Food Insecurity Is Associated with Behavioral Health Diagnosis Among Older Primary Care Patients with Multiple Chronic Conditions

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INTRODUCTION

Food insecurity, defined as uncertain or limited access to nutritionally adequate and safe foods, can negatively impact health outcomes and healthcare utilization of those with multiple chronic conditions (MCC) ^{1–3}. However, few studies have examined food insecurity among older adults with MCC in primary care. This study examines socio-demographic and clinical factors associated with food insecurity among older adults with MCC in primary care in order to direct food insecurity screening efforts to high-risk populations.

METHODS

From March to December 2016, we conducted a cross-sectional telephone survey of adults aged 60 years or older receiving care from an urban academic primary care practice. Inclusion criteria included fluency in English, Spanish, or Chinese (Cantonese/Mandarin); at least two concurrent chronic conditions based on diagnosis codes from the Elixhauser Comorbidity Index ⁴; and at least one clinic visit in the last year. We identified eligible participants from the electronic health record (EHR), selected participants using random clinic sampling stratified by race/ethnicity, and recruited participants using an opt-out letter. The survey included the 10-item U.S. Adult Food Security Survey Module (food insecurity defined as 3+ affirmative responses), education, employment, annual household income, English proficiency, cost-related

medication non-adherence, self-reported health status, and utilization of community food resources and the Supplemental Nutrition Assistance Program (SNAP). We linked survey responses to the following variables from the EHR: age, sex, race/ethnicity, insurance type, preferred language, ICD-10 diagnosis codes, and healthcare utilization. We conducted bivariate analyses and a parsimonious multivariate logistic regression model, adjusting for socio-demographic and clinical factors that were significantly different between older adults with and without food insecurity. We did not include the number of medications since it was moderately correlated with the number of chronic conditions ($r = 0.33$).

RESULTS

The prevalence of food insecurity in this sample of older adults with MCC ($n = 475$) was 8.2%. The food insecure participants were younger (mean 68 versus 73 years old) and more likely to identify as female, disabled, and African American (Table 1). They also had lower levels of education and income. Among food insecure participants, 12% reported SNAP enrollment and 69% reported utilization of at least 1 community food resource. Food insecure participants had higher burden of chronic disease (46% versus 21% had 5+ chronic conditions) compared with food secure participants. In addition, food insecure participants were more likely to report at least 1 behavioral health diagnosis (defined as alcohol or drug abuse, psychoses, or depression, 67% versus 26%), polypharmacy (17 versus 12 total medications), and more primary care visits in the last year (5.3 versus 3.5 visits) compared with food secure participants. In a multivariate model (Table 2), factors positively associated with food insecurity were being African American compared with being White (AOR 5.8 95%CI (2.2, 15.6)) and having at least one behavioral health diagnosis (AOR 4.1 95%CI (1.9, 9.0)). Older age was negatively associated with food insecurity (AOR 0.92 95%CI (0.87, 0.98)).

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Table 1 Socio-demographic and Clinical Characteristics by Food Insecurity Status of 475 Older Adult Patients with Multiple Chronic Conditions from an Urban Academic Primary Care Practice

	Total study population <i>n</i> = 475	No food insecurity <i>n</i> = 436	Food insecurity <i>n</i> = 39	<i>p</i> value*
Socio-demographic characteristics				
Age, years [†]				
Mean ± SD, median (range)	72.2 ± 7.8, 71 (58–98)	72.6 ± 7.8, 72 (60–98)	67.7 ± 6.2, 66 (58–87)	< 0.001
51–60	1.5%	1.4%	2.6%	
61–70	45.5%	42.9%	74.4%	
71–80	36.0%	37.6%	17.9%	0.0014
> 81	17.1%	18.1%	5.1%	
Male [†]	49.1%	50.5%	33.3%	0.04
Race/ethnicity [†]				
Non-Hispanic White	54.3%	55.5%	41.0%	
Asian	22.5%	23.6%	10.3%	< 0.001
African American	7.6%	5.3%	33.3%	
Latino	9.1%	8.7%	12.8%	
American Indian	0.8%	0.7%	2.6%	
Other/unknown	5.7%	6.2%	-	
Preferred language [†]				
English	84.8%	84.6%	87.2%	
Chinese**	9.9%	10.3%	5.1%	0.59
Spanish	4.8%	4.6%	7.7%	
Other	0.4%	0.5%	0.0%	
Limited English proficient	17.3%	17.2%	17.9%	0.91
Education				
< HS diploma	14.3%	14.2%	15.4%	
HS diploma to some college	24.8%	22.2%	53.8%	< 0.001
≥ College degree	60.2%	63.1%	28.3%	
Missing	0.6%	0.5%	2.6%	
Employment				
Full or part time	22.3%	23.2%	12.8%	
Disabled	5.7%	3.7%	28.2%	< 0.001
Retired/unemployed/other	72.0%	73.2%	59.0%	
Total household size				
Mean ± SD, median (range)	2.2 ± 1.2, 2 (1–9)	2.2 ± 1.2, 2 (1–9)	1.8 ± 1.0, 1 (1–5)	0.015
Income				
≤ \$20,000	24.8%	21.1%	66.7%	
> \$20,000	63.6%	67.0%	25.6%	< 0.001
Missing/don't know/not sure	11.6%	11.9%	7.7%	
Any form of Medicare***†	72.0%	71.3%	79.5%	0.28
Cost-related medication non-adherence	13.7%	10.3%	51.3%	< 0.001
Fair or poor health status	31.5%	28.9%	61.6%	< 0.001
SNAP use	4.4%	3.7%	12.8%	0.03
Use of any community food resource^	17.5%	12.8%	69.2%	< 0.001
Clinical characteristics				
Chronic condition diagnoses^^†				
Mean ± SD, median (range)	3.6 ± 1.6, 3 (1–12)	3.5 ± 1.5, 3 (1–12)	4.5 ± 2.0, 4 (2–9)	0.0011
0–1 chronic conditions	1.7%	1.8%	-	
2–4 chronic conditions	74.9%	76.8%	53.8%	0.002
5+ chronic conditions	23.4%	21.3%	46.2%	
Physical health diagnoses				
Congestive heart failure	5.5%	4.8%	12.8%	0.04
Pulmonary circulation disease	2.5%	2.1%	7.7%	0.03
Paralysis	0.4%	0.2%	2.6%	0.03
Chronic pulmonary disease	19.8%	18.6%	33.3%	0.03
Rheumatoid arthritis	7.6%	6.7%	17.9%	0.01
Obesity	21.9%	20.6%	35.9%	0.03
Behavioral health diagnoses				
Alcohol abuse	2.7%	2.3%	7.7%	0.05
Drug abuse	3.4%	2.5%	12.8%	< 0.001
Psychoses	4.0%	3.0%	15.4%	< 0.001
Depression	23.4%	21.3%	46.2%	< 0.001
Any behavioral health diagnosis	29.3%	25.9%	66.7%	< 0.001
Number of medications [†]				
Mean ± SD, median (range)	12.8 ± 6.6, 12 (1–37)	12.4 ± 6.3, 12 (1–35)	16.7 ± 9.0, 14 (1–37)	0.003
0–1	0.4%	0.2%	2.6%	
2–4	5.9%	6.2%	2.6%	
5–7	17.3%	17.7%	12.8%	0.11
8+	76.4%	75.9%	82.1%	
Body mass index, kg/m ^{2†}				
Mean ± SD	27.8 ± 6.3	27.4 ± 6.0	31.7 ± 8.2	< 0.001
Median (range)	26.4 (16.7–54.6)	26.1 (17.1–54.2)	30.8 (16.7–54.6)	

(continued on next page)

Table 1. (continued)

	Total study population <i>n</i> = 475	No food insecurity <i>n</i> = 436	Food insecurity <i>n</i> = 39	<i>p</i> value*
Underweight, < 18.5 kg/m ²	1.5%	1.4%	2.6%	0.003
Normal, 18.5–24.9 kg/m ²	36.4%	38.1%	17.9%	
Overweight, 25–29.9 kg/m ²	33.1%	33.7%	25.6%	
Obese, ≥ 30 kg/m ²	29.3%	27.1%	52.8%	
Healthcare utilization				
Primary care visits in last year [†]				
Mean ± SD, median (range)	3.6 ± 3.0, 3 (0–20)	3.5 ± 2.9, 3 (0–20)	5.3 ± 3.6, 5 (0–17)	< 0.001
ED visits in last year [†]				
Mean ± SD, median (range)	0.28 ± 1.0, 0 (0–10)	0.23 ± 0.77, 0 (0–8)	0.85 ± 2.2, 0 (0–10)	0.14
Hospitalizations in last year [†]				
Mean ± SD, median (range)	0.12 ± 0.32, 0 (0–1)	0.12 ± 0.32, 0 (0–1)	0.13 ± 0.34, 0 (0–1)	0.80

**p* value compares respondents with no food insecurity with respondents with food insecurity

**Chinese = Cantonese and Mandarin languages

***Medicare or Medicare advantage

EHR, electronic health record; HS, high school; SNAP, Supplemental Nutrition Assistance Program; ED, emergency department

^Community food resources include food pantry or food bank, soup kitchen, congregated meal site, church or community-based organization food distribution, Project Open Hand, and Meals on Wheels

^^This is an abbreviated list of chronic disease diagnoses from the Elixhauser Comorbidity Index. All other chronic disease diagnoses from the index (*n* = 20) were not significantly different between patients with and without food insecurity

†Data derived from the EHR

DISCUSSION

Our study is among the first to examine how food insecurity is associated with clinical and healthcare utilization data of older adult primary care patients with MCC. In this population of older adults with MCC, the strongest risk factors for food insecurity were being African American, having a behavioral health diagnosis, and younger age.

We found a positive association between food insecurity with at least one behavioral health diagnosis. This finding has important clinical and population health implications. Among patients with diabetes, food insecurity has been associated with depression and stress, which can influence chronic disease management behaviors^{5, 6}. This study adds to our un-

derstanding of the complex relationships between food insecurity and behavioral health, particularly among older adults with MCC. Among these patients, focusing food insecurity screening efforts to those with a behavioral health diagnosis may efficiently identify patients who may benefit from a referral to food resources.

Study limitations include limited power and generalizability from one study site. Strengths include a multiethnic and linguistically diverse sample and a focus on MCC. There are emerging efforts to embed screening for health-related social needs, including food insecurity, into clinical care. Strategies are needed to identify at-risk populations to direct interventions. Our findings indicate that EHR data may allow for such a population health approach.

Table 2 Adjusted Odds Ratios for Food Insecurity by Socio-demographic and Clinical Characteristics (the Model Was Adjusted for Age, Sex, Race/Ethnicity, Presence of Behavioral Health Diagnosis, Multiple Chronic Conditions, Body Mass Index, and Number of Primary Care Visits in the Last Year That Were Significantly Different between Older Adults With and Without Food Insecurity) Among 475 Older Adult Patients with Multiple Chronic Conditions from an Urban Academic Primary Care Practice

	Adjusted odds ratio for food insecurity (95% CI)
Age	0.92 (0.87, 0.98)
Female (ref: male)	1.20 (0.55, 2.6)
Race/ethnicity (ref: White)	
African American	5.8 (2.2, 15.6)
All others (Latino, Asian American, American Indian, other/unknown)	1.24 (0.52, 3.0)
1+ behavioral health diagnosis (ref: none)	4.1 (1.9, 9.0)
5+ chronic conditions (ref: 0–4)	1.84 (0.78, 4.3)
Body mass index ≥ 30 kg/m ² (ref: BMI < 29.99 kg/m ²)	1.54 (0.70, 3.4)
Number of primary care visits in the last year	1.06 (0.96, 1.18)

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Compliance with Ethical Standards:

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