



Original Research

The association between oral health and food avoidance among older adults in the United States



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ABSTRACT

Objectives: This study examines the association between oral health and food avoidance among older adults in the United States.

Study design: A population-based sample of 1,278 adults aged 51+ from the Health and Retirement Study was used. A logistic regression model was performed to evaluate various oral health conditions and food avoidance behavior among older adults. Results were quantified as odds ratios (OR).

Results: This study found a significant association between oral health and food avoidance in older adults. Individuals with teeth loss, poor self-rated oral health, and teeth or gum sensitivity experienced more food avoidance.

Conclusions: Geriatric health care professionals assessing older adults' well-being can be informed by this study outcome to consider oral health as a potential risk factor for food avoidance. This study can inform policymakers to develop oral health promotion programs and goals for older adults, and also consider nutritional support for older adults with negative oral health conditions.

1. Introduction

One of the significant changes that older adults experience is to their oral health condition in later life. Older adults often experience symptoms such as periodontitis, xerostomia (dry mouth), gingival recession, tooth loss, and oral cancer [1,2]. In the United States, over a quarter of older adults aged 65 and older do not have remaining teeth [3], and this affects their nutritional intake [4].

Previous studies have found that worse oral health condition is related with poor nutritional intake among older adults [5–8]. A study of 635 community-dwelling adults aged 60 and older in rural North Carolina counties found that a greater rate of food avoidance was associated with lower self-rated oral health and negative oral health conditions, such as the presence of periodontal disease, bleeding gums, dry mouth, or having dentures [6]. Another study focusing on a total of 343 adults aged 65 and older living in assisted living facilities in Helsinki, Finland, by Saarela et al. [7] examine how dentition is associated with nutritional status. They found that edentulous participants without dentures had poorer nutritional intake than those with natural dentition. Similarly,

using the British older adults sample age 65 and older, Sheiham and colleagues [8] found that edentate participants experience difficulty in eating and frequently.

Although previous studies provide evidence for oral health improvement as a way to promote healthy eating in later life, more studies are needed to understand this relationship based on the older adults in the United States with larger sample size. Moreover, different aspects of oral health can provide specific intervention strategies to improve oral health and nutritional intake.

As public health, dentistry, and geriatric social work professionals engage with older adults to improve their well-being, they often evaluate their general health. However, the oral health aspect is often overlooked by geriatric professionals and social workers, despite their long history of intervening to ensure the quality of life of vulnerable older adults. For example, to date, social workers do not have many opportunities to intern or train in a dental setting despite the essential need to consult with older adults to learn about their oral health conditions [9]. Therefore, the present study aims to examine the association between oral health conditions and food avoidance in older adults and provide public

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health implications.

2. Data and methods

The Health and Retirement Study (HRS) is a longitudinal population-based study of older adults 51+ years old conducted at the University of Michigan's Institute for Social Research, sponsored by the National Institute on Aging (NIA U01AG009740) and the Social Security Administration. This nationally representative study of older adults in the United States is surveyed biannually since 1992. In 2008, HRS provided a module focusing on dental health and access to healthcare. HRS data is suitable for this study as it collects information on older adults' specific oral health conditions and their dental care experience. This study uses the 2008 dental health module to investigate the research question.

The inclusion criteria of this study are the following: respondents of 2008 (i.e., baseline respondents = 17,217); respondents who are aged 51 and older at baseline (n = 16,785); respondents of the dental health module interest variables (n = 1,375); and respondents not missing the covariates (n = 1,278). This resulted in an analytical sample size of 1,278 individuals.

3. Measures

3.1. Dependent variable

The following question assesses the level of food avoidance: "How often during the last year have you avoided particular foods because of problems with your teeth, mouth or dentures? Would you say very often, fairly often, occasionally, hardly ever, or never?" The original response ranges from 1 = very often to 5 = never. Based on the response distribution, the variable is dichotomized (i.e., 0 = never/hardly ever and 1 = occasionally/fairly often/very often).

3.2. Independent variables

Teeth loss is measured based on the following question "Have you lost more than two of your natural permanent teeth?" (no = 0, yes = 1).

Self-rated mouth and teeth condition is assessed by the following question: "How would you describe the condition of your mouth and teeth? Would you say very good, good, fair or poor?" Response categories ranged from 1 = very good to 4 = poor, but were dichotomized (i.e., 0 = good/very good and 1 = poor/fair).

Sensitivity of teeth or gums is measured by the following question: "How often during the last year have your teeth or gums been sensitive to hot, cold, or sweets? Would you say very often, fairly often, occasionally, hardly ever, or never?" The respondents answered 1 = very often to 5 = never. This was dichotomized (i.e., 0 = never/hardly ever and 1 = occasionally/fairly often/very often).

Gum bleeding is assessed using the following question: "How often during the last year have your gums bled when you brushed your teeth? (Would you say very often, fairly often, occasionally, hardly ever, or never?)" The respondents' answer was dichotomized (i.e., 0 = never/hardly ever and 1 = occasionally/fairly often/very often).

3.3. Covariates

The study controlled for relevant sociodemographic characteristics of the respondents. Sociodemographic factors include respondent age (in years), sex (1 = female, 0 = male), education level (in years), race/ethnicity (1 = Black/African American, 0 = White/Caucasian), and poverty (1 = household income below the poverty threshold, 0 = household income above the poverty threshold).

3.4. Data analysis

First, descriptive statistics were analyzed to report the sample

characteristics. Moreover, correlations between oral health and food avoidance were explored. To address the research question of the association between oral health and food avoidance, the data was analyzed using logistic regression models with Stata SE version 15. The results did not present issues of collinearity. In each model, the outcome variable was the dichotomized food avoidance status. While controlling for all the covariates, the models predicted how the major independent variables are associated with the outcome. Furthermore, all the analyses were performed with person-level weights as recommend in HRS.

4. Results

Weighted descriptive statistics for the sample in 2008 was performed. The 56.5% of older adults were female, the majority of the respondents were Non-Hispanic White/Caucasian (91.0%), and 7.1% of the respondents were under the poverty threshold. The average age of the respondents was 67.2 years old (SD = 0.30), and they on average have about 13.0 years of education (SD = 0.13). Regarding oral health conditions, approximately 66.9% of the respondents indicated that they had lost more than two of their natural permanent teeth. Approximately 73.0% of older adults reported that their mouth and teeth condition is good/very good. Among the respondents, 23.2% reported experiencing frequent teeth/gum sensitivity or gum bleeding. There were 17.0% of respondents who experience frequent gum bleeding.

Next, correlations among oral health and food avoidance variables were examined. At the bivariate level, teeth loss, poor self-rated mouth/teeth condition, frequent sensitivity of teeth or gums, and frequent gum bleeding were associated with food avoidance.

Table 1 presents the association between oral health and food avoidance. The result indicated oral health conditions such as teeth loss, self-rated mouth/teeth condition, and sensitivity of teeth or gums were associated with a level of food avoidance. Individuals with teeth loss had 1.74 times the odds of food avoidance as those without teeth loss (CI = 1.10, 2.75, p.05). The individuals with fair/poor self-rated mouth/teeth condition had a higher odds of experiencing food avoidance than those with good/very good condition (odds ratio = 2.92, CI = 2.01, 4.24, p<.001). Lastly, those with frequent levels of teeth or gum sensitivity had 4.30 times the odds of experiencing food avoidance compared to those who never/hardly experience of teeth or gum sensitivity (CI = 2.72, 6.80, p ≤ .001). Gum bleeding was not significantly associated with the outcome variable. Among the control variables, being female was associated with a higher level of food avoidance (odds ratio = 1.54, CI = 1.01, 2.36, p ≤ .05).

5. Discussion and conclusion

Understanding the impact of oral health on older adults' eating habits/nutrition allows professionals in public health, dentistry, and gerontology to intervene to ensure sufficient nutritional intake and

Table 1
Oral health and food avoidance (n = 1,278).

	Food avoidance Odds ratio (95% CI)
Age	1.01 (0.99, 1.04)
Sex (female = 1)	1.54* (1.01, 2.36)
Education	0.98 (0.92, 1.05)
Race (white = 1)	1.08 (0.60, 1.95)
Poverty threshold (1 = below threshold)	1.55 (0.86, 2.81)
Oral health	
Teeth loss	1.74* (1.10, 2.75)
Self-rated mouth and teeth condition	2.92*** (2.01, 4.24)
Sensitivity of teeth or gums	4.30*** (2.72, 6.80)
Gum bleeding	1.08 (0.66, 1.76)
(Constant)	0.02*** (0.00, 0.18)

*p.05; **p ≤ .01; ***p ≤ .001.

Note: CI stands for confidence intervals.

healthy eating habits.

However, there are several limitations to this study that future studies can consider. First, due to the cross-sectional design, the current study does not address the longitudinal impact of oral health on older adults' eating habits. Another limitation of this study is the use of self-rated measures. Including objective measures of oral health conditions would improve the precision of the measures.

Future research surveys need to collect data on multiple time points to explore the longitudinal relationship between oral health and food avoidance among older adults in the United States. The HRS data selected in the present study was the only dental health module available at the time of analysis. Future researchers can utilize newer data when the completed modules are released. Additional research should explore other domains of oral health and symptoms. Nevertheless, this study has shown the association between oral health and food avoidance, suggesting that oral health needs more attention in the field of public health, dentistry, and gerontology.

Despite the limitations of the study, this study provides a perspective on why public health professionals should consider older adults' oral health conditions as an essential part of holistic health assessment and comprehensive care. With a focused effort to increase the frequency of periodic dental exams, it will more effectively prevent the burden of non-communicable and chronic oral conditions for the aging population. Being aware of the oral health and eating habits relationship, a greater number of older adults can receive appropriate oral health information and resources from professionals in public health, dentistry, and geriatric social work.

There are several ways for public health professionals to strengthen their involvement in oral health promotion. Public health workers can engage in creating innovative oral health promotion programs, providing supportive services in communities, educating vulnerable older adults, and promoting interdisciplinary efforts to foster oral health.

Currently, there are national efforts to improve oral health and reduce disparities [10]. According to the CDC, each year, "over \$45 billion is lost in productivity due to untreated dental disease" [10]. A 2019 fiscal year budget of \$19.5 million supports the CDC's Division of Oral Health (DOH) [10]. Public health professionals and policymakers should

continue to provide data-driven research on oral health impact, develop evidence-based interventions, secure funding for these studies, and disseminate new knowledge.

Declaration of competing interest

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