

Perceived Barriers to Accessing Adequate Nutrition Among Food Insecure Households Within a Food Desert

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ABSTRACT

Objectives: The US Department of Agriculture has identified an area in La Crosse, Wisconsin as a food desert—a low-income area with a low level of access to a grocery store or healthy, affordable food outlet. The purpose of this study was to determine the prevalence and potential predictors of severe food insecurity in this area.

Methods: Questionnaires assessing food insecurity and perceived barriers to accessing adequate nutrition were sent out to 2,068 households located within the food desert in La Crosse. Data was analyzed to examine correlations between severe food insecurity and demographics, certain health behaviors, and perceived barriers to nutrition.

Results: Overall food insecurity existed in 33.9% of households: severe food insecurity with hunger in 14.6%, and without hunger in 19.3%. Significant correlations to severe food insecurity included health insurance status (Medicaid vs private insurance, OR 3.5), renting a home (OR 5.23), identifying the cost of healthy foods as a significant barrier (OR 2.97), having no transportation to a store (OR 3.09), not having enough money (OR 22.88), and currently smoking (OR 3.60).

Conclusion: Severe food insecurity was much higher in this population than expected. Clinicians should consider the patient's ability to access and afford healthy food as part of the patient's health history, as well as considering individual and population solutions.

BACKGROUND

While the majority of households in the United States enjoy having consistent, dependable access to enough food for active, healthy living, ie, “food security,” a portion experience food insecurity.¹ Food insecurity indicates there are insufficient resources to purchase the amount and kind of food needed for the individual or members of the household. Severe food insecurity means that some

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members of a household experience hunger, reduced food intake, or a disruption in eating patterns due to a lack of resources.¹ The United States Department of Agriculture's (USDA) annual survey in 2011 found that 14.9% of households experienced food insecurity; 5.7% experienced severe food insecurity.¹ Regionally, the Midwest demonstrated a lower prevalence of food insecurity, (13.5% of households).¹ Coleman-Jensen et al² showed the prevalence in Wisconsin to be even lower at 11.3%.

One environmental factor that may influence or be related to food insecurity is poor access to adequate nutrition. Access can be defined as the distance to the nearest grocery store; having a vehicle to get to food outlets; or the availability of healthy, affordable foods in the neighborhood. Vehicle ownership is important individual-level information in determining

one's ability to access adequate nutrition. Access to a vehicle remains a top determinant in obtaining proper nutrition at a more affordable price.³ Other factors that may be related to food insecurity include the perceived cost of healthy foods; the presence of behaviors such as smoking and drinking, which may divert finances that instead could be used for purchasing food items; or inadequate housing.⁴ Housing concerns may be tied to neighborhood characteristics (eg, availability of grocery stores) or may be side effects of other issues like low income rather than a cause of food insecurity.⁵

A “food desert” is a low-income census tract (poverty rate of 20% or greater, or a median family income at or below 80% of the area median family income) wherein at least 33% of the population lives more than 1 mile from the nearest grocery store in an urban area or 10 miles from a grocery store in a rural tract.⁶ While hunger is not a new concept, food deserts and food insecurity are relatively new terms. It is important to better under-

Table 1. Demographics of Participants

Characteristic	Frequency	Percent
Response Rate by Census Block Group		
550630003.002	136/532 ^a	25.6 ^b
550630009.001	112/405	27.7
550630009.002	151/558	27.1
550630009.003	77/228	33.8
550630009.004	99/345	28.7
Gender		
Male	161	28.5
Female	405	71.6
Age		
18-39	267	46.4
40-64	208	36.2
65+	100	17.4
Race		
White	510	88.7
Black	9	1.6
Native American	6	1.0
Hmong	11	1.9
Other	39	6.9
Education		
Did not graduate high school	41	7.3
High school graduate	168	29.7
Vocational/some college	169	29.9
College or advance degree	187	33.1
Rent or Own		
Rent	390	68.8
Own	177	31.2
Years Lived in Current Home		
<1 year	148	26.0
1-2 years	121	21.3
3-5 years	87	15.3
>5 years	213	37.4
Work for Pay		
Yes	369	65.5
No	194	34.5
Household Income		
<\$10,000	106	19.2
\$10-25,000	238	43.2
\$25,001-50,000	138	25.1
>\$50,000	69	12.5
Number of Kids in Household		
0	442	78.1
1-2	101	17.7
3+	23	4.2
Type of Health Insurance		
Private insurance	271	48.5
Medicaid	131	23.5
Medicare	67	12.0
None	89	16.0

^aNumber responded/number of valid addresses with the Census Block Group.
^bResponse rate by Census Block Group.

stand the causes and severity of food insecurity in order to better address them at population and individual levels.

A food desert was identified by the USDA within the city of La Crosse, Wisconsin.⁶ The purpose of this study was to determine the prevalence and severity of food insecurity in this census tract.

Table 2. Food Insecurity Rates

Food Security Status	Frequency	Percent
Food secure	380	66.1
Food insecure	195	33.9
Moderate: Food insecure without hunger	111	19.3
Severe: Food insecure with hunger	84	14.6

Further, we examined the correlations as possible explanations to severe food insecurity and the perceived barriers in accessing adequate nutrition among these households.

METHODS

Setting/Population

Participants in this study all resided in a food desert in La Crosse as defined by the USDA⁶ based on US census tract data from the year 2000.⁷ According to 2010 census data, the 5 census blocks included in this food desert consist of 2,362 households and a population of 5,006. A list of household addresses within the identified food desert was obtained from the city of La Crosse's Planning Department. The list was edited to remove any commercial businesses, duplicate addresses, and assisted living and skilled nursing facilities that provide all meals to residents. Surveys from vacant and nonexistent homes that were returned unopened were omitted from the denominator, bringing the final number to 2,068 eligible households. This study had approval from both Gundersen Health System and the University of Wisconsin-La Crosse's Institutional Review Boards (IRB).

Instrumentation/Data Collection

Questions used to determine food security status were taken from the USDA Community Food Security Assessment Toolkit by Cohen,⁸ which has proven validity and reliability. Other questions were adopted from a regional health assessment survey titled COMPASS NOW 2012,⁹ as well as from previous research designed to determine potential barriers to obtaining adequate nutrition.¹⁰⁻¹¹

Questionnaires were sent to every address on the mailing list in November, 2012. A postcard informing the heads of households of the upcoming survey and participation incentive was mailed 1 week prior to the questionnaire mailing. One completed questionnaire per household was requested. A reminder postcard was sent 2 weeks following the initial mailing. Participants were given the option of completing the questionnaire online or filling out a paper copy and returning it in a postage-paid envelope. If participants completed the questionnaire, they could choose to receive a \$5 gift card to 1 of 4 local establishments that offer food products. They were asked to write their address on a separate card (included) and to mail it back with their completed survey. This card was returned to them with their selected gift card.

All data was entered into the online survey collection system and downloaded into a spreadsheet and uploaded into SAS (SAS

Institute, Cary, North Carolina) for statistical analysis. Addresses were checked to remove any duplicate completed surveys from both the paper and online databases. Data went through a process to recode and correct illogical responses. Determining food insecurity status was based on scoring used in the USDA *Guide to Measuring Household Food Security*.¹²

Analysis Methods

For analysis purposes, we modeled the most severe level of food insecurity: food insecurity with hunger. To determine if a relationship existed between food insecurity and demographic, health behaviors, and perceived barriers to food access, univariate analyses were completed using chi-square. Multivariate analyses were completed using logistic regression with a *P* value of <0.05 indicating statistical significance. A logistic regression using backward stepwise elimination was used to remove variables that were not significantly related to severe food insecurity, leaving only those variables that significantly increased the odds of a household being food insecure with hunger.

RESULTS

Out of 2,068 potential households, 575 (27.8%) completed and returned the questionnaire. Response rate varied among the 5 census blocks (Table 1). However, the rate of food insecurity was not significantly different by block. A majority of respondents were white. Over two-thirds had less than a college degree and over one-third had a high school education or less. Thirty-one percent of participants owned their place of residence. Over 25% of the participants had lived in their current residence for less than 1 year. Sixty-two percent of respondents had an annual household income of \$25,000 or less; however, nearly half had private health insurance.

Some level of food insecurity was present in 33.9% of households, with 14.6% having the most severe level of food insecurity (Table 2). Univariate analysis revealed several variables significantly related to severe food insecurity (Table 3). These included several demographic variables: age, race, income, education, health insurance status, home ownership, and employment status. Although the rate of food insecurity was highest in the poorest group, only 3% of respondents over age 65 years were food insecure. Examining age and income combined, we found that 2 out of 68 of those respondents over age 65 earning less than \$25,000/year were food insecure with hunger. Self-reported potential barriers to accessing healthy food that were found to be significantly related to severe food insecurity included no access to a working vehicle, not having a way to get to the store (often/sometimes true), not having enough money (often/sometimes true), cost of healthy food (significant/somewhat a barrier), kinds of food wanted not available (often/sometimes true), and not having access to a working stove (often/sometimes true). Overall, 76% of those who reported they did not have access to a work-

Table 3. Demographics and Predictors Related to Food Insecurity with Hunger (Univariate Analysis)

Characteristic	Percent Food Insecure with Hunger	
Demographics		
Age of respondent		<i>P</i> =0.0001
18-39	16.1	
40-64	18.1	
65+	3.2	
Race		<i>P</i> =0.0429
White	13.7	
Non-white	21.5	
Household annual income		<i>P</i> =0.0001
<\$10,000	28.3	
\$10-25,000	17.7	
\$25,001-50,000	5.8	
>\$50,000	2.9	
Education		<i>P</i> =0.0001
No high school diploma	26.8	
High school graduate	17.9	
Vocational/some college	17.8	
College or advanced degree	6.4	
Health insurance status		<i>P</i> =0.0001
No insurance	23.6	
Medicaid	29.8	
Medicare	3.0	
Private insurance	6.6	
Rent/own home		<i>P</i> =0.0001
Rent	19.7	
Own	3.4	
Work for pay		<i>P</i> =0.0001
No	24.1	
Retired	4.0	
Yes	13.8	
Potential Barriers to Accessing Food		
Access to a working vehicle		<i>P</i> =0.0001
No	27.3	
Yes	11.7	
Don't have a way to get to store		<i>P</i> =0.0001
Often/sometimes true	73.9	
Never true	11.6	
Don't have enough money		<i>P</i> =0.0001
Often/sometimes true	67.5	
Never true	0.4	
Cost of healthy food		<i>P</i> =0.0001
Significant/somewhat a barrier	39.3	
Not a barrier	3.1	
Kinds of food wanted are not available		<i>P</i> =0.0001
Often/sometimes true	47.3	
Never true	10.5	
Don't have access to a stove		<i>P</i> =0.0001
Often/sometimes true	76.2	
Never true	13.6	
Potential Behavioral Correlates		
Smoking status		<i>P</i> =0.0001
Daily	30.3	
Occasionally	28.3	
Former	10.9	
Never	7.2	
Computer access		<i>P</i> =0.0116
No	21.0	
Yes	11.6	
Cell phone with texting		<i>P</i> =0.0024
No	10.6	
Yes	16.2	

Table 4. Odds Ratio (OR) of Predictors of Severe Food Insecurity (Multivariate Analysis)

Predictor of Severe Food Insecurity	Odds Ratio	95% CI
Health insurance status		
Medicaid (vs private insurance)	3.50	1.45, 8.45
Medicare (vs private insurance)	1.41	0.24, 8.43
No insurance (vs private insurance)	1.71	0.65, 4.56
Rent (vs own)	5.23	1.36, 20.18
Don't have a way to get to store often/sometimes (vs have transportation)	3.09	1.20, 7.97
Don't have enough money often/sometimes (vs never true)	22.88	2.94, 177.81
Cost of healthy food a significant/somewhat barrier (vs not a barrier)	2.97	1.37, 6.47
Smoking status, current/occasional (vs nonsmoking)	3.60	1.72, 7.54

ing stove were identified as insecure with hunger. Lastly, potential behavioral correlates that were found to be significantly related to severe food insecurity included smoking status, not having a computer, and having a cell phone with texting ability. Over 30% of current daily smokers and 28% of occasional smokers had severe food insecurity. Those with a cell phone were more likely to have food insecurity; however, those with computer access were less likely to have severe food insecurity.

Multivariate analysis revealed that 6 variables predict severe food insecurity: health insurance status, whether the respondent rented or owned his/her home, not having a way to a store, not having enough money, indicating the cost of healthy foods was a significant barrier, and currently smoking (Table 4). The greatest predictor of food insecurity was if a person reported not having enough money as a significant barrier, with an odds ratio of 22.9. A person who rented was 5.2 times more likely to be food insecure than a home owner. Respondents who smoked were 3.6 times more likely to be food insecure than nonsmokers. Those with Medicaid as their health insurance were 3.5 times more likely to have severe food insecurity.

DISCUSSION

Based on survey results, 14.6% of households in the food desert in La Crosse were food insecure with hunger; 33.9% had some level of food insecurity. This was higher than the 5.7% prevalence of severe food insecurity nationally.¹ This was also much higher than the estimated food insecurity rate of 11.3% in Wisconsin.² We believe this to be true because our study was conducted in a food desert, which by definition has a high rate of people with low income and low access to find healthy, affordable food. Confirming this was important to help better identify and define the problem, but also to help determine possible causes and consequently work on solutions.

In multivariate analysis, self-reported “not having enough money to buy healthy food” was found to be the best predictor of severe food insecurity, but income was not related. It was

interesting to find that the low income elderly in our study were at low risk of severe food insecurity. It is possible that the elderly are accessing more community resources such as food banks. Without knowledge of expenses, establishing rationale for this remains difficult, although smoking is one apparent unnecessary expense of more than half of those who were food insecure. This finding is consistent with other studies that focused on smoking among the food insecure.⁵

The neighborhood we studied has a very high rate of rental property. Over two-thirds of respondents reported they currently were renting their home. Similarly, over two-thirds had lived in their current home for less than 5 years. This certainly speaks to the need to further explore the type and condition of housing, as well as the impact of frequent moving on health. Determining reasons for the correlation of renting and increased rates of food insecurity remain difficult. Possible explanations include less stability, lower income, and a greater likelihood of frequent moves.¹³

We did explore spending habits to some extent by examining computer, Internet and cell phone access. Those without computer or Internet access had higher food insecurity, as did those with a cell phone. This may be confounded with age. Many without a cell phone were over age 65, and the rate of food insecurity was low in this age group. To further investigate spending habits on food insecurity, future research should include whether or not respondents subscribe to cable television. Eating behaviors could be further investigated by asking the amount of sweetened beverages consumed, instances of binge eating, whether or not a family eats together, and types of food served during meals since studies have found correlations between these behaviors and food insecurity.¹⁴⁻¹⁵

While findings of this study predicting food insecurity match previous research, results may not be generalizable beyond the specific population demographics studied. Additionally, self-reporting on a questionnaire may lead to inaccuracies. We did not ask about participant’s marital status. Marital status is particularly important considering results of another study² that showed single-mother households experienced the highest rates of food insecurity.

Much research has been completed concerning factors contributing to and correlated with food insecurity. Finding solutions for populations to have better access to healthy, nutritious foods will involve multiple community members and organizations, including health care systems. Encouraging placement of grocery and other food outlets (such as convenience stores) in food deserts is one solution, but this may not be economically feasible. Retailers may not be able to offer a sufficient variety of healthy foods at affordable prices in low-income neighborhoods. Examining low-cost municipal transit and ensuring routes connect people living in food deserts to food outlets is another important consideration. Assistance programs remain the most frequent intervention; how-

ever, questions exist regarding any impact such programs have on those struggling to obtain enough food.¹ Greater dissemination of the results of cost-comparison studies such as Carlson and Frazão¹⁶ and Glanz et al¹⁷ could increase the awareness of healthy food options that cost less per serving than unhealthy options.

Health care providers need to be aware of the community and environment in which their patients live. Living in a neighborhood with poor access to healthy food—a food desert—can significantly increase the risk of food insecurity. Severe food insecurity may have a significant negative effect on health. Patients with limited incomes may choose to spend their money in ways other than on food or medication. Inquiring about such things as the presence of a working stove, having access to a vehicle, and assessing where food is purchased may not be questions providers routinely ask of their patients, but may be very significant for the patient's overall health status. Understanding the severity of and predictors of food insecurity is necessary to begin to address this issue in our community as well.

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