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Original Article

Association of food access and neighbor relationships with diet and underweight among community-dwelling older Japanese

Hideko Nakamura^{a, b, *}, Mieko Nakamura^b, Eisaku Okada^b, Toshiyuki Ojima^b, Katsunori Kondo^{c, d}^a School of Nursing, Seirei Christopher University, Hamamatsu, Shizuoka, Japan^b Department of Community Health and Preventive Medicine, Hamamatsu University School of Medicine, Hamamatsu, Shizuoka, Japan^c Center for Preventive Medical Sciences, Chiba University, Chiba, Chiba, Japan^d Department of Gerontological Evaluation, Center for Gerontology and Social Science, National Center for Geriatrics and Gerontology, Obu, Aichi, Japan

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ABSTRACT

Background: Food access is important for maintaining dietary variety, which predicts underweight. The aim of this study was to examine the association of food access and neighbor relationships with eating and underweight.

Methods: We analyzed cross-sectional data from 102,869 Japanese individuals aged 65 years or older. The perceived availability of food was assessed using the presence or absence of food stores within 1 km of the home. Level of relationships with neighbors was also assessed. The odds ratios (ORs) and 95% confidence intervals (CIs) for infrequent food intake and underweight were determined using logistic regression analysis.

Results: The proportion of men and women having low access to food was 25–30%. Having low food access (OR 1.18; 95% CI, 1.12–1.25 for men and OR 1.26; 95% CI, 1.19–1.33 for women) and a low level of relationship with neighbors (OR 1.38; 95% CI, 1.31–1.45 for men and OR 1.57; 95% CI, 1.48–1.67 for women) was associated with infrequent intake of fruits and vegetables in both sexes. Association between low food access and infrequent intake of fruits and vegetables was higher among men with low levels of neighbor relationship (OR 1.34; 95% CI, 1.23–1.46) than among men with high levels of relationship (OR 1.10; 95% CI, 1.03–1.18).

Conclusions: Low perceived availability of food is a risk factor for low dietary variety among older people. Furthermore, high levels of relationship with neighbors may relieve the harmful effect of low food access.

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Introduction

In a super-aged society, such as Japan, the extension of healthy life expectancy is one of the most important objectives for health care.¹ For older people, low dietary variety is related to functional status decline^{2–5} and predicts underweight,⁶ two risk factors that could be associated with long-term care.^{7–9} Payette et al¹⁰ indicated that determinants of healthy eating in community-dwelling older people can be divided into two categories: individual determinants and collective determinants. Individual determinants include determinants such as sex, age, health condition,

knowledge, educational attainment, income, and living arrangement, and collective determinants include food-shopping environment, marketing of the “healthy food” message, and social support. In previous studies, individual determinants have been associated with dietary variety.^{10,11} Regarding a collective determinant (food-shopping environment), Yakushiji¹² reported that in 2010 in Japan, there were 3.82 million people aged 65 years or older who had difficulty accessing food stores. Among these, 2.02 million lived in rural areas; however, the number in urban areas is expected to increase in the future. Yakushiji also indicated that lack of food access decreased the dietary variety of the older people. Iwama¹³ has shown that older Japanese individuals in an older commuter town who had supportive relationships with neighbors had higher dietary variety than those who did not. Another Japanese study by Hanibuchi et al¹⁴ showed that high access to supermarkets was associated with overweight or obesity, but not with underweight.

* Corresponding author. 3453 Mikatahara, Kita-ku, Hamamatsu, Shizuoka 433-8558, Japan.

E-mail address: hideko-n@seirei.ac.jp (H. Nakamura).

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In contrast, previous studies from the United Kingdom and the United States found that low food access occurred in urban areas where the poor live — known as “food deserts” — and contributed to diet-related outcomes, such as obesity.^{15,16} Thus, the effect of food access differs across nations.

The aim of the present study was to examine the association of perceived food availability and neighbor relationships on eating and underweight for the Japanese community-dwelling older people using large-scale data.

Methods

The Japan Gerontological Evaluation Study conducted a large-scale postal survey of community-dwelling people aged 65 years or older who were not eligible to receive public long-term care benefits. The data were collected in 31 municipalities (12 prefectures) in Japan from August 2010 through January 2012. The self-administered questionnaire was mailed randomly to 169,215 subjects in 15 large municipalities and to all eligible subjects in 16 small municipalities. The municipalities were urban cities (such as Kobe and Nagoya), local cities, and rural towns/villages and were located in the prefectures of Hokkaido, Aomori, Miyagi, Yamanashi, Chiba, Aichi, Mie, Nara, Hyogo, Okayama, Nagasaki, and Okinawa. The response rate was 66.3% (112,123 respondents). The analytic sample included 102,869 subjects with valid data on sex, age, and municipality. Ethical approval was obtained from the Ethics Committee of Nihon Fukushi University in July 2010 (No. 10-05).

Variables

Eating was evaluated using monthly frequency of food intake. The frequency of intake of fruits and vegetables was assessed with the question “How often did you eat fruits and/or vegetables over the past month?” Possible responses were “Twice a day or more,” “Once a day,” “Four to six times a week,” “Two or three times a week,” “Once a week,” “Less than once a week,” or “None.” Subjects who ate fruits and vegetables at least once a day were categorized as having frequent intake, and those who ate them less than once a day were categorized as having infrequent intake. In the case of meat and fish, the question “How often did you eat meat and/or fish over the past month?” was used, and subjects' responses were categorized in the same way as those for fruits and vegetables.

Body mass index (BMI; kg/m²) was calculated as weight (kg) divided by the square of height (meters) from subjects' self-reported values. Values that were not within the 4 standard deviations of the mean of those reported in the National Health and Nutrition Survey in Japan¹⁷ by age and sex were excluded. The analytic sample was limited to subjects whose BMI was classified as underweight (BMI <18.5) or normal weight (18.5 ≤ BMI <25).

The perceived availability of food was assessed using the question “Are stores or facilities that sell fresh fruits and vegetables present within 1 km of your home?” Possible responses were “Many,” “Some,” “Few,” “None,” or “I don't know.” Subjects who answered “Many” or “Some” were categorized as having high access, and respondents who answered “Few,” “None,” or “I don't know” were categorized as having low access. Relationships with neighbors were assessed using the question “What kind of relations do you have with people in your neighborhood?” Possible responses were “Mutual consultation, lending and borrowing daily commodities, cooperation in daily life,” “Standing and chatting frequently,” “No more than exchanging greetings,” or “None, not even greetings.” Subjects who answered “Mutual consultation, lending and borrowing daily commodities, cooperation in daily life” or “Standing and chatting frequently” were categorized as having a high level of relationship with neighbors.¹⁸ Subjects who answered

“No more than exchanging greetings” or “None, not even greetings” were categorized as having a low level of relationship with neighbors.

Subjects were categorized by age as <75 years old or ≥75 years old, and by living arrangement as living alone or not living alone. Annual equivalent income (million yen per year) was calculated by dividing pre-tax household income by the square root of the number of household members, and the annual equivalent income was then categorized into four groups: ≥4, <4 and ≥2, <2, and missing data. Educational attainment was categorized as <10 years or ≥10 years. Missing data were excluded, with the exception of annual equivalent income. Because there were a large number of subjects with data missing for this metric, a “missing data” category was created.

Statistical analysis

Proportion of low access to food stores, low level of relationship with neighbors, infrequent intake of fruit and vegetables and meat and fish, and other variables between men and women was assessed using the chi-square test. The odds ratios (ORs) with 95% confidence intervals (CIs) for infrequent intake of fruits and vegetables, infrequent intake of meat and fish, and underweight were determined using logistic regression analysis stratified by sex. The independent variables were age (reference: <75 years), food access (reference: high), relationships with neighbors (reference: high level), living arrangement (reference: not living alone), annual equivalent income (reference: ≥4 million yen per year), and educational attainment (reference: ≥10 years). Each variable was analyzed with adjustment for age in model 1, and all independent variables were analyzed simultaneously in model 2.

Furthermore, we conducted an analysis stratified by level of relationship to compare the OR of low food access between people having high levels of relationship with neighbors with those having low levels of relationship. The interaction between food access and neighbor relationships was also evaluated by including the interaction terms. Statistical significance was set at $P < 0.05$ (two-sided). All analyses were performed using SPSS Statistics 22 (IBM, Armonk, NY, USA).

Results

The proportion of community-dwelling men and women with low food access was 25–30%. The proportion having a low level of relationship with neighbors was higher among men than among women (31% vs 19%; [Table 1](#)).

Low food access was associated with infrequent intake of fruits and vegetables (model 2 OR 1.18; 95% CI, 1.12–1.25 for men and OR 1.26; 95% CI, 1.19–1.33 for women; [Table 2](#)) and of meat and fish (model 2 OR 1.15; 95% CI, 1.10–1.21 for men and OR 1.17; 95% CI, 1.12–1.22 for women; [Table 3](#)). However, low food access was not significantly associated with underweight (model 2 OR 1.10; 95% CI, 1.00–1.22 for men and OR 1.05; 95% CI, 0.98–1.13 for women; [Table 4](#)).

Low level of relationship with neighbors was associated with infrequent intake of fruits and vegetables (model 2 OR 1.38; 95% CI, 1.31–1.45; [Table 2](#)), but not associated with infrequent intake of meat and fish (model 2 OR 1.01; 95% CI, 0.96–1.05; [Table 3](#)) in men. In women, low level of relationship with neighbors was associated with infrequent intake of fruits and vegetables (model 2 OR 1.57; 95% CI, 1.48–1.67; [Table 2](#)), and with infrequent intake of meat and fish (model 2 OR 1.11; 95% CI, 1.06–1.17; [Table 3](#)). Low level of relationship with neighbors was also associated with underweight in both sexes (model 2 OR 1.25; 95% CI 1.14–1.37 for men and OR 1.38; 95% CI 1.27–1.49 for women; [Table 4](#)).

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