

Statewide Prevalences of Concern About Enough Food, 1996–1999

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SYNOPSIS

Objective. Food insecurity is defined as not having access at all times to enough food for an active and healthy life-style. A Healthy People 2010 objective is to increase food security and reduce the risk of hunger for all households. The objective of this study was to characterize the prevalence of concern about enough food and its association with other sociodemographic and health characteristics at the state level.

Methods. Adult respondents participating in the Behavioral Risk Factor Surveillance System survey provided information on concern about enough food from nine states from 1996 through 1999.

Results. Overall, the prevalence of concern about enough food ranged from 3.1% to 11.8% for individual states. Across states, low household income was the strongest predictor of concern about enough food. The odds of being concerned about enough food were generally higher among respondents who were female, younger, and without health care coverage. The odds were generally lower among those reporting excellent or very good general health and among non-Hispanic whites.

Conclusion. Food security scales could be used at the state level to track progress for the Healthy People 2010 objective of reducing food insecurity and hunger across American households.

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INTRODUCTION

Food insecurity is defined as the limited or uncertain availability of nutritionally adequate, safe foods or the ability to acquire personally acceptable foods in socially accepted ways.¹ Uncertainty or concern about procuring food is the first of three levels in the progression from food insecurity to hunger.¹ More work is needed to define relationships among risk factors contributing to food insecurity, characteristics of food insecurity, and consequences of food insecurity.³ Once we understand these relationships, we will be better equipped to implement early identification and targeting of certain populations to prevent food insecurity and its consequences.

In children, insufficient food is associated with impaired growth, poorer health status, and more frequent episodes of colds, stomachaches, and headaches.^{4,5} In adults, food insecurity and hunger can have deleterious health and behavioral effects,⁶ and appear to contribute to poor nutrition.^{7–10} Because of these concerns, there is a Healthy People 2010 objective addressing the need to increase food security and reduce the risk for hunger among all households.⁶

In the last two decades, research has focused on quantifying food insecurity and hunger at the national level and has only more recently considered the state level.^{11,12} Early detection of concern about enough food, which can be accomplished through ongoing surveillance systems and used with knowledge of risk factors for food insecurity, might be a feasible strategy for preventing further food insecurity. State-based data are important because many efforts to alleviate hunger are conducted at the state level (e.g., Food Stamp Program, School Lunch and School Breakfast Program, and Special Supplement Nutrition Program for Women, Infants, and Children [WIC]).¹³ Drawing on Campbell's framework,³ we examined both the prevalence and sociodemographic and health characteristics associated with concern about enough food, a component of food insecurity. Data were analyzed for nine states that used the Social Context Module of the Behavioral Risk Factor Surveillance System (BRFSS) from 1996 to 1999.

METHODS

The BRFSS is an ongoing, state-based, random-digit-dialed telephone survey of the civilian, noninstitutionalized U.S. population ages 18 years and older.¹⁴ The BRFSS question on concern about enough food was part of the Social Context Module, an optional module states may use in addition to the core BRFSS questionnaire. Maryland, Montana, Pennsylvania, and Vir-

ginia used this module in 1996 ($n = 11,485$); Kansas, Louisiana, Maryland, South Carolina, and Virginia used it in 1997 ($n = 11,487$); Missouri and Virginia used it in 1998 ($n = 7,100$); and Louisiana and New York used it in 1999 ($n = 4,161$). Respondents were asked, "In the past 30 days, have you been concerned about having enough food for you or your family?" A response of "yes" to this question was considered an indication of concern about enough food.

Each year, respondents were also asked questions regarding demography (e.g., age, marital status, race/ethnicity, number of children in the household), self-reported general health, and socioeconomic status (e.g., income, education, health care coverage). Health care coverage was defined positively if the participant had any health insurance, prepaid plans (e.g., health maintenance organizations), or government plans (e.g., Medicare).

Prevalence estimates were calculated by state and year of data collection. To investigate the contribution of sociodemographic and health characteristics across states, logistic regression analyses were conducted for each state predicting concern about enough food. These characteristics were chosen based on the literature^{4,8,15,16} and on the variables available from the BRFSS. The following independent variables (categorized similarly across models) were examined: sex, age, race/ethnicity, income, education, marital status, number of children in the household, general health, and health care coverage. Because more than one year of data was collected for Louisiana, Maryland, and Virginia, a variable was added for the year of data collection to these models. Additionally, for the state of Montana, race could be divided into only two categories. All sample estimates were weighted by sex, age, and race/ethnicity to reflect the state's noninstitutionalized civilian population. To account for the complex sampling design, SUDAAN was used.¹⁷

RESULTS

The unadjusted prevalence of concern about enough food by state is reported across years in Table 1. Comparing across years and states, the prevalence of concern about enough food ranged from 3.1% in Kansas (1997) to 11.8% in New York (1999). For Virginia, the only state reporting more than two years of data, the prevalence of concern about enough food was similar in 1996 and 1997, but declined in 1998.

Multivariable state-specific models predicting concern about enough food were calculated (Table 2). For all states surveyed, the odds of being concerned about enough food was lower among men, among

Table 1. Unadjusted prevalence of self-reported concern about enough food in the last month, by state, with 95% confidence intervals²⁹

State	1996			1997			1998			1999		
	Concern about food			Concern about food			Concern about food			Concern about food		
	Sample size	Percent	95% CI	Sample size	Percent	95% CI	Sample size	Percent	95% CI	Sample size	Percent	95% CI
Kansas				1,916	3.1	2.3, 3.9						
Louisiana				1,647	9.4	7.7, 11.1				1,647	8.0	6.5, 9.6
Maryland	4,405	4.3	3.6, 5.1	2,323	4.0	2.1, 5.0						
Missouri							3,646	5.3	4.3, 6.3			
Montana	1,802	6.9	5.6, 8.2							2,514	11.8	10.1, 13.5
New York												
Pennsylvania	3,390	6.6	5.6, 7.6									
South Carolina				2,155	5.9	4.7, 7.1						
Virginia	1,888	6.1	4.8, 7.5	3,446	6.2	4.5, 7.9	3,454	4.1	3.1, 5.0			

Table 2. Multivariable odds ratios (95% confidence intervals) of self-reported concern about enough food in the last month, by sociodemographic and health characteristics and by state

Characteristics	Kansas n = 1,547 OR (95% CI)	Louisiana n = 2,806 OR (95% CI)	Maryland n = 5,337 OR (95% CI)	Missouri n = 3,242 OR (95% CI)	Montana n = 1,449 OR (95% CI)	New York n = 1,952 OR (95% CI)	Pennsylvania n = 2,838 OR (95% CI)	South Carolina n = 1,772 OR (95% CI)	Virginia n = 7,298 OR (95% CI)
Sex									
Men	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Women	1.5 (0.7, 3.1)	1.4 (1.0, 2.1)	1.2 (0.9, 1.8)	1.2 (0.8, 1.8)	1.3 (0.8, 2.2)	1.2 (0.8, 1.8)	1.2 (0.8, 1.7)	1.6 (1.0, 2.7)	1.2 (0.9, 1.7)
Age (years)									
≥55	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
35–54	3.3 (1.0, 11.1)	3.3 (2.0, 5.6)	3.9 (1.7, 8.7)	1.9 (1.0, 3.7)	1.6 (0.7, 4.1)	2.2 (1.0, 4.7)	2.0 (1.1, 3.8)	3.2 (1.5, 6.6)	1.6 (1.0, 2.7)
18–34	7.1 (2.2, 22.9)	3.4 (2.0, 5.8)	2.9 (1.2, 6.9)	1.3 (0.6, 2.7)	1.5 (0.6, 3.8)	4.4 (2.0, 9.6)	2.9 (1.5, 5.8)	2.5 (1.0, 6.4)	2.1 (1.2, 3.8)
Race/ethnicity									
Non-Hispanic white	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Non-Hispanic black	2.8 (1.0, 8.2)	1.7 (1.1, 2.4)	1.4 (0.9, 2.1)	2.3 (1.3, 3.9)	1.5 (0.5, 4.1)	2.8 (1.7, 4.7)	1.1 (0.6, 1.9)	2.7 (1.6, 4.7)	1.9 (1.3, 2.7)
Other	1.2 (0.4, 3.5)	1.7 (0.8, 3.7)	2.2 (1.0, 4.5)	3.3 (1.5, 7.5)	NA	2.5 (1.5, 4.1)	1.9 (1.0, 3.8)	4.3 (1.2, 15.5)	3.2 (1.8, 5.6)
Annual household income									
≥\$35,000	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
\$20,000–\$34,999	1.9 (0.7, 5.1)	4.3 (2.2, 8.3)	4.5 (2.6, 7.9)	2.7 (1.1, 6.4)	6.8 (2.5, 18.9)	2.3 (1.3, 4.0)	2.0 (1.1, 3.6)	2.6 (1.1, 6.4)	3.0 (1.9, 4.7)
\$10,000–\$19,999	3.2 (0.9, 11.1)	7.4 (3.7, 14.9)	11.0 (5.6, 21.6)	4.1 (1.8, 9.7)	12.3 (4.1, 37.6)	3.5 (1.8, 6.7)	3.9 (2.0, 7.5)	3.7 (1.6, 8.8)	5.9 (3.4, 10.2)
<\$10,000	5.6 (1.4, 23.0)	13.8 (6.1, 31.1)	13.4 (5.6, 32.2)	6.8 (3.0, 15.5)	12.5 (3.8, 40.8)	7.0 (3.1, 15.5)	2.3 (1.0, 5.2)	3.3 (1.1, 9.7)	11.6 (6.2, 21.6)
Education									
>High school	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
High school	1.5 (0.7, 3.2)	1.3 (0.9, 2.0)	1.1 (0.7, 1.7)	0.7 (0.4, 1.2)	0.9 (0.6, 1.6)	1.9 (1.1, 3.1)	1.3 (0.8, 2.0)	1.9 (1.0, 3.4)	1.2 (0.8, 1.7)
<High school	1.9 (0.5, 6.8)	2.2 (1.3, 3.5)	2.0 (1.2, 3.5)	0.9 (0.5, 1.6)	0.9 (0.3, 2.3)	4.0 (2.1, 7.5)	2.9 (1.6, 5.0)	3.1 (1.6, 6.0)	1.2 (0.8, 1.9)

Table 2 (continued). Multivariable odds ratios (95% confidence intervals) of self-reported concern about enough food in the last month, by sociodemographic and health characteristics and by state

Characteristics	Kansas n = 1,547 OR (95% CI)	Louisiana n = 2,806 OR (95% CI)	Maryland n = 5,337 OR (95% CI)	Missouri n = 3,242 OR (95% CI)	Montana n = 1,449 OR (95% CI)	New York n = 1,952 OR (95% CI)	Pennsylvania n = 2,838 OR (95% CI)	South Carolina n = 1,772 OR (95% CI)	Virginia n = 7,298 OR (95% CI)
Marital status									
Married/live together	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Never married	0.9 (0.4, 2.1)	1.4 (0.9, 2.2)	1.3 (0.8, 2.1)	1.3 (0.8, 2.1)	2.3 (1.2, 4.4)	1.1 (0.6, 1.7)	1.6 (1.0, 2.5)	0.8 (0.4, 1.6)	1.2 (0.8, 1.8)
Divorced/separated	2.0 (0.5, 7.4)	0.6 (0.3, 1.1)	0.8 (0.3, 1.9)	0.8 (0.3, 1.8)	0.2 (0.0, 1.2)	0.8 (0.3, 1.9)	1.7 (0.9, 3.2)	1.1 (0.5, 2.5)	1.2 (0.6, 2.3)
Widowed	0.9 (0.3, 2.5)	0.9 (0.5, 1.5)	1.0 (0.6, 1.8)	1.2 (0.6, 2.6)	1.3 (0.6, 2.7)	0.7 (0.4, 1.1)	1.3 (0.7, 2.3)	1.4 (0.7, 3.0)	0.7 (0.4, 1.2)
Number of children in household									
0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1	2.2 (0.9, 5.6)	1.1 (0.6, 1.7)	1.6 (1.0, 2.6)	1.1 (0.6, 2.0)	2.7 (1.3, 5.9)	0.8 (0.4, 1.4)	1.7 (1.0, 2.8)	1.2 (0.6, 2.4)	1.5 (1.0, 2.3)
≥2	1.7 (0.7, 4.1)	1.3 (0.9, 2.0)	1.8 (1.1, 2.9)	1.7 (1.0, 2.9)	1.8 (0.9, 3.5)	0.8 (0.5, 1.4)	1.8 (1.1, 3.0)	1.9 (1.0, 3.6)	1.9 (1.2, 3.0)
General health									
Excellent or very good	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Good	1.0 (0.4, 2.3)	1.8 (1.2, 2.7)	1.5 (1.0, 2.2)	2.1 (1.3, 3.4)	1.7 (1.0, 3.0)	1.4 (0.8, 2.2)	1.1 (0.8, 1.7)	1.6 (0.9, 2.8)	1.5 (1.0, 2.1)
Fair or poor	2.7 (0.9, 7.7)	2.6 (1.7, 4.1)	1.7 (1.0, 2.8)	2.5 (1.4, 4.3)	2.7 (1.3, 5.4)	1.3 (0.7, 2.3)	2.4 (1.5, 3.8)	2.5 (1.3, 4.8)	1.6 (1.0, 2.5)
Have health care coverage									
Yes	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
No	2.8 (1.2, 6.6)	1.5 (1.1, 2.2)	2.5 (1.6, 3.7)	2.2 (1.3, 3.8)	2.4 (1.5, 4.0)	2.0 (1.2, 3.3)	2.7 (1.7, 4.2)	3.7 (2.1, 6.3)	1.3 (1.0, 1.9)
Year									
1996	NA		1.0	NA	NA	NA	NA	NA	1.0
1997		1.0	1.1 (0.8, 1.6)						1.0
1998									(0.7, 1.4)
1999									0.7 (0.5, 1.0)

NA = not applicable

respondents at least 55 years of age, and among non-Hispanic whites, compared with other racial/ethnic groups, although some estimates were unstable because of small sample sizes. The lower category of household income was the stronger predictor of concern about enough food across states. For most states, the odds of being concerned about enough food were lower in the highest education category. The relationship between marital status and concern about enough food were inconsistent across states. For many—but not all—states, having at least two children living in the household conferred the highest odds of being concerned about enough food. In every state, except New York, the odds of being concerned about enough food were higher if general health was reported as fair or poor. Across all states, not having health care coverage increased the odds of being concerned about enough food.

DISCUSSION

This article provides statewide prevalence estimates of concern about enough food. Food insecurity has been modeled as a progression from uncertainty or concern about having enough food, to moderate hunger, then severe hunger.² The BRFSS survey question used is most similar to the concept of uncertainty about having enough food, which is psychological in nature and may lead to anxiety.² This is considered the first step to dietary compromise and engagement of coping strategies.¹⁸ Based on 34,233 respondents from 1996 to 1999, the data indicate that approximately 3%–12% of adults from the survey states reported concern about having enough food for themselves or their family in the previous month. These results can be compared with two questions asked on the national 1999 Current Population Survey.¹⁵ The adjusted national prevalence of “worried food would run out before I/we got money to buy more” was 11.3%, and the adjusted national prevalence of “food bought didn’t last and I/we didn’t have money to get more” was 9.9%.

Our findings demonstrate consistencies across states for most characteristics studied in relation to concern about enough food. The odds of concern about enough food were generally higher among women, younger respondents, non-Hispanic blacks and other racial/ethnic groups, and households with children. Concern about enough food was related to other public health concerns, such as socioeconomic status and general health. Of all the factors studied, household income was the strongest predictor of concern about

enough food across states, even after controlling for other factors. Qualitative data, such as those cited,^{19,20} could supplement the quantitative data to further understand barriers at the local and state level.

Our findings regarding characteristics related to reporting concern about enough food are similar to studies that have examined factors contributing to food insufficiency and food insecurity. National data from the Third National Health and Nutrition Examination Survey (1988–94) indicated that food insufficiency was more common among those participating in the Food Stamp Program, those without health insurance, those with lower education, those 60 years of age or younger, and those of Mexican-American ethnicity.⁴ Food insecurity, measured at the national level from the 1999 Current Population Survey, was more common among households with children, single parent households, among non-Hispanic blacks and Hispanics, and in central cities and non-metropolitan areas, compared with the suburbs and other metropolitan areas outside central cities.¹⁵ Food insecurity, based on the 1989–91 Continuing Survey of Food Intake by Individuals, was related to lower income, lower education, renting rather than owning a home, larger household size, single parent households, and non-Hispanic black or Hispanic race/ethnicity.^{8,21} Finally, data from a survey conducted in a rural New York county revealed that food insecurity was higher among those with larger households, single parent households, unexpected expenses, low food expenditures, increased food stamp amount, and lack of savings.¹⁶

These findings are subject to several limitations. Data from all states for all years were not collected. Thus, the comparison of statewide data may be confounded by changes occurring over time or by other unmeasured confounders. Because the data were self-reported, these findings are subject to recall bias and inaccurate reporting of behaviors. Conceptual models of food insecurity and hunger indicate the complexity of its measurement.^{3,22–24} No single item is sufficient for assessing food insecurity and hunger,²⁵ and the validity and reliability of the single-item measure used for these analyses is unknown. The question respondents answered in this study determined concern about having enough food in the previous month. Therefore, it did not identify whether the problem was persistent over time or temporary. Also, this question combined individual and household domains. Consequently, it was not able to identify the level of severity.²⁶ Because of the sampling scheme, there were fewer older respondents; therefore, the prevalence for those individuals at the highest ages could not be addressed

adequately. Food insecurity may rise at the oldest ages, because these individuals may have poor health and be less mobile, which could prevent access to lower cost food stores.^{24,27} Also, this study design did not allow contact with some population groups, such as those living on American Indian reservations, homeless individuals, and those without a telephone.¹ Finally, some of our estimates lacked statistical precision. However, we tried to display adjusted models that could easily be compared across states.

These data demonstrate that there is variation in prevalence of concern about enough food across states, but many sociodemographic and health characteristics were consistent across states. State-level data can be used to guide decision-making on strategies necessary to implement an early defense against food insecurity and hunger. At the very least, identifying food uncertainty or concern about enough food should take place at the state level for preventive efforts. Where feasible, the more comprehensive measures of food security, such as the 18-item United States Department of Agriculture Food Security Module¹¹ or the shorter six-item version,²⁸ could be used at the state level for monitoring and evaluating food insecurity and hunger to track progress for the Healthy People 2010 objective of reducing food insecurity and hunger across American households.

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