Source:** Derrickson, Anderson, and Fisher, 2000a.	The 1664 participants included 1459 respondents reached through the random Hawaii Health Survey, 144 food pantry recipients (77 from pilot test), and 61 (from pilot test) who completed the survey a second time. Data from 362 were used in the Rasch analysis: 252 (70%) were households with children, and 69% were identified by the CFSM as food insecure or hungry.	The sample instrument included the entire ICFSM completed through phone interviews. The robustness off the internal scale construct validity of the CSFM scale measure and hierarchical order of items was completed with the same Rasch methods used previously to develop the CSFM (Hamilton et al., 1997).
b. Assessment of the ICFSM	To assess the construct validity of the Individual-level CFSM scale measure **Source:** Derrickson, Fisher, and Anderson, 2001.	The sample described above was used. However, responses from only 29 respondents could be used in Rasch analysis of the ICFSM.	Rasch methods previously employed to assess the CFSM were replicated. Comments from respondents and interviewers were recorded and analyzed for common themes
c. Assessment of CFSM categorical measure and three other categorical measures	To assess the credibility of applying the CFSM categorical measure to a sample from Hawaii; and to assess the concurrent validity and stability of four categorical food security measures: the CFSM, an adapted RC measure, an adapted CCHIP measure, and the face valid measure. **Source:** Derrickson, Anderson, Fisher and Brown, 2001.	The sample included 1469 ethnically diverse respondents gathered through a statewide telephone sample, 144 food pantry recipients, and 61 food pantry respondents who repeated the CFSM a second time. See Table 4 for additional information about each measure evaluated.	The credibility of the CFSM categorical measure was assessed via comparisons to individual items and with a comparison of the 1995 national modal CFSM response pattern. The four categorical measures were compared across food security prevalence estimates and indices of income, vegetable intake, and to the CFSM scale measure.
d. Assessment of the concurrent validity of FVFSM	To document the concurrent validity of the Face Valid Food Security Measure (FVFSM) with residents of Hawaii. **Source:** Derrickson, Anderson, and Fisher, 2000b.	The sample included (n=1603) a statewide sample of 1469 respondents gathered through the Hawaii Health Survey and a convenience sample of 144 food pantry recipients gathered to increase the likelihood of data collection from “hungry” respondents.	The FVFSM and its four categories were compared across income, household and respondent characteristics, use of assistance programs, and dietary intake using chi-square analysis and, when appropriate, “risk ratios” comparing households with hunger to the food secure. The FVFSM was also compared to the four-part food sufficiency question.

Table 3
Methodological Abstract by Study (page 3 of 3)

Study Description/	Primary Objectives	Sample Description	Survey Instruments and Analytical Techniques Utilized
Year 3, 1999-2000: Developing a face valid food security monitoring tool			
4. Qualitative study of perceptions from food security stakeholders	1. To document among Hawaii's household food insecurity stakeholders: perceptions of definitions of hunger and food insecurity, and perceptions on what and how food insecurity and hunger should be measured. 2. To compare how stakeholders interpret reports based on the CFSM with what the national food security measure really measures. 3. To assess perceptions and interpretation of the face valid algorithm, Q2, Q4, and Q7.	The sampling design was a stakeholder stratified convenience study consisting of 19 (44%) WIC nutritionists, 10 (23%) food pantry providers, 4 (9%) Hawaii Foodbank board members, 4 (9%) social workers, 3 (7%) state legislators, and 3 (7%) homeless food providers **Source:** Derrickson and Brown, 2001a	Focus groups and interviews were used to collect perceptions of definitions of hunger and food insecurity, what type of food security information would be useful, how food security status should be measured, the CFSM, the FVFSM, and Q2, Q4, and Q7.Transcripts were analyzed using constant comparative analysis. Responses were compared across questions and by group, and compared to previous work (Radimer, 1990; Bickel, Andrews, and Klein, 1996).
	4. To document perceptions of the term "social acceptability" of foods.	Same as above. **Source**: Derrickson and Brown, 2001b	In the context of interviews outlined above, participants asked what type of food acquisition methods were and were not socially acceptable. Responses were transcribed, and compared using constant comparative analysis across groups.
5. Statewide food security monitoring using six food security indicators	1. To establish baseline estimates of household food insecurity and hunger in Hawaii. 2. To describe food security status in Hawaii by various demographic variables. **Source:** Baker et al., 2000.	The sample design was a statewide random telephone study of >4000 households (>12000 respondents) conducted as one module of the 1999 Hawaii Health Survey used to collect behavioral risk factor surveillance data.	Responses to six of the 18 food security indicators (Q3, Q4, Q9, Q10, Q12, and Q14) were collected and analyzed according to the FVFSM across various demographic variables. Spatial analysis of food security status by telephone prefix was completed.

Table 4
Comparison of Four Household Food Security Measures by Food Security Category

Category	CSFM	FVFSM	Adapted RC Measure	Adapted CCHIP Measure
Food secure	<3 affirmative responses	0 affirmative responses	0 affirmative responses	0 affirmative responses
"Worried"				Affirmative to Q2
Household food insecure - "At risk of hunger"	Adults only: 3-6 affirmative responses; With 1+ child: 3-7 affirmative responses	Any affirmative response to food insecurity indicators	Any affirmative response to food insecurity indicators	Any affirmative response to food insecurity indicators except Q2, "worried"
Moderate hunger/adult hunger	Adults only: 7-8 affirmative responses With 1+ child: 8-12 affirmative responses	Affirmative response to Q10 or Q12	Affirmative response to Q8, Q8a, Q9-12a without affirmative response to child indicators: Q7, Q13-16	Affirmative response to Q10, Q11, Q12, or Q12a.
Severe/child - hunger	Adults only: 9-10 affirmative responses With 1+ children: 13+ affirmative responses	Affirmative response to Q14	Affirmative response to any one of the following: Q7, Q13-16	Affirmative response to any one of the following: Q7, Q13-16
Summary	Based on pattern of modal responses	Based on responses to specific indicators	Based on responses to specific indicators	Based on responses to specific indicators
	Moderate and Severe categories both include hunger among children	Separate hunger categories for adults and children	Separate hunger categories for adults and children	Separate hunger categories for adults and children
	Conservative, particularly in classifying food insecurity	More liberal food insecurity classification, but most strict hunger classification	More liberal classification of all categories	More liberal food insecurity and child hunger; more strict adult classification

[1] CSFM, Core Food Security Module (Hamilton et al., 1997); CCHIP, Community Childhood Hunger Identification Project (Wehler et al., 1992), FVFSM, Face Valid Food Security Measure (Derrickson, 1999: Derrickson, Fisher, Anderson, and Brown, 2001), RC, Radimer/Cornell Measure (Radimer et al., 1992)

Source: Derrickson, 1999; Derrickson, Fisher, Anderson, and Brown, 2001.

Table 5
Recommendations for Household Food Security Monitoring Research and Applied Use

1. **Continue ongoing food security research efforts (ERS, 1999).**

    a. Continue to support research that discerns how robust the CFSM is across diverse population groups.

    b. Continue to work on simple measures of individual-level hunger.

    c. Continue to work on measurement of duration of household food insecurity and individual hunger among adults and children.

    d. Continue to develop and use shorter tools to effectively capture what policymakers and food assistance program managers need to know to ameliorate household food insecurity in local communities and across the nation.

2. **Reassess fundamental aspects of the national food security monitoring tool.**

    a. Consider reassessing the intended purpose of food security monitoring tools, and the definitions used.

    b. Consider reassessing the importance of measuring "food insecurity" vs. "food insufficiency."

    c. Consider the importance of measuring the psychological element of food insecurity (Q2, "worried").

    d. Consider adding items to the scale measure which confirm food security.

    e. Consider promptly revising the wording of the general balanced meal indicator (Q4, "unable to afford to eat balanced meals").

    f. Consider the value of face (content) validity in the CFSM categorical measure.

3. **Support local/state food security monitoring.**

    a. Support local/state food security monitoring using a food security measurement tool with fewer questions.

    b. Consider defining the best food security survey methods needed to ensure the accuracy of household food security prevalence data, and consider how to use the national food security monitoring tool to screen "at risk" households.

Table 6
Hawaii Item Measurement Report of the CFSM (n=362)

Question/Item: In the last 12 months have . . . (item) . . . because of not enough money for food	Item Responses		Rasch Item Calibration (logits)		Goodness-of-Fit Statistics			
					Infit[3]		Outfit[4]	
	Number of Affirmative Responses	Item Sample Size[1]	Value[2]	Standard Error	MnSq	Z	MnSq	Z
2. Worried food would run out	289	359	-4.18	0.17	1.0	0	1.0	0
3. Food bought did not last	256	361	-3.43	0.14	1.0	0	1.1	0
4. Couldn't afford balanced meals	235	357	-3.06	0.15	1.0	1	2.1	2
5. Children relied on few foods	159	251	-2.77	0.17	1.0	0	0.8	0
6. Children unbalanced meals	120	250	-1.72	0.17	1.0	0	0.9	0
7. Children did not eat enough	60	245	0.17	0.21	1.0	0	0.9	0
8. Adults cut size/skip meals	126	354	-0.88	0.17	0.8	-3	0.6	-2
8a. Adults cut/skip meals often [5]	102	353	-0.31	0.18	0.8	-2	0.6	-2
9. Respondent eat less [6]	143	355	-1.26	0.15	1.0	0	0.9	0
10. Respondent hungry [6]	73	356	0.49	0.18	1.0	0	0.7	-1
11. Respondent lost weight [6]	59	353	0.93	0.19	1.0	0	1.0	0
12. Adults not eat- whole day	37	182	1.76	0.23	1.0	0	2.0	1
12a. Adults not eat-whole day often [5]	25	179	2.44	0.27	0.9	0	1.7	0
13. Children cut size meals	28	122	1.72	0.27	1.0	0	0.8	0
14. Children hungry	33	121	1.37	0.26	1.0	0	1.4	1
15. Children skip meals	23	120	2.07	0.3	0.9	0	0.8	0
15a. Children skip meals often [5]	19	119	2.32	0.31	1.0	0	0.9	0
16. Children not eat whole day	5	123	4.35	0.55	0.8	0	0.2	0

[1] Total number indicates the number of respondents who were asked the question.
[2] Item calibration value is the Rasch model scale value indicating item severity.
[3] Outfit MnSq = Outfit mean square residual goodness-of-fit statistic, and standardized Z.
[4] Infit MnSq = Infit mean square residual goodness-of-fit statistic, and standardized Z.
[5] Often indicates greater frequency than in 1 or 2 months of the last 12 months
[6] Respondent indicates respondent answered the question for him/herself only.

Source: Derrickson, Anderson, and Fisher, 2000a.

Table 7

Item Calibration and SE Comparisons: National[1] and Hawaii CSFM data (n=362)

CSFM Items	National		Hawaii		Item calibration difference	
	Item Calibration	SE	Item Calibration	SE	Difference [2]	Z[3]
2. Worried food would run out	-4.99	.03	-4.18	.19	.81	4.63[4]
3. Food bought did not last	-3.73	.03	-3.43	.14	.30	2.09[4]
4. Couldn't afford balanced meals	-3.42	.03	-3.06	.15	.36	2.35[4]
5. Children rely on few foods	-3.10	.04	-2.77	.17	.33	1.94
8. Adults cut/skip size of meals	-1.72	.03	-0.88	.17	.84	4.87[4]
6. Children eat unbalanced meals	-1.64	.04	-1.72	.17	-.08	0.47
9. Respondent ate less than should	-1.56	.03	-1.26	.15	.30	1.96
8a. Adults cut/skip meals often	-0.70	.03	-0.31	.18	.39	2.14[4]
7. Children not eat enough	-0.15	.05	0.17	.21	.32	1.48
10. Respondent hungry	0.27	.04	0.49	.18	.22	1.19
11. Respondent lost weight	1.54	.05	0.93	.19	-.61	3.10[4]
13. Children cut size of meals	1.69	.07	1.72	.27	.03	0.10
12. Adults not eat whole day	1.82	.05	1.76	.23	-.06	0.25
14. Children hungry	1.88	.07	1.37	.26	-.51	1.89
12a. Adults not eat whole day often	2.55	.06	2.44	.27	-.11	0.30
15. Children skip meals	2.86	.10	2.07	.30	-.79	2.50[4]
15a. Children skip meals often	3.48	.12	2.32	.31	-1.04	3.52[4]
16. Children not eat whole day	4.92	.20	4.35	.55	-.57	0.97

[1] Hamilton et al., 1997b, p. 21.

[2] Difference in item calibration values between the national item calibration value and the Hawaii item calibration value.

[3] The Z scores were calculated by dividing the difference between the item calibration values of the samples by the square root of the sum of squared values of each sample items standard error.

[4] Items with calibration values that differed significantly ($p \leq 0.05$) between samples.

Source: Derrickson, Anderson, and Fisher, 2000a.

Table 8

Affirmative Responses to CFSM Items by the CFSM Household Categorical Measure[1]

Item	Total	Food Secure	Food Insecure	Moderate Hunger	Severe Hunger
N	1664	1411	158	64	31
	N	N (%)[2]	N (%)[2]	N (%)[2]	N (%)[2]
Q2 “worried food would run out”	291	61 (4.3%)	137 (86.7%)	62 (96.9%)	31 (100%)
Q3 “food bought didn’t last”	258	40 (2.8%)	126 (79.7%)	61 (95.3%)	31 (100%
Q4 “unable to eat balanced meals”	237	30 (2.1%)	119 (75.3%)	59 (93.7%)	29 (96.7%)
Q7 “child/ren not eating enough”	60	1 (1.7%)	15 (12.5%)	20 (50.0%)	24 (88.9%)
Q8 “adult/s cut size or skip meals”	127	1 (0.9%)	40 (25.8%)	56 (87.5%)	30 (96.8%)
Q9 “respondent ate less than felt they should”	144	7 (5.9%)	54 (34.6%)	52 (82.5%)	31 (100%)
Q10 “respondent hungry”	74	--	17 (10.9%)	32 (50.0%)	25 (80.6%)
Q11 “respondent lost weight”	60	2 (1.7%)	9 (5.8%)	25 (39.7%)	24 (77.4%)
Q12 “adult/s didn’t eat for a whole day”	40	--	5 (3.2%)	14 (21.9%)	21 (67.7%)
Q14 “child/ren hungry”	33	--	4 (2.5%)	8 (12.5%)	21 (67.7%)

[1] CSFM = Core Food Security Module

[2] Percentages indicate the percentage of respondents in each food security category who responded affirmatively to the respective question.

Source: Derrickson, Fisher, Anderson, and Brown, 2001.

Table 9
***Household Food Security Status Prevalence Rates by the CFSM Categorical Measure*[1]**

Food Security Measures	Overall	Family Status			Site	
		Adults only	1+ Child	HHS[1]	Food Pantry	Retest
N	1664	957 (57.5%)[2]	707 (42.5%)[2]	1459 (87.7%)[2]	144 (8.7%)[2]	61 (3.7%)[2]
CFSM[1]	N (%)[3]	N (%)[3]	N (%)[3]	N (%)[3]	N (%)[3]	N (%)[3]
Secure	1411 (84.8%)	894 (93.3%)	517 (73.2%)	1360 (93.2%)	36 (25.0%)	15 (24.6%)
Insecure	158 (9.5%)	36 (3.8%)	122 (17.3%)	72 (4.9%)	60 (41.7%)	26 (42.6%)
Moderate	64 (3.8%)	24 (2.5%)	40 (5.7%)	20 (1.4%)	30 (20.8%)	14 (23.0%)
Severe	31 (1.9%)	4 (0.4%)	27 (1.6%)	7 (0.5%)	18 (12.5%)	6 (19.4%)
Face Valid						
Food secure	1300 (78.1%)	843 (88.0%)	457 (64.6%)	1278 (87.6%)	18 (12.5%)	4 (6.6%)
At risk	259 (15.6%)	92 (9.6%)	167 (23.6%)	147 (10.1%)	73 (50.7%)	39 (63.9%)
Adult	72 (4.3%)	23 (2.4%)	50 (7.1%)	30 (2.1%)	32 (22.2%)	10 (16.4%)
Child	33 (2.0%)	0	33 (4.7%)	4 (0.3%)	21 (14.6%)	8 (13.1%)
Adapted Radimer/Cornell						
Secure	1300 (78.1%)	843 (88.0%)	457 (64.6%)	1278 (87.6%)	18 (12.5%)	4 (6.6%)
Insecure	172 (10.3%)	56 (5.9%)	116 (16.4%)	108 (7.4%)	44 (30.6%)	20 (32.8%)
Adult	119 (7.2%)	58 (6.1%)	61 (8.6%)	53 (3.6%)	46 (31.9%)	20 (32.8%)
Child	73 (4.4%)	0	73 (10.3%)	20 (1.4%)	36 (25.0%)	17 (27.9%)
Adapted CCHIP[1]						
Not hungry	1300 (78.1%)	843 (88.0%)	457 (64.7%)	1278 (87.6%)	18 (12.5%)	4 (6.6%)
Worried	31 (1.9%)	9 (0.9%)	23 (3.3%)	28 (1.9%)	4 (2.8%)	0
At risk	197 (11.8%)	75 (7.8%)	122 (17.3%)	108 (7.4%)	57 (39.6%)	32 (52.5%)
Adult	62 (3.7%)	30 (3.1%)	32 (4.5%)	25 (1.7%)	29 (20.1%)	8 (13.1%)
Child	73 (4.4%)	0	73 (10.3%)	20 (1.4%)	36 (25.0%)	17 (27.9%)

[1] CFSM = Core Food Security Module; CCHIP = Community Childhood Hunger Identification Project; HHS = Hawaii Health Survey.
[2] Percentages indicate row totals.
[3] Percentages indicate column totals.
Source: Derrickson, Fisher, Anderson, and Brown, 2001.

Table 10
The Individual-Level Core Food Security Module
(CFSM, Individual and Additional Items)[a]

Indicator Type	Essence of Indicators: In the last 12 months . . . (item) . . . because there wasn't enough money for food/couldn't afford it?
CFSM	2. Worried about whether food would run out, etc.[b]
CFSM	3. The food we bought just didn't last & we didn't have money to get more.[b]
CFSM	4. We couldn't afford to eat balanced meals.[b]
CFSM	5. We relied on only a few kinds of low cost foods to feed our children.[b]
CFSM	6. We couldn't feed our children a balanced meal.[b]
CFSM	7. Children were not eating enough because couldn't afford enough food.[b]
CFSM	8. Any adult in household ever cut the size of meal or skip meals? [c]
CFSM	8a. How often? [d]
Individual	8I. Did you ever cut size of your meals or skip meals? [c]
Individual	8Ia. How often? [d]
CFSM	9. Did you ever eat less than you felt you should? [c]
Additional	9a. How often? [d]
CFSM	10. Were you ever hungry but didn't eat? [c]
Additional	10a. How often? [d]
CFSM	11. Did you lose weight? [c]
CFSM	12. Any adult ever not eat for a whole day? [c]
CFSM	12a. How often? [d]
Individual	12I. Did you ever not eat for a whole day? [c]
Individual	12Ia. How often? [d]
CFSM	13. Did you ever cut the size of any of your children's meals? [c]
Individual	13I. For child with most recent birthday. Did you ever have to cut the size of this child's meals? [d]
CFSM	14. Were the children ever hungry, but you could not afford more food? [c]
Additional	14a. How often? [d]
Individual	14I. For child with most recent birthday was he/she ever hungry? [c]
Individual	14Ia. How often? [d]
CFSM	15. Did your children ever skip meals? [c]
CFSM	15a. How often? Three or more months. [d]
Individual	15I. For child with most recent birthday did he/she ever skip meals? [c]
Individual	15Ia. How often? [d]
CFSM	16. Did any child ever not eat for a whole day? [c]
Individual	16I. For child with most recent birthday, did he/she ever not eat for a whole day? [c]

[a] Hamilton et al. (1997a). The four-part food insufficiency question ("Which of these statements best describes the food eaten in your household in the last 12 months, that is, since July 1997? 1. We always have enough and the kinds of foods we wanted, 2. We have enough to eat but NOT always the KINDS of foods wanted, 3. Sometimes we don't have ENOUGH to eat, or 4. Often we don't have enough) is not part of the CFSM, but is the first question used for screening households

[b] Affirmative responses are "often true" or "sometimes true"; a negative response is "never true."

[c] An affirmative response was "yes."

[d] An affirmative response was "almost every month" or "some months but not every month." A negative response was "in only 1 or 2 months."

Source: Derrickson, Anderson, and Fisher, 2000.

Table 11

Scale Measurement Report: 18 CSFM Items plus 6 Individual-Level Items (8I, 12I, 13I, 14I, 15I, 16I)

Question/Item: In the last 12 months have . . . (item) . . . because of not enough money for food	Item Responses		Rasch Item Calibration (logits)		Goodness-of-fit statistics			
					Infit		Outfit	
	Number of Affirmative Responses	Item Sample Size[a]	Value[b]	SE	MnSq	Z	MnSq	Z
2. Worried food would run out	289	359	-4.24	.17	1.2	2[e]	1.5	0
3. Food did not last	256	361	-3.48	.14	1.0	0	1.1	0
4. Adults eat unbalanced meals	235	357	-3.11	.15	1.1	1	2.1	2[e]
5. Children rely few foods	159	251	-2.81	.17	1.0	0	0.9	0
8I Indiv. cut size of meals	85	104	-2.06	.31	0.0	0	0.8	0
6. Children eat unbalanced meals	120	250	-1.77	.17	1.0	1	0.9	0
9. Respondent eat less	143	355	-1.31	.15	0.9	0	0.8	-1
8. Adults cut size of meals	126	354	-0.93	.17	0.7	-3[e]	0.5	-2[e]
12I Indiv. not eat 1 whole day	23	280	-0.63	.67	1.3	0	1.1	0
8a. Adults cut size of meals often	102	353	-0.37	.18	0.8	-2[e]	0.5	-2[e]
7. Children not eat enough	60	245	0.12	.20	1.0	0	0.9	0
10. Respondent hungry	73	356	0.43	.18	1.0	0	0.7	-1
14I Indiv. child hungry	16	25	0.54	.60	1.3	0	1.2	0
13I Indiv. child cut size of meals	17	24	0.71	.54	0.9	0	0.8	0
15I Indiv. child skip meals	13	15	0.75	0.65	0.9	0	0.7	0
11. Respondent lost weight	59	353	0.86	0.19	1.0	0	1.0	0
14. Children hungry	33	121	1.31	0.26	0.9	0	1.1	0
13. Children cut size of meals	28	122	1.66	0.27	1.0	0	0.8	0
12. Adults not eat whole day	37	182	1.69	0.23	1.1	0	1.8	1
16I Indiv. child not eat 1 whole day	2	3	1.70	1.49	1.4	0	1.5	0
15. Children skip meals	23	120	2.02	0.30	0.9	0	0.7	0
15a. Children skip meals often	19	119	2.26	0.31	0.9	0	0.8	0
12a. Adults not eat - whole day often	25	179	2.37	0.26	1.0	0	1.7	1
16 Children did not eat for whole day	5	123	4.30	.54	0.8	2[e]	0.2	0

[a] Total number indicates the number of respondents who were asked the question.
[b] Item calibration value is the Rasch model scale value indicating item severity.
[c] Outfit MnSq = Outfit mean square residual goodness-of-fit statistic, and standardized Z.
[d] Infit Mnsq = Infit mean square residual goodness-of-fit statistic, and standardized Z.
[e] Items failed to demonstrate adequate goodness-of-fit statistics.

Source: Derrickson, Fisher, and Anderson, 2000.

Table 12

Hawaii Item Measurement Report of the Recommended Subset of 6 Items

Question/Item: In the last 12 months have . . . (item) . . . because of not enough money for food	Item Responses		Rasch Item Calibration (logits)		Goodness-of-fit statistics			
					Infit[3]		Outfit[4]	
	Number of Affirmative Responses	Item Sample Size[1]	Value[2]	Standard Error	MnSq	Z	MnSq	Z
3. Food bought did not last	215	276	-2.46	0.17	1.1	1	1.0	0
4. Couldn't afford balanced meals	196	275	-2.00	0.17	1.2	2	3.0	5
8. Adults cut size/skip meals	86	274	0.59	0.22	0.6	-4	0.5	-3
8a. Adults cut/skip meals often [5]	62	273	1.31	0.22	0.7	-3	0.4	-3
9. Respondent ate less [6]	104	275	0.12	0.17	0.9	-1	0.8	-1
10. Respondent hungry [6]	33	275	2.44	.023	1.1	1	0.7	.0

[1] Indicates the number of respondents who were asked the question.
[2] Item calibration value is the Rasch model scale value indicating item severity.
[3] Outfit MnSq = Outfit mean square residual goodness-of-fit statistic, and standardized Z.
[4] Infit Mnsq = Infit mean square residual goodness-of-fit statistic, and standardized Z.
[5] Often indicates more frequency than in 1 or 2 months of the last 12 months.
[6] Respondent indicates respondent answered the question for him/herself only.

Table 13
Simple Food Security Monitoring Tool (SFSMT)

Interviewer: Now I'm going to read you statements that people have made about their food situation. Please tell me whether the statement was often, sometimes or never true for your household in the last 12 months. The first statement is:

Q1. "I/We worried whether our food would run out before I/we had money to buy more." In the last 12 months was that (READ FIRST 3 CHOICES)?

- □ 1 Often true
- □ 2 Sometimes true [or]
- □ 3 Never true

Q2. "The food I/we bought just didn't last and I/we didn't have enough to get more." In the last 12 months, was that:

- □ 1 Often true
- □ 2 Sometimes true [or]
- □ 3 Never true

Q3. "I/We couldn't afford to eat meals with a starch such as (cultural grain product; i.e. rice in Hawaii) or bread, meat, beans or fish, and a fruit or vegetable. In the last 12 months, was that:

- □ 1 Often true
- □ 2 Sometimes true [or]
- □ 3 Never true

Q4. "In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money?"

- □ 1 Yes
- □ 2 No

If the answer to any of the above questions is (1) Yes, then continue otherwise END.

Q5. In the last 12 months, were you ever hungry but didn't eat because you couldn't afford enough food?

- □ 1 Yes
- □ 2 No

Q6. In the last 12 months, did you or another adult in your household ever not eat for a whole day because there wasn't enough money for food?

- □ 1 Yes
- □ 2 No

If the household answered any questions with a YES and has one or more children age 17 or under residing in the household then continue otherwise END.

Q7. In the last 12 months, was/were your child/children ever hungry but you just couldn't afford more food?

- □ 1 Yes
- □ 2 No

Source: Derrickson and Brown, 2001a

Face Valid Food Security Categorization (Derrickson, Fisher, Anderson, and Brown, 2001.)
Household Food Secure = no affirmative response.
Household "worried about food" = affirmative response to Q1.
Household "at risk of hunger." Any response to Q2-Q4 is affirmative .
Household with one or more hungry adults = affirmative response to Q5 or Q6.
Household with one or more hungry children = affirmative response to Q7.

Approximation of National Household Food Security Categorization (Bickel et al., 2000)
"Household food secure" = 0, 1, or 2 affirmative responses.
"Household food insecure = 3 or 4 affirmative responses.
"Household hunger" = 5 or more affirmative responses.

Table 14

Hawaii Item Measurement Report of the 7-item Simple Food Security Monitoring Tool

Question/Item: In the last 12 months have . . . (item) . . . because of not enough money for food	Item Responses		Rasch Item Calibration (logits)		Goodness-of-fit statistics			
					Infit[3]		Outfit[4]	
	Number of Affirmative Responses	Item Sample Size[1]	Value[2]	Standard Error	MnSq	Z	MnSq	Z
2. Worried food would run out	277	343	-3.20	0.16	1.0	0	0.9	0
3. Food bought did not last	244	345	-2.40	0.16	0.8	-2	1.1	0
4. Couldn't afford balanced meals	224	342	-2.02	0.15	1.1	1	1.3	1
9. Respondent ate less [5]	133	339	-0.13	0.16	0.9	-1	0.9	0
10. Respondent hungry [5]	61	340	1.74	0.20	0.9	-1	0.5	-1
12. Adults not eat - whole day	25	169	3.22	0.26	1.1	0	2.1	1
14. Children hungry	24	111	2.79	0.28	1.0	0	3.1	2

[1] Indicates the number of respondents who were asked the question.
[2] Item calibration value is the Rasch model scale value indicating item severity.
[3] Outfit MnSq = Outfit mean square residual goodness-of-fit statistic, and standardized Z.
[4] Infit Mnsq = Infit mean square residual goodness-of-fit statistic, and standardized Z.
[5] Respondent indicates respondent answered the question for him/herself only.

Table 15
Four-Part Food Insufficiency Question vs. Food Security Status: Number (Percent) [a,b]

Four-Part Food Insufficiency	Face Valid Food Security Measure				
	Food Secure	At Risk of Hunger	Adult Hunger	Child Hunger	Total
Enough food & kinds wanted	1148 (90.0%)	104 (8.1%)	16 (1.3%)	7 (0.5%)	1275 (79.6%)
Enough food/not always kind wanted	140 (52.0%)	96 (35.7%)	28 (10.4%)	5 (1.9%)	269 (16.8%)
Sometimes not enough	6 (1.2%)	19 (38.7%)	12 (24.5%)	12 (24.5%)	49 (3.1%)
Often not enough		1 (12.5%)	5 (62.5%)	2 (25.0%)	8 (0.5%)
Total	1294 (80.8%)	220 (13.7%)	61 (3.8%)	16 (1.6%)	1601

[a] All percentages are row percentages except for the total column which includes column percentages.
[b] Pearson's chi-square statistics: X^2 = 595, df = 12, 0 = 0.00, r = .534.

Source: Derrickson, Anderson, and Fisher, 2000b.

Table 16
One-Way ANOVA of Selected Variables by Household Food Security Categorical Measures (n=1603)[1]

Measures and Categories	RAI [2]	Daily Vegetable Intake [3]	Monthly Saimin [4]	Scale Measure [5]	Item with item calibration value closest to mean scale measure[5]
CFSM [6]					
Food secure	0.2 [a]	2.00 [a]	3.9 [a]	-4.05 [a]	Q2. Worried food would run out
Food insecure	2.3 [b]	1.72 [a]	9.5 [b]	-1.96 [b]	Q5. Reliance on low-cost foods
Moderate hunger	3.7 [c]	1.18 [b]	7.7 [b]	0.53 [c]	Q8a Adults skip/cut size often
Severe hunger	5.2 [d]	1.29 [a]	14.2 [c]	2.52 [d]	Q12a Adults not eat 1 day often
Face Valid					
Food secure	0.2 [a]	2.02 [a]	3.7 [a]		---
At risk of hunger	1.8 [b]	1.67 [b]	8.4 [b]	-2.84 [a]	Q4/5. Unable to eat balanced meals
Adult hunger	3.8 [c]	1.45 [b]	7.9 [b]	0.10 [b]	Q8a/Q10. Respondent hungry
Child hunger	5.0 [d]	1.00 [b]	13.5 [c]	1.61 [c]	Q13/14. Children hungry
Adapted Radimer/ Cornell					
Food secure	0.2 [a]	2.02 [a]	3.7 [a]		---
Food insecure	1.4 [b]	1.75 [a]	6.8 [b]	-3.39 [a]	Q3. Food didn't last
Adult hunger	3.0 [c]	1.40 [b]	8.4 [b]	-1.01 [b]	Q8/9. Adult not eat enough
Child hunger	4.1 [d]	1.36 [b]	12.9 [c]	0.67 [c]	Q7. Children ate less than should
Adapted CCHIP [6]					
No hunger	0.2 [a]	2.02 [a]	3.7 [a]		---
Only worried	1.2 [b]	1.44 [a]	10.4 [b]	- 4.54 [a]	Q2. Worried food would run out
At risk of hunger	1.8 [c]	1.67 [a]	8.1 [c]	-2.72 [b]	Q4 Unable to eat balanced meals
Adult hunger	3.4 [c]	1.52 [a]	5.5 [b]	-0.34 [c]	Q8a Adult often cut size/skip
Child hunger	4.2 [d]	1.36 [b]	12.9 [c]	0.67 [d]	Q7. Children ate less than should

[1] The sample size of 1603 includes all respondents from the Hawaii Health Survey and all food pantry respondents. All tests were conducted with Tukey's post-hoc test after significant *F* tests. Superscripts indicate that mean values down a column are not statistically significantly different from mean values marked with the same letter.

[2] RAI (resource augmentation index) values range from 0 to 8 for households with children and reach a maximum of 6 for households without children.

[3] Represents average daily vegetable intake of respondent.

[4] Indicates the maximum Saimin intake of anyone in the household in the last month.

[5] Sample size = 362

[6] CFSM = Core Food Security Module; CCHIP = Community Child Hunger Identification Project.

Source: Derrickson, Fisher, Anderson, and Brown, 2001.

Table 17
Income and Stability Assessment of Household Categorical Food Security Measures

Categorical Measures	Total Household Income[1]			Stability		
	N Reporting Income	Income <$5,000 N	%[2]	N	In same category at time 1 and 2[3] n	%[4]
N	1023	71	7%	61		
CFSM[5]						
Food secure	873	33	4%	14	9	64%
Insecure	97	24	24%	28	16	57%
Moderate hunger	33	24	73%	11	7	64%
Severe hunger	25	5	25%	8	6	75%
Face Valid						
Food secure	812	21	3%	4	2	50%
At risk of Hunger	151	34	23%	39	31	74%
Adult hunger	45	12	27%	10	5	50%
Child hunger	15	4	25%	8	5	63%
Adapted Radimer/ Cornell						
Food secure	812	21	3%	4	2	50%
Food insecure	101	18	18%	20	15	75%
Adult hunger	69	21	30%	20	14	70%
Child hunger	41	11	27%	17	10	60%
Adapted CCHIP [5]						
Not hungry	812	21	3%	4	4	50%
Only worried	46	31	67%	0	0	
At risk of hunger	116	24	21%	32	32	59%
Adult hunger	34	12	35%	8	8	38%
Child hunger	15	11	27%	17	17	59%

[1] Pearson chi-square analyses of all four categories and total household income were statistically significant: X^2 >150, p=0.000.

[2] Indicated household income of <$5,000. Sample size of 1023 includes all households that responded to the income question.

[3] Percentage indicates row percentage, i.e., the percentage of those identified as food secure by the national categorical measure.

[4] Numbers indicate the number classified in the same category both at time 1 and at time 2. Percentage = those who were consistently classified in the same category over time.

[5] CFSM = Core Food Security Module; CCHIP = Community Childhood Hunger Identification Project.

Source: Derrickson, Fisher, Anderson, and Brown, 2001.

Table 18
One-Way ANOVA of Respondent Scale Measures[a] by Selected Variables (n≤304)

Variable	Mean ± Standard Error	N	Tukey Post-Hoc Test[b]	*F* (p value)
Ethnicity				
Caucasian	-1.58±.22	91	> 0.05	2.69 (0.01)
Hawaiian	-1.51±.23	90		
Samoan	-1.45±.51	15		
Filipino	-2.79±.26	48		
Japanese	-2.77±.40	16		
Other Asians	-1.99±.55	13		
Other/Mix/Unidentified	-2.52±.66	12		
Hispanic/African American/Native American[a]	-1.97±.50	19		
Household Income				
<$5K	-1.49±.30	50	> 0.05	2.2 (0.07)
$5–19.9K	-1.33±.28	68		
$20–34.9K	-2.16±.25	56		
$35–54.9K	-2.44±.40	22		
$>54.9K	-2.30±.57	13		
Household Savings				
< $250	-1.16±.19	143	[c]	8.45 (0.00)
$250–1000	-2.31±.24	50	[d]	
$1001–10K	-2.91±.32	23	[d]	
> $10K	-2.71±.30	13	[d]	
Vegetable Intake at End of Month				
Increases	-1.08±.34	42	[c]	22.6 (0.00)
Decreases	-.84±.24	76	[c]	
Stays the same	-2.52±.14	175	[d]	

[a] Larger food security values (less negative) indicate more severe food insecurity.
[b] All tests were conducted with Tukey's post-hoc test after significant *F* tests.
[c,d] Mean value is significantly different from those marked with different letter.

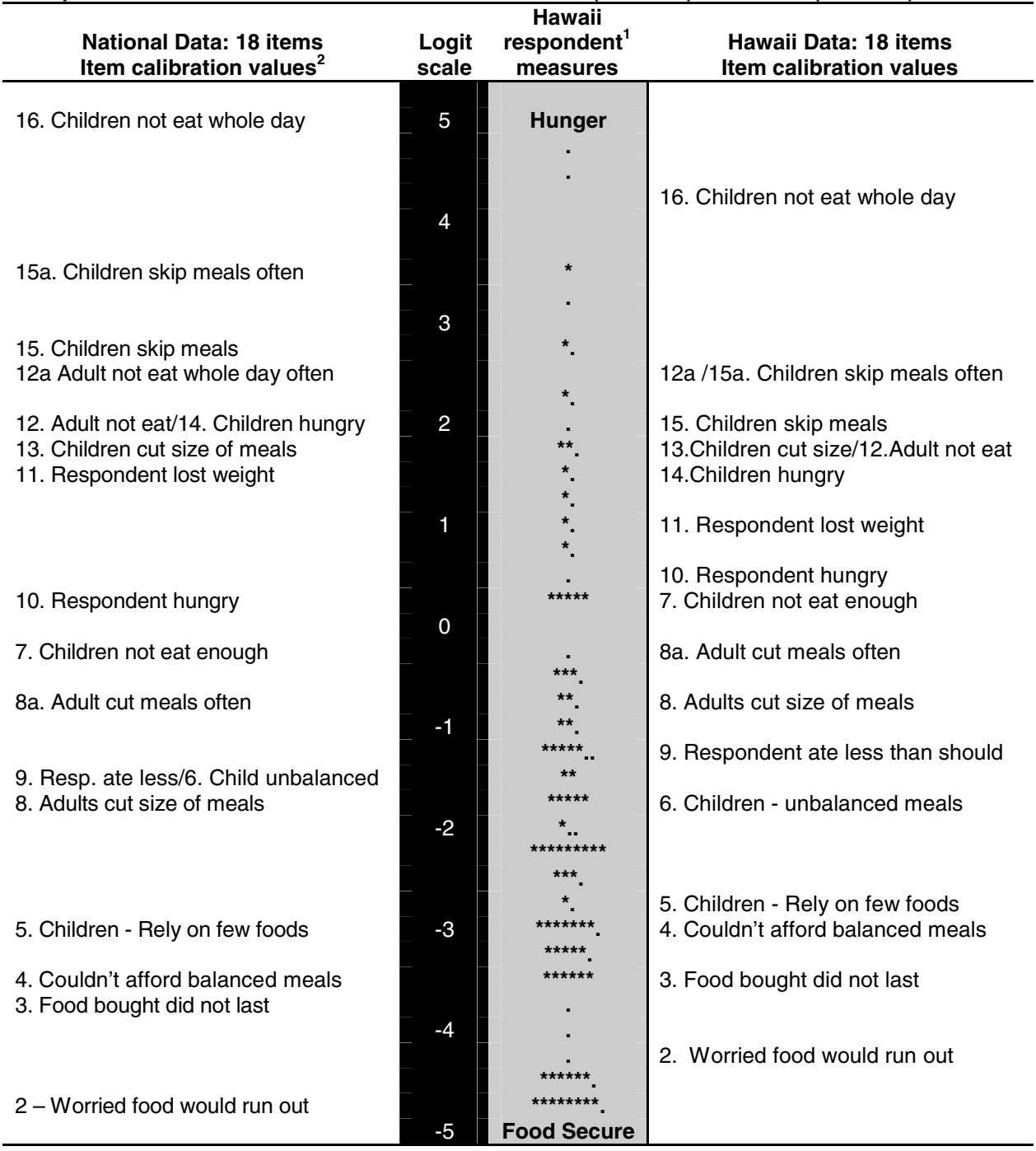
Source: Derrickson, Anderson, and Fisher, 2000b.

Table 19
Responses to "What does balanced, as in balanced meals, mean to you?"

Response Category	Number (Percent)	Typical Responses
Four food groups	15 (20%)	*"Four food groups"* or *"four food groups at each meal"* (n=7) *"Starch, protein, fruits & vegetable"* (n=4) *"Starch, protein, vegetable and milk":* (n=3)
Three food groups	12 (16%)	*"Starch, meat, and vegetable"* (n=7)
All food groups	10 (13%)	*"All food groups"* (n=4) *"Basic food groups"*
Two food groups	10 (13%)	*"Meat and vegetable"* (n=5)
Vague	8 (10%)	*"Eat small meals"* *"Enough to eat"*
Nutritious	7 (9%)	*"Follow the dietary guidelines"* (n=1)
Variety or different	8 (10%)	*"Enough variety of foods" (n=2)* *"Different foods"* (n=2)
No answer	5 (6%)	Unable (n=4) *"No idea"* (n=1)
Pyramid and "Five food groups"	4 (5%)	"Food guide pyramid" (n=3)

Source: Derrickson, Fisher, Anderson, and Brown, 2001.

FIGURE 1
Comparison of CFSM Item Calibration Values: National (18 items) vs. Hawaii (18 items)



[1] For respondent data each * represents four respondents, each . represents one respondent.
[2] The wording of some questions has been abbreviated (Price, Hamilton, and Cook, 1997).

Source: Derrickson, Anderson, and Fisher, 2000a.

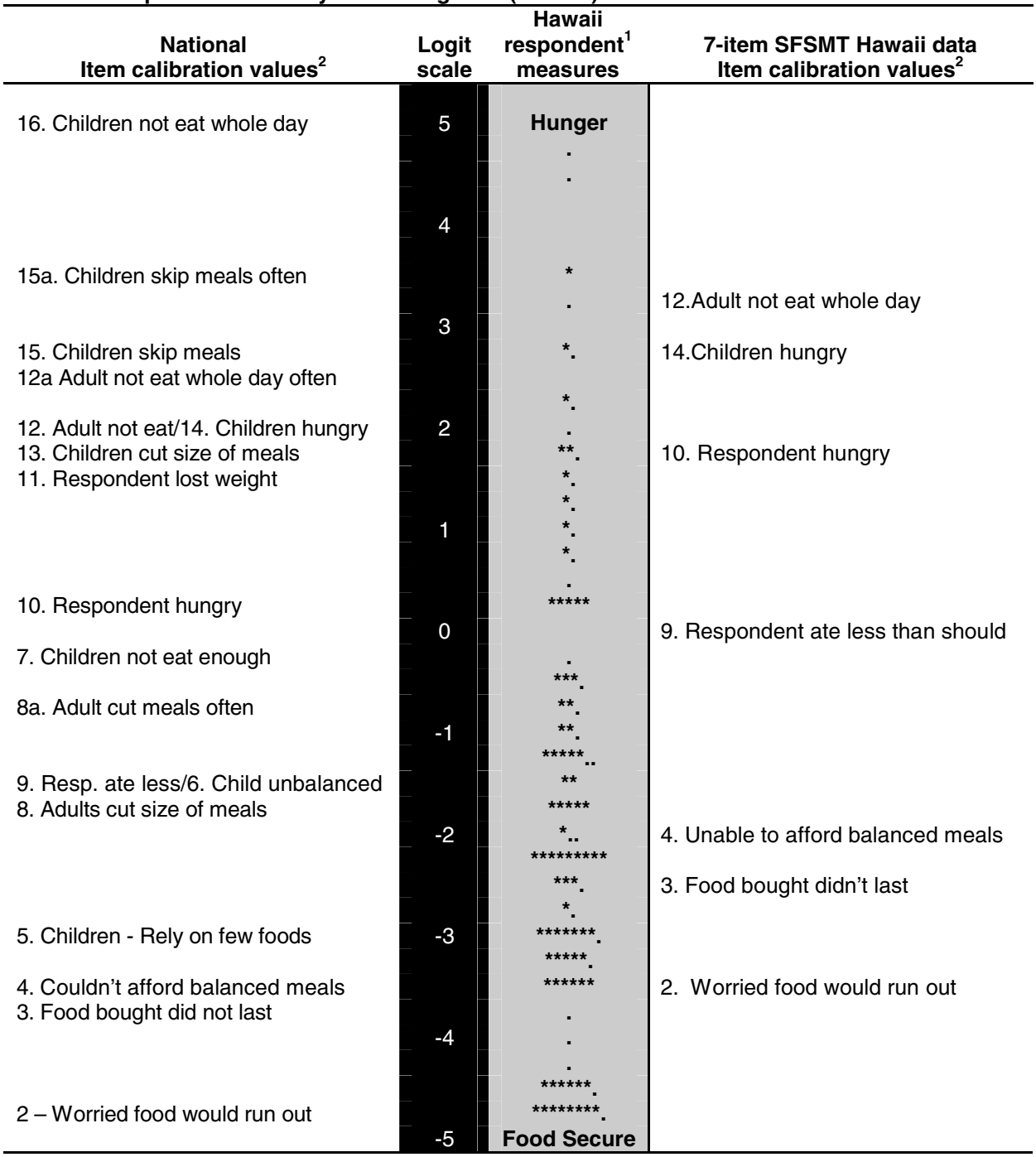
FIGURE 2
Comparison of CFSM Item Calibration Values: National (18 items) vs. Hawaii (6 items)

National Data: 18 items Item calibration values[2]	Logit Scale	Hawaii[1] measures	Hawaii data: 6-item scale Item calibration values[2]
16. Children not eat whole day	5	**Hunger**	
		.	
		.	
	4		
15a. Children skip meals often		*	
		.	
	3		
15. Children skip meals		*.	
12a Adult not eat whole day often			10. Respondent hungry
		*.	
12. Adult not eat/14. Children hungry	2	.	
13. Children cut size of meals		**.	
11. Respondent lost weight		*.	
		*.	8a. Adult cut meals often
	1	*.	
		*.	
		.	
10. Respondent hungry		*****	8. Adults cut size of meals
	0		9. Respondent ate less than should
7. Children not eat enough		.	
		***.	
8a. Adult cut meals often		**.	
	-1	**.	
		*****..	
9. Resp. ate less/6. Child unbalanced		**	
8. Adults cut size of meals		*****	
	-2	*..	4. Unable to afford balanced meals
		*********	
		***.	3. Food bought didn't last
		*.	
5. Children - Rely on few foods	-3	*******.	
		*****.	
4. Couldn't afford balanced meals		******	
3. Food bought did not last		.	
	-4	.	
		.	
		******.	
2 – Worried food would run out		********.	
	-5	**Food Secure**	

[1] For respondent data, each * represents four respondents, each **.** represents one respondent based on the 18-item CSFM measure for Hawaii data (Derrickson, Anderson, and Fisher, 2000a).

[2] The item calibration values in the left column are national values based on 1995 data from the Food Security Supplement to the Current Population Survey (Hamilton et al., 1997a). The data in the right-hand column are item calibration values from the Hawaii set of data (Derrickson, Anderson, and Fisher, 2000a) of the recommended subset of six questions (Bickel et al., 2000).

FIGURE 3
Comparison of CFSM Item Calibration Values: National (18 items) vs. Hawaii (7 items), with the Simple Food Security Monitoring Tool (SFSMT)



[1] For respondent measure data, each * represents four respondents, each . represents one respondent based on the 18-item measure. Data based on 18-item CFSM measure, with Hawaii data (Derrickson, Anderson, and Fisher, 2000a).

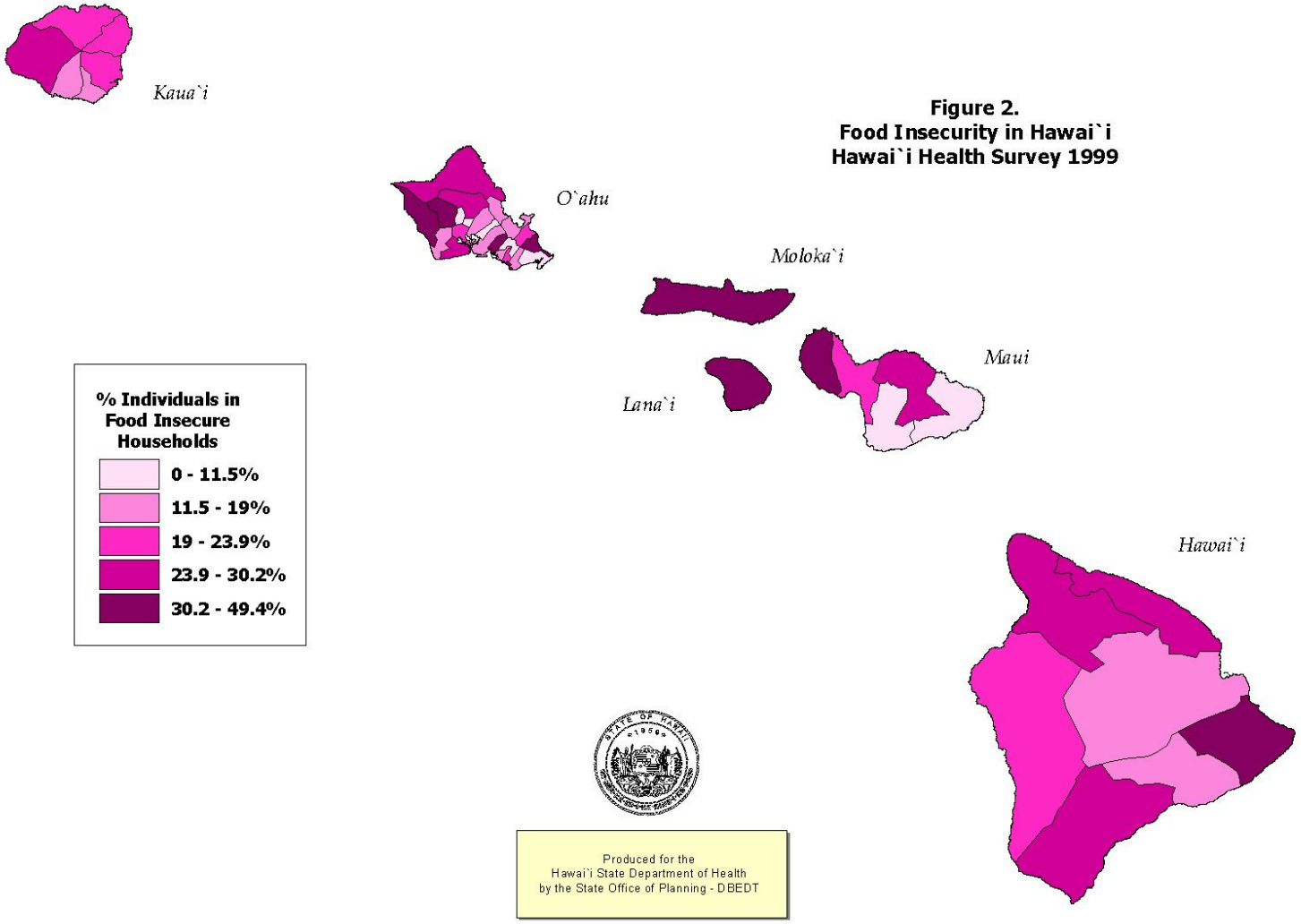
[2] The item calibration values in the left column are national values based on 1995 data from the Food Security Supplement to the Current Population Survey. The data in the right hand column are item calibration values from the Hawaii set of data (Derrickson, Anderson, and Fisher, 2000a).

FIGURE 4
Conceptualization of Continuum of Social Acceptability of Food Acquisition

Food Acquisition Method	Acceptability	Stigma
Food purchase Gifts, social events Hunting, fishing, farming	Completely socially acceptable	None
Going to a relative or close friend's house for a meal	Questionably acceptable, especially if abused	Low
Food pantry or soup kitchen Free or reduced price school lunch WIC Food stamps Emergency food assistance program (TEFAP)	Depends on individual perception	Variable
Begging Eating from trash Stealing	Nearly always unacceptable	High

Source: Derrickson, Fisher, Anderson, and Brown, 2001.

FIGURE 5
Hawaii Health Survey – 1999: Food Insecurity of Hawaii Residents (Baker et al., 2000)



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