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Title

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Permalink

<https://escholarship.org/uc/item/0wz9499m>

Journal

Public Health Nutrition, 20(8)

ISSN

1368-9800

Authors

Gundersen, Craig
Engelhard, Emily E
Crumbaugh, Amy S
[et al.](#)

Publication Date

2017-06-01

DOI

10.1017/s1368980017000180

Peer reviewed

Short Communication

Brief Assessment of Food Insecurity Accurately Identifies High-Risk US Adults

Craig Gundersen¹, Emily Engelhard², Amy S. Crumbaugh², Hilary K. Seligman^{2,3}

¹University of Illinois, Department of Agricultural and Consumer Economics, 324 Mumford Hall, 1301 West Gregory Dr., Urbana, IL 61801-3605; ²Feeding America, 35 Wacker Drive, Chicago, IL; ³University of California San Francisco, Division of General Internal Medicine, and Center for Vulnerable Populations at San Francisco General Hospital, Box 1364, San Francisco, CA 94143

Abstract

Objective: To facilitate the introduction of food insecurity screening into clinical settings, we examined the test performance of 2-item screening questions for food insecurity against the US Department of Agriculture's Core Food Security Module.

Design: We examined sensitivity, specificity, and accuracy of various 2-item combinations of questions assessing food insecurity in the general population and high-risk population subgroups.

Setting: 2013 Current Population Survey December Supplement, a population-based US survey

Subjects: All survey participants from the general population and high-risk subgroups

Results: The test characteristics of multiple 2-item combinations of questions assessing food insecurity have adequate sensitivity (>97%) and specificity (>70%) for widespread adoption as clinical screening measures.

Conclusions: We recommend two specific items for clinical screening programs based on their widespread current use and high sensitivity for detecting food insecurity. These items query how often the household “worried whether food would run out before we got money to buy more” and how often “the food that we bought just didn't last and we didn't have money to get more.” The recommended items have sensitivity across high-risk population sub-groups of $\geq 97\%$ and a specificity $\geq 74\%$ for food insecurity.

Keywords

Food insecurity, screening, health disparities, social determinants of health

Introduction

Widespread attention to the burden of food insecurity in the US and an increased understanding of its adverse health impact has prompted many health systems to initiate programs to screen for food insecurity. In October of 2015, the American Academy of Pediatrics issued a position statement recommending universal screening for food insecurity in the clinical setting ⁽¹⁾. Soon afterward, the American Diabetes Association released their Standards of Medical Care in Diabetes—2016, which for the first time recognizes the unique self-management challenges associated with food insecurity ⁽²⁾. The Centers for Medicare and Medicaid Innovation Center recently launched a 5-year, \$157 million program to test the impact of clinical screening for health-related social needs, specifically including food insecurity. These Accountable Health Communities will test models for linking patients with social needs to community resources in order to reduce costs and utilization ⁽³⁾.

Food insecurity (defined as a household-level economic and social condition of limited access to food) has emerged as a leading health care issue for two central reasons. First, food insecurity rates in the US continue to be very high - in 2015, 12.7% of US households, comprised of more than 42 million people, were food insecure ⁽⁴⁾. Second, food insecurity is associated with higher health care costs ⁽⁵⁾ and poor health outcomes ⁽⁶⁾ for both adults and children, suggesting it may be an important driver of some health disparities.

Many food insecurity screening programs have thus been recently implemented in clinical settings, under the assumption that provider recognition and action will mitigate poor health outcomes. These programs generally use a two-item clinical screening tool based on the USDA's 18-item Core Food Security Module (CFSM)^(7, 8). However, these screeners have been formally tested only in narrow populations (caregivers of children enrolled in a single study, or 49 HIV+ patients), and their relevance to the broader population is unclear ^(9, 10). Prior to widespread dissemination of screening programs such as those being advocated by professional organizations, it is critical to understand the test characteristics of measurement tools in the general population and among high-risk demographic groups.

Methods

We used data from the December Supplement to the 2013 Current Population Survey (CPS)^(7, 8). CPS is a household-level survey conducted monthly by the US Census Bureau for the Bureau of Labor Statistics with the primary goal of tracking the labor market. It includes data collected in-person or by

telephone from 60,000 nationally representative households. Food insecurity estimates from CPS are used to construct official estimates of US food insecurity⁽⁴⁾. The 18 items of the CFMS have been included during a single administration of CPS annually since 1996. This annual administration has occurred in December since 2001.

We calculated sensitivity and specificity of various 2-item combinations suitable for use as clinical screening tools using the USDA's CFMS as a reference measure. We examined the two items recommended as screening tools in previous studies^(9, 10) (items 1 and 2 or 2 and 3 on the CFMS); all possible two-item combinations from an often-used six-item subset of the CFMS⁽¹⁰⁾ (items 2-7); and items 1 and 3 on the CFMS (Table 1). For each, we considered an affirmative response to either question to indicate food insecurity, as previous clinical screening tools for food insecurity have done. We used standard definitions of sensitivity, specificity, and overall accuracy⁽¹¹⁾. Because risks associated with misidentifying a patient as food insecure are low, we sought to maximize sensitivity without unreasonably decreasing specificity.

Results

Sensitivity of each two-item combination was high for the US population and high-risk demographic groups compared to the 18-item CFMS (Table 2). Sensitivity ranged from 96.4% for items 2 and 3 for households with children and incomes <200% of the federal poverty line (FPL), to 99.8% for items 1 and 3 for Spanish-speaking households. (Results for all combinations available by request.) Specificity was lower, ranging from 73.7% for items 1 and 2 for households with children and incomes <100% FPL, to 94.5% for items 2 and 3 for households with a respondent aged >60. Accuracy was high for all 2-item combinations.

Discussion

Nationally representative data suggest a 2-item screening tool can accurately identify household food insecurity. Any combinations described have acceptable sensitivity and specificity for widespread clinical use, and each combination has advantages - items 1 and 2 have been widely disseminated as the Hunger Vital Sign and were recommended by the American Academy of Pediatrics^(1, 12); items 2 and 3 are a subset of the six-item scale; and items 1 and 3 have the highest sensitivity across the population.

There are limitations to using a 2-item screening tool, rather than the full 18-item (or 6-item subset) USDA reference measure acceptable for research. First, clinical screening tools do not allow assessment of the severity of food insecurity (food secure, marginally food secure, low food secure, very low food secure). Second, 2-item measures cannot address all aspects of the complex experience of food insecurity. However, longer food insecurity measurement tools are not compatible with the time demands of clinical practice.

We thus believe that a 2-item measure is an acceptable compromise for clinical practice. Based on our findings, we recommend clinical screening programs use items 1 and 2 from the CFSM for screening (with a response of “sometimes” or “often” true to *either* question consistent with food insecurity)

Now I'm going to read you several statements that people have made about their food situation. For these statements, please tell me whether the statement was often true, sometimes true, or never true for (you/your household) in the last 12 months—that is, since last (name of current month).

- *The first statement is “We worried whether (my/our) food would run out before (I/we) got money to buy more.” Was that often true, sometimes true, or never true for (you/your household) in the last 12 months?*
- *“The food that (I/we) bought just didn't last and (I/we) didn't have money to get more.” Was that often true, sometimes true, or never true for (you/your household) in the last 12 months?*

We recommend items 1 and 2 because a common tool implemented across clinical settings greatly expands our ability to monitor food insecurity and its clinical consequences. Items 1 and 2 are the most frequently used in clinical screening programs, and some electronic health record systems are already working to integrate these two items. In addition, item 3 is susceptible to varying interpretations by age and cultural background⁽¹³⁾.

Conclusions

Brief measures of food insecurity have adequate test characteristics for widespread clinical adoption. Positively identifying patients living in food insecure households in the clinical setting may allow health care providers to better tailor diet counseling, link patients with food resources, or alter clinical management to accommodate the challenges of living in a food insecure household.

Table 1. Core Food Security Module, Items Examined for Use in Two-Item Screening*

| Item Number | Question | Response Options[†] |
|--------------------|---|--|
| 1 | <p>Now I'm going to read you several statements that people have made about their food situation. For these statements, please tell me whether the statement was often true, sometimes true, or never true for (you/your household) in the last 12 months—that is, since last (name of current month).</p> <p>The first statement is “(I/We) worried whether (my/our) food would run out before (I/we) got money to buy more.” Was that often true, sometimes true, or never true for (you/your household) in the last 12 months?</p> | <p>Often true Sometimes true Never true Don't know or Refused</p> |
| 2 | <p>“The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more.” Was that often, sometimes, or never true for (you/your household) in the last 12 months?</p> | <p>Often true Sometimes true Never true Don't know or Refused</p> |
| 3 | <p>“(I/we) couldn't afford to eat balanced meals.” Was that often, sometimes, or never true for (you/your household) in the last 12 months?</p> | <p>Often true Sometimes true Never true Don't know or Refused</p> |
| 4 | <p>In the last 12 months, since last (name of current month), did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?</p> | <p>Yes No Don't know</p> |
| 5 | <p>[IF YES ABOVE, ASK] How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?</p> | <p>Almost every month Some months but not every month Only 1 or 2 months Don't know</p> |
| 6 | <p>In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?</p> | <p>Yes No Don't know</p> |
| 7 | <p>In the last 12 months, were you every hungry but didn't eat because there wasn't enough money for food?</p> | <p>Yes No Don't know</p> |

* The USDA provides public access to the complete Core Food Security Module and its scoring algorithm at <http://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/survey-tools.aspx> ⁽¹⁴⁾.

[†] Bolded response options are considered affirmative: Often true, Sometimes true, Yes, Almost every month, and Some months but not every month.

Table 2. Sensitivity and Specificity for Two Item Combinations from the Core Food Security Module*

| | Prevalence | Items 1 [†] and 2 ^{**} | | | Items 2 [§] and 3 | | | Items 1 [†] and 3 | | |
|--------------------------------------|------------|--|-------------|-----------------------|--|-------------|-----------------------|--|-------------|-----------------------|
| | | Sensitivity | Specificity | Accuracy [¶] | Sensitivity | Specificity | Accuracy [¶] | Sensitivity | Specificity | Accuracy [¶] |
| All Income Levels [†] | | | | | | | | | | |
| All households | 0.142 | 0.972 | 0.927 | 0.933 | 0.972 | 0.935 | 0.940 | 0.993 | 0.913 | 0.924 |
| Households with Children | 0.186 | 0.970 | 0.904 | 0.916 | 0.970 | 0.904 | 0.916 | 0.992 | 0.896 | 0.914 |
| Households with Respondent > Age 60 | 0.093 | 0.966 | 0.944 | 0.946 | 0.983 | 0.945 | 0.949 | 0.990 | 0.931 | 0.936 |
| Respondent is Black | 0.257 | 0.981 | 0.864 | 0.894 | 0.973 | 0.894 | 0.914 | 0.993 | 0.858 | 0.893 |
| Respondent is Hispanic | 0.236 | 0.975 | 0.869 | 0.894 | 0.965 | 0.893 | 0.910 | 0.991 | 0.849 | 0.883 |
| Respondent is an Immigrant | 0.175 | 0.972 | 0.898 | 0.911 | 0.971 | 0.924 | 0.932 | 0.988 | 0.890 | 0.907 |
| Respondent has a Disability | 0.267 | 0.978 | 0.870 | 0.899 | 0.983 | 0.879 | 0.907 | 0.994 | 0.848 | 0.887 |
| Everyone in Household Speaks Spanish | 0.323 | 0.974 | 0.815 | 0.866 | 0.974 | 0.847 | 0.888 | 0.998 | 0.776 | 0.848 |
| Incomes < 200% of the Poverty Line | | | | | | | | | | |
| All households | 0.281 | 0.978 | 0.841 | 0.879 | 0.978 | 0.865 | 0.897 | 0.993 | 0.820 | 0.869 |
| Households with Children | 0.354 | 0.971 | 0.795 | 0.857 | 0.964 | 0.858 | 0.896 | 0.993 | 0.785 | 0.859 |
| Households with Respondent > Age 60 | 0.178 | 0.981 | 0.886 | 0.903 | 0.987 | 0.893 | 0.910 | 0.991 | 0.867 | 0.889 |
| Incomes < the Poverty Line | | | | | | | | | | |
| All households | 0.352 | 0.985 | 0.802 | 0.866 | 0.980 | 0.834 | 0.885 | 0.994 | 0.784 | 0.858 |
| Households with Children | 0.427 | 0.980 | 0.737 | 0.841 | 0.969 | 0.825 | 0.886 | 0.995 | 0.738 | 0.848 |
| Households with Respondent > Age 60 | 0.247 | 0.987 | 0.857 | 0.889 | 0.987 | 0.861 | 0.892 | 0.990 | 0.834 | 0.873 |

*Data are from the 2013 December Supplement of the Current Population Survey

[†]The total number of unweighted observations is 42,081 households

[‡]Item 1 asks “We worried whether our food would run out before we got money to buy more.” Was that often, sometimes, or never true for you in the last 12 months? [Responses of sometimes or often are counted as “affirmative responses”.]

[§]Item 2 asks “The food that we bought just didn’t last and we didn’t have money to get more.” Was that often, sometimes, or never true for you in the last 12 months? [Responses of sometimes or often are counted as “affirmative responses”.]

^{||}Item 3 asks “We couldn’t afford to eat balanced meals.” Was that often, sometimes, or never true for you in the last 12 months? [Responses of sometimes or often are counted as “affirmative responses”.]

[¶]Defined as sensitivity*prevalence+specificity*(1-prevalence)

Acknowledgments

Financial Support: None. **Conflict of Interest:** This research received no specific grant from any funding agency, commercial or not-for-profit sectors. **Authorship:** Dr. Gundersen did the analytical work and contributed to the construction of the paper and its write-up. Dr. Seligman, Ms. Satoh, and Ms. Engelhard contributed to the construction of the paper and its write-up. **Ethical Standards Disclosure:** This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects/patients were approved by the UCSF Human Research Protection Program Institutional Review Board. Written informed consent was obtained from all subjects/patients.

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