Advances in Developing Country Food Insecurity Measurement

Commonalities in the Experience of Household Food Insecurity across Cultures: What Are Measures Missing?[1,2]

Jennifer Coates,*[3] Edward A. Frongillo,† Beatrice Lorge Rogers,* Patrick Webb,* Parke E. Wilde,* and Robert Houser*

*Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy, Tufts University, Boston, MA 02111 and †Division of Nutritional Sciences, Cornell University, Ithaca, NY 14853-6301

ABSTRACT This paper hypothesizes that there is a common "core" to the household food insecurity experience that goes beyond insufficient food quantity and that transcends culture. The paper for the first time employs an exploratory approach to identify cross-cultural commonalities of the food insecurity experience as captured in 22 scales and related ethnographies derived from 15 different countries. The constant comparative method was used to code elements of the food insecurity experience expressed in the ethnographies and to regroup them into domains and subdomains. This typology was then applied to ascertain which experiential domains and subdomains were measured (or not) across all 22 studies. Survey data from 11 of the studies were then analyzed to assess similarities in the relative frequency with which culturally diverse households responded to questionnaire items related to these common domains/subdomains. The analysis confirmed that insufficient food quantity, inadequate food quality, and uncertainty and worry about food were a significant part of the food insecurity experience in all sampled cultures; concerns about social unacceptability emerged in all ethnographic accounts. Several subdomains were identified, such as concern over food safety and meal pattern disruption, with potentially important consequences for physical and psychological well-being. The comparative survey data showed that the relative frequency at which populations responded to domain-related questionnaire items was similar across all but a few cultures. Future food insecurity assessments should consider these core domains and subdomains as the starting point for measures that can generate rich information to inform food security policies and programs. J. Nutr. 136: 1438S–1448S, 2006.

KEY WORDS: • *food insecurity* • *evaluation* • *meta-analysis* • *qualitative* • *indicators*

Academics and practitioners working in developing countries have recently gained momentum in their search for cost-effective and scientifically valid measures of household food insecurity. This shift to what Barrett (1) deems "third generational indicators" represents a movement away from conceptually inadequate "second generation" indicators, such as income and consumption, and toward more direct measures that are intended to capture the household's reported experience of the problem through responses to validated survey items that are transformed into a scale. These advances have the potential to close the concept-to-measurement gaps that have long plagued attempts to understand and quantify the "access" dimension of household food insecurity while also offering a low-cost alternative to the cumbersome data requirements of the "second generation."

Despite this progress, there has been little attention in the growing food insecurity measurement literature to the best method for determining the content of culturally appropriate food insecurity measures or the extent to which a measure developed for 1 culture can be validly applied in another. Certain recent work (2–4) assumes that the household food insecurity experience is often culturally unique and that a thorough ethnographic process is a necessary step to ground the scale in locally relevant experience. Other studies (5–11) in a range of diverse cultures have merely translated or slightly adapted the US national Household Food Security Survey

[1] Published in a supplement to *The Journal of Nutrition*. This publication was made possible through support provided to the Food and Nutrition Technical Assistance (FANTA) Project from the Office of Health, Infectious Disease and Nutrition of the Bureau for Global Health and the Office of Food for Peace of the Bureau for Democracy, Conflict and Humanitarian Assistance at the U.S. Agency for International Development, under terms of Cooperative Agreement HRN-A-00-98-00046-00 awarded to the Academy for Educational Development (AED). The opinions expressed herein are those of the author(s) and do not necessarily reflect the views of the U.S. Agency for International Development. Guest Editors for this publication were Jennifer Coates, Edward A. Frongillo, Anne Swindale, Beatrice Lorge Rogers, Patrick Webb, and Paula Bilinsky. Guest editor disclosure: Jennifer Coates received compensation from AED for additional noneditorial support for the management of the supplement publication; Edward A. Frongillo has no relationships to disclose; Anne Swindale is Deputy Director of the Food and Nutrition Technical Assistance Project and is employed by the Academy for Educational Development; Beatrice Lorge Rogers has no relationships to disclose; Patrick Webb has no relationships to disclose; and Paula Bilinsky is an employee of AED.
[2] Author disclosure: J. Coates, E.A. Frongillo, P. Webb, B.L. Rogers, see above; P.E. WIlde and R.F. Houser, no relationships to disclose.
[3] To whom correspondence should be addressed. E-mail: jennifer.coates@tufts.edu.

0022-3166/06 $8.00 © 2006 American Society for Nutrition.

Measure (HFSSM)[4] without considering whether it validly reflects the food insecurity experience of households in these other countries. An efficient and valid method for determining the content of measures should be driven by what can be assumed about the household-level experience of food insecurity, regardless of who suffers and where. Before now, however, no analysis of this sort has been done.

This paper explores the commonalities in how the experience of food insecurity has been captured in measures validated for different cultures, through a comparative analysis of existing food insecurity scales and related ethnographic data. The first part of the paper uses the constant comparative method (12–14) to identify elements of the food insecurity experience and to determine which of these have (and have not) been detected across a range of very different cultures. The second half of the paper uses survey data to assess similarities in the relative frequency with which households from diverse cultures respond to questions about common food insecurity experiences. The purpose of the second half is to ascertain whether households follow a similar hierarchy of behavioral and perceptional responses in dealing with their insecurity. Based on the results, the authors hope to generate a framework of those elements of the food insecurity experience that should be considered as the starting point for measurement and programming in any context.

U.S. and developing country concepts and measures of food insecurity

The household food insecurity experience. United States and developing country concepts of food insecurity have, until recently, had a parallel but largely distinct evolution. Before the early 1980s, food *availability* was considered the limiting factor in achieving food security in developing countries, and the natural extension of this paradigm was to measure it through tallies of the national or global food supply. In large part as a result of Sen's (15) groundbreaking work on entitlement theory, along with perceptions that the global food crisis of the 1970s was easing, policy attention shifted to recognize the importance of sustained household-level food *access*. Though household-based measures strived to respond in tandem, there remained confusion over the relationships between "insecure access" and food consumption, poverty, and malnutrition. Though the World Food Summit (WFS) declared that food security at any level was achieved only when "all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (16), household food insecurity in developing countries is still commonly measured through income, consumption, and even anthropometric indicators that are only distantly, or partially, related to the concept as it was defined by the WFS.

In a land of plenty such as the United States, issues of food availability and utilization were never as pressing as in developing countries, and the primary focus of definition and measurement was on household-level access. The United States did, however, experience a similar struggle to distinguish concepts of "hunger," "food insecurity," and "malnutrition" (17). The current understanding of household food insecurity in the United States was largely influenced by the work of Radimer et al. at Cornell (18,19) and the advocacy-oriented Community Childhood Hunger Identification Project (CCHIP) (20). Through qualitative research with women in rural New York, researchers at Cornell determined that food insecurity, at least in U.S. households, is experienced in 4 primary domains: *1*) *Uncertainty* or worry over food; *2*) Food is of inadequate *quality;* *3*) Food is of inadequate *quantity;* or *4*) Food was acquired through *socially unacceptable* means.

The work of Radimer et al. (18,19) demonstrated that, at least for a small population of women in the United States, household food (in)security is a complex and meaningful *experience* (rather than "merely" a policy goal) that is related to, yet distinct from, poverty or malnutrition. It suggested that these 4 domains should form the starting point for defining and measuring U.S. household food insecurity more directly than had been done before.

Influenced by these findings, an Expert Panel of the American Institute of Nutrition working with the Life Sciences Research Office formalized a definition of food insecurity, which states that it "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" (21). This definition, these domains, and items representing these domains formed the basis of official efforts by the U.S. Department of Agriculture (USDA) to develop a national household food insecurity scale (22). The US HFSSM asks respondents 18 items that represent the range of their experience. Responses are summarized in a scale to provide a useful continuous measure of the phenomenon and in categories that provide indicators of grades of food insecurity. Since 1995, the U.S. survey data have been used to report national food insecurity prevalence and to monitor the effects of food assistance programs on household food security. The remainder of this paper focuses exclusively on the access dimension of food insecurity, that is, the experience by households and individuals whose access to a secure food supply has been jeopardized.

Food insecurity as a managed process. The research of Radimer et al. (18,19) reinforced the observation, already common in developing country literature, that food insecurity is largely a "managed process" (see 23–25). That is, people are not passive victims of sudden events but are active participants in responding to the risks that they face in their daily lives. Though Radimer et al. (18,19) observed idiosyncratic differences in the management process across households, they also noted a general pattern to the response. In other words, not all households manifested each food insecurity element, but certain elements were commonly experienced as a situation grew more severe. The authors observed that when households' livelihoods were threatened or constrained, they first experienced *worry* about where they would obtain sufficient food and then attempted different *strategies to augment their food supply*. If the condition continued, they often compromised the *quality of the food* consumed by the household. Women were likely to *sacrifice the quantity* of the food they consumed, whereas children's food quantity and eating patterns were disrupted only under very severe circumstances.

The notion of *orderliness* or *predictability* to the food insecurity response has influenced both U.S. and developing country attempts to measure food insecurity along a range of severity. In the United States, the observation of orderliness drove the USDA's choice of statistical model, the Rasch model, to guide the development of the U.S. 18-item food insecurity scale (22). During the Sahelian famines of the 1980s, monitoring changes in the progression of "coping strategies" in the face of acute shocks was thought to provide potentially useful information that could trigger a humanitarian response (see

[4] Abbreviations used: CCHIP, Community Childhood Hunger Identification Project; CSI, coping strategies index; FIVMS, Food Insecurity Measurement and Validation Study; USDA, United States Department of Agriculture; US HFSSM, United States Household Food Security Survey Measure; WFP, World Food Programme; WFS, World Food Summit.

23–25). During the late 1980s, the measurement of coping strategies began to be codified into food security and nutrition monitoring and early warning systems and vulnerability assessments (see 26–33).

However, whether households across different cultures or even within the same culture follow any fundamentally similar response pattern when confronted with a food-related constraint remains a debate. Comparing the results of food insecurity scale applications in the United States and Quebec, Canada, Frongillo (34) reported that the response pattern was similar across these locales. Though the US HFSSM assumes the same response pattern for all households at the same food insecurity level, Wilde (35) has shown significant differences in response patterns between households with and without children. Maxwell and colleagues' method of generating their coping strategies index (CSI) (32,33,36) assumes that the severity implied by a given strategy differs from 1 context to the next.

Coping strategies, though, are but 1 component of the wider food security conceptualization, and therefore, it is possible that there is a more fundamental pattern, a "deeper structure" to the order or intensity at which these household food insecurity elements are experienced that may be universal. Knowing whether or not there is such a fundamental pattern that transcends culture is important for understanding and predicting individuals' responses to food insecurity, for drawing comparisons across cultures, and for measuring them in a scale.

Data

Cross-country analysis data. Studies were identified that either *1*) explored a culture's food insecurity experience to measure it or *2*) tested the relevance of the US HFSSM to apply it in a different culture. To ensure that these studies reflected the food insecurity experience of the culture they were researching, only those scales that had been tested for face validity (e.g., through focus groups, literature review, expert opinion, key informant interview, or cognitive debriefing) were included in the analysis. A candidate scale also had to have demonstrated some additional assessment of validity. Studies that used the US HFSSM verbatim or through direct translation, without any attempt to validate it, were excluded. Applications of the CSI, though it is commonly used by organizations such as the World Food Programme (WFP) and CARE, were not included because the content and method for generating the CSI are not perfectly comparable to the US HFSSM approach.

Table 1 presents a list of the studies that met the cross-country analysis selection criteria. Key characteristics of selected studies are presented in **Table 2**. A pool of 22 different applications of validated food insecurity scales or ethnographies from 15 different countries was included. Eleven of the studies produced scales that were direct translations or slight adaptations of the US HFSSM items but had undergone at least minimal testing for content validity. An equal number of studies used in-depth ethnographic methods to elicit an understanding of the food insecurity experience. Seven of these studies built on an initial phase of qualitative research to develop and validate food insecurity scale items. The geographic coverage of the sample was broad, with 63% deriving from developing countries in Africa, Latin America, and Asia. Nearly all of the studies were undertaken by universities either alone (45%) or in conjunction with government (9%) or practitioner organizations (36%).

Bangladesh food insecurity measurement and validation study data. Data from the cross-country analysis were augmented with detailed ethnographic data from the Bangladesh Food Insecurity Measurement and Validation Study (FIMVS). The FIMVS, conducted by Tufts University between 2001 and 2003, and a parallel initiative conducted by Cornell in Burkina Faso (37), were undertaken to explore the experience of developing country household food insecurity for measurement purposes and to test a process for developing valid household food insecurity scales. The qualitative elements of the Bangladesh FIMVS data set provide a rich source of insights into how household food insecurity is defined and experienced outside the United States. These data are presented here for the first time to provide a contextual illustration of findings from the cross-country analysis. The data collection methods for the 3-year Bangladesh FIMV study have been reported in detail elsewhere (38).

TABLE 1

List of studies and countries included in cross-country analysis

No.	Study reference	Country/population
1	Radimer et al. 1992 (19)	US: Rural New York
2	Wehler et al. 1992 (20)	US
3	Hamilton et al. 1997 (22)	US: National
4	Kendall et al. 1995 (54)	US: Rural New York
5	Coates et al. 2003 (38)	Bangladesh
6	Frongillo and Nanama 2004 (37)	Northern Burkina Faso
7	Parnell 2001 (46)	New Zealand
8	Wolfe et al. 2003 (55)	US Elderly
9	Quandt et al. 1999 (56)	US Elderly
10	Frongillo et al. 2003 (2)	Bangladesh
11	Hamelin 1999(42)	Quebec, Canada
12	Studdert et al. 2001 (6)	Indonesia
13	Ruel and Menon 2003 (10)	Haiti
14	Welch 1998 (44)	Russia
15	Lorenzana and Mercado 1999 (7)	Venezuela
16	Perez-Escamilla et al. 2004 (5)	Brazil
17	Raj and Satpathy 2002 (57)	India
18	World Bank study in Nord et al. 2002 (41)	Kampala, Uganda
19	Melgar-Quinonez et al. 2004 (11)-A	Bolivia
20	Melgar-Quinonez et al. 2004 (11)-B	Ghana
21	Melgar-Quinonez et al. 2004 (11)-C	Philippines
22	Melgar-Quinonez et al. 2004 (11)-D	Burkina Faso

TABLE 2

Key characteristics of cross-country sample

Sample characteristic	*n* = 22	%
Study method		
Ethnography-grounded scale	7	32
Ethnography only	4	18
Adaptation of US HFSSM	4	18
Translation of US HFSSM	7	32
Region		
Africa	4	18
S. Asia and Pacific	6	27
Latin America	4	18
North America	7	32
Eastern Europe	1	5.0
Implementing institution		
Implementing organization	1	5.0
Government	1	5.0
University	10	45
Univ/govt partnership	2	9
Univ/implem.org. partnership	8	36

Data analysis methods

Elements of the household food insecurity experience. The guiding framework of this cross-country analysis is shaped by the linguistic school of thought that suggests that there is a "syntactic base of language," called "deep structure" . . . that consists of a "series of possibly universal rules," which form the basis on which words and pronunciations are overlaid to result in a sentence (39). As suggested in **Table 3**, we hypothesize that there are 3 levels of the household food insecurity experience. At 1 level are core household food insecurity experiential domains, the "deep structure," which are invariant across cultures. We also contend that there are a host of more superficial components of these domains, "subdomains," that may be of common concern across most, but possibly not all, cultures. We expect that, at the most superficial level of expression, specific questions and statements that might form items in a questionnaire will likely differ according to culturally specific characteristics such as preferences and language.

The content analysis of the cross-country sample of studies followed the 3-phase process of data reduction, display, and conclusion/verification outlined by Miles and Huberman (40). The first phase used the constant comparative method (12–14) to assign a code to the sentences or phrases in the ethnographic accounts. A preformed list of codes that represented the 4 U.S. food insecurity domains was used at the outset, and additional codes were added as 1 or more different labels were found to better describe certain phrases. In the second analysis phase, phrases were clustered by code and displayed in a matrix that grouped them according to the domain or subdomain they appeared to represent and by the original country or study from which they were derived. This display format facilitated an understanding of the experiential domains, subdomains, and items that were detected in each study.

During the "conclusion and verification phase," this matrix was analyzed to determine the extent to which each domain or sub-domain was present across the 22 studies. A domain or subdomain was considered "present" in a study if it was represented by 1 or more related scale items or ethnographic phrases. A domain or subdomain was considered "common" across studies if it was present in all or in all but a few studies. Inevitably, this approach, coupled with these data, was useful for determining whether a domain or subdomain mentioned in most studies is a common food insecurity element but was not as useful for concluding that a domain or subdomain *not* measured in a study was *not* a relevant part of the food insecurity experience in that culture. Thus, if a domain or subdomain was not present in some of the studies, accompanying qualitative data and methods were reviewed in an attempt to determine whether the domain or sub-domain was either *1*) *not characteristic of* the food insecurity experience in that culture, *2*) characteristic of, but *not specific to*, food insecurity in that culture (meaning that it may not discriminate the food insecure from the food secure), or *3*) not included in the scale because of some methodologic consideration unrelated to the "true" food insecurity experience.

The analysis of the Bangladesh FIMVS qualitative data followed the same 3-phase process described above. Individual focus group transcripts were divided and analyzed in 3 sets according to whether participants were food secure, moderately food insecure, or severely food insecure (as rated the previous year by enumerators). In the second phase, coded elements were grouped in the matrix by each of these 3 categories. The conclusion/verification phase followed the same procedure described previously.

A common predictable response to food insecurity? The analyses in the second half of this paper explore whether there are commonalities in the way in which households from different cultures respond to food insecurity. In other words, given an increasingly severe food or budget constraint, are culturally different households likely to respond to their situation using not only a similar set of responses but also in a similar sequence?

An ideal way to address this question would be to use comparative qualitative narratives or longitudinal survey data to see whether conditions were worsening and, if they were, to study whether households at the same starting level of food insecurity responded to worsening conditions the same way. However, to our knowledge such comparable qualitative narratives or longitudinal data do not exist. An alternative approach would be to simulate worsening conditions by studying households at different levels of food insecurity and by comparing their response patterns across cultures. These household-level data were available only for the Bangladesh FIMVS study and are described below. Given data limitations, this study relied on population-level data, which yielded information on the relative frequency at which the population affirmed items representing different food insecurity domains. Per Frongillo (34), items with higher response frequencies were considered indicative of less severe household food insecurity than items with lower response frequencies. It was also assumed that there was a positive relationship between the severity of the item and its position in the food insecurity response; that is, more severe strategies (i.e., with lower response frequencies) would, on average, be resorted to after less severe strategies, given the same, or more severe, food access constraint over time.

Only those items that were worded identically or nearly identically across studies were considered for the analysis. First, the response frequencies of 4 items representing 3 different domains of food insecurity (uncertainty and worry, inadequate quality, and insufficient quantity), plus 1 potential consequence of food insecurity, "hunger," were plotted, and their relative frequencies were compared across studies. Next, the item response frequencies of 3 items representing the "insufficient quantity" domain plus "hunger" were plotted and compared the same way. For each of the 2 sets of comparisons, inconsistencies in the relative frequency of item response sets among studies were taken as evidence of different food insecurity response processes across cultures.

The Bangladesh FIVMS study data were then examined for a more complete picture of the sequencing of household responses. The household raw score was held constant, and the frequency of responses to each item by raw score was examined to gain a better picture of how Bangladeshi households at different levels of food insecurity responded to their situation.

TABLE 3

Levels of the household food insecurity experience across cultures

Level	Description	Illustration
Core domains	The deepest structure, the universal food insecurity experience	Inadequate quality
Subdomains	Elements of core domains that are likely to be of concern in many, but possibly not all, cultures	Lack of dietary diversity
Items	Expression of subdomains using culturally relevant examples and language	Could not eat more than rice and vegetable curry.

Based on U.S. food insecurity data, it was hypothesized that Bangladeshi households would demonstrate a similar pattern, in that those affirming only 1 item would most likely say that they had worried, households at lower food insecurity levels would reduce the quality of the food, whereas households at higher food insecurity levels would reduce quality and cut the size and then number of meals (quantity). Finally, only the households with the highest food insecurity score would be likely to eat socially unacceptable food, to go hungry, or to not eat for the entire day.

RESULTS

Elements of the household food insecurity experience

Tables 4 and **5** summarize the experiential domains and subdomains that were detected in the cross-country analysis along with illustrations of the specific scale items that commonly represented each of these subdomains. **Table 6** displays a matrix indicating which domains and subdomains were present in each study.

Uncertainty and worry about food. In this sample, the domain of uncertainty and worry about the food supply was detected in 18 of the 22 studies. Notably, 3 of the studies in which uncertainty and worry items did not appear [Uganda (41), Venezuela (9), Indonesia (6)] used scales that were translations of some, but not all, items in the US HFSSM. Because very little or no qualitative work was done to prepare these scales, it is likely that the uncertainty and worry dimension was excluded not because of the irrelevance of uncertainty and worry in that culture but because of a lack of attention by the researchers to content validity. The fourth study, by Frongillo et al. in Bangladesh (2), used a naturalistic approach in Bangladesh that did not detect any discussion of worry. However, the Bangladesh study by Coates et al. (38) (**Table 7**) clearly identified a preoccupation among respondents about where their food would come from, which suggests that a given implementation of the naturalistic approach is not always sufficient to uncover all domains or subdomains that are relevant features of food insecurity in a particular culture.

Food-related uncertainty and worry at the item level was expressed very similarly across studies as either "worries about food running out," "worries that the food won't last," or fears that the respondent "doesn't know where it will come from." Respondents in the Coates et al. study (38) **(Table 7)** described an atmosphere of uncertainty that drove them to worry about their ability to command food in the near-term: "As soon as we have procured food for 1 meal, we need to worry about the next meal," as well in the unspecified future: "We worry about the future, as to how we will run our family, how we will obtain food." Though food was commonly described as the primary preoccupation, respondents also worried about how to balance the demands for food with other basic needs: "We also worry about clothing and about how to repair our home and keep our

TABLE 4

Core household food insecurity experiential domains, subdomains, and sample items from cross-country analysis

Domain							
Uncertainty and worry		Inadequate quality		Insufficient quantity		Socially unacceptability	
Subdomain	Sample item	Subdomain	Sample item	Subdomain	Sample item	Subdomain	Sample item
Worry about food in near term.	I worry about where the next day's food is going to come from.	Not eating balanced meal/ Not eating healthy and nutritious diet/ Not eating properly	Did you feel you could not afford to eat properly?	Reports of running out of food	Did the food you bought not last, and you didn't have money to buy more?	Socially unacceptable means of acquiring food	Did you ever have to work in the fields with men?
Long-term uncertainty	When you have some money, do you spend the money for more food or save it for the lean period?	Limited within- or between-meal variety	Did you cook the same food day after day?	Perception that quantity of food consumed was not enough	Do you eat less than you think you should because you don't have enough money for food?	Eating socially unacceptable foods that cause shame or embarrassment	Did you have to eat wheat gruel because there was no money for other food?
		Eating less preferred foods/less expensive, luxurious, or socially preferred	Did you have to eat wheat (or another grain) although you wanted to eat rice?	Had to eat less or not at all	Did you personally eat less food so that there would be more for the rest of the family?		
		Eating socially unacceptable foods that cause shame or embarrassment	Did you have to eat rice starch because you lacked money for food?	Had to disrupt typical meal patterns	Since the last harvest, did you or any other adults in your household reduce the number of their daily meals?		
		Unsafe or not fresh food	Were you not able to cook hot rice?				

TABLE 5

Proximate consequences of household food insecurity

Physical consequences of food insecurity		Psychological consequences of food insecurity	
Subdomain	Sample item	Subdomain	Sample item
Hunger	Did your child complain of hunger for lack of food?	Perceived lack of control over food situation	How can we expect to change our situation?
Weight loss	Did you lose weight because there wasn't enough food?	Feelings of powerlessness, guilt, shame	Did you ever feel ashamed that you could not give your children the foods that they wanted?

children alive." In some cases, respondents reported that their uncertainty over their food supply was responsible for severe psychological distress and insomnia: "We worry so much that we cannot even sleep at night. We remain worried all the time."

Uncertainty over the food supply is central to the concept that household food insecurity scales seek to measure; this is the domain that most closely approximates perceived or actual vulnerability or food "insecurity" itself. Exposure to risk coupled with uncertainty about the future and the ability to manage it is likely to prompt the types of behaviors captured through other items in the scale. In other words, whether or not any adversity is actually experienced, merely the fear that supplies could be disrupted can provoke food intake reductions or a divestment response (1).

Inadequate food quality. All of the 22 studies in the sample contained items pertaining to the domain of inadequate food quality. The subdomains that were detected across the range of studies were *1*) not being able to eat a healthy, well-balanced, nutritious, or "proper" diet, *2*) having to eat a diet with little within- or between-meal variety, *3*) eating less preferred foods (either less expensive or socially less preferred), *4*) having to eat foods that are socially unacceptable and embarrassing or shameful, or *5*) having to eat foods that are not fresh or safe.

The most common expression of inadequate quality had to do with not being able to eat healthy or proper diets (16 of 22 studies). Thirteen of the 22 studies referred to eating diets that lacked variety. Only in the Bangladesh FIMV study (38) and Burkina Faso (37) did the issue of eating less preferred and/or socially unacceptable food emerge from the qualitative work, possibly because these societies tended to be the least food secure as a whole, and households that had experienced eating socially unacceptable foods were the least well off of the group.

TABLE 6

Presence of household food insecurity experiential domains and sub-domains across country studies

	Study type, *(reference number)*[1]																				
	Ethnography-grounded scale							Ethnography only				Adaptation of US HFSSM					Translation of US HFSSM				
Domain/subdomain	(19)	(20)	(22)	(54)	(38)	(37)	(46)	(55)	(56)	(2)	(42)	(6)	(10)	(44)	(7)	(5)	(57)	(41)	(11)-A	(11)-B	(11)-C	(11)-D
Uncertainty and worry	X		X	X	X	X	X	X	X		X	X	X	X		X			X	X	X	X
Worry about food in near term	X		X	X	X	X	X	X	X		X	X	X	X		X			X	X	X	X
Long term uncertainty					X																	
Inadequate quality	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Not healthy or proper	X		X	X	X	X	X	X			X	X		X		X	X		X	X	X	X
Limited variety		X	X	X	X				X	X	X	X	X			X			X	X	X	X
Less preferred					X	X		X	X	X	X		X		X			X				
Socially unacceptable food					X	X		X														
Not fresh or safe					X				X	X	X											
Insufficient quantity	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Running out of food	X		X	X	X		X	X	X	X	X	X		X	X	X			X	X	X	X
Quantity of food not enough	X	X	X	X	X	X		X	X		X	X			X		X	X	X	X	X	X
Eating less		X	X		X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X
Skipping meals		X	X		X	X				X	X		X		X	X	X		X	X	X	X
Socially unacceptable acquisition					X		X	X			X											
Other																						
Resource augmentation strategies					X	X		X	X	X	X			X				X				
Hunger and physical consequences	X	X	X	X	X			X				X	X	X	X				X	X	X	X
Psychological consequences								X			X											

[1] See Table 1 for study details.

TABLE 7

Qualitative illustrations of the experience of food insecurity by domain from participants in the Bangladesh FIMV study

Domain	Food secure	Moderately food insecure	Severely food insecure
Inadequate quality	With rice we eat fish, meat, lentils, vegetables. Besides this we eat: payesh [sweet milky rice dish], yogurt, banana and milk, molasses or sugar with rice. We eat meat 4–5 times in a month. There is no food that we would not have liked to eat if we had more money.	With rice we eat taro leaf, eggplant, fish, dal, beans, sweet gourd, pumpkin. We take meat once in a month. [If we had more money] every day we would have eaten a good meal and fed our children properly.	During the lean period, we can purchase rice and nothing else. We can never eat milk, meat, or banana. You know we cannot take fruits like apple, orange. We have meat one or two times in a year. If we had a lot of money we would not have eaten leaf of kotchu, its inner part, mashed garlic, jute lead, wheat gruel, rice starch, or core part of the banana tree, pumpkin.
Insufficient quantity	We always have 3 full-stomach meals. Moreover every day we eat a snack in the afternoon. We can always cook according to our requirement. All members eat 3 full-stomach meals.	We usually eat 2 full-stomach meals, and in the other meal we eat less. I have a son who pulls the rickshaw, so he gets the most. I know that I must keep food for my children even if I have no food at all.	During the harvest when our husbands have jobs we can sometimes eat 2 full-stomach meals per day. We women remain at home, so even if we are hungry we can tolerate it. The male, he works so he can earn money and procure food for his family, so he gets more food.
Uncertainty and worry	We do not need to worry where food will come from.	If we do not have a full-stomach meal we become worried. We would not worry if we had enough food to eat.	We worry so much that we cannot even sleep at night.
Social unacceptability	We only do our own household work, nothing so embarrassing.	After the 1988 flood, I washed katha [thin quilt], chopped wood, washed floor. I do not do such work now.	Though it's shameful, sometimes I need to beg rice from my neighbors.

Only in Brazil (5), Bangladesh (2,38), Quebec (42), and a study of the U.S. elderly (43) did issues of food freshness and safety emerge explicitly during the qualitative inquiry.

Though the core domain of inadequate quality was common to all studies, not every subdomain was detected in each study. In some cases these subdomains were not present for a valid reason; for instance, in many countries, including the United States, both food-secure and -insecure households are likely to worry about the safety and freshness of their food supply; thus, this subdomain does not always characterize *only* the food insecure. In other cases, these subdomains were not present because of some methodologic artifact. For instance, scales that were adapted directly from the US HFSSM use the same items or a shortened set of items for the sake of brevity. Thus, if a subdomain was not originally represented in the U.S. scale, then it would not show up in one of the adaptations.

Although the adequate quality domains and subdomains were similar across the sample, there were important differences in how the questionnaire items were expressed. Several studies framed the quality items very generically without culturally specific markers. Other studies used locally relevant references or language. For instance, in Burkina Faso (37), the "inadequate quality" domain was assessed using culturally specific items related to the consumption of foods out of reach of the most insecure, including meat, milk and fish. Bangladesh FIMVS respondents discussed their frustrations about not being able to eat luxury foods (*"bhalo mondo"*), items that the wealthier villagers could afford regularly: "If we had a lot of money we would cook *bhalo mondo* every day. We cannot eat so many things because of lack of money. If we had money we would eat whatever we prefer. We would eat chicken, *polao*, and fish." Like the food-insecure individuals interviewed in several other countries, these Bangladeshis referred to the monotony of their diets and to the distressing inability to eat healthy and nutritious food: "During the lean period we can purchase rice and nothing else"; "There are many fruits in the market, and if we could buy them we would have got more nutrition." Respondents who had been classified as the most food insecure by enumerators also described having to eat foods that were inferior, such as wheat gruel, the core of the banana tree, rice starch, and certain wild greens, that they would not have eaten if there had been any other choice.

Insufficient food quantity. The analysis detected evidence in every study in the sample that having an insufficient quantity of food (for any or all members of the household) is an important part of the food insecurity experience. The 2 subdomains that were common to 21 of 22 studies were either *1*) reports of running out of food or *2*) perceptions that the quantity of food consumed was "not enough" or that household members could not eat as much as they should or wanted. Two additional subdomains were found in most studies: *1*) having to eat less or not at all (in 17 studies) and *2*) having to disrupt typical meal patterns by reducing the number of meals consumed each day (14 studies). Certain subdomains, such as not having "enough" food, are perceptional in nature. Other subdomains, such as reported reductions in the size and quantity of meals, are common observable behaviors that are very closely related responses to perceived or actual insufficiency.

As with many of the inadequate quality subdomains, the fact that not all insufficient quantity subdomains were present across each study seems to relate primarily to the methodologic considerations involved in creating a scale of severity. For instance, because the original Radimer scale (19) contained items about perceptions but not self-reported behaviors, no food insecurity

scale modeled purely on the Radimer example (e.g., the Russia scale (44)] includes items related to eating less food or skipping meals.

Insufficient quantity items were remarkably similar in all but a few studies in which they were expressed using local concepts. In Bangladesh, food-insecure respondents commonly expressed the concept of sufficient quantity as, "*pet pure khaoa*," or satisfying meals that met their requirement: "We can never eat 3 full-stomach meals. During the lean period we eat only 1 meal in a day. In the rest of the year we have 2 full-stomach meals every day." By contrast, food-secure households reported always eating "to their requirement" and even turning food away in the summer when the heat suppressed their appetite.

Social unacceptability. The domain of "social unacceptability" that emerged in the U.S. qualitative work related to the means by which households procure food. In other countries, social unacceptability was a subdomain of both the types of food consumed (see *Quality*) and of those procurement or allocation strategies that were not culturally normative. Although the subdomains "eating socially unacceptable food" and "acquiring it in unacceptable ways" were detected in each of those studies with an ethnographic component, the domain was not represented by items in any of the scales. For instance, no study asked explicitly (generically) whether the household had to eat "unacceptable food" or "engage in an unacceptable procurement strategy." One reason for omitting or excluding the social unacceptability domain from a study is that these types of items, if not handled carefully, are too sensitive to be asked outright. For instance, this type of item tested in a survey setting in Bangladesh garnered nonresponse and discomfort. When these concepts were explored qualitatively by enumerators who had established a relationship with villagers, the respondents were much more willing to share their specific socially unacceptable experiences.

Thus, the concept of social unacceptability is *implicit* in many of the scale items pertaining to specific management strategies that are outside of culturally normative patterns of behavior. In fact, this context-specific concept of "unacceptability" influences the likelihood of a strategy being adopted in different cultures. At this item level, there are significant differences in what is considered "culturally unacceptable" in different societies. In the United States, for instance, such unacceptable practices included visiting food pantries or borrowing from neighbors, whereas in Bangladesh accepting food aid or borrowing were typical. Unacceptable strategies in Bangladesh included women "working alongside men in the fields," "working in the houses of wealthier neighbors," or begging and stealing.

Social unacceptability is one important factor that distinguishes coping strategies that are a sign of more severe food insecurity from other "strategies to augment the resource base" (22), more "permanent adjustments to food production" (33), or "adaptive," "diversification," and "insurance" strategies (45). Though the relative acceptability of strategies differ from 1 context to the next, a general typology of strategies emerged from the content analysis of the 22 different studies: *1*) borrowing, *2*) accepting external transfers, *3*) reducing consumption, *4*) redistributing consumption, 5) divesting of savings or assets, and 6) scavenging/stealing.

Consequences of insecurity

Alienation. A qualitative study by Hamelin et al. (42) on the food insecurity experience in Quebec produced findings similar to the United States–based work. They also identified what they conceived as an additional core domain of food insecurity: namely, alienation, or a "state of frustration due to being deprived of access to food and subjected to unmodifiable conditions." This experiential domain may arguably be considered a closely related consequence of food insecurity, rather than a core element of the experience itself. The subdomains of this domain were described as *1*) feeling a lack of control over the food situation, including feelings of powerlessness, guilt, shame, inequity; and *2*) The need to hide the situation from others. Hamelin et al. (42) hypothesized that alienation was an element that would afflict only residents of industrialized countries where food is plentiful and food insecurity relatively scarce. And yet, though no other food insecurity scale contained items that pertain to alienation, certainly in the Bangladesh FIMVS ethnographic investigation (Table 7), respondents expressed feeling similarly ashamed and helpless for not being able to provide for themselves or their families. Other evidence suggested that elaborate strategies to hide their situation from others are not characteristic of food-insecure Bangladeshis. In that country, the situation of most households in the village was known to all. In fact, male and female villagers, in separate food insecurity–ranking exercises, produced nearly identical groupings of households and their corresponding food security level.

Hunger and other physiological consequences. Nineteen of the 22 studies asked about "hunger," and others also inquired about weight loss, insomnia, and stress. In the United States, hunger is conceptualized as the most severe manifestation of food insecurity; thus, scales modeled on the U.S. example included hunger items, whereas others omitted them. These physical and psychological manifestations are more appropriately conceptualized as a *consequence* of the perceived or actual inability to acquire sufficient, socially acceptable, quality food rather than a core manifestation of food insecurity itself.

Results: a common predictable response to food insecurity?

Figure 1 presents a comparison, among those 11 studies with similar items, of the relative response frequencies of 4 items pertaining to the domains of worry, eating lower quality food, eating less food, and a potential consequence, "feeling hungry." Under the assumption that prevalence is inversely related to severity, there is a trend across 6 of the studies for worrying to be the least severe (most prevalent) domain of household food insecurity, followed by cutbacks in food quality, eating less food, and feelings of hunger. This suggests that there are definite similarities in how households in different countries manage (or fail to manage) food insecurity. However, there are also inconsistencies in this pattern in the remaining studies. For instance, we see that worry is not the least severe domain in the Melgar-Quinonez et al. study in Burkina Faso (11) or in New Zealand (46). In this Burkina Faso study, worrying marks a

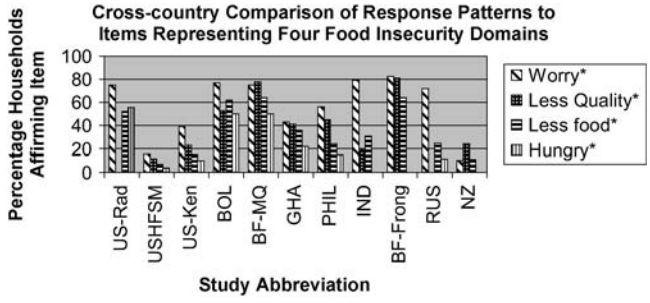

FIGURE 1 Cross-country comparison of response patterns to items representing 3 food insecurity domains and hunger.

more severe situation than eating food of inadequate quality. And in Frongillo and Nanama's Burkina Faso study (37), eating food of inadequate quality is nearly as severe as worrying. In New Zealand, worrying is as severe as eating less food.

Figure 2 compares the item response frequencies of studies that inquired about 3 different subdomains of insufficient quantity plus hunger. In every study country except Ghana (11), eating less food in a meal was a less severe indication of insecurity than skipping meals, and skipping meals was less severe than not eating for an entire day. Hunger, however, was not always the most severe manifestation of food insecurity as it is conceptualized in the United States. In Haiti and Bolivia, hunger was reportedly more prevalent than eating less food. In the study that asked each of the 4 items in 4 countries, Bolivia, Burkina Faso, Ghana, and the Philippines, hunger was, not surprisingly, more prevalent than skipping food for an entire day (11).

Table 8 provides greater detail of the household item response pattern that was reported by Bangladeshi FIMVS households. Contrary to the hypothesis that households would be more likely to worry before taking actions to change their diets, of those that responded affirmatively to only 1 item, for 87.5% of households this item related to eating lower quality food rather than worrying. Of those responding affirmatively to 2 items, more households reported eating less food (73.8%) than worrying (32.5%). At the raw score level of 3, the pattern is more in line with what was observed in the United States because many more households reported worrying, eating lower quality food, and eating less food than any other behavior. Interestingly, of those households that responded affirmatively to 4 items, more households reported eating socially unacceptable foods (94.2%) than skipping meals (13%).

Though the evidence from across countries suggests that households tend to worry before cutting quality, and reduce quality before reducing quantity in progressively severe circumstances, there are exceptions that suggest that this is not an entirely universal pattern. The differences in how the process unfolds may be influenced by factors such as the availability, sustainability, and acceptability of a management strategy, the commitment to future productivity, the level of prior asset endowment, the availability of information, the degree of perceived risk, and the human capacity of the household members to utilize strategies at their disposal.

There may be other factors as well. In countries such as Bangladesh, where households were much more likely to cut the quality and even quantity of food than to worry, the women may have been reluctant to express this emotional side of food insecurity, or it did not preoccupy them as much as rationing and allocating available food within the household. Women often spoke of "Allah's will" when questioned about their perceptions of their future food situation. It could be that this fatalistic approach and belief in a supreme power mitigates the psychological consequences that a perceived lack of control otherwise incurs. Additional research from the Bangladesh FIMVS suggests that there are also gender differences in the level of expressed worry about food experienced by members of the same household (47).

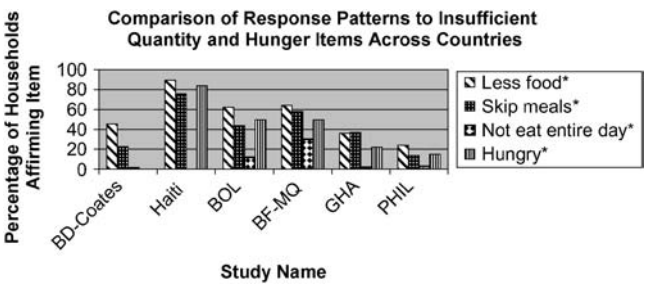

FIGURE 2 Cross-country comparison of response patterns to insufficient quantity and hunger items.

DISCUSSION

A primary objective of this exploration of commonalities in household food insecurity measurement across cultures was to assess whether there was a common core of the experience that could be used as the basis for a generic household food insecurity measure. The paper's finding that there are domains that were common to all or most country measures suggests that it is no longer necessary to develop food insecurity scales entirely "from the ground-up." This evidence also suggests, though, that the US HFSSM (and therefore translations of the US HFSSM) does not adequately represent all potentially important domains and subdomains of the food insecurity experience. These findings suggest that the simplest valid method of developing the content of a comprehensive household food insecurity measure in a new setting is to build on the common set of domains, subdomains, and items identified here rather than starting anew in each context. Based on this paper's analysis, many items representing the different subdomains and domains appear to be useful candidates for a generic measure.

Because this study found that the same perceptions and behaviors do not necessarily indicate the same *degree* of relative household food insecurity severity from 1 culture to the next, caution must be taken in generalizing the meaning of a scale's response patterns for certain measurement purposes. For instance, because of differential response patterns, it is not possible, at present, to create universal cut-offs using the affirmation of specific items to indicate the transition across a threshold from food secure to moderately insecure or from moderately insecure to severely insecure, as was done in the US HFSSM.

This exploratory study is limited in the extent to which it can generalize about the universal household food insecurity experience from how it has been previously measured. Based on the cross-country scale data alone, it is not possible to claim with certainty that a domain or subdomain that is *not* represented in a scale is *not* part of the food insecurity experience in the country. In order to be certain, a confirmatory approach is needed to assess the relevance across cultures of each of the domains and subdomains listed here and to evaluate the appropriateness of potentially generic questionnaire items. That said, in only 2 instances, however, did qualitative evidence indicate that a subdomain was not present in a scale because it was either not a part of the food insecurity experience in a culture (e.g., need to hide food insecurity from others) or it was not universally specific to the food-insecure household (e.g., worry over food safety).

In all other cases, it appears that domains and subdomains were not measured for some surmountable methodologic reason (e.g., because they were difficult to convey in a culturally sensitive way or they had not been detected through the open-ended naturalistic approach used in the "ground-up method" of scale development). Most commonly, domains and subdomains were not measured when capturing all important aspects of the construct was not made a priority [violating a fundamental prerequisite of content validity (48,49)]. In such cases, the reason for "missing" domains or subdomains appears to be the overriding influence of the US HFSSM as the model that continues to be translated or slightly adapted for other cultures (meaning that if something is not present in the U.S. scale, it is

TABLE 8

Percentage of Bangladesh households responding affirmatively to selected items, among households that share the same food insecurity raw score

	Households affirming item, %					
HH raw score (n)	Worry	Less quality food	Less food	Skip meals	Socially unacceptable foods[1]	Not eat whole day
1 (144)	4.2	87.5	4.9	2.8	0.7	0.0
2 (80)	32.5	82.5	73.8	1.3	10.0	0.0
3 (108)	72.2	89.8	95.4	5.6	35.2	1.9
4 (69)	98.6	98.6	95.7	13.0	94.2	0.0
5 (39)	100.0	100.0	97.4	92.3	100.0	10.3
6 (1)	100.0	100.0	100.0	100.0	100.0	100.0
All households (600)	36.3	55.3	45.7	23.0	25.3	1.2

Source: Tufts FSNSP/FANTA data (2001).

[1] Percentage of households responding to at least 1 of 8 items about Bangladesh-specific "inferior" food.

also missing in its progeny). In their search for a single scale with a single statistical dimension, developers of the US HFSSM may have sacrificed aspects of content validity by discarding items that did not meet a unidimensional statistical model of severity along which only certain of these subdomains or domains can be arrayed (50).

Household food insecurity scales provide a very useful summary measure for targeting programs at the population level, for monitoring the household food insecurity situation in an area over time, and for evaluating the impact of interventions. Because of the statistical constraints of a single unidimensional scale, however, rich detail about important elements of the household experience is likely to be discarded or lost in aggregation. Future assessments of the type and extent of household food insecurity affecting a population should maintain data on each of these domains and subdomains in a disaggregated form, possibly using single items or subscales as indicators of the different aspects of the experience. Along with information on the determinants of household food insecurity, these data should help to guide the focus of policies and programs and, possibly, to detect which particular elements of the experience are improved or not through targeted intervention.

Based on these findings, suggested next steps include testing and validating a set of generic items representing these domains and subdomains through cognitive interviewing techniques (51–53). These techniques are intended to ensure that the subdomains, and the items expressing them in a particular context, are understood the same way by both the questionnaire designers and potential respondents. For the purposes of scale creation, the internal consistency and dimensionality of these items should be tested once the same set of items has been administered in different settings. The current work also assumes that household food insecurity is a unitary phenomenon. Future research should investigate the appropriateness of this household concept by comparing the experience by different individuals in the same family. Further research is also needed to investigate the temporal dimensions of insecurity. As with recent research advances that have revealed the dynamic nature of poverty, it is important to understand the common factors influencing the trajectory of individual household food insecurity over time and to better understand the interactions among household food insecurity frequency, duration, periodicity, and severity so that these elements and their household-level effects can be untangled for measurement and programming purposes.

Conclusion: In many developing country contexts household-level food insecurity is still understood, measured, and responded to as a problem of insufficient food quantity. Recent improvements in food insecurity measurement based on understanding the household-level experience have meant that additional elements are increasingly recognized as important, even though they are not always measured or acted on in practice. The analysis presented in this paper is the first time that studies using valid, experience-based scales have been assembled and subjected to an analytic process to identify commonalities and differences in how these elements are experienced, expressed, and managed across cultures. Contrasting the elements in this framework to those that are typically emphasized in measures and in programming highlights the yawning gaps between food access problems and priorities as expressed by developing country households versus how they are treated by those in the global community working to improve the situation. To address such incongruities, the elements of the food insecurity experience that were identified here should be considered as the starting point in future household food insecurity assessments, measurement attempts, and program designs.

ACKNOWLEDGMENTS

We benefited from input by participants at a FANTA-sponsored workshop in April 2004 and from a preliminary, more limited cross-country comparison conducted by Meghan Miller and Siméon Nanama that was presented along with an earlier version of this paper at the same workshop.

LITERATURE CITED

1. Barrett C. Food security and food assistance programs. In: BL Garner, GC Rausser, editors. Handbook of agricultural economics. Amsterdam: Elsevier Science; 2002.

2. Frongillo EA, Chowdhury N, Ekstrom E-C, Naved RT. Understanding the experience of household food insecurity in rural Bangladesh leads to a measure different from that used in other countries. J Nutr. 2003;133:4158–62.

3. Frongillo EA. Commentary: Assessing food insecurity in Trinidad and Tobago. Int J Epidemiol. 2003;32:516–7.

4. Wolfe W, Frongillo E. Building household food-security measurement tools from the ground up. Food Nutr Bull. 2001;22:5–12.

5. Perez-Escamilla R, Segall-Correa AM, Kurdian Maranha L, Sampaio MdFA, Marin-Leon L, Panigassi G. An adapted version of the U.S. Department of Agriculture food insecurity module is a valid tool for assessing household food insecurity in Campinas, Brazil. J Nutr. 2004;134:1923–8.

6. Studdert LJ, Frongillo EA Jr, Valois P. Household food insecurity was prevalent in Java during indonesia's economic crisis. J Nutr. 2001;131: 2685–91.

7. Lorenzana PA, Sanjur D. Abbreviated measures of food sufficiency validly estimate the food security level of poor households: Measuring household food security. J Nutr. 1999;129:687–92.

8. Bernal J, Lorenzana P. Household food security predictors in underprivileged Venezuelan households: Comparison between the Central and Andean regions. Interciencia. 2003;28:15–20.

9. Lorenzana PA, Mercado C. Measuring household food security in poor Venezuelan households. Public Health Nutr. 2002;5:851–7.

10. Ruel M, Menon P. Child care, nutrition and health in the central plateau of Haiti: The role of community, household and caregiver resources. Washington, DC: Food and Nutrition Technical Assistance (FANTA) Project, Academy for Educational Development; 2003.

11. Melgar-Quinonez H. Testing food security scales for low-cost poverty assessment. Columbus: Department of Human Nutrition at The Ohio State University for Freedom from Hunger; 2004.

12. Glaser B, Strauss A. The discovery of grounded theory. Chicago: Aldine; 1967.

13. Strauss A, Corbin J. Basics of qualitative research. Newbury Park: Sage; 1990.

14. Boeije H. A purposeful approach to the constant comparative method in the analysis of qualitative interviews. Qual Quant. 2002;36:391–409.

15. Sen AK. Poverty and famines: An essay on entitlement and deprivation. Oxford: Clarendon Press; 1981.

16. FAO. Rome declaration on world food security, world food summit. Rome: Food and Agriculture Organisation; 1996.

17. Eisinger P. Towards an end to hunger in America. Washington DC: Brookings Institution; 1998.

18. Radimer KL, Olson CM, Campbell CC. Development of indicators to assess hunger. J Nutr. 1990;120:1544–8.

19. Radimer KL, Olson CM, Greene JC, Campbell CC, Habicht JP. Understanding hunger and developing indicators to assess it in women and children. J Nutr Educ. 1992;24:S36–44.

20. Wehler C, Scott R, Anderson J. The community childhood hunger identification project: A model of domestic hunger–demonstration project in Seattle, washington. J Nutr Educ. 1992;24:29S–35S.

21. Life Sciences Research Office, Federation of American Societies of Experimental Biology. Core indicators of nutritional state for difficult-to-sample populations. J Nutr. 1990;120:1559–99.

22. Hamilton WL, Cook JT, Thompson WW, Buron LF, Edward A, Frongillo J, Olson CM, Wehler CA. Household food security in the United States in 1995: Summary report of the Food Security Measurement Project. Washington, DC: United States Department of Agriculture; 1997.

23. de Waal A. Famine that kills: Darfur, Sudan, 1984–1985. Oxford: Clarendon Press; 1989.

24. Corbett J. Famine and household coping strategies. World Dev. 1988;16:1099–112.

25. Longhurst R. Household food strategies in response to seasonality and famine. IDS Bull. 1986;17:67–70.

26. Babu SC, Pinstrup-Andersen P. Food security and nutrition monitoring: A conceptual framework, issues and challenges. Food Pol. 1994;19:218–33.

27. Eele G. Indicators for food security and nutrition monitoring: A review of experience from Southern Africa. Food Pol. 1994;19:314–28.

28. Haddad L, Kennedy E, Sullivan J. Choice of indicators for food security and nutrition monitoring. Food Pol. 1994;19:329–43.

29. Davies S. Adaptable livelihoods: Coping with food insecurity in the Malian Sahel. New York: St. Martin's Press; 1996.

30. Quinn VJ, Kennedy E. Food security and nutrition monitoring systems in Africa: A review of country experiences and lessons learned. Food Pol. 1994; 19:234–54.

31. Webb P, Harinarayan A. A measure of uncertainty: The nature of vulnerability and its relationship to malnutrition. Disasters. 1999;23:292–305.

32. Maxwell D. Measuring food insecurity: The frequency and severity of coping strategies. Food Pol. 1996;21:291–303.

33. Maxwell D, Ahiadeke C, Levin C, Armar-Klemesu M, Zakariah S, Lamptey GM. Alternative food-security indicators: Revisiting the frequency and severity of "coping strategies." Food Pol. 1999;24:411–29.

34. Frongillo EA. Validation of measures of food insecurity and hunger. J Nutr. 1999;129:506S–9S.

35. Wilde PE. Differential response patterns affect food security prevalence estimates for households with and without children. J Nutr. 2004;134:1910–5.

36. Maxwell D, Watkins B, Wheeler R, Collins G. The coping strategies index: A tool for rapidly measuring food security and the impact of food aid programs in emergencies. Nairobi: CARE Eastern and Central Africa Regional Management Unit and the World Food Programme Vulnerability Assessment and Mapping Unit; 2003.

37. Frongillo EA, Nanama S. Development and validation of an experience-based tool to directly measure household food insecurity within and across seasons in northern Burkina Faso. Washington, DC: Food and Nutrition Technical Assistance Project, Academy for Educational Development; 2004.

38. Coates J, Webb P, Houser R. Measuring food insecurity: Going beyond indicators of income and anthropometry. Washington, D.C: Food and Nutrition Technical Assistance Project, Academy for Educational Development; 2003.

39. Chomsky N. Aspects of the theory of syntax. Cambridge: M.I.T. Press; 1965.

40. Miles M, Huberman M. Qualitative data analysis. London: Sage Publications; 1994.

41. Nord M, Satpathy AK, Raj N, Webb P, Houser R. Comparing household survey-based measures of food insecurity across countries: Case studies in India, Uganda, and Bangladesh. Boston: Tufts University Friedman School of Nutrition Science and Policy; 2002.

42. Hamelin AM, Habicht JP, Beaudry M. Food insecurity: Consequences for the household and broader social implications. J Nutr. 1999;129:525S–8S.

43. Quandt SA, Rao P. Hunger and food security among older adults in a rural community. Hum Organ. 1999;58:28–35.

44. Welch K, Mock N, Netrebenko O. Measuring hunger in the Russian federation using the Radimer hunger scale. Bull WHO. 1998;76:143–8.

45. Davies S. Are coping strategies a cop out? IDS Bull. 1993;24:60–72.

46. Parnell WR, Reid J, Wilson NC, McKenzie J, Russell DG. Food security: Is New Zealand a land of plenty? N Z Med J. 2001;114:141–5.

47. Coates J, Webb P, Rogers BL, Houser RF, Wilde PE. Why do women and men in the same households respond differently to household-level food security questions? FASEB J. 2005;19 Abstract 449.2.

48. Messick S. Validity. In: Linn R, editor. Educational measurement. 3rd ed. New York: American Council on Education, Macmillan Publishing Company; 1989.

49. Messick S. Validity of psychological assessment: Validation of inferences from persons' responses and performances as scientific inquiry into score meaning. Am Psychol. 1995;50:741–50.

50. Alaimo K, Froelich A. Measuring food insecurity and hunger, background paper for phase 1 report: Panel to Review U.S. Department of Agriculture's Measurement of Food Insecurity and Hunger, Committee on National Statistics, Division of Behavioral and Social Sciences and Education, National Research Council of the National Academies; July 2004.

51. Alaimo K, Olson CM, Frongillo EA. Importance of cognitive testing for survey items: An example from food security questionnaires. J Nutr Educ. 1999;31:269–75.

52. Willis GB. Cognitive interviewing: A tool for improving questionnaire design. Thousand Oaks: Sage Publications; 2005.

53. Presser S, Rothgeb JM, Couper MP, Lessler JT, Martin E, Martin J, Singer E, editors. Methods for testing and evaluating survey questionnaires. Hoboken, NJ: John Wiley & Sons, Inc.; 2004.

54. Kendall A, Olson CM, Frongillo EA. Validation of the Radimer/Cornell measures of hunger and food insecurity. J Nutr. 1995;125:2793–801.

55. Wolfe WS, Frongillo EA, Valois P. Understanding the experience of food insecurity by elders suggests ways to improve its measurement. J Nutr. 2003; 133:2762–9.

56. Quandt SA, Arcury TA, McDonald J, Bell RA, Vitolins MZ. Meaning and management of food security among rural elders. J Appl Gerontol. 2001;20: 356–76.

57. Raj N, Satpathy AK. Household food insecurity and child labour: Some evidence from rural Orissa. In: Ramchandran N, Massum L, editors. Coming to grips with rural child work. New Delhi: IHD Publishers; 2002.