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Original Article

Household Food Insecurity and Poor Oral Health in U.S. Older Adults: Findings from the Health and Retirement Study

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ABSTRACT

Household food insecurity—meaning irregular or unreliable access to adequate food—affects roughly 1 out of every 15 Americans aged ≥60. In this population, it is linked to multiple chronic illnesses, reduced use of prescribed medications that worsen conditions like diabetes or hypertension, and diminished oral health. Despite this, the connection between food insecurity and oral health has not been thoroughly explored. This study examined how food insecurity relates to several oral health measures in older adults in the United States. We conducted a prospective assessment of a subgroup of Health and Retirement Study (HRS) participants who completed food insecurity items in 2013 and a dental health–focused supplemental survey in 2018 (N = 472). About 20% of participants indicated experiencing food insecurity within the past year. Food insecurity showed a clear association with poorer oral health–related quality of life and increased tooth loss. Compared with food-secure counterparts, food-insecure individuals rated their oral health less favorably (OR = 2.67), were more likely to have lost ≥8 teeth (OR = 2.35), and had reduced odds of receiving dental services (OR = 0.60). Although those with food insecurity had more unmet dental needs than individuals with stable food access, they sought dental treatment less often. Improving oral health in this population may require not only expanding access to care but also addressing broader social and environmental barriers that limit their ability to obtain needed services.

Keywords: Household food insecurity, Oral health, Older adults, U.S.

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Introduction

Household food insecurity—defined as unreliable access to enough food [1]—has been linked to reduced use of various health and dental services [2–4] and greater intake of sugary or processed foods [5]. These patterns suggest possible negative effects on oral health. Food insecurity is classified as marginal (adequate food but concern about sustained access), low (sufficient quantity with limited variety), or very low (inadequate amount, variety, and quality) [1]. The latter two categories constitute food insecurity. Roughly 5.2 million U.S. adults aged ≥60 (equivalent to 1 in 15) experience this issue, disproportionately affecting minority groups and socially disadvantaged individuals [6]. This includes 25% of older adults below the poverty threshold, 20% of African Americans, and 12.5% of Hispanic adults. State-level rates range from 3% to 12.5% [6]. Affected individuals report higher burdens of physical and mental health problems, including hypertension, hyperlipidemia, diabetes [7], pre-diabetes [8], depression [9, 10], and atherosclerotic disease [11]. They also demonstrate poorer control of diabetes and LDL cholesterol [12] and may reduce medication use due to financial constraints [13].

Food insecurity has been linked to more frequent dental caries [14], particularly among children [15], partly due to higher intake of sugar-sweetened beverages, lower diet quality, and reliance on convenience stores

for groceries [5]. Adults and children lacking stable food access also visit dentists less often and experience greater unmet dental needs [2–4]. Older adults and children may encounter barriers such as cost, transportation difficulties, and unstable housing [16]. Such barriers can contribute to poorer oral health, yet only a limited number of studies have assessed how food insecurity relates to dental outcomes in older adults [3, 4, 17]. Thus, we examined associations between food insecurity and self-reported oral health indicators and dental care patterns in aging adults.

Materials and Methods

This retrospective analysis used data from the Health and Retirement Study (HRS), a national longitudinal survey of U.S. residents aged 51 and older. The HRS, funded by the National Institute on Aging (NIA U01AG009740) and administered by the University of Michigan, collects information every two years on demographics, health events, and finances. Extensive documentation on its sampling and methodology is available [18, 19]. To assess nutrition and food access, 12,418 HRS respondents were randomly chosen to join the Health Care and Nutrition Study (HCNS) in 2013 and were mailed relevant questionnaires. Of these, 8,021 participants with complete food security data constituted the base sample. In 2018, approximately 10% of HRS respondents were randomly provided with a supplemental dental health questionnaire [20]. From these sources, 472 individuals had fully linked nutrition and dental data. Because cognitive impairment and living arrangements may influence both food security and oral health, we excluded participants residing in nursing homes at baseline (n = 6) and those ever reporting dementia (n = 14), yielding a final analytic cohort of 452 respondents.

Measures

Food security was evaluated using the six-question short form of the U.S. Household Food Security Scale [21], a validated and widely applied tool that enables comparison with prior research. Items asked whether anyone in the household ran out of food, lacked funds for balanced meals, cut meal size, skipped meals, ate less, or went hungry because of financial limitations, along with how often these events occurred. Each “yes” response counted as 1 point, giving a total possible score of 0–6. A score ≥2 denoted food insecurity.

Oral health indicators were captured through multiple questions drawn from the HRS dental health supplement.

Oral health–related quality of life (OHRQoL) was determined using an approach consistent with earlier work involving this module [22]. Participants noted whether, and how often, they (a) avoided certain foods, (b) struggled to relax, (c) stayed home instead of going out, (d) felt embarrassed, or (e) experienced pain or discomfort tied to their teeth, gums, or dentures. Each item used a 5-level response scale from 1 (“never”/“not at all”) to 5 (“very often”/“a great deal”), except the self-consciousness item, which used a 3-level scale (never, sometimes, always). Scores were summed to form a composite OHRQoL score (0–23). Tooth loss, denture use, subjective oral health, and dental service use have known relevance to cognitive outcomes in older populations.

Tooth loss and denture use were self-reported. Respondents indicated whether they had lost (a) ≥4 teeth or (b) all teeth from the upper and lower arches separately. These answers were combined into a four-category ordinal variable ranging from 0 (fewer than four teeth lost from both arches) to 4 (complete tooth loss from both arches). A binary variable was also created to capture loss of ≥8 teeth. Denture use was coded dichotomously (1 = uses dentures; 0 = does not use dentures).

Self-rated oral health was obtained by asking participants to classify their mouth and teeth as poor, fair, good, very good, or excellent. For analysis, ratings were grouped as fair/poor [1] versus good/very good/excellent (0).

Dental care use was measured via a binary item asking whether the respondent had visited a dentist in the previous two years for any dental service, including denture care (1 = yes; 0 = no). Out-of-pocket dental spending over the same period was self-reported in U.S. dollars and converted to log-dollars for modeling.

A set of demographic and health variables considered potential confounders was included. Demographic items consisted of age, sex, race (white, black, other), and total years of schooling. Total annual household income included wages, pensions, annuities, Social Security payments, and other income streams. Health behavior and condition variables included alcohol consumption (yes/no), smoking status (never, former, current), and a summary index of eight chronic diseases: hypertension, diabetes, cancer, lung disease, heart disease, stroke, psychiatric illness, and arthritis.

Statistical analysis

Descriptive characteristics for the full analytic sample and by food insecurity status were summarized. Spearman correlations were calculated for selected continuous or ordered measures.

Least squares regression models estimated associations for the two continuous outcomes—OHRQoL and logged out-of-pocket dental expenses. Coefficients reflected mean differences between food-insecure and food-secure respondents. Logistic regression was used to model binary endpoints: self-rated oral health, loss of ≥8 teeth, denture use, and dental care within two years. All analyses included adjustments for age, sex, education, race, smoking category, alcohol use, and the number of chronic illnesses.

Sensitivity analysis

To assess whether loss of participants between 2013 and 2018 (analytic sample n = 452) influenced results, an inverse probability weighting (IPW) approach was applied. This method helps account for attrition-related selection bias. Findings were compared with the complete-case models. A probit model was first fit to the baseline cohort (n = 8,021) to estimate the probability of remaining in the study through 2018 based on demographic and health variables used in adjusted models. Individual predicted probabilities were then used to weight respondents inversely in the regression analyses. IPW estimates are considered appropriate when attrition depends only on included covariates (i.e., missing at random).

Results and Discussion

Of the 452 participants included, 19.2% indicated experiencing food insecurity during the prior year. Relative to those with stable food access, food-insecure respondents tended to be younger, more often female, more likely to identify as non-white, more frequently smokers, had a greater burden of chronic illnesses, and reported lower annual household income **(Table 1).** Food insecurity showed a positive correlation with poorer oral health–related quality of life (Spearman's $r = 0.244$, $p < 0.001$) and with greater tooth loss (Spearman's $r = 0.187$, $p = 0.01$). Additionally, worse OHRQoL scores were associated with increased tooth loss (Spearman's $r = 0.297$, $p < 0.001$) **(Table 2).** Individuals reporting food insecurity had higher OHRQoL scores—reflecting poorer oral health ($\beta = 1.647$, $p = 0.000$)—but food insecurity did not predict out-of-pocket dental spending ($\beta = -0.306$, $p = 0.415$) **(Table 3).** Compared with food-secure adults, those who were food insecure had higher odds of rating their oral health as fair/poor (OR = 2.67, 95% CI 1.51–4.72), higher odds of losing ≥8 teeth (OR = 2.35, 95% CI 1.20–4.60), and lower odds of accessing dental care in the past two years (OR = 0.60, 95% CI 0.34–1.05) **(Table 4).** Re-analysis using inverse probability weighting to address attrition yielded findings that were similar to the primary results.

Table 1. Characteristics by food insecurity status among Health and Retirement Study participants with linked food and oral health data from 2013–2018.

	Total sample	**Food insecure**	**Not food insecure**	**p-value**
	N (%) or M (SD)	N (%) or M (SD)	N (%) or M (SD)	
Participant characteristics				
Age in years (mean, SD)	64.24 (9.65)	60.05 (8.52)	65.22 (9.65)	<.001
Gender: Female	263 (58.19%)	58 (66.67%)	205 (56.16%)	.074
Race/Ethnicity				<.001
White	348 (77.33%)	47 (54.64%)	301 (82.69%)	
Black	62 (13.78%)	23 (26.74%)	39 (10.71%)	
Other	40 (8.89%)	16 (18.60%)	24 (6.59%)	
Years of formal education (mean, SD)	13.13 (3.23)	11.05 (3.71)	12.63 (2.89)	<.001
Health and lifestyle factors				
Currently consumes alcohol	254 (57.08%)	31 (36.90%)	223 (61.77%)	<.001
History of smoking (ever smoked)	239 (53.95%)	54 (64.29%)	185 (51.53%)	.035
Annual household income, $ (mean, SD)	77,471.1 (109,569.5)	29,280.81 (25,383.16)	88,684.35 (118,280.4)	<.001
Number of chronic conditions (0–8) (mean, SD)	0.17 (0.43)	0.202 (0.53)	0.16 (0.40)	<.001

Table 2. Spearman correlations between food insecurity* and oral health measures.

	Food Insecurity	**OHRQOL Score**	**Number of Missing Teeth**	**Out-of-Pocket Dental Expenses**
Food Insecurity	1.00			

Oral Health-Related Quality of Life (OHRQOL) Score	0.244 (<0.001)	1.00		
Number of Missing Teeth	0.187 (<0.001)	0.297 (<0.001)	1.00	
Out-of-Pocket Dental Care Expenses	−0.0039 (0.534)	0.064 (0.311)	0.051 (0.433)	1.00

*Food insecurity score range: 0–6.
r and p-values reported.

Table 3. Coefficients from adjusted least squares models for associations between food insecurity and oral health measures.

Outcome	β-Coefficient	95% Confidence Interval	p-value
Oral Health-Related Quality of Life (OHRQOL) score	1.647	0.913 – 2.381	<0.001
Out-of-pocket dental care expenses	−0.306	−1.045 – 0.433	0.415

aBinary food insecurity variable; models adjusted for age, gender, education, race, smoking, alcohol use, and number of comorbidities.

Table 4. Logistic regression estimates linking food insecurity and oral health outcomes.

Outcome (compared to reference group)	Odds Ratio (95% CI)	p-value
Self-rated oral health: Fair/Poor (reference: Good/Very good/Excellent)	2.67 (1.51 – 4.72)	0.001
Lost 8 or more teeth (reference: Lost fewer than 8 teeth)	2.35 (1.20 – 4.60)	0.012
Currently uses dentures (reference: Does not use dentures)	1.59 (0.87 – 2.91)	0.131
Visited dentist in the past 2 years (reference: Did not visit in past 2 years)	0.60 (0.34 – 1.05)	0.076

aBinary food insecurity variable; same covariate adjustments.
bAmong respondents missing ≥10 teeth.

Older adults experiencing food insecurity over the past year exhibited poorer oral health across several indicators, including elevated OHRQoL scores, lower self-rated oral health, and increased tooth loss. The absence of a link between food insecurity and out-of-pocket dental spending may reflect trade-offs between dental treatment and other essential needs [23]. Prior research involving financially strained older men found that those who rationed medications had a reduced likelihood of reporting poor oral health [17], implying similar competing priorities. Although the Supplemental Nutrition Assistance Program (SNAP) aims to lessen food hardship, enrollment has not been linked with improved oral health outcomes [24]. Enhancing access to dental care for economically vulnerable adults and tackling barriers that deter them from seeking treatment may be necessary [16].

This study has several limitations, including a modest sample size, the absence of clinical oral examinations by dental professionals, and potential residual confounding. The small number of participants also prevented assessment of state-level differences. Annual income served as a proxy for socioeconomic status because it is reliably captured in HRS, strongly correlates with food insecurity, and reflects other SES-related factors such as education and work history. Strengths of this investigation include its prospective nature, use of a nationally representative cohort of older adults, application of inverse probability weighting to minimize bias from loss to follow-up, and adjustment for numerous relevant covariates. Some true associations may not have been detected due to type II error.

Our results align with prior work involving older adults in the U.S. showing that financial strain is linked to poorer self-rated oral health [17]. The elevated rates of oral health problems among food-insecure older adults may stem from postponing or avoiding needed dental treatment. Another contributing factor may be higher intake of sugary drinks and processed foods—patterns frequently observed among individuals with limited food access. Those facing food insecurity often consume lower-quality diets [25] and struggle to follow recommended eating patterns for chronic disease management [26]. Diets low in fiber and in fruits and vegetables are linked to periodontal disease and inadequate diabetes control, which may worsen both oral and overall health in this population. Food insecurity has also been tied to skipping medications [27], inadequate chronic disease control [12], and depression [28, 29], all of which could indirectly worsen oral health.

Oral health problems themselves may worsen systemic health. Tooth loss has been connected to impaired chewing ability, reduced fruit and vegetable intake, and greater reliance on highly processed foods. Additionally, severe tooth loss is associated with poorer cognitive performance, increased cardiovascular risk, and higher mortality. Because food-insecure adults experience more tooth loss than those with stable food access, they may face an elevated risk for various adverse outcomes. This same

group also has higher rates of multiple chronic illnesses [30], heart disease [11], and behavioral health conditions [31], and includes larger proportions of African American, Hispanic, and other marginalized populations.

Despite having greater unmet dental needs, adults facing food insecurity remain less likely to obtain dental services. In a qualitative study, Cruz *et al*. described ongoing obstacles to receiving dental care, such as unstable housing, inadequate access to food, unreliable transportation, and limited Medicaid dental coverage for adults with low income [16]. Both qualitative and quantitative research are needed to confirm these findings and clarify the mechanisms behind these associations. Improving oral health in this population is difficult and may require addressing the broader social factors contributing to disparities alongside expanding access to dental services.

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