

Development and Validation of an Arab Family Food Security Scale^{1–4}

Nadine R. Sahyoun,^{5*} Mark Nord,⁶ Anniebelle J. Sassine,⁷ Karin Seyfert,⁸ Nahla Hwalla,⁷ and Hala Ghattas⁷

⁵Department of Nutrition and Food Science, University of Maryland, College Park, MD; ⁶Economic Research Service, USDA, Washington, DC; ⁷Department of Nutrition and Food Sciences, American University of Beirut, Beirut, Lebanon; and ⁸Department of Economics, School of Oriental and African Studies, University of London, London, UK

Abstract

The objective of this article was to describe 1) the validation of 2 similar but not identical food security modules used to collect data from 2 vulnerable populations, southern Lebanon residents ($n = 815$) and Palestinian refugees in Lebanon ($n = 2501$), and 2) the development and validation of an Arab Family Food Security Scale (AFFSS). The surveys used a cluster-randomized sampling design. The 2 food security subscales underwent face and construct validity. In addition, both of these tools and the AFFSS underwent psychometric assessment for internal validity by using statistical methods based on Item Response Theory. The food security questions tested by focus groups were understood and accepted in all regions of Lebanon. The food security subscales and the AFFSS had acceptable levels of internal consistency. The psychometric assessment confirmed that the 7 items of the AFFSS had good internal validity and reasonable reliability with item in-fits from 0.73 to 1.16. Food insecurity was identified among 42% of southern Lebanese and 62% of Palestinian refugee households. The determinants and consequences of food security measured in this study provide additional support for the validity of the modules. Using multivariate logistic regression, the higher the mean monthly income per household member and the higher the educational attainment of the head of household, the lower the risk of food insecurity [ORs (95% CIs): 0.99 (0.98, 0.99) and 0.66 (0.54, 0.80), respectively]. There was a strong significant association between food insecurity and lower food expenditure and lower intake of all food categories except for legumes, which was significantly associated in the opposite direction ($P < 0.001$). The odds of borrowing money and accepting gifts/donations were significantly higher among moderately and severely food-insecure households ($P < 0.000$). The AFFSS has been validated within Lebanon and can potentially be extended to other Arab-speaking populations. J. Nutr. 144: 751–757, 2014.

Introduction

Food security is a complex phenomenon that includes social, biologic, nutritional, and economic influences (1). The FAO defines food security as existing “when all people at all times have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active, healthy life” (2). Indirect measures of food security, such as dietary intake and anthropometric measurements, have been used to describe the nutritional

status of the population in Lebanon (3). Direct measures of food security, however, particularly in vulnerable subpopulations in Lebanon, are not available. This is partly due to the lack of recognition in that part of the world of food security as a directly measurable phenomenon. Consequently, there is no validated tool in the Arabic language to assess its presence and severity in communities in the area.

A validated, culturally appropriate food security assessment tool that can be used in Arabic-speaking countries for assessing and monitoring the extent of the problem is essential to determine the impact of intervention programs intended to alleviate this problem. This is particularly important in light of the growing numbers of refugees in the region. A direct, experiential measure of food insecurity is useful because it is quick and relatively inexpensive to administer and is noninvasive (4). It minimizes the burden on respondents and the cost and complexity of training interviewers. Measurement tools of this type have been validated in many populations and are in regular use for monitoring and for research in a number of countries including the United States, Canada, Brazil, Mexico, and Colombia (5–8). Although food security surveys have been conducted in several Arab countries, including Yemen (9), the Palestinian

¹ Components of this study were supported by a European Union grant to the United Nations Relief and Works Agency for Palestinian Refugees in the Near East (UNRWA); a grant awarded by the WHO, Eastern Mediterranean Regional Office (WHO-EMRO; RPPH 10-53); and the Faculty of Agricultural and Food Sciences at the American University of Beirut.

² Author disclosures: N. R. Sahyoun, M. Nord, A. J. Sassine, K. Seyfert, N. Hwalla, and H. Ghattas, no conflicts of interest.

³ The views expressed are those of the authors and may not be attributed to the University of Maryland, the American University of Beirut, or the Economic Research Service or USDA.

⁴ Supplemental Table 1 is available from the “Online Supporting Material” link in the online posting of the article and from the same link in the online table of contents at <http://jn.nutrition.org>.

* To whom correspondence should be addressed. E-mail: nsahyoun@umd.edu.

Territories (10), Jordan, and Syria (11,12), to our knowledge the measurement tools used there have not been validated for use in the Middle East. In addition, the tools used for these surveys differed in each country and in some cases were developed to measure food security under specific situations, such as the Palestinian uprising in the West Bank or the Gaza War (13).

In 2010, researchers from the American University of Beirut and the University of Maryland developed a tool to assess household food security among vulnerable populations in Lebanon. The tool, derived from qualitative research on food security in the area and from concepts gleaned from other already utilized tools (5,9), was first used in the south of Lebanon, a region particularly exposed to disruption and migration due to war. After a slight modification, this tool was then administered to Palestinian refugees throughout Lebanon. The objective of this article is to describe the validation of the tools used and the development and validation of an Arab Family Food Security Scale (AFFSS) that could potentially be used in the Middle East region.

Participants and Methods

In 2010, surveys were conducted in Lebanon to assess the food security status of marginalized populations. A food security tool was developed and administered to representative samples of residents in the south of Lebanon (Tyre Resident Survey) and to Palestinian refugees living in camps and in gatherings throughout Lebanon (Palestinian Refugee Survey). The following is a description of the design of these 2 surveys, the development and validation of the food security tools, and the development and validation of a final and recommended 7-item food security measure, the AFFSS.

Survey design

Tyre Resident Survey. This cross-sectional household survey was conducted in the southern governorate of Tyre in Lebanon, which includes the city of Tyre and 67 surrounding towns and villages. By using a cluster-randomized sampling design, the city of Tyre and 29 villages were selected. Tyre and the villages were sampled by probability proportional to estimated size. Households within villages were sampled by using a random walk. A total of 815 households participated in the survey.

Palestinian Refugee Survey. This survey was conducted for the United Nations Relief and Works Agency for Palestinian Refugees in the Near East (UNRWA) and was carried out in all 12 Palestinian camps in Lebanon and in 20 gatherings in the 5 administrative areas of Lebanon. The survey, described in detail elsewhere (14), was a multistage sampling of clusters. Within clusters, households were selected at random. A total of 2501 households participated in the survey.

In both the Tyre Resident and Palestinian Refugee Surveys, the individual responsible for food preparation within each household was identified and invited to participate in the study. The interviewees gave either oral or written informed consent if they were willing to participate. If an individual declined to participate, data collectors moved to the adjoining apartment/house. The response rate among Palestinian refugees was 97.1% and was 85.1% among southern Lebanese. The research design for both surveys was approved by the institutional review board of the American University of Beirut.

Measurement of key constructs

The questionnaires used in both surveys contained similar questions and collected information on gender, age, employment, and educational attainment of the head of household. Also collected were total household income, expenditure on food, household frequency of consumption of certain food groups, and coping strategies. Status of food security was obtained by using 2 slightly different questionnaires for both surveys. Described below are the tools used to assess food security and to collect household food consumption patterns and coping strategies.

Development of the food security tool

The household food security tool developed for use in surveys of vulnerable populations in Lebanon originally included 16 questions derived from the U.S. Household Food Security Survey Module (5) and the Yemeni National Food Security Survey (9). The food security tool was translated by native speakers into Standard Modern Arabic and into Lebanese and Palestinian dialects and tested on key informants from the communities to be surveyed. The questions underwent face validity and preliminary internal validation as described below. As a result, the questions that were analyzed and used to determine food security status in this study were reduced to 6 in each survey.

The 6 questions administered in each of the surveys were similar but not identical. Four of the questions were included in both surveys and were identical except for differences in the reference period (12 mo in the Tyre Resident Survey and 6 mo in the Palestinian Refugee Survey). These questions included the following items: “inadequate quality of food,” “cut size of meal,” “skipped meal,” “did not eat whole day or went to bed hungry.” One question inquiring about “not enough of some foods” was included in both surveys and was similar in cognitive content but worded somewhat differently. One additional question was unique to each of the surveys: these included a question about “concerned food would run out” in the Tyre Resident Survey and a question on “foods bought did not last” in the Palestinian Refugee Survey. These questionnaires are shown in **Supplemental Table 1**. To assess the level of food security of participating households, the 6 items of each tool were coded by assigning 1 point to each positive response. The questionnaires were assessed for face validity, and the measures based on them were assessed for construct and internal validity as described below.

Household food group consumption

Food group consumption by household was measured by using a short food group frequency questionnaire. Respondents were asked if household members consumed milk and dairy products, meat and poultry, legumes, vegetables, fruit, chocolate/sweets/candies, and sodas/bottled beverages, and if so, how often per day, week, or month. Responses were converted to weekly consumption. Because frequencies of food consumption are not normally distributed, log-transformed variables were used in the analysis, with results back-transformed to facilitate interpretation.

Coping strategies

In the 2 surveys, if individuals responded positively to the question “Was there a time when you were concerned that you would run out of food for your household for the next month?” (Tyre Resident Survey) or “The food that I bought just did not last and we did not have money to get more” (Palestinian Refugee Survey), they were then asked a series of questions on coping strategies. These questions were derived and adapted from the Coping Strategies Index (15) to ascertain whether the respondents or other members of the household engaged in ≥ 1 of the following actions: worked more to obtain food, borrowed money, borrowed food, accepted gifts/donations, or could do nothing about the situation. The answers were coded as “yes” or “no.”

Validation of food security measures

Face validity. We conducted a qualitative study using focus group interviews in 7 governorates in Lebanon to ensure that the questions as stated were understood as intended, the language was culturally appropriate in the different regions of Lebanon, and the range of beliefs, opinions, and behaviors represented those of the target population.

One municipality from each of the 7 governorates of Lebanon was randomly selected. Municipality leaders and social workers identified 8–12 individuals in each governorate to participate in the focus groups with the research team. A total of 57 individuals participated in the 7 focus group sessions. The individuals selected represented various socioeconomic status groups, were of both genders and different age categories, and represented the different backgrounds and religions of each area. The focus groups included laborers, farmers, social workers, teachers, housewives, and shopkeepers. Focus group discussions were tape recorded and transcribed verbatim in Arabic. Thematic analysis was used for the analysis of the transcribed focus group discussions.

TABLE 1 Characteristics of participants in the Tyre Resident and Palestinian Refugee Surveys¹

	Tyre Resident Survey		Palestinian Refugee Survey	
	Responders	Value	Responders	Value
	<i>n</i>		<i>n</i>	
Household members, <i>n</i>	813	4.95 (4.68, 5.21)	2501	4.45 (4.30, 4.60)
Monthly income, <i>U.S. dollars/household member</i>	800	218 (170, 265)	2312	120 (103, 136)
Head of household educational level, %	734		2501	
Completed 9th grade		35.8		27.4
Completed primary level		69.8		54.2

¹ Values are means (95% CIs) or percentages.

Internal validity. The internal validity of the food security tools was assessed for each survey separately by using statistical methods based on the single-parameter logistic Item-Response-Theory (Rasch) model. These methods assess the psychometric characteristics of the items and the extent to which they measure the same underlying latent trait—in this case, the severity of food insecurity. The Rasch model is essentially a nonlinear factor analysis, and model outputs include estimates of severity parameters for each item and each household on the same underlying logit continuum as well as fit statistics for each item and residual correlations between items (16). After fitting the model separately for the 2 surveys, the item severity parameters for the 5 items that appeared in both surveys were compared to assess the comparability of the food security scales in the 2 surveys.

The 6 food security scale items in each of the surveys, dichotomized to indicate any/no occurrence of the condition or behavior, were fit to the Rasch model by using conditional maximum likelihood methods. The scales were equated on the basis of the 5 common items, and it was determined that the following classifications based on raw score ranges were of approximately equal severity in the 2 surveys: food secure (0–1), moderately food insecure (2–4), and severely food insecure (5,6). Households that did not respond to any of the food security questions (0.32% of respondents in the Palestinian Refugee Survey and none in the Tyre Resident Survey) were omitted from the analyses.

Construct validity. Household food security categories aggregated for analysis as defined below were examined in association with determinants and consequences of food security status. Determinants used in this study were household size, gender and educational attainment of head of household, and household income. Reduction in food quality and quantity is a behavior that is measured within the food security structure; therefore, inquiring about the consumption of specific food groups is a way of validating the module. Another consequence of food insecurity is the coping strategy or strategies that households undertake to ensure that they get enough food in times of need.

The construct validation of the tools was conducted by using pooled data from the 2 surveys ($n = 3308$) to increase statistical power to detect variations in severity of food insecurity. Pooling the data was possible because the severity ranges of the food security classifications were similar and many of the same data elements were collected by using the same methods in the 2 surveys. In addition, the data in both surveys were collected from generally poor populations using face-to-face interviews. The sample design was the same in the 2 surveys and was a stratified 2-stage, clustered sample design with villages, neighborhoods, or camps as the primary sampling units and households as secondary sampling units.

Development of the AFFSS and its validation. Given the similarity in severities of the 5 items common to the 2 surveys, the results from the 2 scales were combined so that the additional question from each survey could be included in a single scale. This results in a scale with better reliability and with items more evenly distributed across the severity continuum than either scale by itself. This 7-item scale, the AFFSS, is described in Supplemental Table 1. The scale was not used in this study, but it is proposed for further use in Arab-speaking populations.

Statistical analysis

All data were imported into Stata 11.1 and into SAS (version 9.13) for statistical analysis. The demographic and socioeconomic characteristics as well as the classification of food security status of each subpopulation were examined first. The analyses were then conducted on the pooled data. By using logistic regression models, we examined the association between food security and demographic and socioeconomic characteristics. The outcome variable, food security, was coded as food secure (0–1) versus food insecure (2–6) in 1 model and as food secure/moderately food insecure (0–4) versus severely food insecure (5–6) in another model.

Food security as a categorical independent variable was examined in association with each coping strategy by using logistic regression analysis and in association with each food group by using linear regression modeling. All models included a dummy variable identifying the survey to control for any differences in measurement of food security and for any other unobserved differences between the populations.

Results

Sample characteristics. Southern Lebanese participants tended to have larger households, higher monthly household incomes, and higher educational attainment than Palestinian refugees (Table 1). Also, a higher percentage of southern Lebanese households were food secure (58%) compared with Palestinian refugees (38%). An estimated 20% of Palestinian refugee households were severely food insecure compared with 10% of the southern Lebanese households (Fig. 1).

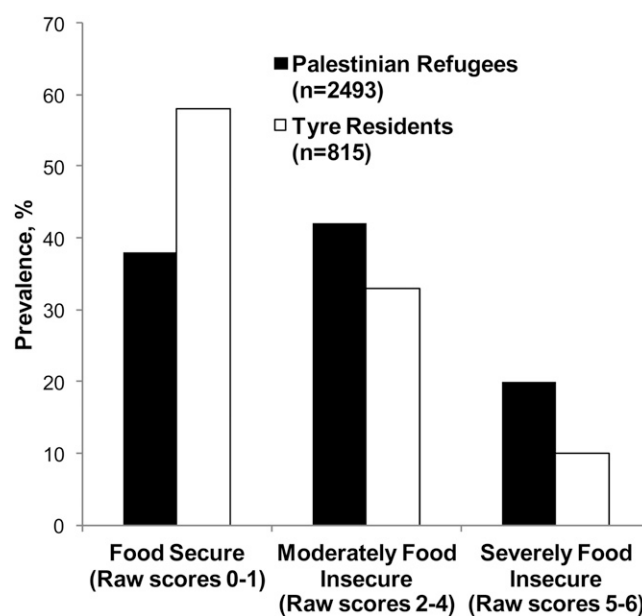


FIGURE 1 Prevalence of household food insecurity among Palestinian refugees from the Palestinian Refugee Survey ($n = 2493$) and among southern Lebanese residents from the Tyre Resident Survey ($n = 815$).

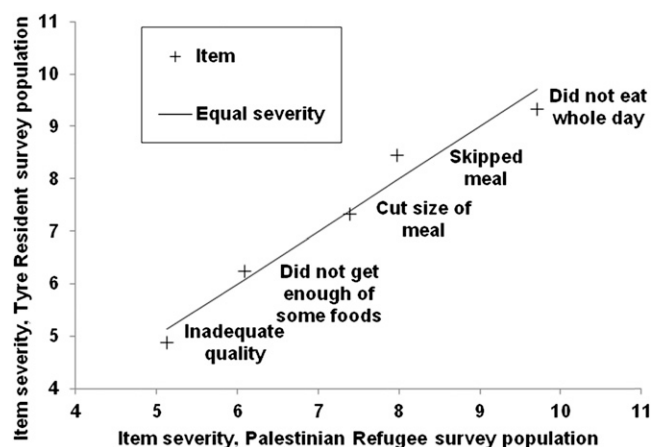


FIGURE 2 Comparison of item severity parameters of equivalent items used in the food security questionnaires in the Palestinian Refugee and Tyre Resident Surveys.

Validation of food security scales. Results from the focus groups indicated that in all 7 regions of Lebanon the food security questions were well understood and were not perceived to be offensive nor were the questions posed too sensitive. The question that stated that “food bought did not last” was only administered to Palestinian refugees but tested in all regions of Lebanon. Participants found the question to be confusing. In the Arabic translation, the term was understood as referring to food spoilage rather than insufficient food quantity for the household. Focus group participants suggested replacement of “food we bought did not last” with “food bought was not enough.”

After adjusting for a modest difference in item dispersion, the severity parameters of the items common to the 2 surveys were very similar (Fig. 2). Analysis (not shown) suggests that the difference in discrimination corresponding to the difference in item dispersion had relatively little impact on reliability. Residual correlations among items in each survey were small, indicating no serious violation of the conditional independence assumed by the Rasch model (analysis not shown).

The similarity of the item parameters of the 5 items common to the 2 surveys justified estimation of the Rasch model for the data from the 2 surveys jointly. This model confirmed that the 7 items fit the model assumptions well enough to constitute a measure with good internal validity and reasonable reliability (Table 2). Item in-fits ranged from 0.73 to 1.16, whereas in-fits in the range of 0.7 to 1.3 are generally considered to adequately approximate the Rasch model assumption of equal discrimination. Item out-fit statistics were somewhat elevated for the 2

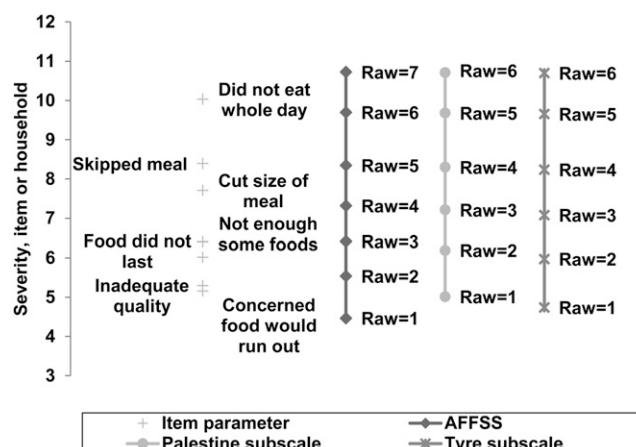


FIGURE 3 Household or item severity parameters of items used in the AFFSS and subscales used in Palestinian Refugee and Tyre Resident Surveys. AFFSS, Arab Family Food Security Scale.

least-severe items, “inadequate quality” and “concerned food would run out,” and for “not enough of some foods,” indicating a small proportion of erratic responses to these items. However, given the good in-fit statistics for these items, the moderately elevated out-fit statistics do not indicate any serious violations of model assumptions. The relative severity of items was essentially unaffected by the difference in time reference in the 2 surveys (6 mo vs. 12 mo) and by the difference in wording of the question on “not enough of some foods.”

The joint psychometric analysis of data from the 2 surveys supports direct comparison of the household severity parameters for the 2 scales implemented in this study as well as comparisons to the household and item severity parameters for the proposed 7-item AFFSS (Fig. 3). These show a range of severity and indicate that the thresholds defining severity categories for the 2 subscales used in the construct validation analysis (i.e., between raw scores 1 and 2 and between raw scores 4 and 5) are, in fact, nearly of equal severity in the 2 surveys. Corresponding thresholds on the combined scale that is proposed for future use are ≥ 2 for food insecurity (moderate or severe) and ≥ 6 for severe food insecurity.

The item severity parameters of items in the AFFSS were also plotted against equivalent items from the U.S. Food Security Survey Module collected in the nationally representative U.S. Current Population Survey (CPS-FSS) (Fig. 4). The similarity of relative severity of the items suggests that the scales measure essentially the same latent trait in Lebanon and the United States. Thus, the household measures of severity and prevalence

TABLE 2 Item severity parameters and item-fit statistics for the Arab Family Food Security Scale

Item	<i>n</i> ¹	Severity parameter (logits)	Error (logits)	In-fit	Out-fit
Concerned food would run out ²	431	5.15	0.127	1.02	1.57
Inadequate quality food	1981	5.29	0.063	1.16	2.17
Food bought did not last ³	1550	6.01	0.067	0.96	1.22
Not enough of some foods	1981	6.41	0.058	1.13	1.77
Cut size of meal	1981	7.71	0.063	0.73	0.66
Skipped meal	1981	8.39	0.069	0.79	0.56
Did not eat whole day or went to bed hungry	1981	10.03	0.100	0.96	0.77

¹ The analysis sample for psychometric assessment included only households with nonextreme responses on the 6 questions in the respective survey (i.e., omitting those with raw scores of 0 or 6) and with no missing responses.

² This item was administered only in the Tyre Resident Survey.

³ This item was administered only in the Palestinian Refugee Survey.

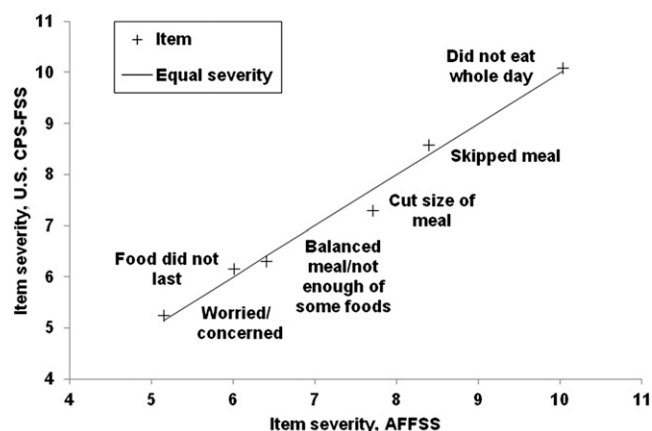


FIGURE 4 Comparison of item severity parameters of equivalent items in the 7-item AFFSS and the U.S. CPS-FSS. AFFSS, Arab Family Food Security Scale; CPS-FSS, Current Population Survey Food Security Supplement.

rates can be made comparable. No attempt has been made at this time, however, to compare the proposed ranges of severity of food insecurity based on the AFFSS with those used in the U.S. scale.

Food insecurity and its predictors. Results from bivariate analysis (not shown) show that the larger the family size, the higher the risk of being moderately and severely food insecure [ORs (95% CIs): 1.1 (1.07, 1.14) ($P < 0.001$) and 1.07 (1.02, 1.11) ($P = 0.003$), respectively]. In multivariate logistic regression, the higher the mean monthly household income per household member and the higher the educational attainment of the head of household, the lower the risk of food insecurity, as expected (Table 3).

Food insecurity, food group intake, and coping strategies. There was a strong significant association between food insecurity, at both levels of severity, and lower consumption of all food categories except for legumes, which showed higher consumption among food-insecure households. The associations were stronger with the more severe range of food insecurity (Table 4). These findings were also reflected in food expenditure per capita, which was significantly lower among moderate and severely food-insecure households (Table 4).

Additionally, the odds of borrowing money and accepting gifts/donations were significantly higher among moderately food-insecure households [ORs (95% CIs): 1.51 (1.01, 2.25) and 1.90 (1.09, 3.30), respectively] and among severely food-insecure households especially [ORs (95% CIs): 2.20 (1.48, 3.28) and 3.90 (1.95, 7.94), respectively] (Table 5).

Discussion

The intent of this research was to validate 2 similar but not identical food security tools used to collect data from southern Lebanese and Palestinian refugee populations in Lebanon and to develop and validate a 7-item food security tool, the AFFSS, for potential use among Arabic-speaking populations.

Food insecurity is quite prevalent among the 2 populations surveyed, the southern Lebanese and Palestinian refugees. Approximately 60% of southern Lebanese are involved in growing tobacco on their own land or on land rented from others. However, tobacco is not a lucrative livelihood, it is seasonal, and its price is government-controlled. Families resort to having several different jobs and may experience periodic food insecurity due to uneven incomes (17). Similarly, Palestinian families are restricted from holding many jobs, especially those that are better paid (14).

The food security questions tested by focus groups were understood and accepted in all areas of Lebanon. The recommendation to replace “food bought did not last” with “food was not enough” has now been integrated into the AFFSS (Supplemental Table 1). Additionally, the food security subscales had acceptable levels of internal consistency and construct validity and the AFFSS also had acceptable levels of internal consistency. The AFFSS scores cover a wide range of severity, with scores most likely to be thresholds for overall food insecurity around 2 or 3 and severe food insecurity around 5 or 6. Given this wide range of item severity, the scale may be usable in a general population or in a severe food insecure population. However, thresholds for classification of families by food security status should be made with input from stakeholders in the region.

The difference in time reference between the 2 subscales in our study did not seem to have an impact on the results. Psychometric analysis showed that the relative severity of items was not affected by this difference. Therefore, either time reference could be used for future surveys. Other studies have reliably used 3 mo (6) or even 30 d (18) as the reference periods, and so the time frame is dependent on the purpose of the survey and the context of its administration.

On the basis of the scores and the corresponding questions, a score of ≥ 3 on the 7-item scale is approximately equivalent to the threshold for food insecurity used in the United States (5). Several of the food security items in the AFFSS are equivalent to items in the CPS-FSS. The similarity in the severity parameters of the 2 scales is quite strong and is evidence of the stability of this measurement construct across languages and cultures. This similarity suggests that the 2 scales measure essentially the same latent trait in both populations and also indicate that the 2 measures may be meaningfully compared. This similarity was also reported between the validated food security scale used in Iran and the CPS-FSS (19), further demonstrating the similarity in experiencing food insecurity across cultures.

TABLE 3 Logistic regression of food insecurity on household demographic and socioeconomic factors¹

Demographic and socioeconomic factors	Model 1: food insecurity (score 2–6 vs. 0–1)		Model 2: severe food insecurity (score 5–6 vs. 0–4)	
	OR (95% CI)	P value	OR (95% CI)	P value
Women head of household (referent: men head of household)	1.51 (1.17, 1.94)	0.002	1.37 (1.05, 1.79)	0.020
Monthly household income per capita (U.S. dollars)	0.99 (0.98, 0.99)	<0.0001	0.99 (0.98, 0.99)	<0.0001
Head of household completed 9th grade (referent: did not complete 9th grade)	0.66 (0.54, 0.80)	<0.0001	0.62 (0.47, 0.81)	0.001

¹ $n = 2936$. P values were derived from multiple regression analysis adjusted for displayed variables and study effect.

TABLE 4 Frequency of household food group consumption and food expenditure by food security status¹

	Food secure (score 0–1; <i>n</i> = 1451)	Moderately food insecure (score 2–4; <i>n</i> = 1292)	Severely food insecure (score 5–6; <i>n</i> = 565)
<i>Food groups, times/wk</i>			
Milk and dairy	7.1 (6.7, 7.5)	5.9 (5.7, 6.1)*	4.3 (4.0, 4.6)*
Meat and poultry	3.0 (2.9, 3.1)	1.8 (1.7, 1.9)*	1.1 (1.1, 1.2)*
Legumes	1.7 (1.6, 1.8)	1.9 (1.8, 2.0)*	2.2 (2.0, 2.4)*
Vegetables	7.4 (7.2, 7.7)	6.0 (5.6, 6.4)*	4.8 (4.5, 5.2)*
Fruit	6.4 (6.1, 6.7)	3.4 (3.2, 3.7)*	2.0 (1.8, 2.2)*
Sweets	3.4 (3.1, 3.7)	2.9 (2.5, 3.4)*	2.3 (1.9, 2.6)*
Sodas	3.9 (3.3, 4.3)	2.9 (2.1, 3.3)*	2.4 (1.6, 2.7)*
Food expenditure per capita, U.S. dollars	90.9 (83.1, 98.6)	70.3* (67.4, 73.2)	49.6* (43.9, 55.4)

¹ Values are means (95% CIs) adjusted for study effect; *n* = 3308. *P* values were derived from independent *t* tests. *Different from control (food-secure category), *P* < 0.01.

However, experiences using the Household Food Insecurity Access Scale show that although the scale has been internally validated in various low- and middle-income countries, many of its questions may not be externally valid and hence cannot be compared across cultures (20). To inform targeted interventions and improve planning, it has been recommended that countries develop their own direct measures on the basis of perceptions and experiences of household food insecurity at the country level (21). We therefore developed from the ground up this direct tool to measure food insecurity in Lebanon and interviewed key informants as well as conducted focus groups to ascertain comprehension and relevance. The strength of this approach is that it is based on an in-depth understanding of experiences of food insecurity among vulnerable Lebanese communities. However, potential limitations include issues such as respondent bias, especially among refugees who may be expecting to receive assistance or benefits (20). Similar to other food security modules, this tool cannot give information about the causes of household food insecurity. We recommend, therefore, that mixed methods that include both qualitative and quantitative research be used in future surveys where it is feasible to do so.

Results of household food consumption can support the validity of tools in assessing the status of food security. In this study,

households that were food insecure had lower food expenditure, and although dietary intake data collection was limited in scope, the data indicate that, on average, food-insecure households consumed animal products as well as fruit and vegetables significantly fewer times per week. Legumes (e.g., lentils and chickpeas), which are an integral part of the diet in Lebanon and are less expensive, were consumed more. These results have been reported by others (22,23).

The coping strategies adopted by food-insecure households also support the validity of the modules used in the surveys. Food-insecure households, especially those in the severe category, decrease the quality and quantities of food consumed but also resort to other short-term coping strategies, such as borrowing money and food and/or accepting gifts/donations. There were no associations between food insecurity and working more in this population or with the response that they could not do anything to improve their situation. These questions are difficult to interpret considering the complexity of the work situation in Lebanon for Palestinians and the limited work availability in southern Lebanon villages. The coping strategies were asked only of those families who were concerned that food would run out or whose food did not last over a given period. It is possible that food-secure families developed other coping strategies that led to food security.

The psychometric analysis reported in this article supports the internal validity of the AFFSS and the subscales. The determinants and consequence of food security measured in this study provide additional support for the validity of the modules. The AFFSS is validated and is available in classical and Lebanese Arabic languages. It also covers a wide range of severity measures of food insecurity. The scale could be usable, therefore, in a general population or in a severe food-insecure population. Thus, having a validated standardized tool for measuring food security status in Arabic-speaking countries is very useful to assess and monitor food security in the region.

Acknowledgments

The authors thank Chirine Harb for qualitative data collection and analysis and Aida El Aily for data entry and quality control. N.R.S., H.G., and N.H. conceived the study; N.R.S. and H.G. designed the research; N.R.S., H.G., and K.S. conducted the research; N.R.S., M.N., A.J.S., K.S., and H.G. analyzed the data; N.R.S., A.J.S., and H.G. wrote the manuscript; and N.R.S. had primary responsibility for the final content. All authors read and approved the final manuscript.

Literature Cited

1. Frongillo EA. Validation of measures of food insecurity and hunger. *J Nutr*. 1999;129 Suppl:506S–9S.
2. World Health Organization. Trade, foreign policy, diplomacy, and health: glossary of globalization, trade and health terms. Geneva: WHO; 2012 [cited 2014 Feb 18]. Available from: <http://www.who.int/trade/glossary/story028/en/>.
3. Naja F, Nasreddine L, Itani L, Chamieh MC, Adra N, Sibai AM, Hwalla N. Dietary patterns and their association with obesity and sociodemographic factors in a national sample of Lebanese adults. *Public Health Nutr*. 2011;14:1570–8.
4. Pérez-Escamilla R, Segall-Corrêa AM. Food insecurity measurement and indicators. *Revista de Nutrição*. 2008;21:15s–26s.
5. Bickel G, Nord M, Price C, Hamilton W, Cook J. Guide to measuring household food security. Revised 2000. Alexandria (VA): USDA, Food and Nutrition Service; 2000.
6. Pérez-Escamilla R, Segall-Corrêa AM, Kurdian Maranhã L, Sampaio Md Mde F, 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.

TABLE 5 Odds of engaging in coping strategies by food-insecure households compared with food-secure households¹

Coping strategies ²	Moderately food insecure (score 2–4)		Severely food insecure (score 5–6)	
	OR (95% CI)	<i>P</i> value	OR (95% CI)	<i>P</i> value
Borrowed money	1.51 (1.01, 2.25)	0.04	2.20 (1.48, 3.28)	<0.0001
Worked more	1.54 (0.62, 3.79)	0.35	0.84 (0.25, 2.70)	0.75
Accepted gifts/donations	1.90 (1.09, 3.3)	0.02	3.90 (1.95, 7.94)	<0.0001
Borrowed food	1.40 (0.70, 2.8)	0.34	2.20 (1.09, 4.40)	0.028
Could not do anything	0.33 (0.11, 1.03)	0.06	1.36 (0.48, 3.85)	0.56

¹ *n* = 1736. *P* values were determined from logistic regression models with each coping strategy as the outcome variable and food security and study effect as independent variables.

² Questions on coping strategies were administered only to participants who responded positively to the question “Was there a time when you were concerned that you would run out of food for your household for the next month?” (Tyre Resident Survey) or “The food that I bought just did not last and we did not have money to get more” (Palestinian Refugee Survey).

7. Melgar-Quinonez H, Zubieta AC, Valdez E, Whitelaw B, Kaiser L. Validation of an instrument to monitor food insecurity in Sierra de Manantlan, Jalisco. *Salud Publica Mex.* 2005;47:413–22.
8. Álvarez MC, Estrada A, Montoya EC, Melgar-Quinonez H. Validación de escala de la seguridad alimentaria doméstica en Antioquia, Colombia. *Salud Publica Mex.* 2006;48:474–81.
9. Kabbani N, Wehelie Y. Measuring hunger and food insecurity in Yemen. Working Paper 419. Economic Research Forum; 2004 [cited 2014 Feb 18]. Available from: http://www.erf.org.eg/CMS/uploads/pdf/0419_final.pdf.
10. Gordon NH, Halileh S. An analysis of cross sectional survey data of stunting among Palestinian children less than five years of age. *Matern Child Health J.* 2013;17:1288–96.
11. Bawadi HA, Tayyem RF, Dwairy AN, Al-Akour N. Prevalence of food insecurity among women in northern Jordan. *J Health Popul Nutr.* 2012;30:49–55.
12. Doocy S, Sirois A, Anderson J, Tileva M, Biermann E, Storey JD, Burnham G. Food security and humanitarian assistance among displaced Iraqi populations in Jordan and Syria. *Soc Sci Med.* 2011;72:273–82.
13. FAO. Report of the food security assessment, West Bank and Gaza Strip. Rome: FAO; 2003.
14. Chaaban J, Ghattas H, Habib R, Hanafi S, Sahyoun N, Salti N, Seyfert K, Naamani N. Socio-economic survey of Palestinian refugees in Lebanon. Beirut (Lebanon): American University of Beirut, United Nations Relief and Works Agency for Palestine Refugees in the Near East; 2010.
15. Maxwell D, Watkins B, Wheeler R, Collins G. Coping strategies index a tool for rapidly measuring food security and the impact of food aid programmes in emergencies: Field Methods Manual. Nairobi: CARE and WFP; 2003 [cited 2014 Feb 18]. Available from: http://www.fao.org/crisisandhunger/root/pdf/cop_strat.pdf.
16. Carlson SJ, Andrews MS, Bickel GW. Measuring food insecurity and hunger in the United States: development of a national benchmark measure and prevalence estimates. *J Nutr.* 1999;129:510S–6S.
17. Save the Children. Rapid assessment in southern Lebanon. 2006 [cited 2013 May 27]. Available from: <http://reliefweb.int/sites/reliefweb.int/files/resources/1E50549602173FACC12571DF0036A5BD-sc-lbn-29aug.pdf>.
18. Coates J, Swindale A, Bilinsky P. Household food insecurity access scale (HFIAS) for measurement of household food access: indicator guide (v. 3). Washington: Food and Nutrition Technical Assistance Project, Academy for Educational Development; 2007.
19. Rafiei M, Nord M, Sadeghizadeh A, Entezari MH. Assessing the internal validity of a household survey-based food security measure adapted for use in Iran. *Nutr J.* 2009;8:28.
20. Deitchler M, Ballard T, Swindale A, Coates J. Validation of a measure of household hunger for cross-cultural use. Washington: Food and Nutrition Technical Assistance II Project (FANTA-2), AED; 2010.
21. Wolfe WS, Frongillo EA. Building household food-security measurement tool from the ground up. *Food Nutr Bull.* 2001;22:5–12.
22. Melgar-Quinonez HR, Nord N, Perez-Escamilla R, Segall-Correa AM. Psychometric properties of a modified US-household food security survey module in Campinas, Brazil. *Eur J Clin Nutr.* 2008;62:665–73.
23. Melgar-Quinonez HR, Zubieta AC, McNelly B, Nteziyaremye A, Gerardo MF, Dunford C. Household food insecurity and food expenditure in Bolivia, Burkina Faso, and the Philippines. *J Nutr.* 2006;136 Suppl:1431S–7S.