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## Food Insecurity and Food Access Among Seniors in Lubbock, Texas

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### ABSTRACT



The purpose of this study was to determine the prevalence of food insecurity and examine relationships between food security and a variety of food access factors influencing food access among 186 seniors in Lubbock, Texas. Socio-demographic, economic and food security, such as coping strategies, data were analyzed on IBM SPSS, version 23. The prevalence of food insecurity was 40.2%. Significant positive relationships were observed between food insecurity and food and nutrition assistance participation and also all the coping strategies. Age, household income and money spent on food per month were predictors of food security ( $R^2 = 0.233$ ;  $p < 0.000$ ;  $SEE = 4.462$ ). Suitable food and nutrition intervention strategies are needed to address food insecurity.

### KEYWORDS

Seniors; food insecurity; food; nutrition

## Introduction

Seniors are considered a vulnerable group due to their high poverty risk<sup>1,2</sup> impacting the quality of their diets and risk of nutrition-related chronic lifestyle diseases.<sup>3</sup> Poverty and economic constraints are often a key factor of food insecurity, but the physical ability to obtain and use food should also be considered.<sup>3</sup> Despite federal and state programs, such as Social Security, seniors often have to compromise food for multiple and unique health-related outlays, unforeseen health care costs and limited mobility influencing shopping and food preparation abilities.<sup>3,4</sup> Furthermore, despite Medicare reducing the financial risk related to health care expenses, the health care burden of seniors are increasing due to longer life expectancy and a higher prevalence of chronic lifestyle diseases that contribute to health care costs.<sup>5</sup> A conceptual model was developed that included interpersonal (transportation assistance, food assistance, eating with others), intrapersonal (health, budget, loneliness) and environmental factors (city transportation, community agencies, availability of grocery stores) to describe the multidimensional nature of food security in seniors.<sup>3,6</sup>

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The purpose of this study was to determine the prevalence of food insecurity among seniors ( $\geq 50$  years) and to examine the relationships between food security and a variety of interpersonal, intrapersonal and environmental factors influencing food access among seniors in Lubbock.

## Methods

### Study area

In Texas, the older population is growing at a faster rate than that of the nation. In 2014, the older population in Texas was nearly 3.1 million, an increase by 49.5% from 2000.<sup>7</sup> Furthermore, Texas rated sixth in the US with 19.04% of seniors estimated as living under a threat of hunger in 2014.<sup>8</sup> There is a paucity of recent data on food insecurity among seniors in the US.<sup>6</sup> This is also true for Texas, specifically in north western Texas and this study was thus undertaken in Lubbock, situated in the South Plains of Texas.

### Study design

This study was a cross-sectional study conducted among seniors in Lubbock, Texas.

### Respondents and sampling

The study employed a random selection of seniors ( $\geq 50$  years) in Lubbock. A total of 200 seniors were recruited from respondents participating in Lubbock Meals on Wheels that deliver meals to seniors with limited mobility at home, five public senior centers serving congregated meals, a homestead and a live-in senior community center where meals are provided. The institutional review board (IRB) of Texas Tech University (TTU) approved the study.

The following sample size calculation [The Survey System]<sup>9</sup> was used to determine the sample size for a representative sample:

$$\text{Sample size} = \frac{Z^2 * (P) * (1 - P)}{C^2}$$

Where,

$Z$  =  $Z$  value of 1.96 for 95% confidence level;

$P$  = 50% expressed as decimal (0.5 used for sample size needed);

$C$  = Confidence interval of 7.5, expressed as 0.075

All senior centers were approached for institutional clearance and the study advertised using information fliers distributed at the various senior centers and Meals on Wheels for interested seniors to enroll. Respondents indicated their willingness to participate by signing an informed consent form. The rights of seniors were respected and safety precautions taken during data collection. A statistically representative sample size of 170 seniors was required, and anticipating possible not response or dropout during the measurement phase, 200 seniors were randomly selected from those for whom informed consent had been obtained. Measurements were done during June and July 2016. Seven senior centers and Meals on Wheels were randomly selected and 25 respondents from each were required for a sample size of 200.

### ***Data collection and tools***

Demographic variables of the seniors were assessed using a combination of questions from various validated questionnaires. The variables included ethnicity, educational status, gender, age, household income, household size and number of grandchildren.<sup>8,10</sup>

To measure chronic conditions, a senior was asked if s/he had been diagnosed with any chronic condition at the time of the survey. A follow-up open ended question requested the senior to list all chronic conditions and indicate medication usage. The presence of disability among seniors was self-reported through a dichotomous Yes/No and a follow-up open ended question asked to list all disabilities. Current smoking status was also assessed.

Food security and coping strategies, for example cutting portion sizes, consuming fewer meals or foods that would not usually form part of the diet, such as purchasing cheaper food items, were assessed using the Household Food Insecurity Access Scale (HFIAS) for measurement of individual/ household food access. It is made up of nine dichotomous (Yes/No) and nine follow-up questions (1 = Rarely (1–2 times); 2 = Sometimes (3–10 times) and 3 = Often (more than 10 times)) to assess the severity of food inadequacy. The procedures as described by Coates and co-authors were followed to calculate HFIAS and the HFIAS score.<sup>11</sup> Other food insecurity access questions included mode of transportation, seniors' perception on changes that will improve the access to food and participation in food assistance programs. Another open ended question on what foods they will buy if they had more money was also included in the questionnaire.

### ***Statistical analysis***

A complete database for 186 seniors were used for the data analyses. All analyses were conducted using the IBM SPSS, version 23 and  $p < 0.05$  was considered significant for all statistical tests. Linearity regression was used to

test all continuous variables for normality. Most variables were normally distributed. Demographic data were analyzed for frequencies and means and standard deviations (SDs).

Individual food insecurity levels were analyzed from the HFIAS questionnaire and grouped according to four ordinal categories; 1 = Food Secure, 2 = Mildly Food Insecure Access, 3 = Moderately Food Insecure Access, 4 = Severely Food Insecure Access.<sup>11</sup> The sample was further categorized as food secure and food insecure (mildly, moderately and severe food insecurity) and frequencies calculated for prevalence rates, as well as for the coping strategies. The HFIAS score was calculated by adding the sum of all follow up questions (1a to 9a) testing the severity of food insecurity; thus the score is 0–27.

Independent samples *t*-tests (nominal data) and linear by linear chi-square associations (categorical data) were conducted to determine significant differences between the groups. Pearson and Kendall Tau correlations were calculated for nominal and categorical data respectively. To understand the predictors of household food security status (food security and food insecurity), linear regression (age in years, household monthly income, household monthly expenditure on food) and a binary logistic regression (gender, ethnicity, education status) were carried out with those dependent variables that had a significant correlation with household food security status. Unadjusted binary regression analysis showed no significance when all the variables were adjusted with food insecurity status.

## Results

The mean  $\pm$  SD age of the respondents was  $72.6 \pm 10.8$  years, with 44.6% women ( $n = 83$ ) and 55.4% men ( $n = 103$ ). A large percentage of the respondents were white ( $n = 92$ , 49.5%), followed by Hispanic ( $n = 45$ , 24.2%) and African American ( $n = 42$ , 22.6%). The majority of the 103 respondents ( $n = 57$ , 55.4%) lived alone, followed by 34.9% ( $n = 65$ ) who had two members in the household and 6.6% with three members in the household. Of the respondents, 33.9% ( $n = 63$ ) were married whilst the rest were either widowed ( $n = 63$ , 33.9%), divorced ( $n = 32$ , 17.2%) or single ( $n = 27$ , 14.5%).

Regarding literacy rate, only 1.1% had no education ( $n = 2$ ), with 25.4% who completed elementary school ( $n = 47$ ), 38.4% high school ( $n = 71$ ) and 31.9% college ( $n = 59$ ) (18.9% undergraduate, 10.8% Masters and 2.2% doctoral qualifications). The main source of income for the majority of the respondents was from Social Security ( $n = 149$ , 80.3%) and also from another pension fund ( $n = 18$ , 9.8%). Only 3.8% of the respondents were employed ( $n = 7$ ), 1.6% full time ( $n = 3$ ) and 2.2% part time ( $n = 4$ ). No significant differences were observed in socio-demographic variables between the food secure and insecure groups, except for ethnicity ( $p = 0.001$ ) and education

( $p = 0.001$ ). A higher prevalence of African American and Hispanic/Latino and lower prevalence of White respondents were present in the food insecure group compared to the food secure group. The food insecure group had a lower education level with more respondents having no education and completing only elementary school compared to more who received high school and college qualifications in the food secure group. The mean  $\pm$  SD monthly household net income of the respondents was  $\$2025.30 \pm 2113.21$ . A statistically significant difference ( $p < 0.001$ ) was observed between the food secure ( $\$2801.02 \pm 2505.52$ ) and food insecure ( $\$937.91 \pm 370.24$ ) groups.

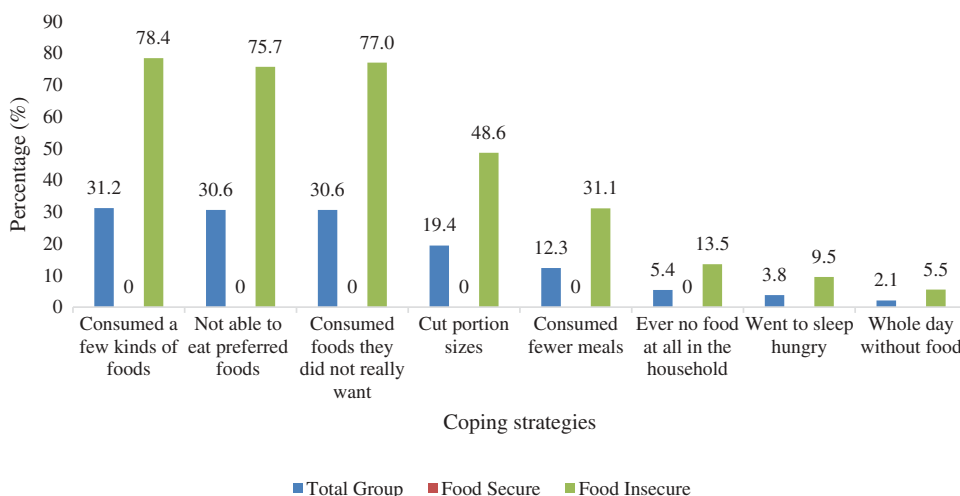
The prevalence of self-reported hypertension and depression were significantly ( $p < 0.050$ ) higher in the food insecure group, however, the food secure group had significantly ( $p < 0.001$ ) more respondents who smoked (Table 1).

### **Prevalence of food insecurity**

Based on the HFIAS categories, the majority of the respondents (59.8%) were categorized as food secure (HFIA1). Of the food insecure respondents (40.2%), 12.5% were mildly (HFIA2), 17.4% moderately (HFIA3) and 10.3% severely food insecure (HFIA4). Although 76.9% of the respondents indicated that they worried about not having enough food in the house, in most cases this happened rarely (83.3%) and in fewer cases sometimes (4.3%) or often (12.9%) during the 30 day measurement period.

The results in Figure 1 show that coping strategies were employed by the respondents ranging from 31.2% for consuming fewer kinds of foods to 2.1% that went without food the whole day. None of the coping strategies were employed by the food secure group and all the coping strategies for the food insecure group were thus significantly different ( $p \leq 0.05$ ) from the food secure group. Furthermore, the majority of respondents in the food insecure group consumed fewer kinds of foods (78.4%), were not able to eat their preferred foods (75.7%) and consumed foods they did not really liked or wanted (77.0%) because of lack of funding. The food insecure group also experienced times when no food was available in the household (13.5%) and 9.5% reported that they had gone to bed hungry or a whole day and night without eating anything (5.5%) because there was not enough food in the house during the previous month.

The mean  $\pm$  SD monthly food budget was  $\$228.93 \pm 150.16$ . The food insecure group spent significantly ( $p < 0.001$ ) less on food per month than the food secure group –  $\$173.98$  compared to  $\$274.45$ . The majority of the respondents (52.7%) used their own vehicle to do food shopping whereas significantly ( $p < 0.001$ ) more respondents in the food insecure group (45.9%) relied on others to assist with grocery shopping than the food secure group (20.0%). Supermarkets with fresh fruit and vegetables nearby, as well



**Figure 1.** Coping strategies among the respondents.

as transport, was also the most important factors considered for improving access to food. The latter significantly ( $p = 0.001$ ) more so for the food insecurity group. The majority of the respondents (57.5%) did not participate in any food assistance programs, however, 22.6% participated in the Supplemental Nutrition Assistance Program (SNAP), 16.1% received food from the South Plains Food Bank and 11.3% from Lubbock Meals on Wheels, while 14.5% received food from other sources, such as faith-based organizations. Significantly more respondents in the food insecure participated in food assistance programs (Table 2).

The respondents indicated that they would purchase more meat (60.8%), fresh vegetables (33.8%) and fresh fruit (28.4%) if more resources were available. The same trend was observed for both food secure and insecure groups (Figure 2).

Significant positive relationships were observed between food insecurity and SNAP ( $r = 0.399$ ;  $p < 0.0001$ ), Food Bank ( $r = 0.268$ ;  $p < 0.0001$ ), and Meals on Wheels ( $r = 0.159$ ;  $p < 0.0001$ ) participation, as well as all the coping strategies. Significant inverse associations were observed between food insecurity and age ( $r = -0.290$ ;  $p < 0.0001$ ), household income ( $r = -0.468$ ;  $p < 0.0001$ ), monthly food expenditure ( $r = -0.285$ ;  $p < 0.0001$ ), education ( $r = -0.240$ ;  $p < 0.0001$ ), the prevalence of depression ( $r = -0.309$ ;  $p < 0.0001$ ) and smoking ( $r = -0.235$ ;  $p = 0.001$ ). Direct associations have also been found with education ( $p < 0.0001$ ) and ethnicity ( $p = 0.010$ ) (Table 3).

The linear regression analysis carried out on the socio-demographic predictors of food security (HFIAS) showed that age, household income and money spent on food per month predictors of food security ( $R^2 = 0.233$ ;  $p < 0.000$ ; SEE = 4.462). No significant differences were observed in the odds ratios in terms of gender, ethnicity and education levels of the seniors.

**Table 1.** Socio-economic parameters compared across the food security groups ( $n = 146$ ).

Variables	Total group ( $n = 186$ )		Food secure group ( $n = 111$ )		Food insecure group ( $n = 75$ )		Significance of differences between food secure and insecure groups p
	Prevalence (%)	Mean $\pm$ SD	Prevalence (%)	Mean $\pm$ SD	Prevalence (%)	Mean $\pm$ SD	
<b>Age</b>	72.6 $\pm$ 10.8		75.6 $\pm$ 10.9		67.9 $\pm$ 9.2		0.161
<b>Number of household members</b>	1.6 $\pm$ 0.8		1.6 $\pm$ 0.8		1.6 $\pm$ 0.9		0.910
<b>Gender:</b>							
Women	44.6		41.8		47.3		
Men	55.4		58.2		52.7		
<b>Ethnicity:</b>							0.001
American Indian/Alaska Native	1.6		1.8		1.4		
African American	22.6		15.5		32.4		
Hispanic/Latino	24.2		20.0		31.1		
Asian	0.5		0.9		0.0		
White	49.5		60.9		32.4		
Other	1.6		0.9		2.7		
<b>Education:</b>							0.001
None	1.1		17.4		37.8		
Elementary school	25.4		36.7		40.5		
High school	38.4		21.1		16.2		
Undergraduate qualification	18.9		16.5		1.4		
Graduate qualification	13.0		2.8		1.4		
<b>Marital status:</b>							0.356
Single	14.5		10.0		20.3		
Married	33.3		39.1		24.3		
Widowed	33.9		39.1		27.0		
Divorced	17.2		11.8		25.7		
Living with partner	1.1		0.0		2.7		
<b>Self-reported health status:</b>							0.154
Chronic condition/s	20.4		23.2		18.4		
Hypertension	36.6		30.5		43.7		

> 0.050 (systolic 0 = 0.998; diastolic 0 = 448)

(Continued)



Table 1. (Continued).

Variables	Total group (n = 186)		Food secure group (n = 111)		Food insecure group (n = 75)		Significance of differences between food secure and insecure groups p
	Prevalence (%)	Mean ± SD	Prevalence (%)	Mean ± SD	Prevalence (%)	Mean ± SD	
Depression	2.1		1.2		2.9		Cells too low to compute
Smoking	17.0		22.2		13.0		p-values 0.000
<b>Living with children</b>	12.9						0.173
<b>Monthly household income:</b>	2025.30 ± 2113.21		2801.02 ± 2505.52		937.91 ± 370.24		< 0.001
<b>Main household income source:</b>							0.262
Fulltime job	1.6		2.8		0.0		
Part-time job	2.2		2.8		1.4		
Social Security	80.3		73.1		90.4		
Loans	0.5		13.0		1.4		
Other pension	9.8		8.4		5.5		
Other	5.5				1.4		

**Table 2.** Significant relationships among variables.

Variables	Correlation ( <i>r</i> )	Significance ( <i>p</i> )
Food insecurity with:		
Age	-0.290	< 0.001
Household income	-0.468	< 0.001
Monthly food expenditure	-0.285	< 0.001
HFIAS score	0.868	< 0.001
Education	-0.240	< 0.001
Ethnicity	-0.232	0.010
SNAP participation	0.399	< 0.001
Food Bank participation	0.268	< 0.001
Meals on Wheels participation	0.159	< 0.001
No participation in food aid programs	-0.363	< 0.001
Smoking	-0.235	0.001
Depression	-0.309	< 0.001
Worry about not having enough money for food	0.609	< 0.001
Not able to consume preferred foods	0.769	< 0.001
Only consuming few kinds of foods	0.789	< 0.001
Consuming foods not wanted	0.779	< 0.001
Cutting portion sizes	0.571	< 0.001
Consuming fewer meals	0.542	< 0.001
No food in the household at a particular time	0.345	< 0.001
Went to sleep feeling hungry	0.345	< 0.001
Not consuming food for a whole day	0.203	0.006

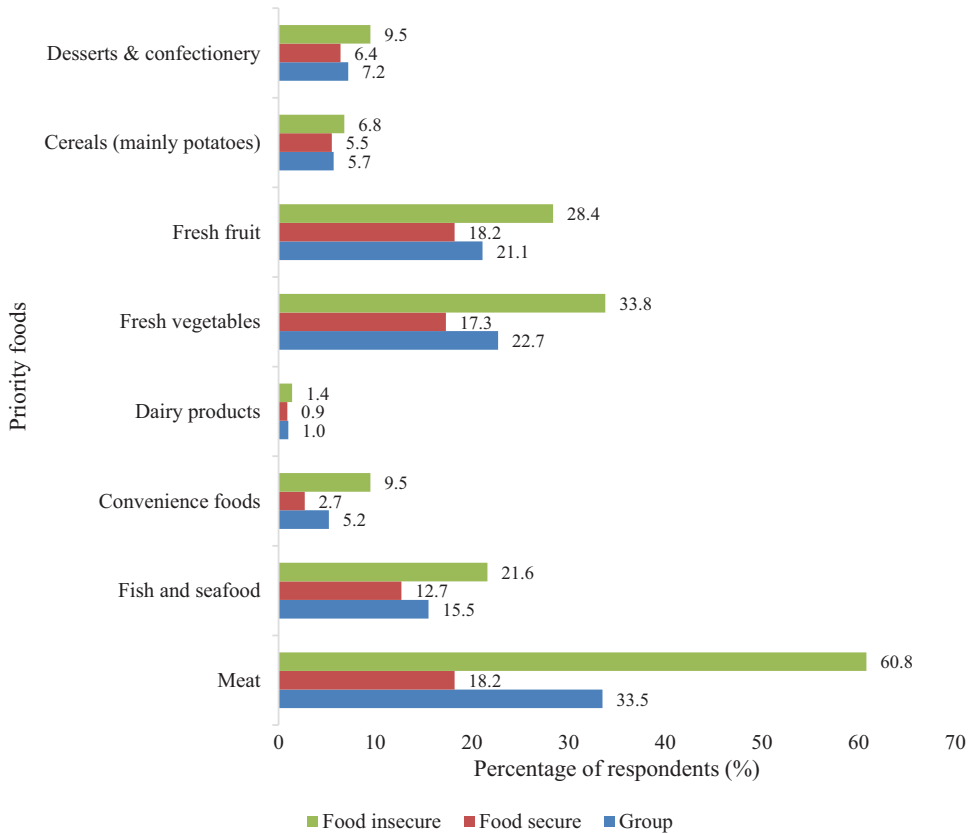
## Discussion

A higher than national prevalence of food insecurity was found with 40.2% of the seniors participating in this study being categorized as food insecure, of which 12.5% were mildly food insecure, 17.4% moderately food insecure and 10.3% severely food insecure. Although the White population group had a significantly higher prevalence of food security compared to the African American and Hispanic populations, all the ethnic groups represented in Lubbock were affected by food insecurity as the prevalence of food insecurity was 32.4% among the Whites, 32.4% among the African Americans and 31.1% among the Hispanics.

The mean monthly household income of the seniors in this study was \$2,025.30, however, when comparing income of the food secure and insecure households, the results indicated that the food insecure households had a significantly lower monthly household income and the income was getting progressively lower as the food insecurity status deteriorated. This finding was confirmed by the observed significant adverse correlation between income and food insecurity. Furthermore, the amount spent on food per month was significantly lower in the food insecure households. The US Department of Agriculture (USDA) has found that seniors believed that their income was inadequate once they were no longer active in the job sector and relied on Social Security.<sup>12</sup> The majority of the seniors in Lubbock relied on Social Security (80.3%) for income, more so in the food insecure group (90.4%) with a small percentage relying on other pension schemes

**Table 3.** Socio-economic parameters affecting food access compared across the food security groups.

Variables	Total group (n = 186)	Food secure group (n = 111)	Food insecure group (n = 75)	Significance of differences between food secure and insecure groups p
<b>HFIAS</b>	3.4 ± 5.3	0.0 ± 0.0	8.4 ± 5.2	< 0.001
<b>Money spent on food per month:</b>	228.93 ± 150.16	274.45 ± 161.31	173.98 ± 116.288	< 0.001
<b>Participation in food assistance programs:</b>				
SNAP	22.6	9.1	43.2	< 0.001
Food Bank	16.1	8.2	28.4	< 0.001
Meals on Wheels	11.3	7.3	17.6	0.029
Other (e.g. faith-based)	14.5	10.9	20.3	0.062
<b>Mode of travel to access food:</b>				
Bus	11.3	13.6	8.1	0.179
Own car	52.7	55.5	47.3	0.175
Bicycle/walk	30.1	3.6	2.7	0.540
Other people assist	32.0	20.0	45.9	< 0.001
<b>What would improve access to food:</b>				
Transportation available		19.1	40.5	0.001
Farmer's market nearby		29.1	33.8	0.303
Supermarket with fruit and vegetables		39.1	47.3	0.170



**Figure 2.** Foods to buy when more money should be available.

(9.8%). The mean± SD daily amount spent on food per person was \$6.42 ± 3.97 for the food secure and \$4.08 ± 3.14 for food insecure seniors in this study. This translates into the food secure being able to afford a thrifty food plan and the food insecure seniors not being able to consume the thrifty food plan costed as \$6.09 per person per day in May 2016.<sup>13</sup> Furthermore, a significant adverse correlation was found between food expenditure and food insecurity.

Economic constraints are one of the key factors causing food insecurity<sup>1</sup> and seniors often have to employ coping strategies or participate in food assistance programs to supplement their food sources.<sup>6</sup> In this study, coping strategies that were employed by the majority of respondents in the food insecure group included consumption of only a few kinds of foods, not eating preferred foods, and consumption of foods that the respondents did not really want. All the coping strategies were significantly associated with food insecurity. The adoption of coping strategies can thus further exacerbate food insecurity in both the short and long term.<sup>14</sup> It was reported that nearly 1 in 12 seniors in the US has inadequate access to sufficient food for sustaining a

healthy lifestyle. Domestic hunger, known as food insecurity, can affect nutritional status in part as a result of decreased nutrient intakes.<sup>15</sup> The food insecure seniors in this study also consumed fewer and smaller portion sizes to cope with food insecurity. In almost a tenth of the households, there was no food to eat at some time during the previous month. Food insecurity is often associated with poor diet quality in seniors. Food insecurity has also been associated with increased risk for nutritional, physical and mental health problems.<sup>16,17</sup> Chronic conditions were reported by 20.4% of the seniors with hypertension being prevalent in 36.6%, more so in the food insecure group (43.7%) compared to the food secure group (30.5%). Lower diet quality often separates lower-income from more affluent American households. Whole grains, seafood, lean meat, low-fat milk and fresh vegetables and fruit are bought more frequently by the higher income groups compared to more cereals, pasta, potatoes, legumes and fatty meats by the lower income groups.<sup>17</sup> In this study, food procurement patterns were not investigated, however, the respondents were asked what they would buy when more money would become available and meat, vegetables, fruit, fish and seafood were the top five food items listed by both the food secure and food insecure groups.

Although none of the food secure group employed any coping strategies, about 10% participated in either SNAP, Food Bank, Meals on Wheels or other faith-based programs respectively. Almost half of the food insecure seniors participated in SNAP, followed by the Food Bank, other faith-based organization programs and Meals on Wheels. Federal food assistance programs are designed to address food insecurity among specific populations, including seniors and these can include congregate meals, home-delivery programs, farmer's markets and the Child and Adult Care Food Program.<sup>18</sup> Despite the positive correlation between food insecurity and food assistance program participation and having food assistance programs available, Keller and co-authors found that seniors often worried about the costs of food and not having enough money for food once all their bills, and medication were paid.<sup>1</sup> In this study, 76.9% of all the seniors indicated that they worried about not having enough food in the household. This was confirmed by the positive correlation about food insecurity and worrying about not having enough food in the house.

Furthermore, mood and anxiety disorders and depression have been associated with chronic cycles of food deprivation and availability.<sup>16</sup> In this study, 2.1% of the seniors suffered from depression. Although the majority of the seniors had their own car to do food shopping, some also used the city bus, a bicycle or walked to the shops. However, one fifth of the food secure and almost half of the food insecure seniors used friends or family to assist them with food shopping. These results were consistent with those of a study conducted among seniors in Minnesota.<sup>6</sup> The seniors indicated that food

access could be improved if transportation would be available more regularly or having a farmer's market or supermarket with fresh fruit and vegetables closer to their homes. This was consistent with the findings of Keller and co-authors.<sup>1</sup>

In this study, the budget, living alone and eating with others were examined as intrapersonal factors contributing to food insecurity and the budget was confirmed to be significantly associated with food insecurity. Furthermore, most of the participants in this study were living alone and participated in congregate meals and thus eating with others were found to be important for these seniors. The interpersonal factors examined included transportation assistance and food provision. The results showed that transportation assistance was needed by the food insecure group. Although food provision was used in both the food secure and food insecure groups, the food insecure group had a significantly higher participation in food assistance programs. Furthermore, food insecurity in these seniors showed a positive relationship with participation in food assistance programs. No environmental factors were included in this study, however, city transportation and community agencies were used by some of the participants, and more so by the food insecure group. Interaction among these factors often occur.<sup>3</sup> In this study, the intrapersonal factor, namely budget constraints, interacted with the interpersonal and environmental factors by relying on food assistance programs and family and friends to assist with transportation for grocery shopping.

A limitation of this study is the recruitment from senior centers providing congregate and home delivered meals. Another limitation is that this is a small study undertaken in only one community and the results can thus not be generalized to seniors in general. Another limitation may be the self-report of sensitive information, such as household income. Despite these limitations, this study is that it is the first of its kind to be undertaken in Lubbock and identified some factors contributing to food insecurity and coping strategies employed by seniors. The results also provide valuable information for planning and implementing interventions to address food insecurity among seniors in this community.

## Conclusion

Although adequate food availability and access are influenced by many factors, only three socio-economic variables were identified as predictors for food security in this senior community, namely age, household income and money spent on food per month. It was difficult to compare our results across other similar studies because of the paucity of data for food insecurity and seniors specifically in Texas, but this study points to a serious problem of household food insecurity among seniors in Lubbock.

This finding is consistent with the fact that seniors have been identified as the first of seven vulnerable groups at risk of food insecurity in the US.<sup>20</sup> More in-depth studies are needed to explore the various interpersonal, intrapersonal and environmental factors that contribute to food and nutrition insecurity of seniors to plan and implement suitable food and nutrition strategies. These strategies can include nutrition education, including cooking classes, supermarket tours to identify economical nutritious foods, and household vegetable gardening to address food and nutrition insecurity effectively and efficiently amongst this group of vulnerable people.

## Acknowledgments

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