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## Characteristics of Households of People With Diabetes

### Accessing US Food Pantries:

#### Implications for Diabetes Self-management Education and Support

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#### Abstract

**Purpose**—The purpose of this study is to explore the associations between food insecurity (FI) and coping strategies of relevance to diabetes self-management among households of people with diabetes (HHDM) who access US food pantry programs.

**Methods**—The authors conducted a secondary data analysis of HHDM accessing US food pantry programs from the Hunger in America 2014 study ( $n = 16\,826$ ). Weighted analyses included descriptive statistics for household sociodemographics, food pantry service utilization, FI, and coping behaviors. The authors used chi-square and logistic regression to estimate the relationship between FI and coping behaviors.

**Results**—Nearly one-half of HHDM reported visiting food pantries at least 6 times in the past year. Most HHDM were FI, with the majority experiencing the most severe form of FI. Over one-fifth of households reported lacking health insurance. The majority of HHDM reported purchasing inexpensive unhealthy foods to ensure household food adequacy, and many reported watering down food and beverages. The odds of reporting these behaviors significantly increased as FI worsened.

**Conclusion**—Food pantries represent an opportunity for the delivery of community-based diabetes self-management education and support programs. These programs should be adapted to

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address population barriers to self-management and to support access to healthful foods and medical care.

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The American Diabetes Association recognizes the implications of *food insecurity*—a household condition of limited or uncertain access to adequate food<sup>1</sup>—as a major social determinant of health for patients living with diabetes.<sup>2</sup> A growing body of literature indicates that food insecurity is an independent risk factor for poor diabetes self-management behaviors,<sup>3</sup> such as poor diet<sup>4,5</sup> and medication scrimping,<sup>6</sup> that can lead to elevated A1C<sup>7</sup> and excess health care costs.<sup>8</sup> Consequently, the American Diabetes Association's 2018 standards of medical care in diabetes endorse treatment decisions that are tailored to the socioeconomic needs of the patient and recognize the importance of community food resources and self-management support from community-based health workers.<sup>2</sup> In the United States, an estimated 46.5 million individuals access charitable food assistance annually, and 1 out of every 3 households receiving these foods includes 1 member with diabetes.<sup>9</sup> Thus, food pantries may be suitable locations for the delivery of community-based diabetes self-management education and support (DSME/S) programs for vulnerable populations affected by food insecurity. For example, one pilot intervention study that provided diabetes-appropriate food boxes to food pantry clients with diabetes (A1C >6.5%) led to improved fruit and vegetable intake, reduced medication nonadherence, fewer reported tradeoff decisions of buying food or medicine, and lower A1C values.<sup>10</sup> A follow-up randomized controlled study evaluating a similar intervention among persons with diabetes (A1C >7.5%) further demonstrated improvements in fruit and vegetable intake and food security.<sup>11</sup>

Diabetes self-management education (DSME) comprises the initial training necessary for diabetes self-care and focuses on knowledge, skill, and ability development.<sup>12</sup> Diabetes self-management support (DSMS) comprises ongoing support for the successful implementation and maintenance of behaviors necessary for successful diabetes self-management and can include behavioral, psychosocial, educational, or clinical support.<sup>12</sup> Both DSME and DSMS should address factors that influence a person's capacity for disease self-management, such as socioeconomic barriers. However, little is known about the characteristics of households of people with diabetes (HHDM) that use food pantry programs, which has important implications for the adaptation of DSME/S programs in these settings. For example, one recent study found that when compared with non-HHDM who use food pantries, HHDM more often employ various types of coping strategies to secure food.<sup>13</sup>

While several DSME/S interventions have been developed or adapted for low-income populations,<sup>9,14–18</sup> few have focused on addressing barriers related to food insecurity or have been implemented in food pantry settings.<sup>10</sup> HHDM accessing food pantries may face unique barriers to accessing traditional DSME/S programs due to a lack of health insurance or high copayments, transportation, work or caregiving responsibilities, or discomfort with sharing information about their food situation with their provider or in a group setting. Additionally, the degree of household food insecurity may influence diabetes self-management behaviors differently, depending on its severity. For example, low food security is characterized by reduced quality, variety, or desirability of available food supply and thus may result in challenges in meeting macronutrient composition goals and micronutrient

needs.<sup>19</sup> Very low food security is further characterized by disrupted eating patterns and reduced food intake, which may additionally increase risk of hypoglycemia.<sup>7</sup> Both categories of food insecurity have been associated with social isolation,<sup>20</sup> which may further compromise behavior change due to the absence of social support. Thus, understanding the severity of food insecurity and coping behaviors most commonly reported by this population can help to prioritize and tailor components and related activities that compose food pantry-based DSME/S programs. Educators working with this population can use this knowledge to facilitate individualized patient goals, adapt curricula, and prioritize components of a plan for ongoing support.

Approximately every 4 years from 1993 to 2014, Feeding America conducted the national Hunger in America study, which aimed to document food insecurity prevalence, demographics, and social conditions among persons seeking assistance through charitable feeding programs, including food pantries and prepared meal programs. The Hunger in America 2014 study identified that 33% of client households have at least 1 member with diabetes,<sup>21</sup> and recent secondary analyses of this study's data identified socioeconomic and coping strategy differences between HHDM and non-HHDM.<sup>13</sup> This present study builds on these published analyses to inform the adaptation and tailoring of DSME/S programs in food pantry settings by specifically exploring how food insecurity among HHDM is related to coping behaviors that may compromise disease management.

## Methods

### Study Design and Data Source

The first Hunger in America study was conducted in 1993 to better understand the service needs of charitable food clients and partner programs throughout the Feeding America national network. Between 1993 and 2014, survey data collection for the Hunger in America study occurred approximately every 4 years. The Hunger in America 2014 client survey, used for these secondary analyses, was conducted between April and August 2013. It used proportionate probability sampling of Feeding America charitable feeding programs with a random selection of clients to estimate the population served through charitable feeding programs at the national and food bank levels. Feeding America sponsored the study, which was conducted by Westat, to survey a cross-sectional sample of 51 043 clients accessing food assistance from 9816 sampled grocery programs, including food pantries and other grocery assistance programs, such as mobile pantries and school backpack programs. Trained volunteers and food bank staff assisted with data collection at food pantry sites using electronic tablets. The original study methodology is fully detailed in the Hunger in America 2014 national report.<sup>9</sup>

The current study was a secondary data-weighted analysis of surveys completed by adult clients accessing US food pantry programs, the largest type of grocery program, that participated in Hunger in America 2014. The authors included data from all surveys that had replicate weights and indicated that 1 household members had diabetes (n = 16 826). This study was reviewed and deemed exempt by the University of Oklahoma Health Sciences Institutional Review Board.

## Survey Items

Survey questions used in the Hunger in America 2014 study are fully described elsewhere.<sup>9</sup> In brief, individual-level demographics for the respondent included sex, age, race/ethnicity, and the language used for survey administration (English, Spanish, Vietnamese, Russian, Mandarin Chinese). All other questions were assessed at the household level.

**Independent Variables**—Household-level sociodemographic questions included the following: highest level of educational attainment within the household (less than high school through 4-year college degree or higher), household composition, employment, and annual household income (10 categories: \$0, \$5000, \$5001–\$10 000, \$10 001–\$15 000, ..., >\$35 001–\$50 000, >\$50 000). Federal poverty-level categories ( 130%, 131%–185%, and 186%) were calculated with annual household income and household size. Households were categorized into 1 of 4 composition categories: 1 child, 1 senior, 1 child and senior, and no child or senior. Finally, respondents were asked to classify their type of residence. For these analyses, having a rented room or temporary/no housing was classified as unstable housing, and all other responses (house/townhouse, apartment, mobile home or trailer, or military housing) were categorized as stable housing.

In addition to diabetes diagnosis, other health and medical-related variables were assessed at the household level, including insurance status, unpaid medical bills (yes/no), self-rated poor health of any household member (yes/no), and diagnosis of high blood pressure (yes/no/ don't know) for anyone in the household.

Food pantry utilization and availability of cooking and cold storage equipment in the home were assessed at the household level. Pantry utilization was assessed by frequency of use in the past year (first time, 1–12 months) and whether the client planned to come to the pantry on a regular basis to help with his or her monthly food budget or wait until he or she ran out of food. Respondents were also asked if they had a place to keep food cold (yes/no) and if they had equipment (eg, stove, microwave, or hot plate) to cook food (yes/no).

Household food security status was evaluated with the Six-Item Short Form of the US Food Security Survey Module (possible scores: 0–6), with higher scores indicating more severe food insecurity.<sup>15</sup> Based on US Department of Agriculture scoring methodology, respondent households were classified as follows: high/marginal food secure (0–1 point), low food secure (2–3 points), or very low food secure (4–6 points). Low and very low food secure are defined as food insecure. Respondents were separately asked about current household SNAP enrollment (Supplemental Nutrition Assistance Program; yes or no).

**Outcome Measures**—Medication-food tradeoffs were assessed by asking respondents how often they or anyone else in their household chose between paying for food and medicine/medical care (every month, some months during the year, 1 or 2 times a year, or never—with the middle 2 categories combined as “at least once per year” for these analyses). Additionally, household coping strategies were assessed by asking clients if they did any of the following to get food in the past 12 months: “bought the cheapest food available even if you knew it wasn't the healthiest option,” “watered down food or drinks to make them last longer,” “eaten food after the expiration date,” “bought food in dented or

damaged packages to save money,” and “grown food in a garden either at home or in a community garden.” Each coping strategy was defined as yes if checked or no if not checked.

## Statistical Analyses

Descriptive statistics were calculated for individual and household survey variables. Chi-square tests were conducted for household demographics, health, and coping behaviors to identify any significant differences in these factors among high/marginal-, low-, and very low-food secure households. Multiple logistic regression was then used to examine the independent effects of food security (independent variable) on coping behaviors that may affect disease management (dependent variables). In these analyses, households with high/marginal food security were used as the reference group, as compared with households with low and very low food security. The outcome variables included medication-food tradeoffs, buying cheap food, watering down food/drinks, eating food after the expiration, buying dented/damaged packages, and growing food in a garden. These analyses were adjusted for household poverty, household composition, insurance status, and unpaid medical bills. All statistical analyses were weighted to be representative of the national food pantry population and performed with SAS 9.4 (SAS Institute Inc, Cary, North Carolina).

## Results

### Descriptive Analyses

**Individual Respondent Demographics**—Among the 16 826 HHDM respondents accessing food pantries, the majority were women (74.5%). Almost half of respondents identified as a minority, including African American (26.1%), Hispanic (19.4%), and Native American (2.4%), with the remainder reporting non-Hispanic white (44.5%) or other (7.6%). HHDM survey respondents were primarily middle-aged (30–59 years, 64.1%), followed by 60 years (28.6%) and a few aged 18 to 29 years (7.4%). The majority of HHDM surveys were administered in English (88.5%), followed by Spanish (11.0%). The majority reported accessing the pantry by car (75.8%) or on foot (14.5%).

**Household Socioeconomic Characteristics**—More than half HHDM reported that the highest educational attainment was at or below a high school diploma or equivalent (58.3%); however, about one-third of HHDM had at least 1 member with some college education (32.9%). The majority of HHDM respondents reported household income 130% of the federal poverty line (68.5%; Table 1).

**Household Composition**—While more than half of HHDM respondents (52.2%) reported a household size of 3, 1-person (23.3%) and 2-person (24.5%) households were common (Table 1). Most HHDM also included children (35.3%) or seniors (46.3%), with 10.8% of all HHDM having both children and seniors.

**Household Health Status**—A majority of HHDM included at least 1 member with hypertension (83.9%; Table 1), and two-thirds reported poor health among 1 household

members (67.1%). Most HHDM respondents reported unpaid household medical bills (60.2%), while one-fifth (22.1%) reported that all household members were uninsured.

**Household Food Pantry Use and Kitchen/Housing Status**—Most HHDM reported that they use food pantry services as part of their monthly budget plan (65.1%) and almost half utilized food pantry services at least 6 months of the year (45.4%), with 24.3% using food pantry services every month. Among HHDM, the majority had cold storage (96.2%) and cooking equipment (96.1%) in their homes. Additionally, 93.8% of respondent households had stable housing (Table 2).

**Household Food Insecurity and Coping Behaviors**—Among HHDM, adult-level household food insecurity was high (88.6%), including those experiencing very low (58.6%) or low (30.0%) food security. Over one-third (38.3%) of HHDM respondents reported choosing between food and medical care every month. Most HHDM reported use of at least 1 coping strategy to get enough food in the past 12 months, with the majority indicating that they purchased unhealthy foods because they are the cheaper option (81.7%); many watered down foods and beverages (43.0%), while only about one-quarter grew a food garden (26.2%). Slightly more than one-half reported SNAP use (56.1%; Table 2).

### **Food Insecurity Severity and Its Relationship With Household Characteristics and Nutrition-Related Coping**

At the most severe level of food insecurity, households more often had children, lower incomes, more chronic disease, and more competing demands and had to rely on more coping strategies (Table 3). Households with incomes  $\leq$  130% of the federal poverty line had the highest percentage of very low food security (74.5%), and as income rose, the percentage with very low food security fell. Furthermore, more HHDM experiencing low (52.7%) or very low (70.8%) food security had unpaid medical bills than those experiencing high/marginal food security (37.9%). Similarly, more HHDM experiencing low (27.9%) or very low (48.9%) food security reported choosing between food and medicine/medical care every month than those with high/marginal food security (13.1%). HHDM experiencing low and very low food security were also significantly more likely to report the 5 coping behaviors assessed, such as purchasing inexpensive unhealthy foods ( $P < .0001$ ) and watering down foods or drinks ( $P < .0001$ ) as compared with HHDM experiencing high/marginal food security.

Adjusted multiple logistic regression models of coping strategies and food security, controlled for household poverty level, unemployment, unpaid medical bills, and lack of health care coverage (Table 4). After adjustment, the odds of all coping behaviors were higher among HHDM experiencing low and very low food security versus households reporting food security. The adjusted odds of choosing between food and medicine at least once in the past year was almost 4 times higher among those with low food security and  $>11$  times higher among those with very low food security (adjusted odds ratio [aOR] = 11.4, 95% CI: 8.9–14.5) as compared with highly/marginally food secure households. In addition, HHDM experiencing very low food security were substantially more likely to report purchasing inexpensive and unhealthy foods (aOR = 13.1, 95% CI: 10.2–16.9) and watering



down food and drinks (aOR = 8.7, 95% CI: 6.5–11.5) as opposed to those households with marginal/high food security.

## Discussion

Access to a stable food supply is critical to successful diabetes management. Food security, which is characterized by having reliable access to affordable nutritious food, implies that people have the food-related resources necessary to apply nutrition-related action steps prescribed during DSME/S. This study found that among those HHDM accessing US food pantries, most experience very low food security and that the severity of food insecurity was highly related to difficulties in behaviors that may affect capacity for diabetes self-management, such as having to choose between food and medicine, purchasing inexpensive and unhealthy food, and watering down food and drinks. These findings have clear implications for the planning of DSME/S programs that aim to address food insecurity–related diabetes disparities.

This secondary analysis identified several factors that diabetes educators and health program planners should consider while adapting DSME for this population. For example, this study’s findings indicate that HHDM accessing food pantries will require educational materials that are written at or below a high school degree or equivalent. Additionally, DSME materials should be available, at minimum, in English and Spanish to meet the language needs of most food pantry clients. Nearly one-quarter of HHDM are composed of single adults; therefore, education materials should consider special meal planning and other disease self-management considerations for single-person households. Essential “survival skills” should be emphasized, including how to recognize the signs of hypoglycemia and how to plan meals at times during the month when food is more likely to be scarce, to help avoid the need for skipping meals or watering down food and drinks. Other essential “need to know” information should include which diabetes medications should be temporarily avoided or modified if no food is available. Finally, over one-third of HHDM included children, which suggests that any educational programming may need to provide child care for smaller children and offer complementary programming for older children as a strategy for higher participation rates within these eligible households.

Diabetes educators should additionally consider the special type of self-management support needs for people with diabetes who live in food-insecure households. For example, households may lack adequate funds to purchase diabetes-appropriate foods, and food insecurity may further influence eating behaviors, including stress-induced eating, while contributing to social isolation, which can make behavior change more difficult.<sup>20,22,23</sup> Receiving food from community food assistance programs may help to prevent social isolation and provide an adequate volume of food, but participants report often receiving inappropriate or sugary foods at food pantries.<sup>20</sup> Furthermore, food pantries may not always provide the necessary ingredients, such as olive oil and spices, to prepare even basic healthy recipes. Thus, food pantry–based DSMS efforts should not only consider food insecurity a fundamental barrier to disease self-management capacity but also support, where possible, long-term solutions for building food security.



Specifically, this study found that among HHDM, food insecurity compromised medication adherence and healthy diet behaviors, both of which are critical for optimal diabetes self-management. To better support self-management capacity, food pantry-based DSMS programs should include, when possible, programming that helps to support household financial stability, in addition to distribution of diabetes-appropriate food. Options for such programming include connection to federal nutrition assistance programs (eg, SNAP) and other assistance programs (health insurance, Low Income Home Energy Assistane Program, etc). This secondary analysis found that the majority of HHDM reported purchasing inexpensive, unhealthy food due to a lack of resources, which may contribute to higher intakes of sugar, fat, and sodium commonly found in processed foods. These findings support other studies suggesting that people with diabetes who live in food-insecure households have worse dietary quality and lower intake of fruits and vegetables as compared with individuals who are not food insecure, which may in turn explain the association between food insecurity and poor A1C control.<sup>5</sup> In a previous study of this same population, many HHDM wanted to receive more diabetes-appropriate foods at pantries, such as fresh produce and lean proteins.<sup>13</sup> Providing these foods may increase both client satisfaction and health. Knowledge and self-efficacy for preparing low-cost healthy meals should be addressed, and recipes/meals that require a refrigerator and cooking equipment may be feasible for the majority of patients. Developers of these resources should consider that many HHDM include children; thus, recipes should be family-friendly in addition to disease appropriate. Future research could further study the availability of supportive cooking equipment (knives, cutting boards, can openers, or blenders), cooking staples (oil, spices, etc), as well as food preparation knowledge and skills among HHDM accessing food pantries. Finally, this study's findings show that the majority of HHDM visiting food pantries do so on a regular basis, suggesting that these community-based settings may be suitable for the delivery of ongoing DSME/S programs.

## Limitations

There are some limitations with the current study. First, disease burden was ascertained at the household level only. Therefore, these findings cannot be directly interpreted to individuals living with diabetes. However, food insecurity is measured at the household level, and diet-related disease management is influenced by others in the household; hence, household analyses are highly relevant for exploring factors associated with disease management among food-insecure populations. Another limitation is that medical diagnoses for household members were reported by 1 household member, which likely underestimated household disease burden and the proportion of members in poor health. Additionally, this study did not collect estimates of other chronic health conditions relevant to diabetes management, such as renal disease. The lack of health care coverage among those in the overall sample may have resulted in the exclusion of HHDM who are undiagnosed due to lack of health care access.

## Conclusion

Efforts to effectively link patients to community resources are one of the core elements described in the chronic care model for optimizing the care of patients with chronic disease,

and they include the identification and development of resources to support healthy lifestyles that remove barriers to diabetes self-management.<sup>2</sup> The supportive role of food banks and food pantries in this model is implied, yet these community providers may require technical assistance to successfully integrate DSME/S programs into their existing infrastructure. Food pantries that offer DSME/S can provide existing health care providers with a more appropriate referral site when food insecurity is identified in the clinic. Educators working in these settings should consider how the severity of household food insecurity may influence patient achievement of self-care behavior goals. Programs should emphasize connecting clients to medical care and medication assistance while working to provide participating households with increased access to medically tailored foods, such as fruits, vegetables, and lean proteins.

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**Table 1** Characteristics of HHDM Accessing US Food Pantry Programs: Hunger in America 2014 Study

	n	Weighted %	95% CI
Highest educational attainment of adult household members			
<High school	2532	14.1	6.2–21.9
High school diploma	5606	32.7	22.7–42.7
GED	2000	11.6	5.2–17.9
Skilled trade	1453	8.8	1.7–15.9
Some college / 2-y degree	3541	23.5	9.0–37.9
4-y college or higher	1450	9.4	0.0–18.8
Household size			
1	3565	23.3	11.7–34.8
2	4231	24.5	13.2–35.7
3–5	6355	39.2	15.3–63.1
6	1893	13.1	0.0–38.6
Household composition			
One or more child (no senior)	3791	24.5	8.8–40.3
One or more senior (no child)	5509	35.5	21.5–49.6
One or more child and senior	1590	10.8	0.9–20.6
No child or senior	4524	29.2	17.5–40.8
Households with children (total)	5381	35.3	18.6–52.0
Households with seniors (total)	7099	46.3	32.2–60.4
Household poverty level (past month), %			
130	10 253	68.5	55.5–81.6
131–185	2534	15.1	5.2–25.1
186	2424	16.3	7.0–25.6
Health related			
Any member in poor health	8866	67.1	50.2–85.0
Hypertension in HHDM	13 627	83.9	75.4–92.4
Uninsured members (no insurance)	3585	22.1	12.2–32.0
Unpaid medical bills (yes)	10 363	60.2	46.5–73.9

Abbreviation: HHDM, households of people with diabetes.

**Table 2** Food- and Nutrition-Related Resources and Coping Strategies Among HHDM Accessing US Food Pantry Programs, Hunger in America 2014 Study<sup>a</sup>

	n	Weighted %	95% CI
Decision to use food pantry services			
Wait until food is gone	4839	34.9	18.6–51.1
Plan on food as part of monthly budget	10 667	65.1	48.9–81.4
Months accessing food pantry in past year			
12	4367	24.3	11.3–37.2
6–11	3193	21.2	10.4–31.9
1–5	6200	45.0	31.1–58.9
First time	1283	9.6	2.3–16.8
Foods wanted most but do not usually get from this program			
Fresh fruits/vegetables	9740	57.6	35.4–79.8
Proteins	8135	49.6	29.1–70.1
Grains	2204	13.9	1.4–26.3
Dairy	7292	44.5	25.2–63.9
Beverages	2758	16.7	3.7–29.7
Kitchen and housing characteristics			
Cold storage	15 010	96.2	91.3–100
Cooking equipment	14 980	96.1	91.3–100
Stable housing <sup>b</sup>	15 696	93.8	84.7–100
Household food coping strategies			
Purchased inexpensive unhealthy food	12 903	81.7	71.0–92.4
Watered down food or drinks to make them last longer	6745	43.0	32.4–53.6
Ate food past expiration date	9774	60.7	47.7–73.8
Purchased foods in dented/damaged packages	9360	57.1	42.2–72.0
Grew food in a garden	4417	26.2	10.5–41.8
SNAP participation	9211	56.1	44.8–67.5
Choose between food and medical care			
Every month	6400	38.3	27.3–49.2
Some months	4130	25.6	12.0–39.3

	n	Weighted %	95% CI
1 or 2 times a year	1689	10.9	0.0–23.6
Never	4029	25.3	13.6–36.9
Household food security			
Food secure/marginal	1719	11.4	4.2–18.7
Low food security	4192	30.0	11.7–48.2
Very low food security	8460	58.6	38.9–78.2
Food security items related to irregular intake: adult members			
Cut size or skipped meals	10 819	66.0	50.3–81.8
Ate less than wanted	10 826	68.2	51.1–85.3
Did not eat balanced meals	13 573	85.9	78.4–93.4
Were hungry, didn't eat	8200	50.7	36.7–64.7

Abbreviations: HHDM, households of people with diabetes; SNAP, Supplemental Nutrition Assistance Program.

<sup>a</sup>Percentages have been adjusted for missing data.

<sup>b</sup>Stable housing includes house/townhouse, apartment, mobile home or trailer, military housing; does not include rented room/boarder house or temporary or no housing.

Relationship Between Food Insecurity and Select Household Characteristics and Nutrition-Related Coping Among HHDM: Hunger in America 2014 Study<sup>a</sup>

Table 3

	Food Security Status, Weighted %			P Value
	High/Marginal	Low	Very Low	
Household composition				<.0001
1 children (no senior)	16.1	18.1	31.2	
1 seniors (no children)	53.1	42.1	26.4	
1 children and seniors	11.1	12.8	10.6	
No child or senior	19.8	27.1	31.8	
Poverty level, %				<.0001
130	54.9	66.3	71.5	
131–185	18.9	16.6	14.5	
186	26.2	17.2	14.0	
Health related				
High blood pressure in HHDM	85.4	82.3	84.9	.9694
Any member in poor health	48.9	66.1	70.4	<.0001
Uninsured members (no insurance)	15.3	20.3	23.0	<.0001
Unpaid medical bills (yes)	37.9	52.7	70.8	<.0001
Choose between food and medical care				<.0001
Every month	13.1	27.9	48.9	
Some months	21.2	40.0	38.6	
Never	21.2	32.9	12.5	
Food coping strategies				
Purchased inexpensive, unhealthy food	45.6	78.8	92.2	<.0001
Watered down food or drinks	11.3	26.6	58.3	<.0001
Ate food past expiration date	38.1	52.4	71.7	<.0001
Purchased food in dented/damaged packages	28.7	46.2	69.3	<.0001
Grew food in a garden	24.1	24.2	27.9	.0107

Abbreviation: HHDM, households of people with diabetes.

<sup>a</sup>Bold indicates  $P < .05$ .



**Table 4**  
Adjusted Models of the Association Between Food Insecurity and Food-Related Coping Strategies Among HHDM Receiving Food Assistance From US Food Pantries: Hunger in America 2014 Study<sup>a</sup>

Factors Related to Disease Management Outcomes	aOR (95% CI) vs Secure/Marginally Food Secure	
	Low Food Security	Very Low Food Security
Choose between food and medical care <sup>b</sup> : at least once per year	<b>3.9 (3.2–4.8)</b>	<b>11.4 (8.9–14.5)</b>
Food insecurity coping strategies <sup>c</sup>		
Purchased inexpensive, unhealthy food	<b>3.8 (3.1–4.7)</b>	<b>13.1 (10.2–16.9)</b>
Watered down food or drinks	<b>2.2 (1.6–3.0)</b>	<b>8.7 (6.5–11.5)</b>
Ate food past expiration date	<b>1.7 (1.3–2.1)</b>	<b>4.1 (3.2–5.0)</b>
Purchased dented/damaged packages	<b>2.3 (1.8–2.9)</b>	<b>6.0 (4.7–7.6)</b>
Grew food in a garden	1.3 (1.0–1.6)	<b>1.4 (1.1–1.9)</b>

Abbreviations: aOR, adjusted odds ratio; HHDM, households of people with diabetes.

<sup>a</sup> Adjusted for household poverty level, household type, unpaid medical bills, and health care coverage. Bold indicates  $P < .05$ .

<sup>b</sup> Response options: every month, some months during the year, 1 or 2 times a year, never (dichotomized: at least once per year, more or never).

<sup>c</sup> Response options: yes, no.