

Food Insecurity and Perceived Diet Quality Among Low-Income Older Americans with Functional Limitations

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ABSTRACT

Objective: To evaluate how functional limitations are associated with food insecurity and perceived diet quality in low-income older Americans.

Design: Nationwide repeated cross-sectional surveys regarding health and nutritional status.

Setting: The National Health and Nutrition Examination Surveys, 2007–2008, 2009–2010, and 2011–2012.

Participants: Individuals aged ≥ 65 years with household incomes $\leq 130\%$ of the federal poverty level ($n = 1,323$).

Main Outcome Measures: Dependent variables included dichotomous indicators of food insecurity and poor-quality diet, measured with the household food security survey module and respondents' own ratings, respectively. Independent variable was presence of limitations in physical functioning.

Analysis: Weighted logistic regressions with nested controls and interaction terms.

Results: Functional limitations in low-income older adults were associated with 1.69 times higher odds of food insecurity ($P < .01$) and 1.65 times higher odds of poor-quality diet ($P < .01$) after accounting for individuals' health care needs and socioeconomic conditions. These associations were greatest among those living alone (odds ratio = 3.38 for food insecurity; 3.07 for poor-quality diet; $P < .05$) and smallest among those living with a partner.

Conclusions and Implications: Low-income older adults who live alone with functional limitations are exposed to significant nutritional risk. Resources should be directed to facilitating their physical access to healthful foods.

Key Words: aged, chronic limitation of activity, food insecurity, NHANES, nutritional status (*J Nutr Educ Behav.* 2017;■■:■■–■■.)

Accepted September 9, 2017.

INTRODUCTION

Food insecurity refers to “a limited or uncertain availability of nutritionally adequate and safe foods or uncertain ability to acquire acceptable foods in socially acceptable ways.”¹ In 2014, 8.9% of households that included persons aged ≥ 65 years were food insecure and 3.2% experienced very low food security.² The number of food-insecure seniors is estimated to increase from 5 million in

2005 to 9.5 million by 2025.³ Food insecurity continues to be a challenge to health, nutritional quality, and policy development for older Americans.

Contributing factors of food insecurity may go further than a problem of affordability. Existing studies indicated that physical functionality is an important determinant of food insecurity among working-age adults.^{4–6} Older adults may be particularly vulnerable to the accessibility barriers associated with functional limitations.⁷

However, systematic assessment of the problems of food insecurity and poor-quality diet in older Americans is sparse.

Food insecurity and very low food security percentages were higher for elderly people living alone than for those living with family.² Elderly people living with a spouse were more likely to have balanced nutrient intake than those living alone.⁸ Older adults burdened with functional limitations require assistance in completing activities such as grocery shopping, cooking, and preparing meals, which often comes from a family member or spouse.⁹ Adequate familial and social support to prepare and cook may negate the detrimental effects of the functional limitations on food access in elderly individuals.^{10,11} Despite the speculation that the challenge owing to functional impairments may be exacerbated by the lack of adequate social support,^{12,13} little is known about whether the effect of elderly persons' functional limitations on food

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Conflict of Interest Disclosure: The authors' conflict of interest disclosures can be found online with this article on www.jneb.org.

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<https://doi.org/10.1016/j.jneb.2017.09.006>

insecurity and diet quality differs by their living arrangement.

Addressing disability as a contributor to food insecurity among older Americans is critical to assess the burden on society accurately.¹⁴ Functional limitations affect 42% of Americans aged ≥ 65 years.^{15,16} Recent analysis indicated increased prevalence of disability in the near-elderly demographic.¹⁷ Extended life span may also mean a rise in the old-age dependency ratio (ie, older population to working age population)¹⁸ as well as more years spent with functional impairment for individuals. Considering that food insecurity leads to greater risk of diet-related chronic diseases, a better understanding of the interplay among food access, diet, and health is crucial in the low-income elderly population.

This study assessed (1) how functional limitations in low-income elderly adults determine food insecurity and poor diet quality among the elderly population; and (2) whether the obstacles to food access and nutrition owing to functional limitations are different according to individuals' marital status.

METHODS

This study used data from the National Health and Nutrition Examination Surveys (NHANES). The NHANES is a nationwide cross-sectional study conducted biennially by the Centers for Disease Control and Prevention's National Center for Health Statistics. It includes questionnaire items on functional limitations, measures of food insecurity, and dietary assessment of the respondents. The analysis sample was drawn from 3 waves of the NHANES (2007–2008, 2009–2010, and 2011–2012), which were the 3 most recent available waves to include food insecurity information. This study did not require review by the institutional review board because human subjects were not involved, as per US Department of Health and Human Services guidelines.¹⁹

Measures

The researchers measured household food insecurity with the 18-question survey module developed by the US Department of Agriculture's Econom-

ic Research Service and included in the NHANES. During the interview, statements such as *The food that I/we bought just didn't last, and I/we didn't have money to get more or I/we lost weight because I/we didn't have enough money for food* were presented with a 12-month reference period. Depending on the number of affirmative answers, households were categorized into 4 levels of food security: food security, marginal food security, low food security, and very low food security. Two dichotomous variables of food insecurity were created. The variable food insecurity equaled 1 if the respondent's household was classified as having low or very low food security, and 0 if food security or marginal security. The variable very low food security equaled 1 if the respondent's household was in very low food security, and 0 otherwise.

Diet quality was assessed based on the diet behavior and nutrition component of the NHANES questionnaire. Based on the question *In general, how healthy is your overall diet?* the dichotomous variable perceived poor-quality diet was created and coded as 1 if the respondent answered poor or fair, and 0 if replied good, very good, or excellent. Although the consistency of this perception-based construct as a measure of diet quality may be debatable, the large heterogeneity in nutritional requirements associated with aging and functional decline made it difficult to assess this sample's diet quality on an index-based metric.²⁰

The dichotomous variable functional limitation was created to indicate that the respondent was either unable to perform or had much difficulty with at least 1 of the following activities: walking, running, or playing; walking without special equipment; walking for a quarter mile; walking up 10 steps without resting; lifting or carrying something as heavy as 10 lb; doing chores around the house; preparing own meals; walking from 1 room to another on the same level; standing for about 2 hours; using fingers to grasp or hold small objects; and pushing or pulling large objects. These activities were selected to represent the physical ability needed to obtain and prepare food.

Indicators of different living arrangements were constructed by

combining the respondent's marital status and the number of adult members in the household. The dichotomous variable living with partner indicated the respondent was married or cohabiting and there were ≥ 2 adults in the household. The dichotomous variable living with other adult indicated that the respondent was neither married nor cohabiting and there were ≥ 2 adults in the household. The variable living alone indicated that the respondent was the only adult member in the household.

The data included variables implying chronic health care costs (cancer, diabetes, kidney failure, high blood pressure, or mental health problems, as well as health insurance and prescription coverage), socioeconomic characteristics (gender, age, race/ethnicity, education, and presence of incomes from wage, pension, and welfare, respectively), and survey year, which entered the analyses as controls.

Statistical Analysis

This study considered 3 dependent variables: food insecurity, very low food security, and perceived poor-quality diet. Important independent variables were functional limitation and indicators of living arrangement. Because health expenditure needs and low socioeconomic status may be correlated with functional limitations and living arrangement while directly affecting food access and nutrition, the regression model controlled for covariates representing chronic health care costs and socioeconomic characteristics. Year fixed effects were incorporated to account for society-wide variability over time that may have influenced food insecurity and diet. That is,

$$Y_{it} = \beta_1 \text{Limitation}_{it} + \text{Living}_{it} \beta_2 + \text{Health}_{it} \beta_3 + X_{it} \beta_4 + \delta_t + \varepsilon_{it} \quad (1)$$

where Y is the latent propensity of food insecurity or poor diet quality, *Limitation* is a dichotomous measure of presence of functional limitations, *Living* is a vector of living with partner, living with other adults, and living alone, *Health* is a vector of control variables related to chronic health care costs, X is a set of socioeconomic characteristics, and ε is the

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