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Food Security, Health, and Medication Expenditures of Emergency Department Patients

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Abstract

Background—In the United States, 35 million people live in food-insecure households. Although food insecurity and hunger are undesirable in their own right, they also are potential precursors to nutritional, health, and developmental problems.

Study objectives—To examine the prevalence of household food insecurity and its association with health problems and medication expenditures among emergency department (ED) patients.

Methods—We conducted a cross-sectional study in four Boston-area EDs and enrolled consecutive adult patients during two 24-hour periods at each site. Food security status was measured using the validated 18-item US Household Food Security Survey Module.

Results—Overall, 66 (13%; 95% CI, 10–17%) of 520 ED patients screened positive for food insecurity. Among these 66 patients, 32 (48%; 95% CI, 36–61%) reported food insecurity with hunger. Patients from food-insecure households differed from food-secure patients with respect to sociodemographic factors. Food-insecure patients were more likely than food-secure patients to report a variety of chronic and mental health problems (all $P < 0.05$), including obesity. Food-insecure patients, compared to food-secure patients, also were more likely (all $P < 0.001$) to put off paying for medication to have money for food (27% vs. 4%, respectively), to take medication less often because they couldn't afford more (32% vs. 4%, respectively), to report needing to make a choice between buying medication and food (27% vs. 2%, respectively), and to report getting sick because they couldn't afford to take medication (27% vs. 1%, respectively).

Conclusions—ED patients from food-insecure households report more chronic and mental health problems, and difficulty purchasing medication.

Keywords

food insecurity; hunger; emergency department

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INTRODUCTION

Food security is the ability to acquire enough food in socially acceptable ways. Food insecurity refers to a limited or uncertain ability to acquire food. In the United States (US), approximately 35 million people live in food-insecure households (11% of all US households) (1). Food insecurity and hunger are conditions that result from financial resource constraint. Hunger is a severe state of food insecurity rather than a distinct or separate condition. Food insecurity and hunger are undesirable in their own right, but are also potential precursors to nutritional, health, and developmental problems. An objective of *Healthy People 2010*, the federal government's disease prevention and health promotion objectives, is to increase food security among US households and, in so doing, reduce hunger.

A recent estimate was published that food insecurity and hunger cost the US \$90 billion annually; \$67 billion of these costs are associated with mental health and medical care (2). One study reported that children in food-insecure households have significantly greater adjusted odds of hospitalization since birth (3). A previous study examined hunger among a convenience sample of ED patients (4). Twenty-three percent of this sample reported that they went hungry at least once in the preceding 12 months, with 18% reporting that they either "often" or "sometimes" did not have enough food in their homes in the preceding 12 months. Fourteen percent of all respondents said that they had "gotten sick" as a result of not being able to afford their medications.

Little is known about the role of food insecurity in illnesses treated in the emergency department (ED). We studied a sample of ED patients to examine the prevalence of household food insecurity and health problems among consecutive ED patients relative to the general population, and whether ED patients from food insecure households report difficulties purchasing medicine. We hypothesized that the ED population, compared to the general population, would be more food-insecure and that they would report more health problems and having to choose between buying food or medicine.

MATERIALS AND METHODS

This study was a multicenter, cross-sectional survey of adult patients at four Boston-area EDs. The Institutional Review Boards at all sites approved the protocol. The Emergency Medicine Network (www.emnet-usa.org), a research collaboration that focuses on public health issues, coordinated this study.

Patients were enrolled from July through August, 2005. At each ED, research assistants interviewed consecutive patients age 18 years and older over a 24 hour time period, on one weekday and one weekend day. Research assistants attended a study training session and completed a course on the protection of human research subjects. We excluded patients with severe illness or distress, insurmountable language barriers, altered mental status, as well as potential victims of sexual assault.

In the survey, basic demographic information was collected and participants were asked about medical history, choices made in purchasing medicine, and diet and physical activity habits. We used the validated 18-item US Household Food Security Survey Module recommended by the USDA to measure food security (5). Responses to food security questions were coded as either affirmative or negative, and missing values (<13%) were entered using recommended methods (5). Patients were classified as food-insecure if 3 or more survey questions were answered affirmatively. Food security status was classified as "food secure," "food insecure without hunger," or "food insecure with hunger." Although the USDA recently introduced new labels to describe food security status, we chose to use the labels in use when the data were

collected. Methods used to assess household food security status have not changed and the food security categories used in this study are directly comparable to the new labels.

Our study measured food insecurity that occurred because the household did not have enough money to buy food. The condition is measured at the household level. Hunger is an individual-level condition that may result from household food insecurity. Patients described as “food insecure with hunger” may not experience hunger themselves, but come from households with reduced desirability of diet, disrupted eating patterns, and reduced food intake by at least one household member. This study does not categorize people who reported being hungry because they were dieting or too busy to eat.

All analyses were performed using STATA 9.2 (StataCorp, College Station, TX). Data are presented as proportions (with 95% confidence interval [CI]) or means (with standard deviation [SD]). Associations between food security and other factors were examined using Student’s t-test and Chi-square; a two-sided $P < 0.05$ was considered statistically significant.

RESULTS

Of 762 eligible patients, 520 (68%) participated. Responses to the food security questions were available for 496 patients. The remaining 24 patients had no responses to the food security survey questions, so food security data could not be analyzed. Overall, 66 (13%; 95% CI, 10–17%) patients screened positive for food insecurity. Among these 66 patients, 32 (48%; 95% CI, 36–61%) reported food insecurity with hunger. Among the 159 patients with children in their household, 24 (15%; 95% CI, 10–22%) reported food insecurity, of whom 17 (71%; 95% CI, 49–87%) were classified as food-insecure with hunger.

Table 1 shows characteristics of study participants according to food security status. Patients from food-insecure households differed from food-secure patients with respect to sociodemographic factors. Patients from food-insecure households were more likely to be younger and female, and less likely to be white. Food-insecure patients reported lower household incomes and were less likely to have a high school education or health insurance.

Food-insecure patients were more likely than food-secure patients to report a variety of health problems (Table 2). For example, patients from food-insecure households were significantly more likely to report insomnia, chronic pain, and stomach ulcers. Seventy percent of food-insecure patients reported depression. In addition, food-insecure patients were significantly more likely than patients from food-secure households to report stress, anxiety disorder, and post-traumatic stress disorder. Food-insecure patients also were more likely to report alcohol or drug abuse and to have smoked within the past year.

Food-insecure patients had higher body mass index (BMI) compared to patients from food-secure households (30.3 vs. 27.5 mg/kg²; $P = 0.004$). A further examination of BMI showed that 43% (95% CI 31–56%) of patients from food-insecure households were obese (BMI ≥ 30 mg/kg²) compared to 27% (95% CI 23–32%) of food-secure patients ($P = 0.03$). When the sample was stratified by sex, the association was statistically significant in women ($n = 247$; 30.6 vs. 27.2, $P = 0.007$) but not in men ($n = 215$; 29.4 vs. 27.9, $P = 0.36$), although a formal test of interaction was not statistically significant ($P = 0.51$). Our data included one extreme BMI value, but the relationship between BMI and food security status remained unchanged after excluding this outlier. Food-insecure patients were less likely than food-secure patients to report being moderately to very physically active (61% vs. 74%, respectively, $P = 0.02$).

In addition to increased health problems, food-insecure patients were more likely to put off paying for medication to have money to buy food, to take medication less often because they could not afford more, and to report needing to make a choice between buying medication and

buying food. In our sample of food-insecure patients, 27% (95% CI 16–40%) attributed getting sick to their inability to afford medication. Among food-insecure patients, 34% (95% CI 22–48%) said that they would forgo purchase of medications if money was tight.

DISCUSSION

The prevalence of household food insecurity in our sample was higher than in the general population in Massachusetts, as estimated by the USDA (13% in our study vs. 8% of all Massachusetts households) (1). The prevalence of household food insecurity in our sample was also slightly higher than the national prevalence of 11% (1). Almost half of food-insecure patients in our sample were classified as being from households that were food-insecure with hunger, compared to 37% of food-insecure households overall in Massachusetts (1). We found a slightly higher prevalence of food insecurity among patients from households with children, which resembles the national trend (1).

We found that ED patients from food-insecure households reported more chronic and mental health problems. These findings are consistent with the results of other studies and reinforce the negative consequences associated with food insecurity. These food-insecure patients were more likely to report having to choose between purchasing food and buying or taking medicines (6,7). By contrast, few patients from food-secure households reported any difficulty purchasing medicine.

Interestingly, food-insecure patients had higher BMIs. This seemingly paradoxical relationship was described more than a decade ago by Dietz (8). Since that time, the association has been shown in previous studies of women, but not consistently in men or children (9–16). In our study, female ED patients from food-insecure households were more likely to have significantly higher BMIs compared to those from food-secure households, but we did not find this relationship among males. Prior research has examined the sex differences in the relationship between obesity and food insecurity, but more study is needed to better understand the processes involved (17).

A potential explanation for why individuals who live in households with limited ability to purchase enough food are overweight is that people in households without enough money for food may try to stretch their dollar by purchasing readily available, inexpensive, energy-dense foods (18). These foods tend to be higher in refined grains, added sugars, and fat. Relying on low-cost food is a good economic decision for these households, but a poor decision as it relates to nutrition and obesity prevention. Also, many low-income neighborhoods have fewer supermarkets, which reduces access to healthy food choices (19). Both explanations raise the possibility that obese patients from food-insecure households actually have nutrient deficiencies due to poor diets. Although we did not collect blood specimens to assess nutritional status, we believe that this possibility merits further study.

Limitations

Our study has several potential limitations. First, we were unable to enroll all ED patients during the designated 24-hour periods because very ill and emotionally disturbed patients, in addition to those with insurmountable language barriers, were excluded. It may be that this group of people is at even higher risk of food insecurity. If true, our results would underestimate the prevalence of food insecurity among ED patients. Second, although we used a validated instrument to estimate food insecurity prevalence, the health and medication outcomes are based on self-report alone. Finally, the study was limited to emergency departments in the Boston area, which limits the generalizability of the findings. We chose a diverse group of sites within Boston, but found no significant differences in food insecurity between the four

emergency departments (data not shown). Nevertheless, this study provides new data about food insecurity in the ED and highlights the ED's particularly vulnerable patient population.

Future research might examine the specific relationship between food insecurity and obesity. Also, investigators recently reported the successful use of a one-question screening tool for food security status, an advance that greatly improves the feasibility of a rapid assessment of food security status in health care settings (20). Given the difficulties food-insecure patients reported in purchasing medicine, an awareness of the food security status of patients may assist ED staff to determine effective discharge instructions, particularly related to medication use. The ED continues to serve as an important safety net for the American public. Future research might also examine effective ways to refer food-insecure ED patients to resources for better nutrition, particularly federal nutrition programs. Streamlined referral to such programs would help to minimize the effort required from over-committed ED staff, while still addressing this important public health issue.

CONCLUSIONS

Our study shows that 13% of ED patients are food-insecure. ED patients from food-insecure households report more chronic and mental health problems, and difficulty purchasing medication.

ARTICLE SUMMARY

Why is this topic important?

Food insecurity and hunger are undesirable in their own right, but are also potential precursors to nutritional, health, and developmental problems.

What does this study attempt to show?

This study examined the prevalence of household food insecurity and its association with health problems and medication expenditures among emergency department (ED) patients.

What are the key findings?

Overall, 13% of ED patients screened positive for food insecurity; 48% of these patients reported food insecurity with hunger. Food-insecure patients were more likely than food-secure patients to report a variety of chronic and mental health problems. In our sample of food-insecure patients, 27% attributed getting sick to their inability to afford medication.

How is patient care impacted?

In the future, use of simple screening instruments in the ED could aid in the recognition of food insecurity, with subsequent referral to nutrition programs.

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Table 1

Sociodemographic characteristics of emergency department patients according to food security status

Characteristic	Food-secure (n=430)	Food-insecure (n=66)	<i>P</i> value
	% (95% CI) or mean (SD)	% (95% CI) or mean (SD)	
Age	49 ± 20	41 ± 15	0.003
Female sex	52% (47–57)	69% (57–80)	0.01
White race	73% (68–77)	57% (44–69)	0.008
No high school education	12% (9–16)	35% (24–48)	<0.001
Household income			<0.001
< \$20,000	22% (18–27)	56% (42–68)	
\$20,000–\$60,000	41% (36–47)	36% (24–49)	
> \$60,000	37% (32–42)	8% (3–18)	
No health insurance	8% (5–11)	17% (9–29)	0.01

95% CI = 95% confidence interval; SD = standard deviation.

Table 2

Health problems of emergency department patients according to food security status

Health problem	Food-secure (n=430)	Food-insecure (n=66)	P value
	% (95% CI)	% (95% CI)	
Insomnia	21 (18–26)	53 (40–66)	<0.001
Chronic pain	24 (20–28)	41 (29–54)	0.005
Stomach ulcers	4 (2–6)	16 (8–27)	<0.001
Depression	39 (34–44)	70 (57–80)	<0.001
Stress	42 (37–46)	64 (51–76)	0.001
Anxiety	17 (13–21)	33 (22–46)	0.002
Post-traumatic stress disorder	7 (4–9)	16 (8–28)	0.009
Any substance abuse	7 (4–9)	15 (8–26)	0.014
Smoker	25 (21–30)	45 (33–58)	0.001

95% CI = 95% confidence interval; SD = standard deviation.