

Assessment of Household Food Security Among Food Stamp Recipient Families in Maryland

Cheryl A. Oberholser, MS, RD, LDN, and Cynthia Reeves Tuttle, PhD, MPH

In a country with an abundance of financial and nutritional resources, people continue to experience hunger. In 1999 and 2000, 10% of Americans experienced food insecurity and hunger.^{1,2} Food insecurity exists whenever “the availability of nutritionally adequate and safe foods or the ability to acquire foods in socially acceptable ways is limited or uncertain.”^{3(p1560)} The consequences of hunger and malnutrition on health status are of continuing concern for many Americans. Research has shown that experiencing food insecurity and hunger has implications for one’s physical and mental health status. Food insecurity has been shown to be associated with being overweight in women,⁴ with poor health status among children,⁵ with “negative academic and psychosocial outcomes” in children,^{6(p44)} and with individuals having “higher odds of reporting poor/fair health” and “suffering from depression and distress.”^{7(p120)}

In 1994, the US Department of Agriculture (USDA) developed the US Food Security Survey Module (FSSM), which directly measures the prevalence of household food insecurity and hunger. The mission of the USDA’s Food and Nutrition Service is “[t]o increase food security and reduce hunger in partnership with cooperating organizations by providing children and low-income people access to food, a healthful diet, and nutrition education in a manner that supports American agriculture and inspires public confidence.”⁸ The USDA has also established a National Nutrition Safety Net (NNSN) to combat the problem of hunger in the United States. The NNSN is composed of economic and food assistance programs that are designed to promote and assist with the achievement of the mission of the Food and Nutrition Service.

Two viewpoints exist on the issue of food insecurity among low-income households. One might expect low-income households participating in an assistance program to ex-

Objectives. We assessed the relationship between food security status and various sociodemographic characteristics among households that include children and that receive food stamps.

Methods. A modified version of the US Food Security Survey Module was implemented by telephone survey with Maryland food stamp recipients.

Results. Of the 245 households, 66% experienced food insecurity. Food security status was associated with participation in the Special Supplemental Food Program for Women, Infants, and Children, the summer food program, and a food bank. Food security status was not associated with the number of months households received food stamps. There was no difference between the food security status of households living in urban and rural counties.

Conclusions. A gap exists between the food stamp support provided and some households’ nutritional and economic needs. (*Am J Public Health.* 2004;94:790–795)

perience some level of food insecurity, because they lack the resources necessary to access adequate amounts of nutritious food. In contrast, because the purpose of the programs of the NNSN is to provide economic and food assistance to low-income households, one might also expect a low prevalence of food insecurity among this population.⁸

Evidence indicates that food insecurity and hunger persist despite the efforts of government and private food assistance programs.⁹ According to data from the 2000 Current Population Survey administered by the US Census Bureau, approximately 10% of US households are food insecure.² Single-female-headed households with children and all types of households with children experienced rates of food insecurity higher than the national average.^{1,2} The same survey reported that among households with incomes below 130% of the poverty line (the eligibility requirement to receive food stamp benefits), approximately 47% and 42% of single female-headed households and households with children experienced food insecurity, respectively.² Data also show that the programs of the NNSN are not adequately meeting the nutrition needs of some households, most likely those at highest risk.² The purpose of this study was to measure the prevalence of

food insecurity and hunger experienced by a sample of food stamp recipients and to assess how food security status is related to sociodemographic characteristics, participation in economic and food assistance programs during the previous year, living in a rural or urban county, and the number of months in which the household received food stamps during the previous year.

METHODS

Participants

The target sample size of 278 food stamp recipients was established with the binomial sample size estimate equation, $t^2 pq / (\text{desired confidence interval} / 2)^2 = \text{sample size } (n)$, setting 4 as the approximate squared t value based on $\alpha = .05$, 50 as the hypothesized percentage of food security and the hypothesized percentage of food insecurity, and 6 as one half the desired 95% confidence interval. To be eligible for the study, participants had to be food stamp recipients who lived in the state of Maryland, spoke English, owned a telephone, and had at least 1 child. A random sample listing of 1545 food stamp recipients who met the criteria of eligibility was provided by the Maryland Department of Human Resources.

Survey Instrument

The final version of our questionnaire included a consent form, a page of supplemental questions, and a modified version of the US FSSM. Minor revisions were made to improve the layout and the wording of the US FSSM without changing the meaning or sequence of the questions, to make the questionnaire more user friendly. Questions were rewritten from the first person (I or we) to the second person (you). A version of the US FSSM containing only the modifications to the layout was validated by research conducted among 259 participants of the Special Supplemental Food Program for Women, Infants, and Children (WIC) in Maryland (C. Tuttle, C. Oberholser, unpublished data; C. Tuttle, M. Nord, unpublished data, Spring 2001). The supplemental questions pertained to sociodemographic characteristics, additional public or private programs used within the past year, number of months in which the participants received food stamps during the past year, and form of transportation used most frequently. (In this article, food bank refers to a food bank, pantry, or soup kitchen.) Sociodemographic characteristics included age, sex, marital status, number of children in the household, number of extended family members living in the household, and ethnicity. County of residence and income level were based on information provided by the Maryland Department of Human Resources.

Data Collection

The study design and questionnaire were approved for implementation by the University of Maryland institutional review board. The food stamp recipients were randomly contacted by telephone from September through December of 2001 and were asked to participate in the research project. The survey took approximately 15 minutes to complete, and the interview times ranged from 10 to 30 minutes. As an incentive, participants were automatically entered into a monthly raffle for \$100 worth of gift certificates at a local grocery store. Approximately 650 of the telephone numbers for 1545 recipients were not in service, were disconnected, or were wrong numbers. Of the 327 households contacted, 81 refused to participate and 246 agreed to participate. One person who was in-

terviewed did not meet the criteria of eligibility and was eliminated from the study. The final sample size was 245. The responses to the telephone interview were entered into a database with Epi Info 2000 (Centers for Disease Control and Prevention, Atlanta, Ga).

Data Analysis and Statistics

Rasch analysis, performed by the USDA Economic Research Service, validated the standard methods of measuring food security used in our study.¹⁰ Households were categorized by food security status with methods outlined by the USDA.¹⁰

The level of significance for all statistical tests was $P < .05$. Chi-square contingency table analyses and backward stepwise logistic regression analyses were used to examine the relationship between sociodemographic variables and food security status. Chi-square analysis was used to examine the relationships between food security status and marital status of respondent, ethnicity of respondent, and past-year participation by any member of the household in each of the programs or services included in the questionnaire. Because preliminary analysis indicated that sociodemographic variables did not significantly contribute to the model, these were eliminated from the logistic regression. The full model used in the multiple logistic regression included food insecurity as the dependent variable and participation in economic and food assistance programs as the independent variables. The independent variables included participation in the WIC, summer food, or school breakfast or lunch programs; receipt of temporary cash assistance; and use of a food bank. After backward stepwise logistic regression analyses, the final model (simple logistic regression) included food insecurity as the dependent variable and use of a food bank as the independent variable. Of the possible correlations between participating in the 5 assistance programs, the highest correlation was $r = .185$. Thus, it was acceptable to assume that high correlation between program participation in various programs was not a problem and did not affect the significance of the results in the backward stepwise logistic regression model.

Spearman's correlation was used to examine the association between the number of

months in the past year a household received food stamps benefits and the FSSM score. Chi-square analysis was used to compare the prevalence of food security between households living in urban and rural counties in Maryland. Counties were classified into rural or urban counties according to the USDA rural-urban continuum codes.¹¹ Counties with code 0 were considered urban (central counties of metropolitan areas with a population of 1 million or more), and those with codes 1 through 7 were considered rural (fringe counties of metro areas with a population of 1 million or more and counties with a population of less than 1 million).¹¹ This classification corresponds with the US Census Bureau urban and rural classification system. An urbanized area is defined as core census blocks with a population density of at least 1000 people per square mile and of surrounding census blocks with an overall density of at least 500 people per square mile.¹² With 2 exceptions, all of the counties classified as urban in our study had population densities greater than 1000 people per square mile in 1990.¹¹ The other 2 counties had population densities of approximately 400 and 750 people per square mile. The remainder of the counties classified as rural in our study all had population densities of fewer than 500 people per square mile.¹¹

RESULTS

Respondent and Household Characteristics

A majority of the respondents were single, female, and of African American ethnicity (Table 1). Of this sample of low-income families with children, 75% of households received free or reduced-price school breakfast or lunch. Thirty-four percent of the households participated in WIC, 33% received temporary cash assistance, 12% participated in the summer food program for children, and 18% had accessed a food bank within the past year (Table 2).

Food Security Status

Of the 245 participants, 66% of the households experienced some level of food insecurity. Only 34% of our sample was identified

TABLE 1—Sociodemographic Characteristics of Study Respondents

Characteristic	No. (%) or Mean	SEp or SEM	n
Ethnicity			245
African American	157 (64)	3.1	
White	79 (32)	3.0	
Other	9 (4)	1.1	
Gender			245
Female	237 (97)	1.1	
Male	8 (3)	1.1	
Marital status			245
Married	52 (21)	2.6	
Single	193 (79)	2.6	
Age, y			243
19–29	58 (24)	2.7	
30–39	86 (35)	3.1	
40–49	68 (28)	2.8	
50–70	31 (13)	2.2	
Age, y	37.7	0.68	243

Note. SEp = Standard error of the percentage.

as food secure. Thirty-eight percent experienced food insecurity without hunger, 21% experienced food insecurity with moderate hunger, and 7% experienced food insecurity with severe hunger.

Association With Sociodemographic Characteristics

No associations were found between food security status and marital status ($P=.6600$), ethnicity ($P=.2598$), participation in the school lunch or breakfast program ($P=.2701$), or receipt of temporary cash assistance ($P=.2886$). Significant associations were observed between food security status and participation in the following food assistance programs (compared with households not participating in the program): WIC ($P=.0261$), summer food program ($P<.0001$), or a food bank ($P<.0001$).

Percentage of households participating in WIC decreased as food security status progressed toward severe hunger (Figure 1). However, households participating in a summer food program for children or in a food bank demonstrated the opposite association with food security status, as did participation in WIC. Percentage of households

TABLE 2—Sociodemographic Characteristics of Study Households

Characteristic	No. (%) or Mean	SEp or SEM	n
Participating in program			245
School breakfast/lunch	183 (75)	2.8	
WIC	84 (34)	3.0	
Temporary cash assistance	80 (33)	3.0	
Food bank	45 (18)	2.5	
Summer food program	29 (12)	2.1	
Other services	19 (8)	1.7	
Clothes closet or shelter	12 (5)	1.4	
School and WIC	55 (22)	2.6	
School and summer program	26 (11)	2.0	
WIC and food bank	15 (6)	1.5	
Food bank and summer program	11 (4)	1.3	
WIC and summer program	9 (4)	1.3	
Transportation			245
Bus	91 (37)	3.1	
Own car	90 (37)	3.1	
Friend or relative's car	37 (15)	2.3	
Walking	12 (5)	1.4	
Other	9 (4)	1.3	
Taxi	6 (2)	0.8	
No. of persons	3.88	0.089	235
No. of children	2.25	0.075	245
Monthly food stamp benefits, \$	235	8.1	245
Monthly household income, \$	760	28	245

Note. SEp = Standard error of the percentage; WIC = Special Supplemental Food Program for Women, Infants, and Children.

who participated in either of these 2 programs increased as food security status progressed toward severe hunger (Figure 1). In addition, backward stepwise logistic regression analysis showed that households that had used a food bank within the past year were nearly 3 times more likely to be food insecure compared with households that had not (odds ratio = 2.84, $P=.0123$) (Table 3).

The households received food stamp benefits for an average of 9 months within the past year. Spearman correlation verified that the number of months in which each household received food stamps in the past year was not associated with food security score or with subsequent food security status ($r=.0872$, $P=.1840$). No significant difference in prevalence of food security was observed between households living in rural and in urban counties ($\chi^2=.0071$, $P=.9326$).

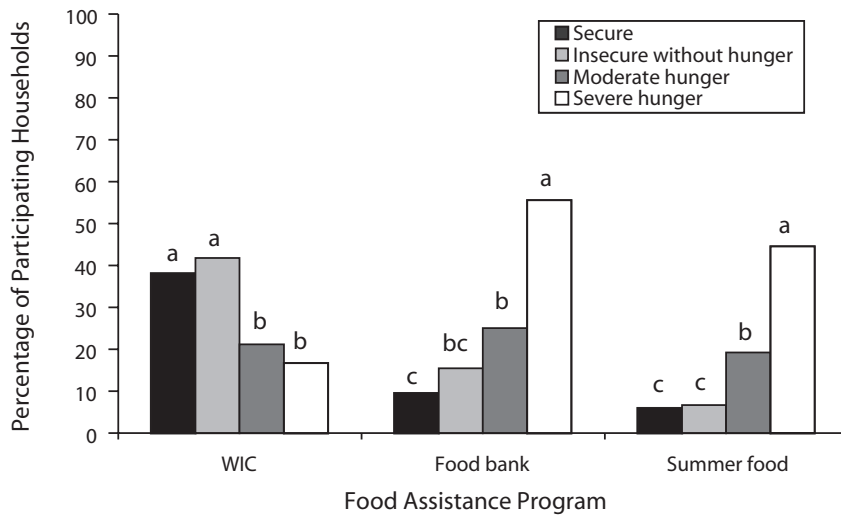
Reasons for Food Insecurity

Households experiencing food insecurity, with or without hunger, were asked, “Which of these statements best describes the food eaten in your household in the past 12 months?” 55 participants (34%) responded that they “sometimes did not have enough food to eat,” and 15 (9%) reported “often not having enough to eat.” Fifty-six participants (35%) did not always have the “kinds of food they wanted to eat,” although they had enough to eat. Not enough money to buy food was consistently and most frequently reported as the reason for not having enough food or the kinds of food they wanted to eat.

DISCUSSION

Food Security Status

A high proportion (66%) of food stamp-recipient households with children in this study experienced food insecurity. These



Note. WIC = Special Supplemental Food Program for Women, Infants, and Children. Overall *P* values (*n* = 245); WIC (*P* = .0261); food bank (*P* < .0001); summer food program (*P* < .0001). Bars with identical letters “a” through “c” are not significantly different within programs (*P* > .05).

FIGURE 1—Percentage of households participating in food assistance programs, by food security status.

TABLE 3—Likelihood of Experiencing Food Insecurity Among Households Participating in Economic and Food Assistance Programs

Program	Odds Ratio (95% Confidence Interval)	<i>P</i>
Food bank	2.84 (1.254, 6.409)	.0123
Summer food program	2.35 (0.849, 6.526)	.1001
Temporary cash assistance	1.35 (0.743, 2.434)	.3279
WIC	0.79 (0.451, 1.391)	.4168
School lunch/breakfast	1.10 (0.594, 2.051)	.7555

Note. WIC = Special Supplemental Food Program for Women, Infants, and Children.

rates of food insecurity and hunger are higher than those reported in the 1999 National Food Stamp Program Survey. The 1999 National Food Stamp Program Survey data (*n* = 2396) represent all households in the US population receiving food stamps. The results of the food stamp program survey indicated that approximately 28% of households expe-

rienced food insecurity without hunger, 17% experienced food insecurity with moderate hunger, and 5% experienced food insecurity with severe hunger, as compared with 38%, 21%, and 7%, respectively, observed in our study.¹³ The higher prevalence of food insecurity and hunger in our study, compared with the National Food Stamp Program Survey data, may result from our sampling only families with children rather than all types of households or from the majority of our respondents’ being single and female.

Association With Sociodemographic Characteristics

We found identical rates of food insecurity in urban and rural counties. This finding provides convincing evidence that households in rural and urban counties in the state of Maryland experience food insecurity in equal proportions and that demographics normally used to identify a county as rural or urban did not have a significantly different influence on the prevalence of food insecurity.

In light of the fact that, according to national food stamp data, the average length of participation is less than 2 years and that 57% of households participate for 1 year or

less, it is not surprising that 52% of our respondents reported receiving benefits for all 12 months of the year.¹⁴ Examination of the relationship between the number of months in which a household received food stamp benefits within the past year and food security score did not reveal significant associations between economic factors, participation, and food security status.

The percentage of families participating in WIC during the past year decreased as food security status progressed from secure to severe hunger (*P* = .0261). This finding is in contrast to the findings of Kendal et al.¹⁵ and to other results from our study. Results from a study of 193 households with women and children in New York State demonstrated a significant progressive increase in the percentage of households participating in WIC as food insecurity worsened (*P* = .0001).¹⁵ These results also conflict with the associations we found between food security status and participation in the summer food program or in food banks. These apparently conflicting results in our study may be explained by potential barriers to WIC participation, including WIC eligibility guidelines or by participants’ having problems accessing the WIC program (transportation issues, language barriers, etc.). Only pregnant women, postpartum women, and children younger than 5 years of age are eligible for WIC benefits. In addition, WIC clients must meet the criteria of having a household income less than 185% of the poverty level and of having an identified medical or nutritional risk factor. Eligibility for WIC cannot be directly examined from the data collected in our study, although the age of the oldest child in the household may reflect the household composition and therefore eligibility for the WIC program. Four percent (7 of 157 households) of households not participating in WIC reported that the oldest child was aged 5 years or younger, whereas 29% (23 of 78) of participating households reported that the oldest child was aged 5 years or younger. Households not participating that experienced hunger may have older children and therefore are not eligible for the WIC program. Other possible reasons for these results may include perceived difficulty in accessing the WIC benefits because of eligibility requirements and because of the

need to schedule an appointment—relative to participation, for example, in a food bank, where one can receive services without an appointment.

Additional concerns arise when the focus shifts to explaining the food security status of families not participating in food assistance programs. These results show that some families experiencing food insecurity and hunger are not participating in some of the programs of the National Nutrition Safety Net (NNSN), which are designed to alleviate hunger.⁸ These families either are ineligible because of participant criteria or are not able to fully use the food assistance programs for other reasons. Some households may choose not to participate because they perceive a social stigma attached to participation in food assistance programs.

According to Venner et al.,^{9(p9–10)} “emergency food program activity constitutes a unique barometer for gauging the paradox of hunger in a strong economy, and is evidence of the numbers of households and individuals for whom neither employment in a strong economy nor federal safety nets are providing the support necessary to ensure their food security.” In addition to the 18% of the households in this study that used a food bank in the past year, other indicators suggest that the food safety net is not providing sufficient support to some households. The high prevalence of food insecurity among these food stamp–recipient households, the fact that those households using a food bank within the past year were nearly 3 times more likely to be food insecure than those households not using a food bank, and the fact that respondents reported insufficient money as the primary reason for food insufficiency are indicators that a gap exists between the supplementary monetary benefits received from the food stamp program and the economic and nutritional needs of these households.

The results of this study show that the programs of the NNSN are not adequately providing for the economic and nutritional needs of some households. In addition to identifying that gaps exist in the NNSN, the issue of adequate wages and household income also needs to be addressed. This study did not directly measure employment status or wages earned, although one may speculate that em-

ployment status and the monetary value of wages are also factors contributing to the gap between the households’ needs and the services provided by food assistance programs.

Limitations

The analysis and interpretation of these results is limited by our inability to calculate the number of households who are eligible to participate in each program. We cannot distinguish between nonparticipating households who do not qualify to receive benefits from a program and those that qualify but choose not to participate in the program.

The results of this study could be biased because of the fact that 650 of the telephone numbers were disconnected or a wrong number. However, because these households are most likely at high risk, this potential bias would mean that our results may actually underestimate the prevalence of food insecurity among this sample. Because of fluctuation in use of the food stamp program, all of the households interviewed were not receiving food stamp benefits at the time of interview. However, all of the households had received food stamp benefits sometime within the past year. Because the FSSM is based on the perception of the respondent, results could also be influenced by a respondent’s attitude during the interview or by recall bias.

CONCLUSIONS

Research should be conducted to identify how the apparent gap in the NNSN can be decreased and eliminated. One possible starting point would be to assess how employment and wages contribute to food insecurity and hunger among low-income households, how the barriers to participation in food assistance programs can be decreased and eliminated, and the extent to which these food assistance programs provide nutritional support to participating at-risk populations.

Our results indicate that action needs to be taken to decrease the prevalence of food insecurity and hunger among food stamp recipients. Participation in career development programs would enhance employment status and improve economic status for some households. Further support—not restricted to economic support—should be given to single-

parent-headed households with children. State programs not only should evaluate the amount of food stamp benefits provided to these at-risk families but also should increase referrals to food assistance programs and decrease the barriers to participation in an effort to maximize the utilization of programs of the NNSN. The goal of increasing food security and thus reducing the mental and physical health problems associated with hunger is an impetus to further investigate and act on food insecurity issues among low-income households with children. ■

About the Authors

At the time of the study, Cheryl A. Oberholser was a graduate student with the Department of Nutrition and Food Science, University of Maryland, College Park, Md, and Cynthia Reeves Tuttle was with the Department of Nutrition and Food Science, University of Maryland, College Park.

Requests for reprints should be sent to Cynthia Reeves Tuttle, PhD, MPH, Bread for the World Institute, 50 F Street NW, Suite 500, Washington, DC 20001 (e-mail: ctuttle@bread.org).

This article was accepted May 22, 2003.

Contributors

Both authors participated in the conception, implementation, and evaluation of the study and in the preparation of the article.

Acknowledgments

This project was funded by the Maryland Agricultural Experiment Station.

The United States Department of Agriculture Economic Research Service, and especially Mark Nord, deserves recognition for performing the statistical analysis that validated the implementation of the Food Security Survey Module. We also thank Dr. Mark Kantor (University of Maryland) and Dr. Larry Douglass (University of Maryland) for their assistance with the research study and the statistical analysis, respectively.

Human Participant Protection

The consent form and the study design were approved by the University of Maryland human subjects institutional review board. A memorandum of agreement was signed between the University of Maryland Department of Nutrition and Food Science and the Maryland State Department of Human Resources ensuring confidentiality of food stamp receipt.

References

1. Andrews M, Nord M, Bickel G, Carlson S. *Household Food Security in the United States, 1999*. Washington, DC: US Dept of Agriculture, Economic Research Service, Food and Rural Economics Division; 2000. Food Assistance and Nutrition Research Report 8.
2. Nord M, Kabbani N, Tiehen L, Andrews M, Bickel G, Carlson S. *Household Food Security in the United States,*

2000. Washington, DC: US Dept of Agriculture, Economic Research Service, Food and Rural Economics Division; 2002. Food Assistance and Nutrition Research Report 21.

3. Anderson S, ed. *Life Sciences Research Office Report: Core Indicators of Nutritional State for Difficult-to-Sample Populations*. Bethesda, Md: Federation of American Societies for Experimental Biology; 1990.

4. Townsend M, Peerson J, Love B, Achterberg C, Murphy S. Food insecurity is positively related to overweight in women. *J Nutr*. 2001;131:1738–1745.

5. Alaimo K, Olson C, Frongillo E Jr. *Food Insecurity and Children's Health Status in the United States: Findings from NHANES III*. Washington, DC: US Dept of Agriculture, Economic Research Service; 2001.

6. Alaimo K, Olson C, Frongillo E Jr. Food insufficiency and American school-aged children's cognitive, academic, and psychosocial development. *Pediatrics*. 2001;108:44–53.

7. Vozoris N, Tarasuk V. Household food insufficiency is associated with poorer health. *J Nutr*. 2003;133:120–126.

8. Bickel G, Cunningham A, Dixon B, et al. *The National Nutrition Safety Net: Tools for Community Food Security*. Washington, DC: US Dept of Agriculture, Food and Nutrition Service; 2000.

9. Venner S, Sullivan A, Seavey D. *Paradox of Our Times: Hunger in a Strong Economy*. Medford, Mass: Tufts University Center on Hunger and Poverty; 2000.

10. Bickel G, Nord M, Price C, Hamilton W, Cook J. *Measuring Food Security in the United States: Guide to Measuring Food Security*. Washington, DC: US Dept of Agriculture, Food and Nutrition Service; 2000.

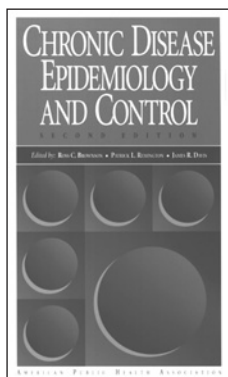
11. Economic Research Service / Dept of Agriculture Briefing Room. *Measuring Rurality: Rural-Urban Continuum Codes*. Available at: <http://www.ers.usda.gov/briefing/rurality/RuralUrbCon>. Accessed January 24, 2002.

12. US Census Bureau *Urban and Rural Classification*. Available at: http://www.census.gov/geo/www/ua/ua_2k.html. Accessed April 5, 2002.

13. Cohen B, Ohls J, Andrews M, et al. *Food Stamp Participants' Food Security and Nutrient Availability, Final Report*. Princeton, NJ: Mathematica Policy Research; 1999.

14. Federal Food Programs. *Food Stamp Program*. Available at: http://www.frac.org/html/federal_food_programs/programs/fsp.html. Accessed March 2, 2002.

15. Kendall A, Olsen C, Frongillo E Jr. Validation of the Radimer/Cornell measures of hunger and food insecurity. *J Nutr*. 1995;125:2793–2801.



Second Edition

ISBN 0-87553-237-3
1998 ■ 546 pages ■ softcover
\$32.00 APHA Members
\$45.00 Non-members
Plus shipping and handling

Chronic Disease Epidemiology and Control

Edited by Ross C. Brownson, PhD, Patrick Remington, MD, MPH, and James R. Davis

With this book, you'll learn to:

- Locate critical background information for developing appropriate interventions
- Enhance your technical capacity for delivering effective programs
- Improve your knowledge about the methods used in chronic disease epidemiology
- Identify diseases and risk factors
- Examine the underlying biological or physiological processes of disease
- Learn about high risk populations, geographic variations, and trends
- Plan, organize, and address prevention and control methods

American Public Health Association



Publication Sales
Web: www.apha.org
E-mail: APHA@TASCO1.com
Tel: (301) 893-1894
FAX: (301) 843-0159

CHRN04J5