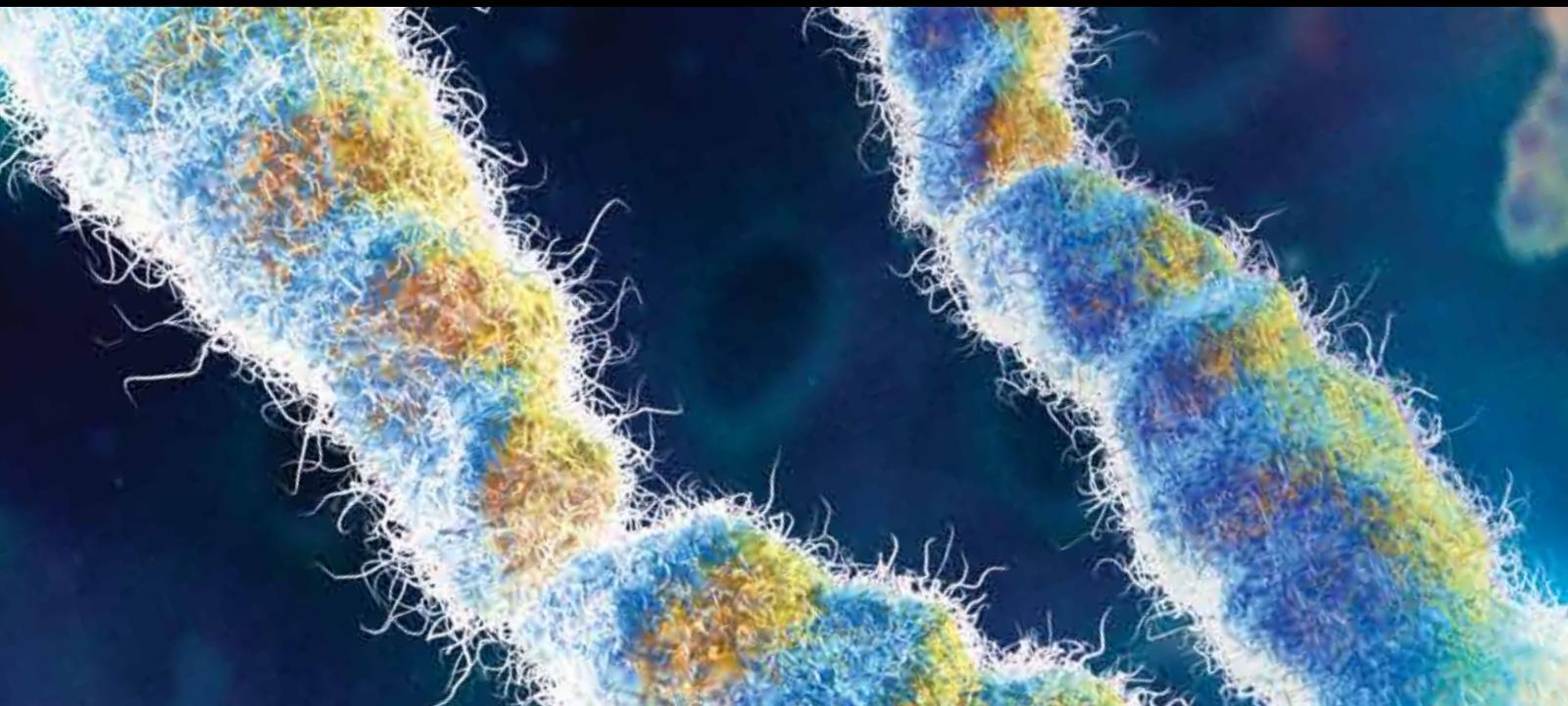


# Nutrition and Aging: Nutritional Health Inequity

Guest Editors: Joseph R. Sharkey, Julie Locher, Nadine Sahyoun,  
and Sara Wilcox



# **Nutrition and Aging: Nutritional Health Inequity**

Journal of Aging Research

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## Editorial

# Nutrition and Aging: Nutritional Health Inequity

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Good nutritional health is critically important for the prevention and management of nutrition-related health conditions as well as the prevention of cognitive and physical functional decline. The achievement and maintenance of good nutritional health is particularly challenging for the burgeoning and diverse older population. Many seniors experience nutritional health inequity as a result of gender, race or ethnicity, education or income, country of birth, disability, living arrangement, adequacy of social support, or geographic location.

The five research articles in this special issue used qualitative and quantitative approaches to extend the conversation about nutritional health inequity in vulnerable seniors. E. Edfors and A. Westergren used semistructured interviews of homeliving older adults in Sweden to understand self-determination and individual approaches to acquiring, preparing, and consuming food. Using in-depth interviews, R. J. Green-LaPierre and colleagues in Nova Scotia focused on a vulnerable subset of seniors (lone women) and explored the experiences of how these women with limited resources access food. A. M. Albertson and colleagues used a US sample of older adults to examine the contribution of ready-to-eat breakfast cereals to overall diet quality. D. L. Huang and colleagues focused on adults with mobility disabilities and used in-depth interviews to highlight the special challenges they face in gaining access to and utilizing food resources. A. Westergren documented the use of action-oriented study Circles in Sweden to facilitate professional development and

better patient outcomes in nursing homes. The papers highlight several subsets of seniors that face nutritional health disparities and suggest implications beyond the settings and subpopulations they study.

This special issue is representative of a growing movement among researchers as well as providers of service to focus on nutritional health equities among older adults who are most disadvantaged for a whole host of reasons. All of the authors brought attention to the many and varied challenges encountered in addressing nutritional health inequities. They all also emphasized the need for developing interventions targeted at addressing this persistent, yet addressable, social and health problem.

Joseph R. Sharkey  
Julie Locher  
Nadine Sahyoun  
Sara Wilcox

## Research Article

# Ready-to-Eat Cereal Consumption Patterns: The Relationship to Nutrient Intake, Whole Grain Intake, and Body Mass Index in an Older American Population

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**Objective.** To investigate the relationship between ready-to-eat (RTE) breakfast cereal consumption patterns and body mass index (BMI), nutrient intake, and whole grain intake in an older American population. **Design.** A cross-sectional survey of US households, collected by the NPD Group via the National Eating Trends (NET) survey. Main outcome measures include BMI, nutrient intake, and whole grain intake. **Subjects/Setting.** The sample included 1759 participants age 55 and older, which was divided into approximate quartiles based on intake of RTE breakfast cereal for the 2-week period (0 servings, 1–3 servings, 4–7 servings, and ≥8 servings). **Results.** In the multivariate linear regression analysis adjusted for energy and age; intake of dietary fiber, whole grains, and the majority of micronutrients examined were found to be positively associated with frequent RTE cereal consumption. The proportion of participants consuming less than the Estimated Average Requirement (EAR) was lower for the highest quartile of RTE cereal consumers compared to nonconsumers, for the majority of vitamins and minerals examined. Significant differences in BMI between RTE breakfast cereal intake groups were found for men. **Conclusion.** Results suggest that ready-to-eat breakfast cereals may contribute to the nutritional quality of the diets of older Americans. Prospective studies and experimental trials are needed to better evaluate the role of RTE cereal consumption in energy balance.

## 1. Introduction

According to US Department of Health and Human Services, Administration on Aging population estimates, the number of older Americans is expected to grow dramatically. By 2030, the number of adults aged 60+ is expected to increase to approximately 25% of the population, while the number of the oldest old (age 85+) is expected to double [1]. Adequate nutrition is an important factor in continued health and independence for older adults [2, 3].

Homebound elderly people who skip breakfast are more likely to have inadequate nutrient intakes [2]. Caloric needs typically drop with advancing age, while needs for certain micronutrients such as calcium, vitamin D, and vitamin B<sub>12</sub> increase [4]. Thus the importance of choosing nutrient dense

foods increases for this population. Several cross-sectional studies have found positive associations between breakfast consumption and RTE breakfast cereal consumption, and increased nutrient intake for adult and elderly adult populations [5–8]. RTE cereal provides a convenient and easy to prepare breakfast option, which can provide whole grains and dietary fiber, along with many vitamins and minerals. RTE breakfast cereal is also an important contributor of whole grain in the US diet, providing approximately 30% of daily whole grain intake [9]. Recently, whole grain intake was found to be inversely associated with BMI and abdominal body fat in an older American population [10].

Similar to other age groups, the prevalence of overweight and obesity in the elderly population is increasing [11]. An estimated 76.5% of men and 73.5% of women ≥60 years old

are currently overweight or obese ( $BMI \geq 25$ ) while 36.6% of men and 42.3% of women  $\geq 60$  years old are estimated to be obese ( $BMI \geq 30$ ) [12]. Based on recent NHANES data, McKeown estimates 62.5% of men and 74.9% of women ages 60 to 69 years old are abdominally obese [10]. It has been suggested that abdominal obesity may be a better measure of obesity than BMI in an older population, since after the age of 60 this population tends to lose lean body mass, while increasing visceral body fat [13].

A number of cross-sectional studies have examined the association of ready-to-eat (RTE) cereal intake with nutrient intake and body weight status. RTE cereal consumption has been found to be positively associated with intake of a range of vitamins and minerals and inversely associated with body mass index (BMI) in child and adolescent populations [14, 15]. In addition, eating breakfast along with a pattern of frequent ready-to-eat cereal consumption is associated with lower BMI, higher nutrient intakes, and weight maintenance in adults [7, 16–19]. Research in older adults is lacking. Thus, we examined the association of RTE cereal consumption patterns with nutrient intake in a sample of older adults who participated in a cross-sectional survey. The association of RTE cereal consumption with BMI and percent overweight or obese ( $BMI \geq 25$ ) was also examined in this study.

## 2. Methods

Data collected as part of the National Eating Trends (NET) survey were analyzed. The NET survey is conducted by the NPD Group, a marketing information company that has been monitoring the intake of US households since 1980 through this survey [20]. As described previously, the General Mills Bell Institute of Health and Nutrition (BIHN) has developed a proprietary method for combining data from the NET survey's 14-day food diary data, with portion size estimates from the National Health and Nutrition Examination Survey (NHANES) 1999–2004, and nutrient and food group data from the University of Minnesota's Nutrient Data System for Research (NDSR) Version 34, 2008 (Nutrition Coordinating Center, Minneapolis, MN) [14]. This combined dataset allows for population based, food pattern comparisons of usual intake, based on categories of foods consumed.

**2.1. Food Consumption Data.** Annually, the NET survey samples 2,000 households representing approximately 10,000 individuals, and data from the March 2006 through February 2008 survey were used for this study. To be included in this study, the subjects must have completed at least 7 days of food reporting and have provided height and weight data for calculation of BMI. The NET survey included 1905 participants age 55 and older, of these 1759 completed at least 7 days of food diaries and provided height and weight data (92%). Of these 1759 participants, 46% were male, 54% were female, and 22% were  $\geq 75$  years old.

For the NET survey, each year the NPD Group collaborates with a third party to establish a mail access panel that is a cross-sectional group of US households (noninstitutionalized people in the contiguous 48 states). Survey

targets are set for the following demographic factors (family versus nonfamily, age, household income, household size, age of head of household, employment status, race, and census region) based on US Census Bureau statistics. NPD uses historical response data to over-sample households with lower expected response rates and adjusts the target levels quarterly to obtain a demographically and geographically balanced sample. Panelists are recruited using mailing lists and mall interventions, and NET survey panelists are then randomly selected from active mail panelists (those who have returned at least 1 other survey). Participant incentives include selection from a range of gifts (\$25 to \$30 value). Approximately 72% of households provide completed surveys for at least 10 of the 14 days of the annual survey.

Recruitment and data collection were conducted across all 52 weeks of the year. Each household member was required to document food and beverage intake by maintaining a daily eating diary. The “person most responsible for meal preparation” was responsible for documenting the name and brand of all food consumed for all household members, including any additions with cooking or food preparation. Description of the meal occasion (breakfast, lunch, snack, etc.) and location (at home, away from home) was included in the diary along with food names, flavor descriptors, brand names, package types, product form, special nutritional attributes, and other details. Food diary records were mailed back on a daily basis for the 14 day period.

**2.2. Food Diary Data Entry.** The University of Minnesota's Nutrition Database System for Research (NDS-R) provided the nutrient and food group data for this study. The NDS-R system provides a comprehensive database of complete nutrient data for 156 nutrients or components, for over 18,000 foods. The database is updated on an ongoing basis and contains over 7,000 brand name products. NDS-R has over 100 food groups in the database and each food is assigned a food group. Completed food diaries were entered into NDS-R for calculation of nutrient intake and food groups. Foods reported by NET survey panelists were matched, based on food diary descriptions to foods included in the NDS-R database. The recipe module of the NDS software was used to assign nutrient values to foods with special attributes (low fat, calcium fortified, reduced sodium, etc.) which were not found in the database and each recipe was assigned an appropriate food group.

**2.3. Portion-Size Data.** NET panelists record the foods and beverages consumed by household members but not the quantities. This procedure is standard for panel surveys to minimize recorder burden and thus increase reliability. Portion-sizes were estimated by combining data from the NHANES 1999–2004. Serving weights for individual food codes were aggregated and then collapsed for like-foods to strengthen cell sizes, and smoothed to eliminate outliers. Age and gender-specific mean serving weights were thereby determined for over 800 food types; these portions were subsequently assigned to each food recorded and coded in the NET diary.

**2.4. Data Tabulation.** Of the 1905 older American adults who were included in the NET survey, 146 participants were excluded for not meeting the inclusion criteria. 94% of those in the analytic sample provided complete (14 days) food diaries. For the 6% of participants with 7 to 13 days of dietary information the estimated servings of RTE cereal were normalized to 14 to allow for placement in the study quartiles. The pattern established over the 7- to 13-day period was assumed to be constant for the full 14 days. For example if no RTE cereal was consumed in the days collected, no servings would be included for the full 14 days, or if 2 servings were consumed in 7 days, 4 servings would be assumed for the full 14-day period. Self-reported values for height and weight were provided by each individual in the study. BMI was calculated by using the formula:  $BMI = \text{weight (lb)} / \text{height (in)}^2 \times 703$ .

Servings of whole grains consumed by study participants were estimated based on food group assignments in the NDS-R database. All grain-based foods in the NDSR database are categorized as being either “whole grain,” “some whole grain” or “refined grain”. To be assigned to the “whole grain” category the first grain ingredient in the product must be a whole grain. Foods assigned to the “some whole grain” category are products that contain whole grain ingredients, but the first grain ingredient is not a whole grain. “Refined grain” products are those that contain no whole grain ingredients. In this paper servings of whole grains were calculated by summing serving of foods classified as “whole grain” in the database.

**2.5. Statistical Analysis.** To examine whether RTE cereal consumption was associated with BMI, body weight status, whole grain, and nutrient intake a series of analysis of variance (ANOVA) models were conducted by approximate quartiles of RTE cereal intake. Slightly greater than one quarter of the participants were nonconsumers, which made breaks in intake levels approximate rather than exact quartiles of RTE cereal intake (Table 1).

Logistic regression modeling was conducted to examine the association between RTE cereal consumption pattern and odds of falling below Estimated Average Requirement (EAR) for micronutrients with an established intake level. Covariates included within the ANOVA and logistic regression models were energy and age. Values were adjusted for energy to see if RTE cereal consumption was associated with a more nutrient dense diet. Age was included as a covariate, because it is associated with both RTE cereal consumption and nutrient intake. The contrasts were examined between the possible pairs of cereal consumption categories using the Wald chi-square test.

Logistic regression was used to compare odds of being overweight or obese by level of RTE cereal consumption. The contrasts were examined between the possible pairs of cereal consumption categories using the Wald chi-square test. For both the ANOVA and logistic regression models examining the association of RTE cereal consumption with body weight age and  $age^2$  were included as covariates.  $Age^2$  was included because the relationship between BMI and age is not linear, around 60 years of age this relationship can change [13]. All

analyses were stratified by sex, because it was hypothesized that the association of RTE cereal consumption with the measured outcomes may vary by sex.

An alpha level of 0.01 was used to determine the significance for the analysis of variance comparisons, except where otherwise noted. All analyses were performed using SAS version 9.2 (SAS Institute, Cary, NC).

### 3. Results

The sample size and RTE cereal consumption distribution are displayed in Table 1. With respect to findings related to food and nutrient intake, the objective of this study was to determine the relationship between RTE cereal quartile of consumption to nutrient intake. For both men and women in the sample, significant differences in nutrient intakes between the fourth quartile (Q4) compared to the lowest two quartiles (Q1 and Q2) of RTE cereal consumption were seen for most nutrients examined (Table 2). For males, Q4 intake of energy was higher compared to Q1 and Q2. After adjusting for energy and age there was a significantly lower ( $P < 0.01$ ) intake of total fat, total saturated fat, total trans fat, and cholesterol among those in Q4 compared to Q1 and Q2. In addition among men, intakes of total carbohydrate, dietary fiber, total sugar, vitamin A, vitamin C, vitamin D, thiamin, riboflavin, niacin, vitamin B6, folate, vitamin B12, potassium, calcium, iron, magnesium, and zinc were significantly higher ( $P < 0.01$ ) among those in Q4 compared to those in Q1 and Q2. There were no significant differences between intake of total protein, added sugar, or vitamin E across consumption patterns of RTE cereal. Sodium intake was not significantly different between the highest and lowest quartiles of intake. Similar relationships were found for women age 55+ (Table 3), with the exception of total sugar intake which was not significantly different across quartiles of RTE cereal intake.

In addition to significant differences in nutrient intake, this study found whole grain intake to be positively associated with RTE cereal consumption. For both men and women, average whole grain intake among those in Q4 of RTE cereal consumption was nearly double the whole grain intake of those in the Q1 (the nonconsumers) (Tables 2 and 3).

The percentage of participants in each quartile that fell below Estimated Average Requirement (EAR) for nutrients with established EAR amounts was examined (Table 4). A significant inverse linear relationship was found between the frequency of RTE cereal consumption and the percentage of participants failing to consume the EAR for a number of nutrients. In women, this relationship was found for all nutrients examined except vitamin D and E and for men, all but niacin and iron.

In examining the relationship of RTE cereal consumption patterns and BMI there were some significant differences found in mean BMI for all men and all women (Table 5). With respect to men, the adjusted mean BMI was significantly lower among those in Q4 compared to Q1 and Q2 ( $P = 0.0332$ ). For women, there were significant differences between Q3 and Q4, but no significant differences between the highest and lowest quartiles of RTE cereal intake.

TABLE 1: Sample size and RTE cereal consumption distribution for adults 55+ from the 2007-2008 NET survey.

Gender/age	Sample size	Quartile of cereal consumption			
		Q1		Q2	
		0 Servings/14 d <i>n</i> (%)	1–3 Servings/14 d <i>n</i> (%)	4–7 Servings/14 d <i>n</i> (%)	8+ Servings/14 d <i>n</i> (%)
All adults ages 55+	1759	490 (27.9)	484 (27.5)	380 (21.6)	405 (23.0)
Males ages 55+	803	231 (28.8)	207 (25.8)	165 (20.6)	200 (24.9)
Females ages 55+	956	259 (27.1)	277 (29.0)	215 (22.5)	205 (21.4)

TABLE 2: Adjusted\* mean daily nutrient intake for adult men, ages 55+, by quartile of cereal consumption.

Nutrient	Quartile of RTE cereal consumption				<i>P</i>	
	Q1		Q2			
	0 Servings Mean ± SE	1–3 Servings Mean ± SE	4–7 Servings Mean ± SE	8+ Servings Mean ± SE		
Energy (kcal)	1826 ± 38 <sup>a</sup>	1932 ± 39 <sup>ab</sup>	2033 ± 45 <sup>bc</sup>	2142 ± 43 <sup>c</sup>	<0.0001	
Total fat (g)	81 ± 1.6 <sup>a</sup>	80 ± 1.8 <sup>a</sup>	76 ± 2.0 <sup>b</sup>	73 ± 1.9 <sup>c</sup>	<0.0001	
Total saturated fat (SFA) (g)	27 ± 0.6 <sup>a</sup>	27 ± 0.7 <sup>a</sup>	25 ± 0.8 <sup>b</sup>	25 ± 0.7 <sup>b</sup>	<0.0001	
Total trans Fat (TRANS) (g)	5.2 ± 0.1 <sup>a</sup>	5.3 ± 0.1 <sup>a</sup>	5.0 ± 0.2 <sup>a</sup>	4.4 ± 0.2 <sup>b</sup>	<0.0001	
Cholesterol (mg)	307 ± 8 <sup>a</sup>	309 ± 8 <sup>a</sup>	272 ± 8 <sup>b</sup>	244 ± 6 <sup>c</sup>	<0.0001	
Total carbohydrate (g)	228 ± 5 <sup>a</sup>	233 ± 5 <sup>a</sup>	246 ± 7 <sup>b</sup>	253 ± 6 <sup>b</sup>	<0.0001	
Dietary fiber (g)	16 ± 0.4 <sup>a</sup>	16 ± 0.4 <sup>a</sup>	18 ± 0.5 <sup>b</sup>	19 ± 0.5 <sup>b</sup>	<0.0001	
Total sugar (g)	104 ± 4 <sup>a</sup>	104 ± 3 <sup>a</sup>	113 ± 4 <sup>b</sup>	117 ± 4 <sup>b</sup>	<0.0001	
Added sugar (g)	69 ± 2 <sup>a</sup>	67 ± 2 <sup>a</sup>	68 ± 2 <sup>a</sup>	67 ± 2 <sup>a</sup>	0.7652	
Total protein (g)	78 ± 1 <sup>a</sup>	78 ± 1 <sup>a</sup>	77 ± 2 <sup>a</sup>	80 ± 1 <sup>a</sup>	0.2402	
Vitamin A (mcg rae)	735 ± 33 <sup>a</sup>	724 ± 30 <sup>a</sup>	805 ± 36 <sup>ab</sup>	867 ± 29 <sup>b</sup>	0.0020	
Vitamin C (mg)	81 ± 3 <sup>a</sup>	85 ± 4 <sup>a</sup>	94 ± 4 <sup>ab</sup>	99 ± 4 <sup>b</sup>	0.0011	
Vitamin D (mcg)	4.2 ± 0.2 <sup>a</sup>	4.7 ± 0.2 <sup>ab</sup>	5.3 ± 0.2 <sup>b</sup>	6.5 ± 0.2 <sup>c</sup>	<0.0001	
Vitamin E (mg alpha-tocopherol)	6.5 ± 0.2 <sup>a</sup>	6.6 ± 0.2 <sup>a</sup>	7.3 ± 0.3 <sup>a</sup>	7.3 ± 0.3 <sup>a</sup>	0.0245	
Thiamin (mg)	1.6 ± 0.03 <sup>a</sup>	1.7 ± 0.03 <sup>b</sup>	1.8 ± 0.04 <sup>c</sup>	1.9 ± 0.04 <sup>d</sup>	<0.0001	
Riboflavin (mg)	2.1 ± 0.04 <sup>a</sup>	2.2 ± 0.04 <sup>a</sup>	2.4 ± 0.05 <sup>b</sup>	2.6 ± 0.05 <sup>c</sup>	<0.0001	
Niacin (mg)	21.9 ± 0.4 <sup>a</sup>	22.5 ± 0.4 <sup>a</sup>	23.5 ± 0.5 <sup>b</sup>	25.8 ± 0.5 <sup>c</sup>	<0.0001	
Vitamin B6 (mg)	1.6 ± 0.03 <sup>a</sup>	1.7 ± 0.03 <sup>a</sup>	1.9 ± 0.04 <sup>b</sup>	2.3 ± 0.06 <sup>c</sup>	<0.0001	
Folate (mcg)	437 ± 8 <sup>a</sup>	491 ± 9 <sup>b</sup>	588 ± 12 <sup>c</sup>	743 ± 20 <sup>d</sup>	<0.0001	
Vitamin B12 (mg)	5.1 ± 0.2 <sup>a</sup>	5.3 ± 0.2 <sup>a</sup>	5.6 ± 0.2 <sup>a</sup>	7.0 ± 0.2 <sup>b</sup>	<0.0001	
Sodium (mg)	3509 ± 59 <sup>ab</sup>	3584 ± 67 <sup>a</sup>	3450 ± 75 <sup>ab</sup>	3428 ± 69 <sup>b</sup>	0.0146	
Potassium (mg)	2544 ± 52 <sup>a</sup>	2599 ± 51 <sup>a</sup>	2775 ± 65 <sup>b</sup>	2875 ± 61 <sup>b</sup>	<0.0001	
Calcium (mg)	759 ± 21 <sup>a</sup>	781 ± 20 <sup>a</sup>	895 ± 28 <sup>b</sup>	987 ± 30 <sup>c</sup>	<0.0001	
Iron (mg)	13 ± 0.3 <sup>a</sup>	14 ± 0.3 <sup>b</sup>	16 ± 0.3 <sup>c</sup>	19 ± 0.4 <sup>d</sup>	<0.0001	
Magnesium (mg)	248 ± 5 <sup>a</sup>	252 ± 5 <sup>a</sup>	274 ± 6 <sup>b</sup>	294 ± 6 <sup>c</sup>	<0.0001	
Zinc (mg)	10.2 ± 0.2 <sup>a</sup>	10.2 ± 0.2 <sup>ab</sup>	10.8 ± 0.3 <sup>b</sup>	12.3 ± 0.3 <sup>c</sup>	<0.0001	
Whole grains (servings/14 d)	5.4 ± 6 <sup>a</sup>	6.8 ± 5 <sup>a</sup>	8.8 ± 6 <sup>b</sup>	13.0 ± 8 <sup>c</sup>	<0.0001	

<sup>a,b,c,d</sup>Means within the same row with the same letter are not significantly different (*P* < 0.01). \*Adjusted for energy and age.

When comparing the rates of overweight and obesity across RTE cereal consumption levels in analysis adjusted for age and age<sup>2</sup>, significant differences in mean % overweight or obese were found for males but not for females (Table 5). Among men, the rate of overweight and obesity (BMI ≥ 25) was lower among those in Q4 compared to Q1 and Q2

(*P* = 0.0433). Among men, the rate of obesity (BMI ≥ 30) was lower among Q4 compared to Q2. However, no significant differences were observed in other groups. For women, there were no significant differences between quartiles. Results were similar in analysis adjusted for age only (data not shown).

TABLE 3: Adjusted\* mean daily nutrient intake for adult women, ages 55+, by quartile of RTE cereal consumption pattern.

Nutrient	Quartile of RTE cereal consumption				<i>P</i>
	Q1	Q2	Q3	Q4	
	0 Servings Mean ± SD	1–3 Servings Mean ± SD	4–7 Servings Mean ± SD	8+ Servings Mean ± SD	
Energy (kcal)	1363 ± 24 <sup>a</sup>	1510 ± 28 <sup>b</sup>	1570 ± 32 <sup>b</sup>	1622 ± 33 <sup>b</sup>	<0.0001
Total fat (g)	60 ± 1.1 <sup>a</sup>	60 ± 1.2 <sup>a</sup>	58 ± 1.4 <sup>b</sup>	55 ± 1.4 <sup>c</sup>	<0.0001
Total saturated fat (SFA) (g)	20.0 ± 0.4 <sup>a</sup>	20.0 ± 0.5 <sup>a</sup>	19.3 ± 0.5 <sup>ab</sup>	18.7 ± 0.5 <sup>b</sup>	<0.0001
Total trans fat (TRANS) (g)	4.0 ± 0.1 <sup>a</sup>	4.0 ± 0.1 <sup>a</sup>	3.7 ± 0.1 <sup>b</sup>	3.3 ± 0.1 <sup>c</sup>	<0.0001
Cholesterol (mg)	216 ± 6 <sup>a</sup>	227 ± 5 <sup>a</sup>	212 ± 6 <sup>a</sup>	188 ± 5 <sup>b</sup>	<0.0001
Total carbohydrate (g)	183 ± 3 <sup>a</sup>	185 ± 4 <sup>ab</sup>	190 ± 4 <sup>bc</sup>	197 ± 5 <sup>c</sup>	<0.0001
Dietary fiber (g)	13 ± 0.3 <sup>a</sup>	13 ± 0.3 <sup>a</sup>	13 ± 0.3 <sup>a</sup>	15 ± 0.4 <sup>b</sup>	<0.0001
Total sugar (g)	88 ± 2 <sup>a</sup>	87 ± 3 <sup>a</sup>	91 ± 3 <sup>a</sup>	92 ± 3 <sup>a</sup>	0.0654
Added sugar (g)	58 ± 1 <sup>a</sup>	56 ± 1 <sup>a</sup>	56 ± 2 <sup>a</sup>	53 ± 2 <sup>a</sup>	0.1569
Total protein (g)	58 ± 1 <sup>a</sup>	59 ± 1 <sup>a</sup>	60 ± 1 <sup>a</sup>	61 ± 1 <sup>a</sup>	0.0648
Vitamin A (mcg rae)	588 ± 21 <sup>a</sup>	578 ± 18 <sup>a</sup>	631 ± 22 <sup>ab</sup>	679 ± 21 <sup>b</sup>	0.0005
Vitamin C (mg)	71 ± 3 <sup>a</sup>	68 ± 3 <sup>a</sup>	76 ± 3 <sup>ab</sup>	84 ± 3 <sup>b</sup>	0.0001
Vitamin D (mcg)	3.2 ± 0.1 <sup>a</sup>	3.8 ± 0.1 <sup>b</sup>	4.2 ± 0.1 <sup>b</sup>	4.9 ± 0.1 <sup>c</sup>	<0.0001
Vitamin E (mg alpha-tocopherol)	5.5 ± 0.2 <sup>a</sup>	5.2 ± 0.2 <sup>a</sup>	5.8 ± 0.2 <sup>a</sup>	5.9 ± 0.2 <sup>a</sup>	0.0336
Thiamin (mg)	1.20 ± 0.02 <sup>a</sup>	1.26 ± 0.02 <sup>b</sup>	1.34 ± 0.03 <sup>c</sup>	1.49 ± 0.03 <sup>d</sup>	<0.0001
Riboflavin (mg)	1.5 ± 0.03 <sup>a</sup>	1.7 ± 0.03 <sup>b</sup>	1.8 ± 0.04 <sup>c</sup>	2.0 ± 0.04 <sup>d</sup>	<0.0001
Niacin (mg)	16 ± 0.3 <sup>a</sup>	17 ± 0.3 <sup>a</sup>	18 ± 0.3 <sup>b</sup>	20 ± 0.4 <sup>c</sup>	<0.0001
Vitamin B6 (mg)	1.2 ± 0.02 <sup>a</sup>	1.3 ± 0.02 <sup>a</sup>	1.5 ± 0.03 <sup>b</sup>	1.8 ± 0.05 <sup>c</sup>	<0.0001
Folate (mcg)	344 ± 6 <sup>a</sup>	384 ± 7 <sup>b</sup>	471 ± 10 <sup>c</sup>	600 ± 16 <sup>d</sup>	<0.0001
Vitamin B12 (mg)	3.7 ± 0.1 <sup>a</sup>	4.0 ± 0.1 <sup>ab</sup>	4.4 ± 0.1 <sup>b</sup>	5.7 ± 0.2 <sup>c</sup>	<0.0001
Sodium (mg)	2640 ± 43 <sup>a</sup>	2697 ± 45 <sup>a</sup>	2622 ± 50 <sup>a</sup>	2585 ± 51 <sup>a</sup>	0.0263
Potassium (mg)	1988 ± 34 <sup>a</sup>	2036 ± 39 <sup>a</sup>	2095 ± 44 <sup>a</sup>	2246 ± 44 <sup>b</sup>	<0.0001
Calcium (mg)	597 ± 15 <sup>a</sup>	637 ± 15 <sup>ab</sup>	690 ± 17 <sup>b</sup>	765 ± 19 <sup>c</sup>	<0.0001
Iron (mg)	10 ± 0.2 <sup>a</sup>	11 ± 0.2 <sup>a</sup>	13 ± 0.2 <sup>b</sup>	15 ± 0.3 <sup>c</sup>	<0.0001
Magnesium (mg)	198 ± 4 <sup>a</sup>	202 ± 4 <sup>a</sup>	207 ± 5 <sup>a</sup>	230 ± 5 <sup>b</sup>	<0.0001
Zinc (mg)	7.6 ± 0.2 <sup>a</sup>	7.6 ± 0.1 <sup>a</sup>	8.1 ± 0.2 <sup>a</sup>	9.3 ± 0.2 <sup>b</sup>	<0.0001
Whole grain (servings/14 d)	6.1 ± 6 <sup>a</sup>	7.3 ± 6 <sup>a</sup>	8.8 ± 6 <sup>b</sup>	12.3 ± 7 <sup>c</sup>	<0.0001

<sup>a,b,c,d</sup> Means within the same row with the same letter are not significantly different (*P* < 0.01). \*Adjusted for energy and age.

## 4. Discussion

Study results suggest that frequent RTE cereal consumption may be associated with better nutrient intake profiles and higher whole grain intake in older Americans. Among older men RTE cereal consumption may be associated with lower BMI. Key nutrients that are typically underconsumed in older American populations include protein, fiber, vitamins B12, D, and E, calcium, magnesium, and zinc. Nutrients for which overconsumption is a concern include fat, cholesterol, vitamin A, iron, and zinc. Frequent consumption of RTE cereal was found to be associated with higher intake of all key underconsumed nutrients except protein, which was not significantly different between the groups. In addition, consumption of whole grains for Q4 was more than double than the Q1 (nonconsuming group). RTE cereal consumption was also associated with lower energy adjusted fat and cholesterol intakes.

It was not surprising to find the positive association between higher RTE cereal consumption with higher intakes of vitamins and minerals, as many RTE cereals are fortified

with vitamins and minerals and other studies have found similar associations for both children and adults [7, 14, 15, 17, 21]. In addition, RTE cereal consumption is associated with greater intake of milk and calcium, as milk and RTE cereal are usually consumed together [19].

Breakfast intake and frequent RTE cereal consumption have been associated with lower BMI based on a number of cross-sectional studies [14–17]. However, BMI is not an ideal measure of body fatness or mortality risk for older individuals and several studies suggest abdominal circumference may be a better measure of overweight and obesity in an elderly population [13, 22]. This study has data only on BMI as no measure of waist circumference was gathered. In this study, significant associations between RTE cereal consumption and body weight were found only for men. This finding differs from Song's data for adults' ≥19 years of age, which found an inverse association between RTE cereal consumption and BMI for women but not men [17].

There are a number of strengths of this study. First, while many studies have data from only 2 to 4 days of food records;

TABLE 4: Percentage of adults 55+ falling below the Estimated Average Requirement (EAR) by RTE cereal consumption pattern.

Nutrient	Percent falling below EAR									
	Men				<i>P</i>	Women				<i>P</i>
	Q1	Q2	Q3	Q4		Q1	Q2	Q3	Q4	
Vitamin A	58.4 <sup>a</sup>	52.7 <sup>a</sup>	35.8 <sup>b</sup>	20.5 <sup>c</sup>	<0.0001	55.2 <sup>w</sup>	44.8 <sup>x</sup>	34.9 <sup>y</sup>	17.6 <sup>z</sup>	<0.0001
Vitamin C	58.0 <sup>a</sup>	53.1 <sup>a</sup>	38.2 <sup>b</sup>	40.0 <sup>b</sup>	<0.0001	55.2 <sup>w</sup>	50.2 <sup>wx</sup>	44.2 <sup>xy</sup>	35.6 <sup>y</sup>	0.0002
Vitamin E	95.2 <sup>a</sup>	96.1 <sup>a</sup>	91.5 <sup>ab</sup>	87.5 <sup>b</sup>	0.0042	97.3 <sup>w</sup>	97.8 <sup>w</sup>	94.4 <sup>w</sup>	95.6 <sup>w</sup>	0.1833
Thiamin	14.7 <sup>a</sup>	6.3 <sup>b</sup>	1.8 <sup>bc</sup>	0.5 <sup>c</sup>	<0.0001	29.3 <sup>w</sup>	15.2 <sup>x</sup>	9.3 <sup>xy</sup>	5.4 <sup>y</sup>	<0.0001
Riboflavin	3.9 <sup>a</sup>	1.0 <sup>b</sup>	0.0 <sup>b</sup>	0.0 <sup>b</sup>	0.0018	13.1 <sup>w</sup>	2.5 <sup>x</sup>	0.5 <sup>x</sup>	0.0 <sup>x</sup>	<0.0001
Niacin	3.9 <sup>a</sup>	3.9 <sup>a</sup>	2.4 <sup>ab</sup>	0.0 <sup>b</sup>	0.1547	14.3 <sup>w</sup>	8.7 <sup>x</sup>	4.7 <sup>xy</sup>	2.0 <sup>z</sup>	<0.0001
Vitamin B6	40.7 <sup>a</sup>	30.4 <sup>b</sup>	11.5 <sup>c</sup>	3.5 <sup>d</sup>	<0.0001	68.0 <sup>w</sup>	54.5 <sup>x</sup>	32.6 <sup>y</sup>	13.2 <sup>z</sup>	<0.0001
Folate	26.4 <sup>a</sup>	9.2 <sup>b</sup>	1.8 <sup>c</sup>	1.0 <sup>c</sup>	<0.0001	54.1 <sup>w</sup>	28.9 <sup>x</sup>	11.6 <sup>y</sup>	3.9 <sup>z</sup>	<0.0001
Vitamin B12	6.9 <sup>a</sup>	1.5 <sup>b</sup>	0.6 <sup>b</sup>	0.0 <sup>b</sup>	<0.0001	19.7 <sup>w</sup>	7.2 <sup>x</sup>	3.7 <sup>xy</sup>	1.0 <sup>y</sup>	<0.0001
Iron	1.7 <sup>a</sup>	1.5 <sup>a</sup>	0.0 <sup>a</sup>	0.0 <sup>a</sup>	0.1161	3.1 <sup>w</sup>	0.7 <sup>x</sup>	0.0 <sup>x</sup>	0.0 <sup>x</sup>	0.0025
Magnesium	90.9 <sup>a</sup>	89.9 <sup>a</sup>	82.4 <sup>b</sup>	69.5 <sup>c</sup>	<0.0001	91.5 <sup>w</sup>	82.0 <sup>x</sup>	79.5 <sup>x</sup>	67.8 <sup>y</sup>	<0.0001
Zinc	52.8 <sup>a</sup>	45.9 <sup>a</sup>	32.1 <sup>b</sup>	15.5 <sup>c</sup>	<0.0001	50.6 <sup>w</sup>	38.3 <sup>x</sup>	25.1 <sup>y</sup>	13.7 <sup>z</sup>	<0.0001
Calcium	74.0 <sup>a</sup>	67.2 <sup>a</sup>	49.7 <sup>b</sup>	34.0 <sup>c</sup>	<0.0001	95.8 <sup>w</sup>	89.5 <sup>x</sup>	88.4 <sup>x</sup>	77.1 <sup>y</sup>	<0.0001
Vitamin D	95.7 <sup>a</sup>	95.7 <sup>a</sup>	95.2 <sup>ab</sup>	87.0 <sup>b</sup>	0.0010	99.2	98.9	98.6	99.0	0.9305

<sup>abcd</sup>Proportions within the same row with same letters are not significantly different (*P* < 0.01) (men).

<sup>wxyz</sup>Proportions within the same row with same letters are not significantly different (*P* < 0.01) (women).

TABLE 5: Adjusted\* mean body mass index for adults 55+ years and percent overweight or obese by quartile of cereal consumption (BMI ≥ 25) by RTE cereal consumption pattern (energy excluded).

Gender/age	Sample size	Quartile of RTE cereal consumption				Overall <i>P</i>	
		Mean BMI		Percent overweight/obese			
		Q1 0 Servings	Q2 1–3 Servings	Q3 4–7 Servings	Q4 8+ Servings		
Male ages 55+	803	28.19 <sup>a</sup>	27.96 <sup>a</sup>	27.36 <sup>ab</sup>	26.93 <sup>b</sup>	0.0332	
Female ages 55+	956	27.48 <sup>ba</sup>	28.22 <sup>ba</sup>	28.53 <sup>a</sup>	27.09 <sup>b</sup>	0.0607	
						<i>P</i>	
Male ages 55+	803	74.43 <sup>a</sup>	70.69 <sup>a</sup>	63.05 <sup>b</sup>	64.35 <sup>b</sup>	0.0433	
Female ages 55+	956	61.11 <sup>a</sup>	63.40 <sup>a</sup>	62.57 <sup>a</sup>	58.81 <sup>a</sup>	0.7575	
						<i>P</i>	
						Percent obese	
Male ages 55+	803	28.70 <sup>ab</sup>	30.61 <sup>a</sup>	24.42 <sup>ab</sup>	21.02 <sup>b</sup>	0.1111	
Female ages 55+	956	28.63 <sup>a</sup>	33.19 <sup>a</sup>	32.46 <sup>a</sup>	28.84 <sup>a</sup>	0.5622	

<sup>a,b</sup>Values within the same row with the same letter are not significantly different (*P* < 0.05).

\*Mean values adjusted for age, age<sup>2</sup>.

this study is based on 14 days of data. Measurement error due to within person coefficient of variation in food and nutrient intake is reduced in this study due to the collection of 14 days of dietary intake information. This study included a representative sample of an older US population. The sample size allowed for examining the association of RTE cereal consumption with nutrient intake and weight status in older adults, with analysis conducted separately for males and females. In addition, the nutrient and food group database NDSR is one of the most comprehensive databases available for diet research, including nutrients of interest such as vitamin D and few missing nutrient values.

One limitation of this study is that a number of factors that could potentially confound the association of RTE cereal with BMI were not assessed and therefore could not be adjusted for in the analysis. For example, it did not include

any measure of physical activity or ability to perform daily activities. Therefore, we do not know if this consumption pattern was associated with other lifestyle patterns, such as higher levels of physical activity. Another limitation is that BMI is based on self-reported measures of height and weight, and this is not the most reliable measure since people tend to overestimate their height and underestimate weight. Another limitation is the lack of reported portion size data. Reporting of portion size is one of the most error prone areas of dietary assessment. Portion size values were imputed from NHANES data where respondents are trained and use a variety of estimation tools however; reporting error is a potential issue. Finally, data on intake of dietary nutrient supplements was not gathered. Consequently, the association of RTE cereal consumption with nutrient intake could not be examined in the context of vitamin and mineral intake

for all sources. It is unknown if supplementation may help bridge the gap between usual nutrient intakes and dietary recommendations. RTE cereals are generally fortified and can contribute a significant proportion of nutrients to those who consume them.

Overconsumption of certain vitamins and minerals such as vitamin A, iron, and zinc can be a risk for older Americans who eat fortified products and use vitamin and mineral supplements [23]. A recent study found 37% of men and 47% of women age  $\geq 51$  years consume at least one vitamin or mineral supplement each day [23]. Data from the 1999-2000 NHANES found 63% of individuals  $\geq 60$  years in age consume some type of daily dietary supplements [24]. Many older Americans may be unaware of the risk of overconsumption of vitamins and minerals and more education about this concern is needed. In addition, food manufacturers need to consider this concern for the elderly population when deciding on how to fortify RTE cereal products.

The food grouping estimates in the NDSR database are not ideal of determining whole grain intake. Food items that were grouped as "some whole grain" were not included in this study due to the uncertainty of the amount of whole grain in the food. Foods grouped as "whole grain" were counted as all whole grain, when the food may have other ingredients and also may include some refined grains. The finding of higher levels of whole grain in the highest quartile of RTE cereal consumption makes sense considering the higher intake of fiber for this group and since RTE cereal is an important contributor of whole grain in the US diet.

## 5. Conclusion

Results suggest that ready-to-eat breakfast cereals may contribute to the nutritional quality of the diets of older Americans. Prospective studies and experimental trials are needed to better evaluate the role of RTE cereal consumption in energy balance.

## Authors' Contribution

A. M. Albertson and N. Joshi contributed to research design. A. C. Wold wrote the introduction and discussion for the paper. A. M. Albertson wrote the methods and results for the paper. N. Joshi did the data analysis. All authors read and approved the final paper.

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## Research Article

# Food Access Patterns and Barriers among Midlife and Older Adults with Mobility Disabilities

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We examined where midlife and older adults with a mobility disability accessed food outside the home in King County, Washington, USA, how they travelled to these food destinations, and facilitators and barriers to food access using qualitative interviews. Thirty-five adults aged  $\geq 50$  years with a mobility disability (defined as use of an assistive device for mobility) were interviewed. Supplemental objective information was obtained from a Global Positioning System device worn by participants for 3 days. Participants primarily accessed food at grocery stores, restaurants, and coffee shops/cafés. The most common transportation modes were walking, obtaining a ride from friends, motorized chair/scooter, and public transit. Location and proximity of food destinations were factors affecting participants' ability to access these destinations. Adequate space, ease of entry, available amenities such as restrooms, and helpful people were facilitators for participants to access food outside the home.

## 1. Introduction

The ability to access food is essential to life and health. Food access is defined as "having sufficient resources to obtain appropriate foods for a nutritious diet" and is one dimension of food security (defined as "including both physical and economic access to food that meets people's dietary needs as well as their food preferences") [1]. The prevalence of food insecurity was 7.9% among U.S. households with elderly individuals in 2010 [2]. Difficulty accessing food may negatively affect the nutritional status and health outcomes [3], especially in older adults [4, 5]. Food insecurity was previously reported to be associated with functional impairments in U.S. older adults [6]. Accessing food is a complex process requiring a location to access food, adequate financial and transportation resources, and the cognitive ability to plan and carry out accessing food.

Older adults and adults with a disability may have more difficulty accessing food due to physical limitations [7],

inability to drive, financial limitations, and environmental limitations, among other factors. Physical limitations are more common in older age: in 2009, 38.4% of adults  $\geq 65$  years reported physical limitations (difficulty in stooping, lifting, reaching, grasping, or walking, but no limitations in carrying out activities of daily living or instrumental activities of daily living) [8], and 60.8% of community-dwelling adults  $\geq 65$  years in 2010 reported difficulty with at least one basic action (defined as movement, emotional, sensory [seeing or hearing], or cognitive) [9]. Lower income is also more common in older age and in adults with disability [10]. As these physical and financial limitations increase, environmental limitations may be more difficult to overcome.

Available transportation is another important factor for food access, especially considering that reliance on cars is high in the U.S. [7, 11, 12]; adults may be less likely to drive with increasing age due to disability and cost. An Australian study reported that lack of car access was a barrier to accessing food, and that older adults were more likely to

lack car access [11]. Another study of 16 Australian adults reported that they most commonly walked to food shops, but also used several other transportation modes [12]. The built environment (human-made structures, e.g., buildings, roads, etc.) of potential food access destinations may also impair the ability of older adults and adults with mobility disabilities to access food. One study of grocery and convenience stores in Chicago found that while 63% of stores had an accessible entrance, none of the stores met all accessibility criteria [13]. While transportation and accessibility are key concepts in food access research, the perceptions of these characteristics are not well described. To date, there are few studies that explore how the built environment impacts the ability of adults with a mobility disability to access food.

We hypothesize that midlife and older adults with a mobility disability may face difficulty in accessing food. Food access was defined as going outside the home to obtain or consume food. The purposes of this study were to (1) increase understanding of where midlife and older adults with a mobility disability access food; (2) how they travel to food access destinations; (3) facilitators and barriers (including built environment) to accessing food. We undertook a qualitative study using interviews of adults aged  $\geq 50$  years with a mobility disability (defined as requiring an assistive device for mobility). Qualitative methods were used due to the lack of available studies about how this population perceives the built environment and to obtain robust descriptions of facilitators and barriers to accessing food. This approach is not frequently used in studying food access.

## 2. Methods

The Built Environment, Accessibility, and Mobility Study (BEAMS) was a pilot study conducted from October 2010 through September 2011 in King County, Washington, USA. Study procedures were approved by the Institutional Review Board at the University of Washington. The primary goal of BEAMS was to better understand built environment facilitators and barriers to physical activity in midlife and older adults with mobility disability by obtaining their perspectives [14]. Two sets of questions were also asked about utilitarian activities for goods and services, including food destinations. We conducted a qualitative study utilizing in-depth individual interviews in addition to obtaining participant travel information from Global Positioning System (GPS) devices. We chose interviews as the best method to obtain detailed information from study participants about their perceptions of the built environment, since there are few published studies about this topic.

Study eligibility criteria were as follows: age  $\geq 50$  years, use an assistive device for mobility, leave home  $\geq 3$  days/week, reside in King County, Washington, speak and read English, and allow study researchers to visit their residence. Our target study enrollment was 25–40 participants with the goal of reaching theme saturation (i.e., no additional new themes or concepts are generated from additional participant interviews) [15]. Participants were purposefully recruited through study announcements in relevant organizational

e-newsletters (e.g., senior center newsletters, Arthritis Foundation), as well as flyers distributed at senior centers, community events and other locations where older adults meet. Additionally, we recruited participants with a range of disability types, who used different assistive devices, and resided in diverse types of neighborhoods (e.g., walkability, income) in order to obtain a variety of perspectives.

Individuals who were interested in the study, met eligibility criteria, and gave verbal consent to participate were mailed a written consent form, GPS device (Qstarz BT-Q1000XT, Qstarz International Co., Ltd., Taipei, Taiwan), GPS instructions for use, and a prepaid return envelope. Participants wore a GPS device for 3 days (2 weekdays and 1 weekend day) prior to their interview to acquire objective information about where participants travelled to destinations. The home interview was conducted after the signed consent form and GPS device were returned by mail. Prior to the interview, study researchers printed color maps from the GPS device to serve as interview prompts.

Semistructured interviews were conducted at participant homes by two study researchers. One researcher interviewed the participant, while the other researcher took detailed notes using a laptop computer. The interviewer was in the participant's direct sight line, while the researcher taking notes sat to the side. Interviewers had a Bachelor's degree or higher in a health-related field (e.g., nursing, clinical psychology) and underwent a minimum of 5 hours of training, which included practicing with the interview protocol, conducting a formal practice interview with observation and feedback from the principal investigators (D. E. Rosenberg, B. Belza), and observing one of the primary investigators conduct an interview. The note takers were trained to use an Excel template in which they could quickly and easily fill in responses to each item of the interview guide. This training included being observed and provided with feedback during at least one-structured-practice interview session.

The interview protocol consisted of open-ended questions about facilitators and barriers to (1) accessing and using destinations while using the GPS device (up to 3 locations were discussed); (2) accessing utilitarian locations (e.g., grocery stores, shops) in the neighborhood (up to 10 locations discussed); (3) use of indoor and outdoor physical activity locations in the neighborhood (interview protocol available upon request from D.R.). In addition to assessing barriers and facilitators, we asked participants what transportation mode they used to travel to each location visited while wearing the GPS device. Immediately upon completion of the interview, the two study researchers who conducted the home visit debriefed about the interview and each confirmed the interview notes' content and accuracy.

Additional participant demographic and background data collected with a self-reported, written survey were age, race/ethnicity, checklist of health conditions, and checklist of assistive devices used. Census 2000 data were used to determine median household income at the census tract level. (Census tracts are small statistical subdivisions of counties with 2,500–8,000 persons, which are "designed to be homogeneous with respect to population characteristics, economic status, and living conditions." [16]). Census 2000

data were the most current census data available during the study period. Neighborhood walkability scores were generated using walkscore.com. Walkability is a measure of how easy it is to walk and live in an area [17]. Walkscore may be used to estimate proximity to walkable destinations [18]; scores range from 0 to 100 with higher scores signifying greater walkability. The U.S. Department of Agriculture's Food Desert Locator [19] was used to determine whether any study participants lived in food deserts. Food deserts are defined as "a low-income census tract [poverty rate  $\geq 20\%$  or median family income  $\leq 80\%$  of area's median family income] where a substantial number or share of residents has low access to a supermarket or large grocery store [ $\geq 500$  people and/or  $\geq 33\%$  of census tract's population resides  $>1$  mile from a supermarket or large grocery store]" [19].

For the purpose of this study, typed interview notes were specifically analyzed pertaining to accessing food outside the home. Content analysis (i.e., analyzing themes and concepts) was used to develop a start list of codes [20] using an inductive reasoning approach after review of the interview notes. Codes pertained to participants' reports of where they accessed food outside their home, how they travelled to food access destinations, their reasons for visiting food access destinations, and their perceptions of the indoor built environment at food access destinations. These codes were subcategorized into facilitators and barriers to accessing food destinations. Two study researchers (D. L. Huang, D. E. Rosenberg) reviewed the start list of codes and achieved consensus. As new themes were introduced by participants, codes were further refined during coding using both inductive and deductive reasoning approaches. An audit trail tracking the decision-making process was kept throughout the coding process. Coding was performed by two study team members (D. L. Huang, D. E. Rosenberg) and results were discussed to determine consensus for final coding. We achieved theme saturation as well as interrater agreement in coding. Descriptive analyses of demographic data and assistive device use were performed using SPSS version 19 (IBM, Armonk, NY, USA).

### 3. Results

Thirty-five participants were interviewed. Characteristics of study participants are shown in Table 1. Participants had a mean age of 66.8 years, were predominantly female and Caucasian, and used a variety of mobility assistive devices (some participants used more than one assistive device). The majority of participants reported not driving. Two participants lived in food deserts [19], and four participants lived in retirement facilities that provided food on-site in a dining room. These facilities were not counted as an out-of-home location or place to obtain food for home consumption.

**3.1. Types of Food Access Locations.** Participants accessed a variety of locations to obtain food (Figure 1). Grocery stores were the most commonly accessed out-of-home food location by study participants. Several participants reported accessing 2 or more different grocery stores. Participants

TABLE 1: Characteristics of study participants ( $n = 35$ ).

Characteristic	Value
Age in years, mean $\pm$ SD (range)	66.8 $\pm$ 9.4 (50–86)
Sex, $n$ (%)	
Male	9 (25.7)
Female	26 (74.3)
Race/ethnicity, $n$ (%)	
Caucasian	30 (85.7)
African-American	2 (5.7)
Asian	1 (2.9)
$\geq 1$ race	1 (2.9)
Walkscore, mean (range)	67 (18–98) \$46,199
Household income, median (range)	(\$25,821– \$94,179)
Reside in low-income (<\$35,000) census tract, $n$ (%)	9 (25.7)
Reside in food desert, $n$ (%)	2 (5.7)
Participants living in facilities that provide meals, $n$ (%)	4 (11.4)
Type of assistive device, $n$ (%)	
Cane	20 (57.1)
Walker (2- or 4-wheeled)	20 (57.1)
Electric wheelchair or scooter	9 (25.7)
Manual wheelchair	7 (20)
Other	4 (11.4)
Participants who drive, $n$ (%)	7 (20)

also visited food banks, warehouse stores, farmers markets, convenience stores, corner stores, and drugstores to obtain food (see Figure 1 for the number of participants who reported going to various types of food locations). Destinations accessed for food consumed outside the home included restaurants (both full-service and fast food), cafés/coffee shops, senior centers, and shopping malls. Most participants went to more than one type of destination to access food. Participants who lived in facilities that provided on-site meals also accessed food outside the home at locations such as grocery stores and restaurants. Three participants reported that family members regularly brought food to their homes (e.g., family purchased groceries for participant).

**3.2. Types of Transportation to Food Access Destinations.** Transportation used by participants included active (e.g., walking) and passive (e.g., using a motorized chair or scooter, paratransit) modes to access food locations (Figure 1). The majority of participants reported using one transportation mode, but others reported using 2 or more modes of transportation to access food. These participants used combinations of walking, public transit, paratransit, rides from friends or family, and vans or shuttle services provided either by their residence or an organization (e.g., senior center).

**3.3. Factors Impacting Choice of Food Destinations.** Reasons for visiting (or not visiting) food access destinations were categorized into three major themes: destination factors,

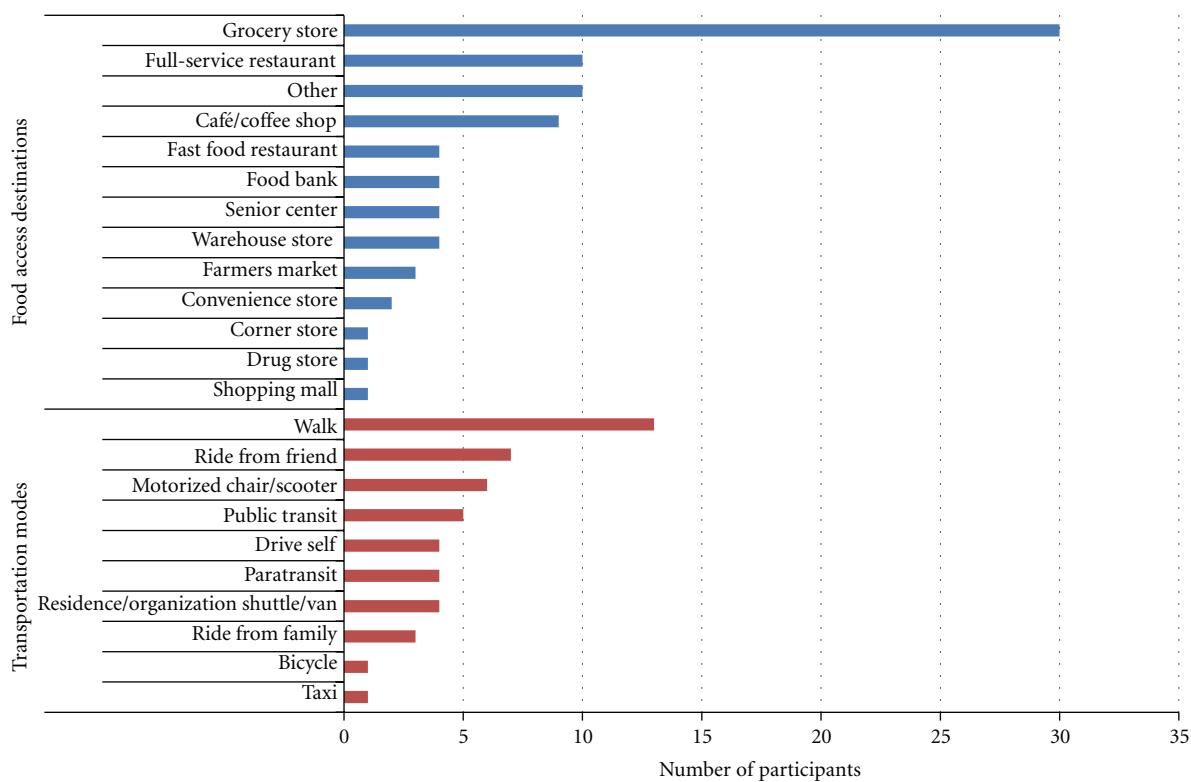


FIGURE 1: Counts of food access destinations and transportation modes used by study participants.

participant factors, and outdoor built environment (Table 2). Barriers to accessing food destinations included all three themes; facilitators to access included destination and participant factors.

**3.3.1. Destination Factors.** Location and proximity were frequent destination factor subthemes. Some participants reported visiting food destinations because of their proximity to other locations with goods and services, such as drugstores and banks. Cost was another common subtheme of destination factors: participants chose where they shopped for groceries and ate meals outside the home (e.g., restaurants, senior centers) based on cost.

**3.3.2. Participant Factors.** Subthemes included participants' preference for certain stores, usually based on product availability and selection. Some participants also reported going to food access destinations in order to socialize and stay active.

**3.3.3. Outdoor Built Environment.** Outdoor built environment characteristics were primarily perceived as (1) barriers to accessing certain food destinations and (2) transportation barriers to food destinations. These included lack of sidewalks, obstructed roads (e.g., parked vehicles, construction), hills and lack of public transit to food destinations.

**3.4. Facilitators and Barriers of Food Access Destinations.** Four themes emerged as key facilitators and barriers for visiting

food access locations (Table 3). These included (1) space, (2) entry/accessibility, (3) amenities, (4) people.

**3.4.1. Theme 1: Space.** This theme included participants' general perceptions of (a) adequacy of space to carry out their intended activity (e.g., grocery shopping, drinking coffee at a coffee shop) while using a mobility assistive device, (b) ease or difficulty navigating the destination, and (c) general destination features. Participants reported that wide, unobstructed aisles facilitated shopping in grocery stores, while a common barrier was narrow aisles. Obstructed aisles, including displays in aisles and other shoppers' carts, were also commonly reported barriers to navigating grocery stores. Other examples of barriers included crowds and closely spaced tables and chairs at restaurants. Additional facilitators to navigating food destinations included elevators to access different floors, no stairs (destination on a single level), and stable product layouts. Built environment barriers to navigating destinations included escalators or stairs to access different floors, small elevators, changes in product layouts (e.g., items periodically moved to different locations in store), a large number of store aisles, and poor signage. General features that participants reported to be facilitators included clean flooring (slippery or uneven flooring were barriers), adequate light, and whether the destination followed the American with Disabilities Act Standards for Accessible Design.

**3.4.2. Theme 2: Entry/Accessibility.** Ease of entry to the food destination was a common theme among participants.

TABLE 2: Factors impacting choice of food access destinations.

Factors	Facilitators Theme/concept	Barriers Theme/concept
Location	Close proximity/ease of travel	Long distance
	Proximity to other locations (e.g., other goods and services) to group errands	
	Lower cost/affordability	Higher cost
	Facility follows ADA Standards for Accessible Design	Difficult entry
Participant	Larger size of location	Small size of location
	Product availability and selection	Lack of handicapped parking
	Preference for store and products	Crowded parking lot
	Smaller shopping trips	
Outdoor built environment	Leave home to eat, socialize, activity	Limited by product selection
		Difficulty carrying purchases
		Lack of sidewalks
		Obstructed roads
		Highways
		Hills
		Lack of public transit

TABLE 3: Facilitators and barriers of food access destinations.

Theme	Facilitators Concept/theme	Barriers Concept/theme
Space	Adequate space	Inadequate space
	Ease of navigation	Navigation difficulty
	Helpful general features	Unhelpful general features
Entry/accessibility	Ease of entering destination	Difficulty entering destination
	Seating available	Seating unavailable
	Restrooms	Restroom features inadequate
Amenities	Drinking fountains	
	Shopping cart as assistive device for mobility	
	Availability of electric shopping carts	Lack of electric shopping carts
People	Good service	Poor/suboptimal service
	Helpful family, friends, and caregivers	Inattentive fellow customers

Doors and entries were the two subthemes. Facilitators were automatic doors, lightweight doors, entries that were conveniently located, flat, at street level, and without an entry ramp or stairs. Barriers were heavy doors, doors that opened outward, two sets of entry doors, raised thresholds and door mats, poorly located entries, and the presence of stairs. One participant reported that an entry ramp was a barrier, because it was difficult to simultaneously open the entry door and control her assistive device on the ramp.

**3.4.3. Theme 3: Amenities.** A number of participants reported using shopping carts as an assistive device for support and mobility in stores. Participants also stated that the availability of electric shopping carts was a facilitator to food shopping and the lack of these carts was a barrier. Participants reported availability of seating and accessible restrooms as facilitators for accessing and utilizing food destinations. Lack of available seating to rest was a barrier. Seat height (which affects the ability to sit down and rise from seating) and space to sit with an assistive device were subthemes. Accessible restrooms with adequate space

and doors that were easy to open were facilitators for use. Restrooms without accessibility features were reported as barriers to use. One participant specifically mentioned poor placement of grab bars affected his ability to transfer to and from the toilet, as well as urinals not designed for those using wheelchairs. An additional amenity facilitator was the availability of accessible drinking fountains.

**3.4.4. Theme 4: People.** The major theme was quality of service given by food access destination staff/employees. Poor or suboptimal service was reported by a few participants, though typically not at grocery stores: one participant reported rude volunteers at a food bank. Examples of suboptimal service included long waiting times for service and unavailability of table service. One participant mentioned avoiding certain food destinations because table service was not available; she preferred going to destinations with table service due to difficulty carrying food to a table while using an assistive device. Good service was a facilitator reported by several participants, which included destination staff/employees, and paratransit and shuttle service drivers. Examples

of good service included assistance with bringing groceries to the participant's vehicle, reaching items on high shelves, and opening doors. Some participants reported visiting certain grocery stores because employees knew them. Another theme noted was having helpful family, friends, or caregivers to access food destinations (facilitator); inattentive fellow customers were a barrier. One participant mentioned nearly being knocked over by another customer's shopping cart.

#### **4. Discussion**

Midlife and older adults with mobility disability in our study accessed a variety of food destinations and utilized several different modes of transportation to these destinations. Many participants accessed more than one type of food destination and used more than one transportation mode. This included participants who lived in facilities that provided on-site meals; these participants also obtained groceries from facility "field trips" to grocery stores or from family members who brought groceries to their home. Additionally, many of those who accessed grocery stores reported going to more than one store. This demonstrates how our study participants adapted to carrying out these instrumental activities of daily living (shopping and transportation), despite their mobility and transportation limitations. While most participants used passive forms of transport (e.g., by automobile) to food destinations, thirteen participants reported walking to food destinations. This indicates that having food locations in proximity to where older adults live can promote physical activity as well as food access among people with mobility disabilities. An interesting concept that was not fully captured in these interviews was the amount of time some participants spent accessing food. For example, some participants reported devoting a certain day of the week to obtain food; one participant reported regularly visiting more than one food bank.

Location and proximity of food access destinations were important factors for our study participants. Interestingly, some participants reported accessing food in combination with carrying out other utilitarian activities such as going to the bank or to the doctor. One participant reported that she preferred to visit the grocery stores near a senior center (not in her neighborhood), because it was close to several other locations with goods and services. The two participants who lived in food deserts also spoke about the importance of location and proximity of food access destinations. Cost was another important factor for study participants in determining where they chose to access food. This is not surprising given that older adults are more likely to have a fixed income. Some participants also reported travelling farther from their residence to access food at a lower-cost destination. Preference for certain food access destinations was also important, but location, proximity, and cost seemed to carry greater weight in where our study participants chose to access food.

The perceived indoor built environment barriers and facilitators pertained to adequate space, ease of accessing multiple levels at destinations, ease of entry, and available amenities at food access destinations. Door features were

frequently noted by our study participants, particularly doors that were difficult to open due to heavy weight and location (e.g., located at top of entry ramp). Amenities such as available seating and accessible restrooms were also important to participants. An interesting nonbuilt environment finding was the impact of helpful people on accessing food destinations. Participants appreciated friendly employees at these destinations and availability of extra assistance. Additionally, participants liked the extra help they received from paratransit and shuttle/van drivers. For example, one participant reported that the van driver for a senior center carried her groceries from the store to the van and from the van to her home.

Our findings must be couched within the context of the study limitations. A limitation of our study was that we did not audio record and transcribe the interviews due to participant concerns. Early in the recruitment process, our target population voiced concerns about being audio recorded. Many participants received government assistance for housing and transportation, and were concerned about the potential implications of being audio recorded for receiving these benefits. However, the credibility of our findings was enhanced by our training procedures for both interviewing and taking interview notes. In addition, the coders achieved consensus during the coding process even with their differing levels of interview involvement (D.H. was not involved in participant interviews, D. E. Rosenberg either conducted or took notes for approximately one-third of the interviews) and their different disciplinary backgrounds (geriatric medicine, clinical psychology, and public health).

An additional limitation of this study was that BEAMS' primary focus was to understand the impact of built environment on physical activity, though participants were interviewed about utilitarian activities (including food access). This likely influenced the depth of participant responses about food access, though accessing food was a topic initiated by many of our study participants. However, accessing food was one of the most important utilitarian activities that our participants needed to accomplish, and food locations were the most common destination visited while participants wore the GPS device. This finding must be cautiously interpreted given that 3 days is a relatively short time period to monitor mobility, but it illustrates the importance of addressing food access among this population of midlife and older adults with mobility disabilities. Other limitations of the study include that we specifically recruited participants who leave their homes at least 3 days per week, so we did not obtain the perspectives of those who are home-bound and likely face additional challenges to accessing food. Additionally, our participants were fairly culturally homogeneous (predominantly Caucasian and female).

The key strengths of our study are that it provides insightful information about where midlife and older adults with mobility disability accessed food, how they travelled to these destinations, reasons for accessing particular food destinations, and their perceptions of the indoor built environment and other factors at these destinations. Our use of qualitative methods allowed us to obtain information that would be otherwise difficult to capture using other research

methods. Our findings are difficult to compare to previous studies, because these studies have not examined the types of destinations older adults with disabilities access for food, or many of the facilitators or barriers to food access. Since there is a lack of previous studies available about this topic, we feel our findings provide useful information.

Accessing food is essential to life and can become more difficult with older age and mobility disability. Consideration needs to be given to how our aging population will access food, principally where grocery stores are located and proximity to different modes of transportation (especially public transit where available). Urban planning should particularly consider proximity of food access destinations to other destinations with goods and services, as this may help older adults continue to live independently in the community. Attention to easy pedestrian access (e.g., short, well-marked, and protected routes) would facilitate visiting multiple destinations. Food access destinations should also take into account the needs of this population, especially the need for adequate space and ease of entry while using an assistive device. Future studies should include determining how food access can be better understood and improved in order to prepare for the growing population of adults aging with a mobility disability. Improved understanding of how the types of food destinations relate to caloric intake and diet quality among older adults with mobility disabilities would also be helpful for future research efforts. Overall, further research of maintaining food access for adults aging with mobility disability would ideally impact public policy, urban planning, and businesses to help older adults function and thrive in their communities.

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## Research Article

# Learning from “Knocks in Life”: Food Insecurity among Low-Income Lone Senior Women

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Building on earlier quantitative work where we showed that lone senior households reliant on public pensions in Nova Scotia (NS), Canada lacked the necessary funds for a basic nutritious diet, here we present findings from a qualitative study involving in-depth interviews with eight low-income lone senior women living in an urban area of NS. Using a phenomenological inquiry approach, in-depth interviews were used to explore lone senior women’s experiences accessing food with limited financial resources. Drawing upon Bronfenbrenner’s Ecological Systems Theory, we explored their perceived ability to access a nutritionally adequate and personally acceptable diet, and the barriers and enablers to do so; as well in light of our previous quantitative research, we explored their perceptions related to adequacy of income, essential expenses, and their strategies to manage personal finances. Seven key themes emerged: world view, income adequacy, transportation, health/health problems, community program use, availability of family and friends, and personal food management strategies. World view exerted the largest influence on seniors’ personal perception of food security status. The implications of the findings and policy recommendations to reduce the nutritional health inequities among this vulnerable subset of the senior population are considered.

## 1. Introduction

In 2008, we published unique work addressing the question of whether Canada’s public pensions, Old Age Security<sup>1</sup> and the Canada Pension Plan<sup>2</sup>, provide adequate income for four hypothetical senior households living in Nova Scotia (NS) to afford a basic nutritious diet [1]. This was the first published study using food costing<sup>3</sup> data to investigate the sufficiency of public financial programs targeted at seniors. Results showed that single-member households in NS in 2008 lacked the necessary funds, with monthly deficits estimated to be as high as \$224.18 if they were to purchase a basic nutritious diet.

The province of NS is home to the oldest population in Canada, with 16.5% of its residents over the age of 65 years; the majority of which are women [2]. As elsewhere [3], senior women in NS are disproportionately impacted by poverty.

In 2006, almost one-third of lone senior women lived below the before-tax low-income Cutoff (LICO)<sup>4</sup> Canada’s unofficial poverty line, compared to one in five men who lived alone [4]. In NS, 74% of seniors living below the LICO are women [4].

## 2. Purpose

The purpose of this paper is to explore the phenomenon of food insecurity for low-income lone senior women living in NS. This study used in-depth interviews to explore lone senior women’s experiences accessing food with limited financial resources. We explored their perceived ability to access a nutritionally adequate and personally acceptable diet, and the barriers and enablers to do so; as well in light of

our previous quantitative research [1], we explored their perceptions related to adequacy of income, essential expenses, and their strategies to manage personal finances.

### 3. Background

The United Nations' Food and Agricultural Organization states that "food security exists when all people, at all times, have physical and economical access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life" [6, page 1560]. An assured ability to acquire acceptable foods in socially acceptable ways is also considered a key component of being food secure [7]. The easiest way to understand food insecurity is lack of financial resources to purchase food needed and wanted; however, in some of the pioneering research, which came out of Cornell University, on hunger and food insecurity, Radimer and colleagues [8] found that two dimensions of food insecurity existed: an individual dimension and a household dimension with each dimension containing four components: quantitative, qualitative, psychological, and social.

The quantitative and qualitative components of food insecurity are the most easily measured: experiencing hunger, going without food, or having to eat less food than usual, and consumption of nutritionally inadequate meals. Individuals reporting food insecurity are significantly more likely to consume less energy and other key nutrients than those self-reporting as having sufficient food [9, 10]. The psychological component to food insecurity is exemplified by an individual's anxiety over their food situation, such as wondering where their next meal will come, while the social component is manifested by socially or culturally less normative patterns of eating (e.g., skipping meals), and acquiring food in socially unacceptable ways (e.g., using a food bank) [8]. While these characteristics have been documented among senior populations in the US by Wolfe et al. [5], they also found that having the right foods for health and anxiety over not having these specific health-related foods are phenomena within the qualitative and psychological components of food insecurity that are unique to seniors.

Other food security research focusing on seniors has also found that finances are not the only limiting factor for seniors to access acceptable and adequate food. Upon analyzing in-depth interviews with 145 adults, age 70 years and older, living in rural North Carolina, Quandt and Rao [11] revealed that barriers to food security in rural American seniors were associated with material (e.g., low-income), social (e.g., limited family network), and health (e.g., presence of disease or disability) related factors. Dean et al. [12] report that among older and senior adults in a largely rural area of central Texas, food insecurity is associated with diminished social capital (limited access to community and familial resources) and perceptions of personal disparity in comparison with others. Single, widowed, or divorced persons also reported higher levels of food insecurity, related in part to limited familial social capital [12]. Reliance on

others for help with food-related activities such as grocery shopping and meal preparation can influence food intake and can be considered part of the concept of food insecurity among older adults [13].

There is also the "generational lens" through which seniors view the world. Other work completed by Quandt and colleagues [14] suggests that pride, self-sufficiency, and "you cannot always get what you want" attitude are aspects of the generational lens that colour the nature of food security for seniors. These "senior-relevant" factors highlighted by researchers in the US suggest that what food security means to seniors, and therefore how they manage their ability to access food is different than younger populations' views of food security. However, Canadian research in this area is lacking. Given the different history and health and social systems in the US, it is not clear whether pride and a self-sufficient attitude would play the same role in a Canadian senior's meaning of food security.

These newer "senior-relevant" factors also suggest the possibility that Canada's current food security measurement tools, which focus on low-income as the most significant determinant of food insecurity [15], may not accurately capture the other major enablers and barriers seniors face in accessing sufficient, quality foods in socially acceptable ways. It is possible we are not understanding and therefore not capturing the full picture of food insecurity among seniors.

The negative relationship between food insecurity and one's ability to access a nutritious diet and mitigate risk for chronic disease is well understood. Chronic diseases commonly impacting seniors such as cardiovascular disease and cancer are used to exemplify the relationship between insufficient access to nutritious food and the resulting poor health outcomes [16–18]. Therefore, understanding how a particular group of seniors—lower income senior women living alone in Nova Scotia—attempt to maintain food security, can provide insights to the necessary policies and programs needed to reduce the nutritional health inequities among this vulnerable subset of the senior population.

### 4. Theoretical Framework

An ecological model was used to frame the participants' perceived realities regarding their ability to access a nutritionally adequate and personally acceptable diet, the barriers and enablers to do so; as well their perceptions related to adequacy of income, essential expenses, and their strategies to manage personal finances, guiding our approach to addressing our research purpose. Ecological models reveal that individual behaviours such as food procurement patterns are influenced by biological, demographic, psychological, social/cultural, environmental, and policy variables. Bronfenbrenner's Ecological Systems Theory [19, 20] was used as a framework to examine the many different areas in the seniors' environment where these variables exert their influence.

Three key themes characterize ecological systems theory. First, individuals are characterized as embodied within a system comprising a nested arrangement of structures.

The first of these structures, the microsystem refers to the face-to-face interactions within immediate settings such as home, neighbourhood, and informal social networks. The mesosystem comprises the relationships between and among the immediate settings, for example, family, seniors' centres, and community facilities. The exosystem consists of the social structures, both formal and informal, removed from the individual but yet functioning at the local level to regulate and control their everyday lives within the *microsystem*. These structures include the major institutions within society rendered visible through the implementation of policies and practices at the local level. Examples include mass media, government agencies, and social networks. *Macrosystems* may be defined as the overarching meaning systems, conveyed symbolically through culture. Macrosystems such as religious, political, legal, economic, health, and social systems are understood in ecological theory not just as reified structures but also as carriers of ideology that construct a "world view" that, both implicitly and explicitly, shapes experience at all other levels of the environment [21, 22].

Second, the conceptualization of the levels of the environment as a *nested* arrangement of structures implies that they are not mutually exclusive. Rather, it is assumed that a system cannot be understood when broken into its component parts or when separated from its context. Transactions flow bidirectionally from the outer level (*macrosystem*) inward, and conversely, from the inner level (*microsystem*) outward. These reciprocal exchanges are vital to maintaining the equilibrium of individuals, a proposition that has significance for this research.

Third, ecological theory brings into view the *interdependencies* that exist between immediate environments and broader systems. Change in one part of the system will stimulate changes in other parts. An ecological approach facilitates and emphasizes consideration of the impact of multiple and overlapping influences in addressing food security issues.

## 5. Methods

**5.1. Data Collection and Sampling.** Eligible participants were women 65 years of age or older, who lived by themselves in a noninstitutionalized setting (i.e., independent) in urban NS, and who were in receipt of the Guaranteed Income Supplement (GIS)<sup>5</sup>. Women living by themselves who had a spouse in a nursing home, hospital, or other type of institution were ineligible to participate. Interviews took place over the course of four months between June and September 2007. Lone senior women were the focus of this research as national statistics show this subgroup of the senior population at greatest risk for poverty and the most likely to not access all the financial benefits available [4, 23], and our previous research suggest seniors living alone are more likely to be unable to afford a nutritious diet than those living with a partner [1]. Sampling was done using purposive and snowball methods, using site-based recruitment through health care agencies and seniors' centres. Data collection and analysis continued concurrently until theoretical saturation was reached at eight participants.

Women participated in semistructured face-to-face interviews. The interview guide used to facilitate the interview was formulated using Radimer's conceptualization of food insecurity and hunger with its individual and household dimensions and four components: quantitative, qualitative, psychological, and social [8]. The intent was to use this framework to draw out health and world view as distinguishing features of food security in the elderly. The interview guide also contained questions developed by the Institute for Research on Poverty [24] dealing with how study participants procured and prepared food, their typical daily food routine, and asked questions about a time (if relevant) when they had difficulty getting enough food. Lastly, the interview guide asked participants to review hypothetical affordability scenarios comparing monthly income to expenses constructed in our earlier work [1] to gain their perspective on adequacy of Canadian public pensions to afford the food they needed and wanted, as well as other essential expenses. Broad, open-ended, semi-structured questions with probes were used.

Interviews took place in participants' homes or a location of the participant's choosing. Interviews were conducted in English, lasted between 60 and 120 minutes, were digitally recorded and transcribed verbatim. Journal and field notes were also recorded directly following the interviews. All participants were offered the opportunity to review their transcript. Study procedures were approved by Mount Saint Vincent University's Ethics Review Board.

**5.2. Data Analysis.** During the analysis, a phenomenological approach [25], in combination with a conceptual framework based on Bronfenbrenner's ecological model [20], was used to explore senior women's perceptions of their lived realities. Phenomenology is used to uncover the meaning behind a phenomenon, it goes beyond simply describing an experience, seeking to arrive at a structural description of the experience and expose the underlying and precipitating factors that account for what is being experienced [26].

Transcribed interviews, journal and field notes were imported into NVivo 7.0, a qualitative data analysis software program (QSR International, 2007). One of the authors (RGL) analyzed transcripts by systematically coding text, informed by the interview guide topics and themes that emerged from the data corresponding to environmental levels in Brofenbrenner's Ecological Systems Theory (microsystem, mesosystem, exosystem, and macrosystem) [19, 20]. Later, findings and links to the conceptual framework were strengthened through investigator triangulation.

## 6. Results

**6.1. The Participants.** Of the eight women who participated, four were 65–74 years of age and four were 75 years or older. All women rented their dwelling: one lived in a duplex, one in a townhouse complex, one in an apartment building, and five lived in senior-oriented apartments. Seven of the eight women lived in subsidized housing, meaning their rent was based on a percentage of their income, while the eighth participant paid market rent for her duplex. One woman

was never married while the other participants lived alone because they were either widowed or divorced. All women received the basic OAS pension and GIS. Four women received a Canada Pension, the result of their contribution to the Pension Plan when they were previously employed. Two women received survivor's benefit through the CPP. Only one woman reported receiving a private pension, although it only amounted to \$73/month after working almost 25 years. None of the women owned a car; health reasons and finances were the main impetuses for "giving up" their vehicle.

As the women talked about their experiences managing finances, accessing the food they needed and wanted, and how they viewed their situation, seven main themes emerged depicting their perception of their food security status. These themes can be placed within the four interconnected layers of the seniors' environment as defined by Bronfenbrenner: (1) at the macrosystem level, *world view*, (2) within the exosystem, *income adequacy*, (3) at both the exo- and mesosystems levels, *transportation related factors*, (4) at both the exo- and microsystem levels, *health/health problems*, (5) within the mesosystem, *community program use*, (6) at the meso- and microsystems, *availability of family and friends*, and (7) within the microsystem, *personal food management strategies*. Figure 1 provides a visual map of the meaning of food security to these women, organized according to Bronfenbrenner's Ecological Framework.

**6.2. World View (Macrosystem Factor).** All of the women in this study met the criteria (according to its definition) to be classified as food insecure. They all used various coping skills to bring food into the house, such as accessing food banks, stretching meals, relying on credit; however, interestingly, none of them perceived themselves to be food insecure. At one or more points in the interview, participants were asked if they could recall a time in their life since they were a senior and living on their own when they had difficulty getting the food they needed and wanted. Some shared stories of going hungry in the past, such as when they were caring for their children or when they were first on their own without their spouse, but none considered their current situation as food insecure. A world view, or generational lens, develops as a result of past life experiences, cultural and religious beliefs and personal belief systems, and contribute, to the women's self-perceived food security status.

These women had a general contentedness about their diet, their life, and general circumstances. As stated by one participant: "*No, because as I say I've been doing good the way I've been doing now for many years and I've got no complaints with any of it. I've got a roof over my head and I've got food to put in my stomach and my doctors tell me I'm doing good so there's nothing else I could want. I mean there's a lot of people that can't say that.*" Although this woman was content with her life, she accessed a nearby food bank frequently, sometimes weekly. Despite needing to access food in a socially unacceptable way on a regular basis she perceived nothing problematic with her situation—due to her resourcefulness she did not lack food. A sense of resilient self-sufficiency was detected in the women interviewed, as

most spoke about needing to be vigilant about their spending to assure that bills could be paid and assuring they had enough for the expenses they needed versus what they wanted. It was evident in talking with them that they had been through a lot and could manage most things that might come their way. "*I had a hard time bringing up my children, and you learn from your knocks in life eh? Don't want to go through those again, I got to look after me, and I am, I'm looking after me.*"

The lives all of these women were impacted in some way by the Depression and World War II so they understood the need to be resourceful and not wasteful. Some were lone parents, as were these two participants: "*No I've never ever went hungry, the only time I've ever went hungry when I was with my children*". "*Because I went for quite a few years where I didn't get enough to eat because I had to make sure my children were eating.*" Experiencing hunger earlier in life shaped how they saw their current situations; by definition, the participants experienced food insecurity within the quantitative component.

All eight women acknowledged factors hindering their access to food; however, they perceived the strategies they took to overcome the obstacles as either acceptable or just a fact of life; just something you do if you're old, poor, and so forth. None of the participants identified themselves as living in poverty or being in great need, or even want. The generational lens through which they viewed their situation allowed them to compare their current situation to situations in the past where they faced extreme financial difficulties; relative to more difficult times, they perceived their current income to be adequate, in other words, their perspectives were colored by their prior experiences and resultant world view.

**6.3. Adequacy of Income (Exosystem Factor).** As the women reviewed the affordability scenarios created in our previous work that compared monthly income to monthly basic expenses for two hypothetical lone senior households [1], the women were very candid in disclosing how much income they received each month and what bills their income went towards. The biggest lesson from their stories was the role of GIS and income/geared housing in protecting the funds remaining for food, and the importance of a "med-alert" type device and cable TV, two expenses which the participants deemed to be essential.

In general, the women were appreciative of the pensions they received, they were thankful to have a reliable monthly income; however, there were notions that they could use a bit more. "*Old Age Pensions and that? Well I tell ya, they could be more. They could be more. Of course, now this is a God send, what I get now compared to what I got then...when I was on mothers' allowance.*" Another participant shared: "*Oh, I'm always just about at the end of it at the end of the month... nobody's gonna get rich when I go, there'll be no fighting over my money!*" Public Pensions programs exist at the exosystem level, they are formal programs removed from the individual, but yet functioning at the local level to regulate and control their everyday lives and ability to access food.

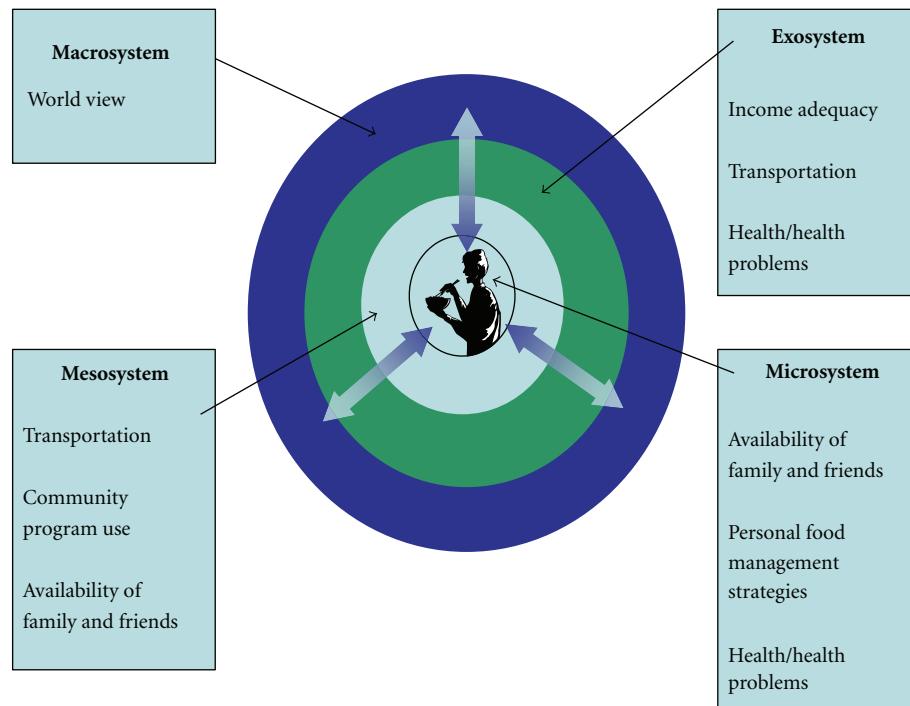


FIGURE 1: How low-income lone senior women living in NS experience food security, organized according to Bronfenbrenner's Ecological Framework.

Another significant example of a social structure directly impacting seven of the eight interviewed women's lives was the provincial senior social housing program. Two of the participants explain: "Every year you have to call Ottawa and get them to send you a letter saying exactly what you're getting then you give that to Housing and they figure out 30% of it, they take. And the rest you've got for your TV and your phone and your groceries and to live on. It doesn't leave you a lot... Before you get your Old Age pension you only pay 25% of what you're getting, but once you hit 65 you pay 30%..."

"[Housing] always take a third because that's their share of the rent. Every time rent comes up they take a third of that, whatever you get, so they can't put any more on for rent, because it's subsidized housing." This controlled rent expense meant despite the adequacy or inadequacy of their overall income, seven of the eight women never had to pay a disproportionate amount on shelter; thus their funds could be better distributed to other necessary expenses.

While none of the women conveyed that their food intake suffered because of inadequate income, due to their various coping strategies, what did seem to suffer was their social life. For example, participants commented, "Like I never go to movies, the last time I went to a movie I took my children by their hands to see Herbie The Love Bug. They're now 46 and 43. Because I can't afford to go to movies." or "No I can't afford to go out [to dinner], unless one of my children, my daughter she generally takes me out on Mother's Day and on Christmas I generally go down to her place... but no I eat by myself."

Although admittedly it wasn't a necessity, cable TV was viewed as an important component of their daily routine and helped to address the isolation these women experienced.

Many watched television while eating their meals alone, and many would watch their favourite shows to help pass the time. "*If you don't have cable you can't watch TV... like I've got digital cable because I can't go out. I mean the girls will come in to play cards and sometimes we'll go to Bingo every once and a while but that [cable] is the only enjoyment I have, know what I mean?*" Within the context of these low-income lone seniors' lives, cable was essential to help them cope with their situation, to help improve their quality of life.

**6.4. Transportation (Exo- and Mesosystem Factor).** The cost and feasibility of transportation was a major reoccurring theme during all interviews. None of the women owned cars, many had mobility issues, and all depended on family, friends, or neighbours to access grocery stores, medical appointments, or church.

Even the municipal accessible bus service did not meet the needs of some of the participants to access the foods they needed and wanted. Changes in the bus routes and a policy stating the accessible bus would only venture a certain number of meters off the urban transit (nonaccessible) route meant one participant could no longer rely on this service. Another participant noted how far in advance she would have to schedule the bus. "*You have to give exactly two weeks notice and then they'll work you in. So therefore you have to make your appointments [well in advance] ... And you [referring to interviewer] can get up in the morning and say I think I'll go get groceries today... we can't do that.*"

Within the mesosystem layer of the women's environment, family and friends provided the transportation to

enable access to food for six of the eight women. The senior woman is involved in her mesosystem environment albeit not as intensely, as she will not have as much control at this level because it will always involve influence from another party (e.g., the family member or friend). While family and friends were the primary source of transportation for six of the women, for others family members were dispersed across the country, or of those that lived nearby some were unable or unwilling to provide this service for the participants on a consistent, reliable basis.

**6.5. Health and Health Problems (Exo- and Microsystem Factor).** A myriad of health problems affected this group of women: five suffered from arthritis or joint pain, four had Type 2 diabetes, four had hypertension, three had some type of digestive disorder, three had full or partial dentures, two were on medication for dyslipidemia, and two were cancer survivors. Stroke, thyroid problems, cardiovascular disease, and severe food allergies were reported once each. Overall, the main health problems contributing to food insecurity were physical and mobility limitations. The participants' multiple health issues required various medications, thus resulting in these women being regulated by drug plan policies. For six of the women enrolled in the provincial seniors' Pharmacare<sup>6</sup> program, they greatly benefited from the policy that exempted all seniors in receipt of the GIS from paying the annual premium associated with Pharmacare. The copayment policy also protected them from paying extreme costs at the pharmacy—the plan is structured so seniors pay a certain percentage of the total prescription cost at the pharmacy up to a maximum amount of (at the time of study) \$30 for each prescription, with an annual maximum of \$382. One participant explains: “We gotta pay 30% . . . it doesn’t matter how much my medication comes to, you still only pay \$30. Now this here [referring to a prescription], it’s \$96.95 but you still only pay \$30. And same with my cholesterol pills, you still only pay \$30. Those cholesterol pills are \$133.82. But I still only pay \$30. It doesn’t matter if they were \$500, you’d still only pay \$30.”

Saving money on medications and health benefits was important so that money could be better distributed to other parts of the budget, despite loss of services. One of the participants, formerly with her deceased husband’s employer’s insurance company, shared that once she turned 65 years of age and was eligible for Pharmacare she took advantage of the cheaper drug insurance plan, despite losing some health services. “Yeah, I dropped Blue Cross; the thing was costing me a lot of money. But I used to be able to get some therapy for my arthritis, they’d pay for that but Pharmacare don’t pay for that.”

Throughout the interviews, as the women reviewed the affordability scenarios created in our previous work [1], an emergency response-type service was often mentioned as an essential expense, where the client wears a button, as a pendant or bracelet, which activates a speakerphone putting them in touch with the operator who in turn phones a first responder. A couple of the participants shared stories of how this service has alleviated the fear of having a fall when

living alone. “I call it my panic button. Oh I’ve used it a lot.” One woman was adamant that it should be built into the Pharmacare program. “I think not enough have it. I think that should be a basic thing that you should have to have. Some before they turn 65 if they have any type of medical problem and it should be required when you turn 65.”

Grocery stores were another social structure which the women had minimal control over as store location and layout greatly impacted their food access. While grocery shopping had previously been viewed as a social outing for some of the women, mobility limitations turned it into a chore. “Oh it’s too much walking around. The stores are too big and my foot’s too sore, I could never get around it. You know, just like going to the mall, you know, the mall is so awful, you know about that, the mall, it’s so big by the time you get around and get home it’s just like, ahhh. You feel like you’re dead. And grocery stores are just the same, they’re too big and I don’t want to get in no wheelchair, where am I gonna put the groceries at?”

Health and health problems were also a direct part of the women’s microsystem, a part of their everyday experiences interacting with their diet. For example, needing to avoid food because of allergies, sensitivities or because it was contraindicated with a medication was an issue for some of the women. One participant had nine different ingredients listed on her allergy information card, meaning sometimes she was left with little choice for meal options available through the congregate dining program at her seniors’ manor. “Your only choice is take it or leave it. A lot of foods I’m allergic to and they used to substitute but now the new the director’s decided no no, no more substitution . . . I’m allergic to many, many foods. I’m allergic to hamburg, which (participants of the congregate dining program) eat a lot. And things like peas, and carrots and bananas, and all kinds of nuts . . .” The reality for this particular woman was that her health issues dictated whether she could participate in a meal or not, thus comprising her nutritional intake, her social interactions from being part of a congregate dining program, and her finances as she lived at a manor where she opted for her monthly rent to include the dining program.

**6.6. Community Program Use (Mesosystem Factor).** All eight women described how they regularly accessed community-based food resources, including food banks, congregate seniors’ dining programs, and meal delivery programs. While home-delivered meal programs have potential to make a significant contribution to the nutrient intake of seniors, it was common for the women in this study to stretch one meal to make it into two, as this participant shared: “Well at first when I first was getting [a home meal delivery service] they were wonderful. And I always had the soup for my lunch and I could make the dinner do two dinners.”

Three of our participants regularly accessed a food bank, these women talked casually about their use of food banks with no sense of shame detected, perhaps attributable to life experiences and “world view.” They spoke accolades about the staff and volunteers at the food banks they attended and were so appreciative of the food they received. Not only could they receive food when in need, their food banks also

delivered to them, which was considered a “God-send” for one participant who had difficulty walking. “*Well sometimes like if I need, say if I need onions or anything like that, I'll phone up and see if they've got any and if they have well [volunteer] will bring it down*”. They were careful to point out that they only received food when it really needed it and took strides to make their food last as long as possible. “*I just get the food once a month, they give me quite a bit, it lasts, I'm not that big of an eater... they give me stuff that I make on my own, and I make enough that it lasts me for almost the week...*” Throughout the interviews it was clear these women used community food resources when needed and were thankful for the increased access to food they provided.

**6.7. Availability of Family and Friends (Meso- and Microsystem Factor).** All participants were asked what the biggest factor in their lives was influencing their ability to access food; four of the women immediately responded with “family”. The role that family members played varied amongst the participants, but critical roles were seen in providing transportation to shopping and medical appointments, housework, caring for them if they were sick, tending to legal matters, paying certain bills if necessary, and offering love and company.

One of the women when asked what was the biggest factor influencing her ability to access food she quickly responded “neighbours with cars,” she explains: “*Well actually I'm in a very lucky situation, because a downstairs neighbour takes another neighbour for groceries every month and she said to me one day I might as well get your groceries while I'm walking around with her. And I just give her my debit card and my list and she does my shopping... And she not only goes and gets my groceries, but she brings them back and she puts them away for me.*” It was unclear if this strong trust between these two individuals existed prior to the woman being unable to shop for her own groceries, or if the trusting relationship was created out of necessity so the participant could bring food into her house.

Three of the women had no family close by. One brought up the point several times throughout the interview that when you have no family, no one to fall back on, you have to be financially prepared for the unexpected. “*It's good to have a little bit of money, it doesn't matter how young you are [and] it don't matter how old you are, you don't know what's going to come up that you're not counting on, and then when you've got nobody to come back on. [I've made wise choices] with the money, it's because I've got nobody to come back on. You've got to have some money or somebody to help you out you know.*”

Social capital, the number of people who can be expected to provide support and the resources those people have at their disposal [27], seemed essential for all women to help them complete various activities of daily living. As age brought about increases in health and mobility issues, reliance on others also increased.

**6.8. Personal Food Management/Coping Strategies (Microsystem Factor).** Additional to using organized community-based programs, the women in this study employed other

food management strategies at the individual level to buffer food insecurity. Strategies included tight budgeting, “stretching” food, stock-piling nonperishables, eating poor quality (old) produce, purchasing food or medications on credit, and using various resources available at grocery stores. A unique shopping practice carried out by one of the women included asking produce department staff to chop or peel vegetables, particularly hard root vegetables like squash and turnip. She would also request staff to cut whole vegetables in half. For example, she knew she couldn't eat a whole bunch of celery and didn't want to pay for something that was going to rot in her fridge. “*I'll say (to produce department staff) I really don't want to buy that great big bunch of celery, because it'll rot on me. And he'll say, So? And I'll say, cut it in half! And if I buy a squash I'll say will you cut my squash, and he'll say how do you want it? And I'll say in quarters. And they'll cut it for me. And if I buy a turnip because my hands can't do it anymore and I'll say will you cut that? How do you want it? Cut it in chunks so I can just peel it and that's what I do... I thought, what's the sense of me buying it if I can't cut it?... Yeah, when you're a senior and you're living alone you got to, economically you got to do it. I got sick of throwing vegetables out. Well I'm not doing it anymore, because I don't have the money.*” The women interviewed were all very resourceful, and perhaps due to their past experiences, current financial restraints and “world view”, they have developed unique strategies to cope with hunger.

## 7. Discussion

The purpose of this work was to explore the phenomenon of food insecurity for low-income lone senior women living in NS. To help us examine the meanings behind these women’s experiences of accessing food, Bronfenbrenner’s Ecological Systems Theory provided a model to observe the women in their immediate environments and then examine their situations more broadly so as to determine how their everyday actions (e.g., food acquisition and consumption) are mediated by more distal aspects of their physical and social milieus.

Of particular interest was the generational lens that was cast over all the participants’ perceptions of their food security status. Despite participants clearly meeting criteria for food insecurity, for example, some reported having difficulty accessing food because they are in too much pain to shop, needing to use food banks or other charitable food models, or having difficulty accessing food that meets special dietary requirements. They also reported needing to make sacrifices such as switching insurance plans or sacrificing social outings so that they can maintain enough self-sufficiency to consider themselves food secure. Yet overwhelmingly, the participants did not self-identify as having any real problem accessing food. This finding may be a product of their world view, a macrosystem factor, which reflects their experiences of living through more difficult, or food insecure periods of life.

In contrast to findings by Hamelin et al. [28] and our previous work with low-income lone mothers [29–31], the shame often associated with food insecurity and accessing food banks does not seem to be part of the

experience for these senior women. American researchers have suggested that experiences are colored by the world view or generational lens which enables seniors to endure hardships, this may be due to the impact of remembering the Great Depression or the World Wars [32, 33]. Similar to findings among seniors in the US, our research suggests that while food insecurity among lone senior women in Canada does exist, senior women's self-perceptions of food insecurity are influenced by a macrosystem cultural lens from an older generation, which may be at odds with current cultural understandings of food insecurity. The finding that senior women in this study have skills and perceptions that enable them to cope with food insecurity raises questions about how future generations will experience food insecurity and how this will impact their health and well-being if they do not share a similar world view or generational lens than that of their parents or grandparents. While an argument can be made that senior women of the future will not be as vulnerable to food insecurity because many more will have worked (may have greater access to CPP or personal savings) and can drive (may not be as isolated), there is a risk that food insecurity among seniors will become a more prominent social issue if we do not have the proper mechanisms in place to support seniors' ability to access a nutritious diet.

At the exosystem level, the participants identified several policies and programs such as OAS, CPP, and Pharmacare that influenced access to food. Consistent with findings of our previous research [1], participants described the protective effect of the GIS, the OAS program for low-income seniors. If a low-income senior has no other source of income besides the OAS basic pension (i.e., did not pay into CPP or have a private pension plan), they can receive up to an additional \$738.96 (effective July 2012) in monthly income on top of the basic OAS pension [34], this additional GIS benefit is nontaxable income. As of July 2012, the average monthly GIS benefit received by a single senior is \$492.23 [35]. Canada's universal health care has a protective effect on the food security status of seniors. In NS, no senior need absorb the full cost of their medications because of the compulsory drug insurance plan, Pharmacare. Recipients of the GIS also do not have to pay the annual premium associated with the insurance plan. Although Pharmacare is an exosystem factor its existence speaks to Canadians' values and beliefs at the macrosystem level that healthcare should be accessible to every citizen [36].

Unfortunately, a recent evaluation of the GIS shows that many seniors who are eligible to receive GIS are not doing so; it is speculated that a large proportion of eligible nonrecipients consists of seniors in vulnerable communities, such as aboriginal people, homeless or near homeless, and immigrants [23]. While increasing the accessibility of GIS would help to address food insecurity among vulnerable seniors, the findings from our provincial food costing research consistently show that even with the GIS, not a great deal of money is left at the end of the month, which can leave lone seniors vulnerable to food insecurity if emergency or unforeseen expenses arise [1, 37, 38].

Also at the exosystem level, is the protective role subsidized housing plays on freeing up money to be made

available for food. Seven of the eight participants lived in subsidized housing; affordable and accessible housing is necessary to help low-income persons, including seniors, achieve food security [39]. Our findings suggest that housing costs absorb the "lion's share" of seniors' monthly pensions; this has been shown in other research in NS [1, 37] and elsewhere [38]. Finding and maintaining housing on limited income can be a major challenge for seniors, as heard in two of the stories from the women interviewed who spoke of excessively long wait lists to get an apartment in a seniors' manor in urban NS. In 2006, 4% of seniors in NS were able to access the provincial government's Seniors Rental Housing program [4]; many more seniors would benefit from the income-protection subsidized housing offers but there are not enough spaces allocated for the 11% of seniors (13,715), living below the low-income cutoff [4]. It could be speculated that the voices of seniors paying market rent would reflect more food insecure experiences than the women interviewed here.

At a more local level, social supports for seniors may be dwindling. Our qualitative results suggest that reliable and accessible transportation is an issue for senior women in urban NS. Statistics Canada shows that relatively few seniors use public transit [40], and our participants clearly shared their challenges with transit systems. Most seniors in NS live in areas without public transit [4] meaning volunteer drivers, private transportation services, and reliance of family and friends become more and more important to help gain access to groceries. Unfortunately, the trend in NS is migratory as youth and adults leave the province in search of employment [41] and as the volunteer sector dwindles [42]. It is quite plausible the NS senior's microsystem is shrinking as the structures with which the senior has direct contact become fewer and fewer [43]. This is of concern in light of the "world view," we notice today's seniors working within; will seniors in need reach out to community resources if they've been raised to weather hard times? Who, if not a family member, will notice a lone senior women stretching or skipping meals, or eating nutritionally inadequately?

The finding that seniors may be experiencing food insecurity, relying heavily on social networks and personal coping strategies suggests existing data of food insecurity in seniors may not be comprehensive; current indicators and measures do not capture the whole experience of how seniors experience food insecurity. In addition, with their generational lens and experience of previous hardships such as the Great Depression and World Wars, food insecurity amongst seniors is not viewed as a serious problem by seniors themselves. This may help to explain why rates of food insecurity among seniors in Canada are reported to be low (3.2%) [44], while poverty rates as determined by the LICO are much higher (11.8%) [45]. It is unclear whether food insecurity among seniors is truly being captured by current means of data collection. If the results from this study are any indication, there may be a great many seniors with similar generational views who are silently "coping", effectively rendering the issue of food insecurity among seniors invisible.

The results from this study are timely, as in Canada, policies in place to protect vulnerable populations such as

seniors may be at risk. During the announcement of Canada's Economic Action Plan 2012 (the Federal Budget), significant changes to the OAS program were proposed: starting in 2023, the age of entitlement for all OAS benefits would gradually increase by two years from 65 to 67, with full implementation by 2029. This proposed policy change may mean more seniors will be relying on provincial social assistance and disability programs longer, especially given that statistics are showing that the Canadian population is aging, with population projections suggesting that by 2051 seniors will form 24.7% of the Canadian population compared to 14.4% in 2011, and 9.6% in 1981 [46]. In light of this, our findings raise concerns that the risk of poverty and food insecurity among lone senior women may be significant into the future.

These findings and our earlier work [1] suggest that OAS and GIS benefits are essential to ensuring food security for seniors. However, even with these public pensions, seniors incorporate a variety of strategies to ensure access to food, as observed by the eight women interviewed. Given the anticipated increase in the aging population in Canada, as well as the changing *world view* of the next generation, the coping strategies employed by these women may be lost and thus, food insecurity rates in future generations will likely increase. This demonstrates the importance of ensuring that progressive and sustainable social policies are implemented at multiple levels.

We close with the following recommendations to better monitor and address food insecurity in the Canadian senior population; however, lessons learned can be extended beyond our political borders.

- (i) Currently, tools used to capture the prevalence of food insecurity, for example, the Food Security Survey Module used as part of the Canadian Community Health Survey since 2004 only use *income* security as an indicator for *food* security. Other indicators such as health status, social inclusion, availability of affordable and accessible housing and transportation are important influencers on seniors' ability to achieve food security and therefore measurement tools which incorporate consideration of these factors should be developed and validated.
- (ii) Adequate funding should be allocated to community programs that provide nutritious food to seniors (e.g., meals on wheels, etc.) to better protect those seniors from malnutrition who are unable to cook or travel due to health/mobility limitations and those with unavailable personal social supports.
- (iii) Accessible and affordable housing (e.g., subsidized housing) must be available and reflective of the level of need among community dwelling seniors.
- (iv) Accessible municipal transportation, with adequate scheduling and routes, should be available in urban centres, with various methods of community input available to ensure the system is meeting the needs of its users/community residents.
- (v) In terms of further reaching policy implications, federal and provincial governments in Canada should

develop and implement a poverty reduction strategy that aims to lift people out of poverty. In relation to seniors, this would include continuing to review and implement changes to public pension systems to ensure income adequacy among Canadian seniors and increasing access and awareness of programs, services, and support, such as Guaranteed Income Supplement for low-income seniors.

## Endnotes

1. The Old Age Security (OAS) program is the cornerstone of Canada's retirement income system. At age 65, it provides seniors with a modest pension (average of \$510.17/month in July 2012) [35] if they have lived in Canada for at least 10 years [47].
2. Nearly all Canadians between the ages of 18–70 years who are employed (including self-employed individuals) earning more than \$3500 a year contribute to the CPP and are entitled to a retirement pension once they turn 60 years of age [48]. The age at which a senior decides to start collecting his/her pension affects the amount payable to the contributor.
3. Food costing, conducted in towns and cities across Canada, involves using the National Nutritious Food Basket to monitor the cost and affordability of a basic nutritious diet [49].
4. The LICO is an income threshold below which a family will devote 20% more of its income on the necessities of food, shelter, and clothing than the average Canadian family living in a similar-sized community [50].
5. The Guaranteed Income Supplement (GIS) is a part of the Old Age Security (OAS) benefits for lower-income seniors. To be eligible, seniors must be receiving an OAS basic pension and meet other certain income requirements. The monthly amount available depends on the applicant's marital status and income. Seniors must apply for their GIS, generally through the income tax system, and this benefit is not taxable [51].
6. The Nova Scotia Seniors Pharmacare Program is a provincial drug insurance program that helps seniors with the cost of their prescription drugs. GIS recipients are not required to pay the annual premium [52].

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## Research Article

# Home-Living Elderly People's Views on Food and Meals

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**Background.** The aim of the study was to describe home-living elderly people's views on the importance of food and meals. **Methods.** Semistructured interviews with twelve elderly people. The interviews were analysed using qualitative content analysis. **Results.** Respondents described how their past influenced their present experiences and views on food and meals. Increased reliance on and need of support with food and meals frequently arose in connection with major changes in their life situations. Sudden events meant a breaking point with a transition from independence to dependence and a need for assistance from relatives and/or the community. With the perspective from the past and in the context of dependency, respondents described meals during the day, quality of food, buying, transporting, cooking, and eating food. **Conclusions.** Meeting the need for optimal nutritional status for older people living at home requires knowledge of individual preferences and habits, from both their earlier and current lives. It is important to pay attention to risk factors that could compromise an individual's ability to independently manage their diet, such as major life events and hospitalisation. Individual needs for self-determination and involvement should be considered in planning and development efforts for elderly people related to food and meals.

## 1. Introduction

Malnutrition, which includes undernutrition as well as overweight/obesity, is a common problem among the elderly. The prevalence of undernutrition among home-living elderly people was found to be 14.5% according to the Mini Nutritional Assessment (MNA) [1]. Among elderly people who had recently moved to a residential home, 33–37% were malnourished according to the MNA [2]. The higher prevalence of undernutrition among elderly people admitted to residential homes highlights the importance of identifying elderly people who live at home and are at risk of malnutrition, to prevent the development and aggravation of undernutrition, followed by increased dependency on and need for institutional care [1]. In addition, among 70-year-old Swedes, 20% of the men and 24% of the women were obese ( $BMI > 30$ ) [3]. In Swedish nursing homes the prevalence of overweight was 22% and another 8% were obese [4]. Thus, obesity is also a frequent problem among the elderly.

The consequences of undernutrition in elderly people include functional decline or frailty [5–7], decreased quality

of life [8], increased health care utilisation and costs [9, 10], higher rates of adverse complications from other health conditions [11], and increased mortality [6, 7, 12]. The consequences of obesity include negative impact on physical functions and quality of life, decreased survival rates, metabolic syndromes, arthritis, pulmonary abnormalities, urinary incontinence, cataracts, and cancer [13]. Thus, from a nutritional perspective, obesity as well as undernutrition are a concern among elderly people as they exacerbate age-related decline in physical functioning and can cause frailty [13].

Myriad risk factors are associated with inadequate caloric intake and malnutrition. Risk factors for undernutrition have been identified as higher age, lower self-perceived health, low functional status, diseases, taking several medicines, and symptoms of depression [1, 14–18]. It was also found that people who were hospitalised prior to receiving home health services were more likely to undereat than those not hospitalised [19]. Eating with others increases caloric intake [20]. Aging is associated with a decrease in total energy expenditure, and if this coincides with a maintained or increased energy intake, overweight/obesity may develop [13].

Currently in Sweden, fewer elderly people with functional impairment move to nursing homes, and more choose or have to remain in their own homes. Many of these people are disabled and dependent on others for acquiring, preparing and/or consuming their food. The need for help with acquiring food typically occurs before the need for assistance with meal preparation arises [21]. Some elderly people get help with these activities from informal providers. Previous research has shown that living with others or receiving help from informal providers is beneficial for dietary intake [22, 23], and that frequent provision of meals from a formal agency can improve food intake [24] and decrease undernutrition risk [21]. Furthermore, by getting meals from a formal agency, those who would otherwise not be able to obtain or prepare food without assistance are able to keep living in their own homes [25].

Considering all the negative effects of malnutrition, it seems of utmost importance to identify elderly people living at home at risk of developing malnutrition, or who have already developed it, so that suitable preventive actions and/or treatment can be provided. To do so we need a deeper understanding of the circumstances of older people living at home, with respect to nutrition, from their perspectives. The aim of the study was to describe home-living elderly people's views on circumstances that are of importance regarding food and meals.

## 2. Methodology

The study was carried out in a small community in southern Sweden (approximately 12500 inhabitants), containing two smaller towns. Elderly care interventions, such as getting meals from a formal agency (food distribution/meals on wheels), were provided from two different kitchens, one localised in the towns. The meals were distributed to the elderly by home care staff. The elderly person had to pay a subsidised fee for the meal and meal delivery. Even though respondents lived independently they could have access to elderly centres for social activities and restaurants.

This study was a descriptive qualitative study based on semistructured interviews with twelve elderly people living in their own homes in a small municipality in southern Sweden. Criteria for inclusion in the study were elderly people over age 65 living in their own homes (with or without home help service and/or meals from a formal agency) and able to communicate in Swedish. Respondents were recruited by the nutritionally responsible nurse and the unit managers in the municipality. Written information about the aim of the study, that participation was voluntary and who to contact for further information, was distributed to potential respondents by home care staff. It is unknown how many people received this information. Those who agreed to participate were contacted by phone by the first author (E. Edfors); further information about the study was given and the time and place for the interview were set.

Twelve people were interested and actually participated in the study, seven men and five women, aged 82 to 94 (average 87.7 years). Four of them lived as couples and both partners were included in the study. Six of the respondents

had no home help service and out of these three had food distribution from a formal agency. Three of the respondents had no food distribution while nine had food distribution that varied from three to seven days a week. Half of the respondents rated their severity of disease as moderate and only one as severe (Table 1).

The interviews were conducted by the first author (EE) in the respondents' homes. Before the interview started, the respondent was given clarifying information about the aim of the study, their right to withdraw at any time with no personal consequences, and that participation was voluntary. Written informed consent was obtained. As there could be a risk that the interviews were perceived as an invasion of privacy and cause emotional strain, respondents were offered the opportunity to contact the authors afterwards. All collected materials and personal data relating to respondents were treated confidentially. The study was performed in accordance with the Helsinki declaration of ethical principles [26]. Formal approval was not needed for this type of study, in accordance with Swedish law [27].

The interviews were conducted as semistructured interviews [28] based on the aim of the study. The interview started with an open-ended question and the respondent was asked to talk freely about an ordinary day, focusing on food and meals, "describe an ordinary day and try to focus on the food and meals during the day." Thereafter the questions were about food preferences and intake, physiological difficulties (swallowing, chewing), and functional difficulties (cooking, shopping), and on social dimensions of eating. These questions were inspired from themes in "Seniors in the Community: Risk Evaluation for Eating and Nutrition, Version II" (SCREEN II) that measures the risk of malnutrition among elderly people living in their own home [29]. Throughout the interview, the author, using follow-up questions, tried to capture the importance of circumstances and factors affecting food and meals. The interviews lasted 40–90 minutes and were recorded with digital equipment and transcribed verbatim.

The interview texts were inductively analysed by using qualitative content analysis [30]. Content analysis is described on two levels: the manifest content analysis that focuses on the content of the texts from a superficial perspective based on the written word, and latent content analysis that goes in-depth on content and interprets the underlying meaning conveyed by the text [30]. In this study the analysis was mainly based on manifest content analysis. The analysis was conducted in all stages by the two authors and work continuously alternated between the whole and parts of the collected material. In step one, texts were read and reread as a whole, a so-called naive reading. Statements were then made based on the impressions of and reflections about the wholeness and important elements in the text that had emerged during the naive reading. Then all parts of the text relating to the aim of the study were divided into meaning units that seemed to be about the same thing. In next step the meaning units were coded. The codes were critically discussed and a number of categories with subcategories emerged. Finally, all texts were re-read and compared with the outcome of the analysis to ensure that

TABLE 1: Characteristics of the respondents.

Interview number	Gender	Age	Cohabitation	Living in town (T) Countryside (CS)	Home help service	Food distribution, days/week	Severity of disease <sup>(1)</sup>
1	Male	84	Alone	CS	No	7	Moderate
2	Male	90	Together	T	Yes	7	Mild
3	Female	87	Together	T	Yes	7	Severe
4	Female	94	Alone	T	Yes	7	Moderate
5	Male	82	Alone	T	No	7	None
6	Male	89	Alone	CS	Yes	3	Moderate
7	Female	84	Alone	T	Yes	5	Mild
8	Female	85	Alone	T	No	0	Moderate
9	Male	89	Alone	T	Yes	7	Mild
10	Female	88	Together	CS	No	0	Moderate
11	Male	94	Together	CS	No	0	Moderate
12	Male	86	Alone	T	No	7	Mild

<sup>(1)</sup> Self-perceived severity of disease graded as none, mild, moderate, or severe.

TABLE 2: Categories and subcategories regarding home-living elderly people's views of food and meals.

Categories	Subcategories
Habits founded in the past affect the present	Food and meals Roles
To get help from others with food and meals	The breaking point Transition from independence to dependence
	Meals during the day Quality of food
Food and meals in present life	Buying and transporting food Cooking Eating

the categories covered the contents of the texts and codes. "Open Code" (freeware) software was used for the qualitative analysis (UMDAC and Epidemiology, University of Umeå).

### 3. Results

Three categories, with two-to-five subcategories each, were developed based on the text analysis: habits developed in the past affect the present; getting help from others with food and meals; current food and meals (Table 2).

#### 3.1. Habits Founded in Past Life Affect Present Life

**3.1.1. Food and Meals.** The interviews showed that experiences in childhood and earlier adulthood had a great impact on the respondent's current feelings and views concerning food and meals. It was evident that the foundations of norms and values regarding food culture, traditions and eating habits were laid early and did not change to any great extent throughout life.

*As children we were never allowed to say "I do not want that, I won't eat it." No, that was just not possible (no. 4, female, age 94).*

*I eat the same type of food and about the same time as I always have done, as I did when my wife lived and when I worked (no. 9, male, age 89).*

The majority of the respondents had lived their lives in an environment where they were used to cooking for themselves and there was a difference between everyday meals and special occasions. Food and meals had also played an important social role. It was, for instance, important to be generous to the "outside world".

*There were people in the whole house, and there were a lot of rooms, and there was food, a lot of food, yes really (no. 4, female, age 94).*

*I feel that when you are out, or come someplace, you should be offered a cup of coffee, that's what I'm used to. Back home in the country, the coffee would be on as soon as someone walked in the door (no. 4, female, age 94).*

The respondents had grown up on a diet of home-cooked dishes made from locally produced ingredients. Meals consisted of, for example, porridge, wholemeal bread, potatoes, pork, and fresh fish. At ceremonies and celebrations one might be offered freshly slaughtered meat and more luxurious food.

*I am used to home-cooked dishes since I was a child, not macaroni and spaghetti (no. 7, female, age 84).*

*"When I grew up, pigs were supposed to weigh 125 kg when they were slaughtered. There was a thick layer of fat on their backs" (no. 11, male, age 94).*

The diet was based on what the season had to offer and it was vital to “make do with what the house could offer” and seize every opportunity to increase the food supply, for instance, by hunting, fishing, and picking berries.

*I still pick berries and make syrup. I grew vegetables before (no. 10, female, age 88).*

*I grew up by the sea and do not know anything else. I have been fishing myself, and everything (no. 6, male, age 89).*

**3.1.2. Roles.** The interviews showed a division in gender roles regarding the responsibility for the diet. Usually, the woman in the family had the main responsibility for food and meals. “*My wife was a very good cook*” (no. 5, male, age 82). The majority said that they had always been served homemade and carefully cooked food and that they knew how good and nutritious food should taste.

*I worked as a cook; I used to do the cooking at home before I got my heart attack (no. 1, male, age 84).*

*I've always been a good cook, and have always appreciated good food. My husband always said, "you cook such good food, I get way too fat". But I so appreciated good things.... I wanted... if you are going to eat, you might as well have good food (no. 4, female, age 94).*

### 3.2. To Get Help from Others with Food and Meals

**3.2.1. The Breaking Point.** The interviews revealed that in several cases, major changes in the ability to be independently responsible for food and meals were linked to some form of sudden event. It could be that the female partner who was responsible for meals passed away. Other causes could be falls, infections, and other diseases, such as myocardial infarction, conditions that in many cases had led to a hospitalisation. Other factors that affected independence were general frailty and an inability “*to use one's old body*,” that is, factors linked to “normal ageing.”

*About five years ago my wife had an accident, and she could no longer do the cooking. We had to get food from the service house (no. 1, male, age 84).*

**3.2.2. Transition from Independence to Dependence.** Becoming dependent on others on a daily basis can be difficult to deal with. One man had a strong desire to get well and return to independence.

*I believe that everything changes. I dream of being able to buy myself a car in the spring so that I can go shopping (no. 6, male, age 89).*

Other respondents felt that they had no choice but get used to it and accept the situation.

*I have become so used to it that I do not even think about whether it is difficult or not, it is just*

*something you have to put up with (no. 4, female, age 94).*

One man seemed pleased to be dependent and he had strongly questioned the community's decision to discontinue his food distribution.

*Well now that it has been so long, you might consider cooking again (note, said aid assessors)... Oh, said I, aren't you being a bit too hard now... It's quite expensive, she said... will they lose five crowns? Ten crowns? I can pay the difference because I've never been a burden for the community. (no. 12, male, age 86).*

### 3.3. Food and Meals in Present Life

**3.3.1. Meals during the Day.** Currently, and in the past, respondents' daily meals were distributed as breakfast, dinner and supper, usually served at the same time every day. The majority had their principal meal at noon, while supper mostly consisted of lighter food, such as tea and sandwiches. However, one male respondent preferred to have a proper cooked meal also for supper. From the interviews it could be discerned that the majority of respondents distributed their meals so that at night there was a long period without eating.

*All my life I've had lunch at twelve o'clock. So I usually eat at noon, and then I eat once in the evening, usually very light food (no. 6, male, age 89).*

Regular snacks were not common, except when someone occasionally felt hungry and had, for example, a piece of fruit, a cookie, or a sandwich. On the other hand, snacks in the form of coffee breaks were considered a natural and important element in social gatherings with other people, such as when friends came for a visit or when the respondents participated in social activities.

*I do not eat snacks unless there is a study circle, like today, where we get served nice little cookie (no. 8, female, age 85).*

The four respondents who lived as couples ate their meals together, while single respondents mostly ate their meals alone. Two women felt lonesome with no companion at mealtimes. Four men, on the other hand, preferred to eat alone. They found it easier to be able to sit comfortably and eat at any time they wanted at their own pace, without having to consider other people.

*I think it's great, I have no major, no problems at all. I think it's nice to sit quietly and eat my meal (no. 1, male, age 84).*

Even though respondents lived independently they could have access to elderly centres for social activities and restaurants.

*I generally eat by myself. I have thought many times that I should go to the restaurant, because*

*they do have a separate dining room at XXX (note, elderly centre). But I end up feeling more comfortable eating at home (no. 5, male, age 82).*

One woman said that eating at the elderly centre demanded suitable clothing, social behaviour and sociability. The noisy environment, caused by young people from a nearby school who also had their lunch there, could be another reason for eating alone at home instead.

*... And then the young people from the school there, they also eat there, and when they're there, it is not easy for the older people to be among them, since they are noisy and do not behave (no. 7, female, age 84).*

Overall, the interviews revealed that the respondents usually did not skip a meal. Their appetite was normally good. Poor appetite and weight loss could be caused by psychological malaise, other illnesses, grief, lack of outdoor activities and bad temper.

*Yes, it's psychological and that eliminates a lot of things. Very, very sensitive... when these problems occur (note, depression)... the food does not taste good, no. Then I ended up skipping meals and eating only two or three crackers a day (no. 11, male, age 94).*

Other reasons for a poor appetite or skipping a meal were related to the content of the distributed food, such as food having an unappealing appearance, not tasting good or containing ingredients that the older person did not like or tolerate, such as hot spices, or being difficult to chew and digest.

*And it is served in such an unappealing way in these trays, it's not exactly exciting. There is one container for the sauce and one for the potatoes and the pieces of meat just lying there... it's not, it does not give you an appetite... and you feel like, oh, that does not look good at all... (no. 4, female, age 94).*

**3.3.2. Quality of Food.** The interviews revealed different perceptions of the quality of food among respondents who had food distribution. Respondents who got their food from a separate kitchen were very satisfied with the food content and quality. They understood that they would not always be served their favourite dishes. This group of respondents felt that the food consisted of varied and tasty dishes and appreciated the variation in content between weekday and weekend.

*Wonderful, yes... It is very, very, very good. I cannot complain... It's varied and that's good. There are some things I do not like so much, but I still do not cancel. I could... (no. 12, male, age 86).*

Other respondents, who got their food from another kitchen, felt that the food was poor, tasteless, and badly cooked. They also said the food looked unappetising, contained spices that they were not familiar with, and was

too influenced by modern food trends, such as pizza. They requested more varied old fashioned food, cooked in the traditional way with well-known spices such as salt, pepper, dill, and bay leaves.

*It varies, it does, I'm being frank now... food for us elderly people is probably supposed to be cooked with care, but it happens that some food is not properly cooked" and "... It should be properly boiled or fried, depending on the dish. Very important. It happens that this is overcooked (no. 5, male, age 82).*

They also wanted certain ingredients in their food, such as fresh fish, veal, lamb, vegetables, fat, and cream. One respondent preferred the restaurant service and seemed to get much better food there than in food distribution. One woman chose to throw away food when it did not taste good or looked unappetising.

*Now that I have reached this age, I should be allowed to... have things I like, and not... food that makes me think: Ugh, what is that, that's no good. What do I need that for? I do not want that... straight into the rubbish... I've thrown out a lot of money there (no. 4, female, age 94).*

Usually it was the home care staff who received the complaints about the food, even though the respondents knew that they not could influence the food content to any significant degree. Several interviews revealed that respondents perceived shortcomings in the municipality's interest in listening to their views about the food distribution.

*I have talked to these girls. I feel sorry for the girls. They're the only ones I've talked to. The others, the people at the top, yes, well, I do not have time to talk to you right now, maybe I can call you some other time or something (no. 6, male, age 89).*

**3.3.3. Buying and Transporting Food.** The interviews showed that those who lived in urban areas were satisfied with the availability of well-stocked supermarkets. Having more than one shop in the community was believed to promote choice, quality and good prices. The majority of the respondents emphasised the importance of having access to an open-air market that was open one day a week, which gave them the opportunity to buy local products and good quality fresh fish. An important service to one couple that lived outside the urban area was the regular visits of a fish van and a private supplier of food.

One man and one woman, who arranged their shopping independently, said that the premise for this was that they could drive their car to the store themselves. Respondents who were no longer able to buy their food themselves stated different reasons for this, such as the inability to drive and difficulties in mobility. Five of the respondents, who got no help with shopping from the community, got help from children, other relatives and/or friends, usually once a week.

*I always keep a list. When I know that something is missing, I write it down, and then when he*

*comes (note, the son) it's ready (no. 9, male, age 89).*

*Before we had four shops, now there is none. Now my daughter helps me with shopping (no. 12, male, age 86).*

One respondent, who had access to transport service (subsidised transport by taxi) for purchases, did not use this help because he tended to need more than one ride to and between the shops.

*I get transport service, but it's so complicated and difficult... I do not know quite how long I have, and sometimes I need to go to the pharmacy, and then I have to go all the way from the supermarket to the pharmacy, and then I get a pain in my chest and have to order an extra trip... (no. 1, male, age 84).*

Five of the respondents got community assistance with buying and transporting food, usually once a week. They had a strong desire to have control of food planning, such as shopping lists and purchases. Most of them wrote their own shopping list, and the shopping was carried out by the home care staff. Sometimes the respondent would forget to write things down on the list, or the wrong things were purchased by the home care staff. When this happened, the respondent usually had to wait until the next week's shopping.

*They bought the wrong things... That's why it's important that when I order something there are people who know what it is all about, especially those who have their own household. And then they send a girl working temporarily... Here I am... and sometimes when they are gone.. oh goodness, I forgot... (no. 6, male, age 89).*

One woman requested more than one hour for shopping, since the staff's short allotment of time for this purpose made it impossible for her to come along to the shop. She wanted to be able to compare what different shops had to offer and make her own decisions.

*One hour is too short. I want to spend some time in the shop. Two hours would give enough time to go to both XXX and YYY without hurry (note, two shops). See for yourself and not just request something. I do not know what they have and what's good. (no. 4, female, age 94).*

**3.3.4. Cooking.** Cooking was sometimes seen as a meaningful and enjoyable thing to do. One woman liked to cook all the food, both for herself and for others. Four male respondents with food distribution appreciated it and felt it was easier to prepare the morning and evening meals, when they did not have to be responsible for the main meal. Several respondents chose to buy precooked frozen dishes and full meals for the main meal. One reason for this could be that they were frail and did not have enough strength to cook the main meal themselves. Another reason could be that it was

boring to cook just for themselves. Prepared dishes were also considered easier to cook, for example, in a microwave, a cheap alternative and sometimes better tasting than the food that was served at the municipality's elderly centre.

*It is not fun to cook anymore, now when I'm alone, therefore I buy pre-cooked food (no. 7, female, age 84).*

*I buy pre-cooked food at the shop. I think it is better than the XXX (note, elderly centre restaurant)... (no. 7, female, age 84).*

*I do not miss cooking; it is enough with managing morning and evening meals (no. 9, male, age 89).*

**3.3.5. Eating.** The issues that respondents raised about eating were, in most cases, related to their oral health and dental status. Broken teeth and poorly adapted prostheses could be the causes of difficulties with chewing. Some respondents thought the meat from food distribution was leathery and difficult to chew.

*Things that are hard to digest, such as brown beans, pea soup and stuff, I do not eat that, and whole meat, I cannot chew (no. 2, male, age 90).*

Problems with eating were also linked to the presence of other symptoms, such as fungal infection in the mouth and nausea caused by problems from the oesophagus and stomach. Difficulties in swallowing food were also connected to oral health, dental status, food content, and the cooking method. The respondents emphasised the importance of caring for their teeth and regular dental visits to maintain optimal dental and oral health.

*... It's worse now with the teeth. I can usually chew the food I get from... Yet, some of it is tough (no. 2, male, age 90).*

Most respondents had, at some time, choked on something. In two cases the situation had developed to a life-threatening condition. Items the respondents mentioned having choked on included tablets, crumbly bread, large pieces of food, and tough meat.

*... I'm a bit narrow in the throat... I choke... bread crumbs and things (no. 10, female, age 88).*

## 4. Discussion

The aim of the study was to describe home-living elderly people's views on important circumstances regarding food and meals. The analysis of the interviews showed that respondents' earlier life had a strong influence on current views of food and meals. Souter and Keller [31] presented similar results in a study describing how what older people ate depended on past life experiences and their approach to old age [31]. Other studies concerning food and meals showed that habits and preferences that are formed during childhood and youth are difficult to change in adult life [32]

and that dietary intake was often similar to what the elderly people grew up with [33]. This has also been documented in other cultures. Interviews with elderly Taiwanese people showed only small changes in eating patterns, and how preferences for traditional habits from earlier generations influenced their food and meals [34]. Developing assistance regarding food and meals for elderly people requires knowledge about the individual's current needs, but habits founded in earlier life must also be taken into consideration.

The results of the study showed that the respondents' needs for help to manage their daily food and meals often arose in relation to a sudden life event. Stressful life events also contribute to an increased risk of developing malnutrition. Examples include being widowed or falling ill and requiring hospitalisation. They perceived their dependence on others both positively and negatively. Most respondents stated that the woman in the family had had the main responsibility for meals. Several men in the study reported that their wife's death had been the breaking point for becoming dependent on food distribution and they thought the food distribution was a good alternative to get nourishing food. However, women who previously had cooked all their food mentioned difficulties in accepting the situation and in reconciling themselves with the conditions of food distribution. This is consistent with a study that showed that being dependent on others was difficult to accept, but dependence on meals from food distribution could also mean better quality of life [35]. Another study showed that elderly women living alone tended to simplify cooking and eating and had fewer cooked meals and events with coffee with cakes [36], and that poor cooking skills among elderly men was a barrier to improving energy intake, healthy eating and appetite [37]. Sudden life events often change habits relating to food and meals, and men and women seem to adapt to the new circumstances in different ways depending on earlier roles and experiences. These events are important to capture in order to highlight the need for assistance so that necessary actions can be taken.

In this study habits founded in past life, and negative life events affected the food and meals in present life. It might be that also the view of the future influences current food intake. Shifflet has studied food habit changes in a couple of studies including elderly patients visiting nutrition sites [38, 39]. Even though the focus for these studies was on food habit changes there are some interesting implications for the understanding of the findings in the present study. In one of the studies [38], the temporal frameworks within which food habit changes are negotiated were explored. Food habit changes were found to be externally motivated (following physician-prescribed diets, altering food intake due to taste changes, social isolation, and reduced income) or internally motivated (self-prescribed diets, maintenance of lifelong food habits, reduction of food intake due to being less active). In addition, past experiences in conjunction with a negative or positive view of the future resulted in varying levels of compliance with special diets [38]. The respondents in the present study expressed a wish to maintain their lifelong food habits and it is likely that such a wish would negatively affect eventual efforts to achieve positive food habit changes,

if that would be necessary. However, the respondents did not express any concerns about the future affecting their food habits to any great extent. This might be due to that they already had made some food habit changes in connection with previous negative life events. In another study by Shifflett and McIntosh [39] it was found that among people with a positive future time perspective 9.7% of respondents had made negative food habit changes. However, among those with a negative future time perspective 32.4% had made negative food habit changes. Some types of disruptions and concerns that may be associated with a negative view of the future and possible changes in food habits were identified—females, loss of spouse, living alone, perception of declining health, and low income [39]. Also in the present study especially loss of spouse, living alone, and declining health seemed to negatively influence the ability to acquire, prepare and/or consume food. Considering the findings from Shifflet's studies [38, 39] together with the findings from this study it seems important not only to consider the past experiences and negative life events but also the elderly persons future time perspective in the negotiation of appropriate food use patterns.

The results of the study are guided by the respondents' desires to choose and make decisions about shopping, cooking and eating. This could mean access to fresh food of good quality, sitting by yourself and eating in peace or the opportunity to go to the shop with the home care staff. Similar findings are also highlighted in a study by Pajalic et al. [35], where elderly people with food distribution wanted good food from natural products and tasting "home-cooked food" [35]. The findings showed that the quality of assistance offered to older people living in their own home is dependent on the ability to be involved in decisions about food and meals, and on whether the help is given on the individual's own terms and is designed based on personal preferences and habits [40]. Swedish health care laws [41] and social services [42] make it clear that care and help must be based on respect for individual autonomy and integrity. Ageing and disease can cause physical and mental decline, which may result in the individual no longer being able to make the choices he or she wishes, but having to adapt to the new situation. There is self-determination as long as the person can freely choose between offered options, even if it is not always the most wanted option [43]. For those with formal home help service, all care staff can help the older person to maintain their independence and autonomy by building trusting relationships, being aware of needs and offering necessary help. The older people's autonomy can be promoted and affirmed through empowerment and opportunities to influence their own situation. Writing shopping lists, having access to flyers, going shopping, cooking with staff, having more than one dish to choose from, and being able to influence the content of menus and dishes are factors that can affirm participation and empowerment.

In planning and implementing qualitative studies, it is important to consider factors such as trustworthiness and transferability. A prerequisite for forming an opinion on trustworthiness is that all steps in the research process are well described [30]. Data were collected through

semistructured interviews with older people living in their own home. The respondents were recruited by the community unit heads and there is a risk that only those elderly who had positive feelings agreed to participate. We had no way of knowing how many declined to participate or why. The results of the study, however, reveal both positive and negative aspects, and despite a low number of respondents, the results can be considered to provide valuable insight into what is important to consider regarding food and meals for older people living in their own home. The interview texts were analysed using content analysis [30]. To minimise the risk of researcher influence, the two authors read the texts several times independently and then discussed their interpretation during each step of the analysis. To ensure that no data relating to the aim were excluded, the results were finally tested against the original texts [30]. The contents of the results are also supported by illustrative quotations that show extractions from the study interview texts [44].

## 5. Conclusions

Meeting the need for optimal nutritional status for older people living at home requires knowledge of individual preferences and habits, from both their earlier and current lives. It is important to pay attention to risk factors that could compromise an individual's ability to independently manage their diet, such as major life events and hospitalisation. Individual needs of self-determination and involvement should be considered in planning and development efforts for elderly people related to food and meals. Preventive home visits to elderly people, without home help service and/or meals from a formal agency, can be one way to capture difficulties with acquiring, preparing and/or consuming food. This can be done in order to give advice and/or suggest provision of formal help. Another intervention could be to develop a program, promoting eating with other seniors. Elderly people can be picked up at home and driven to an elderly centre restaurant at which they receive nutritious meals and opportunities to socialise with others.

## Conflict of Interests

The authors declare that they have no Conflict of interests.

## Authors' Contribution

E. Edfors and A. Westergren have contributed equally to this work, that is, to designing and conceiving the study, analysis, coordinating, and drafting the paper. Data collection was made by E. Edfors. Both authors have read and approved the final paper.

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## Research Article

# Action-Oriented Study Circles Facilitate Efforts in Nursing Homes to “Go from Feeding to Serving”: Conceptual Perspectives on Knowledge Translation and Workplace Learning

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**Background.** Action-oriented study circles (AOSC) have been found to improve nutrition in 24 nursing homes in Sweden. Little, however, is known about the conceptual use of knowledge (changes in staffs' knowledge and behaviours). **Methods.** Qualitative and quantitative methods, structured questionnaires for evaluating participants' (working in nursing homes) experiences from study circles ( $n = 592$ , 71 AOSC) and for comparisons between AOSC participants ( $n = 74$ ) and nonparticipants ( $n = 115$ ). Finally, a focus group interview was conducted with AOSC participants (in total  $n = 12$ ). Statistical, conventional, and directed content analyses were used. **Results.** Participants experienced a statistically significant increase in their knowledge about eating and nutrition, when retrospectively comparing before participating and after, as well as in comparison to non-participants, and they felt that the management was engaged in and took care of ideas regarding food and mealtimes to a significantly greater extent than non-participants. The use of AOSC was successful judging from how staff members had changed their attitudes and behaviours toward feeding residents. **Conclusions.** AOSC facilitates professional development, better system performance, and, as shown in previous studies, better patient outcome. Based on a collaborative learning perspective, AOSC manages to integrate evidence, context, and facilitation in the efforts to achieve knowledge translation in a learning organisation. This study has implications also for other care settings implementing AOSC.

## 1. Background

Promoting nutritional health equity among at risk older populations in nursing homes is of importance. Effective interventions that reduce the risk of undernutrition can help to ensure that people stay healthier in old age. Findings from a couple of studies indicate inequity between the nutritional care provided to patients in hospitals and elderly people in nursing homes. Two surveys conducted in 2007 indicate that patients in hospitals and at risk of undernutrition are more likely to get oral supplements (43–54%) [1] than elderly persons at risk of undernutrition in nursing homes (14–19%) [2]. It is plausible that appropriate nutritional care for older people in nursing homes requires educational interventions.

This study is a part of a larger project that has shown, in a before–during–after controlled trial, that by implementing action oriented study circles (AOSC) for the staff in nursing homes, knowledge translation (KT) regarding eating and nutrition was achieved in terms of instrumental outcomes (had a positive impact both on provider behaviour and on patient outcomes) [2, 3]. The means by which this was achieved is believed to be inconsistent and complex, and what occurred can be described as a “black box phenomenon” [4]. It is presumed that evidence, context, and facilitation influenced the KT in the previous studies [2, 3], but this remains to be explored. This study puts action-oriented study circles (AOSC), a pedagogical method for work based collaborative learning, and KT into a theoretical context. It

also looks into the “black box” of KT and reveals some of its content.

**Knowledge Translation.** It is a challenge to achieve improvements in nutritional care in an environment that is complex and evolving, and there is a tendency to measure the success of projects only in terms of instrumental outcomes of KT (better system performance (care) and measurable change in patient outcomes (health)). However, besides instrumental outcomes, also conceptual outcomes are of interest when it comes to improving nutritional care. The conceptual outcomes describe changes in understanding, knowledge and attitudes [5]. It is suggested that research translation should be used as an intermediate outcome, while patient outcomes and provider behaviour are endpoint outcomes [6, 7].

KT can be defined as “the exchange, synthesis, and ethically-sound application of knowledge—within a complex system of interactions among researchers and users—to accelerate the capture of the benefits of research … through improved health, more effective services and products, and a strengthened health care system” (Canadian Institutes of Health Research, cited in [8] page 1). KT is a processual phenomenon that is dynamic and interactive [9]. The purpose of KT is to decrease the gap between what is known from research and knowledge synthesis, and the implementation of this knowledge by key stakeholders, in order to improve care delivery, efficiencies of the health care system and health outcomes [5]. Graham and Tetroe [10] highlight the importance of improving our knowledge about KT. For instance, more research is needed that focuses on developing theory-based KT interventions and on testing their effectiveness.

**The Organisational Influence and the PARiHS Framework.** In this study, the success of the implementation of change is believed to be linked to the nursing home organisation. Thus, in order to succeed, the type of organisation and decentralised decision making, in relation to the teams, are regarded as important [11]. A framework for successful implementation that incorporates organisational factors (such as facilitation and context) is the PARiHS framework (Promoting Action on Research Implementation in Health Sciences), developed since 1998 [12, 13]. The framework can be used to theory-based KT, and to better understand the “black box” of implementation. According to Kitson and colleagues [12], a “successful implementation” (SI) of new ideas (evidence, guidelines, etc.) is a function (f) of the interrelations between three key elements—evidence (E), context (C), and facilitation (F):  $SI = f(E, C, \text{and } F)$ .

The dimension *Evidence* includes research, clinical experience, patient experience, and routine data. Thus, it is important to not only consider evidence within the “evidence-based medicine” framework. Instead, in the PARiHS framework, also other sources of knowledge are considered, including research evidence, clinical experience, professional craft knowledge, patient preferences and experiences, and local information [12]. Graham et al. [5] conceptualise, in relation to KT, that “knowledge” can be empirically derived (research based) but also encompass other forms of knowing,

such as experiential knowledge. Both local and external knowledge creation or research can be integrated in the knowledge to action process [5]. For instance, local research can be carried out in order to determine the magnitude of the problem and the care gap [5]. The *Context* in a care setting is made up of several factors, factors that are interdependent [12, 14]. Among others such as leadership, culture (prevailing beliefs, values of relationships, teamwork, power, and reward systems), feedback processes (information sharing), and organisational slack (human resources, space, time) are part of the context [14]. *Facilitation* includes purpose, role, skills, and attributes. The subelement “Purpose” (in the *Facilitation* dimension) can be technical or holistic. “Technical” means introducing a discrete method, while “holistic” means sustaining and enabling personal development and system transformation [12]. Facilitation refers to the process of “enabling (making easier) the implementation of evidence into practice” and “facilitation is achieved by an individual carrying out a specific role (a facilitator), which aims to help others” ([13] page 579). The facilitator has an appointed role, internal or external to the organisation, in which the change is being implemented. Facilitators are said to have a key role in helping teams and individuals understand what and how they need to change practice. The role of facilitator is more about helping and enabling than persuading or telling [13]. In the two previously mentioned studies [2, 3], the intervention with study circles was theory based in the PARiHS framework.

The success of the implementation of change is believed to be linked to the professionals’ needs and motivation and to the fact that people change their behaviour on the basis of experienced problems in practice [11]. Thus, in order to achieve improved nutritional care, a pedagogical method is needed to increase professional competence, to better serve the care recipients, to meet external expectations (including pressure from colleagues), and to inspire to change by learning through social interaction. Action-oriented study circles might have these qualities.

**Action Oriented Study Circles .** By adding “action oriented” to “study circles,” I want to emphasise that it is not only “studies” that are expected but also “action” (knowledge to act). Action-oriented study circles (AOSC) is a pedagogical method that might increase the likelihood of achieving KT, as it emphasises work-based learning in the local social context. Often, different theoretical perspectives must be considered in order to develop a good KT [11], and using AOSC makes it possible to integrate pedagogical, social, and organisational theoretical perspectives. Furthermore, the study circle methodology can be linked to the PARiHS framework in that the facilitation aspect is very much connected to enabling self directive learning and cooperative learning approaches [12]. Facilitative learning approaches that are student centred and problem based emphasise critical reflection and focus on experimental learning, and by achieving local consensus they have the potential to enhance changes in practice culture, as well as evidence-based improvements.

The “birth year” for the study circle is regarded to be 1902. It started in the temperance movement, and its

instigator was Oscar “with the beard” Olsson. It has since then been the core method used by the Workers’ Educational Association (ABF) in Sweden [15]. The idea of the study circle can be connected to Vygotsky’s ideas about cultural mediation and internalisation, namely, that by interacting in a group, individuals come to share the knowledge of a culture. In this way, knowledge becomes internalised, one “knows how” [16]. Also Piaget’s thoughts on “cooperative relations” are applicable to the ideas behind study circles. In cooperative relations, power is evenly distributed between participants so that a symmetrical relationship emerges. In cooperative relations, authentic forms of intellectual exchange become possible; each partner has the freedom to project his or her own thoughts, consider the positions of others, and defend his or her own point of view. According to Piaget, the knowledge that emerges is open, flexible, and regulated by the logic of argument rather than determined by an external authority [17]. Study circles also have similarities with problem-based learning (PBL), and pedagogical research has shown that learning is enhanced when the student is active [18, 19].

The fundamental concepts of the study circle are voluntary, informal, and participant-centred learning in which flexibility of format and structure is important [20]. If pedagogical models are divided into the persuasion model, the information model and the discussion model, the study circle belongs to the discussion model. The discussion model means that the participants engage in conversations, identify and analyse problems, and take actions [21]. In addition, the study circle places great emphasis on the broader environmental and social context in which individuals work and where the interventions for change are expected to occur. By using a discussion model for learning, one assumes that knowledge acquisition is a collaborative process and that individual understanding is rooted in social interaction. Because of its simple, flexible structure, and its capacity to address contextual factors, the study circle could serve as a model for educational interventions in care and service. The overall aim of study circles is to identify key problems and to learn how to master them [22]. Several positive experiences have been described by participants in study circle activities arranged within the popular education framework in Sweden (folkbildning), such as personal development, increased self-esteem, changed ways of thinking, increased courage, learning how to study, increased social and cultural competence, and improved cooperation and solidarity [15].

Study circles are becoming increasingly popular in Sweden in care and service. The Swedish Institute for Health Sciences (Vårdalinstitutet) [23], for instance, has several manuals for study circles for different areas such as dementia, ethics, culture, eating and nutrition, palliative care, pain, stroke, and elderly health. However, study circle interventions in care and service have been explored only in a few studies [2, 3, 22, 24–28], and some of these have focused on nutrition in nursing homes and instrumental outcomes of KT [2, 3, 28]. It was shown that study circle interventions with focus on nutrition in nursing homes can improve the care (more residents with risk of undernutrition get the right treatment) [2, 3] and the care recipients’ outcome (decreased

number of residents with undernutrition) [2, 3, 28] in a short- [2, 28] and long-term perspective [3]. Wallin [7] states that “if we want to understand what strategies are working in changing practice to be more evidence-based, then we must test these strategies” (page 579). Thus, research has shown that study circle interventions improve instrumental outcomes, and now we need to show what impact they have on staff knowledge and attitudes, that is, conceptual outcomes. Furthermore, Wallin [7] highlights that there is a need for examining the PARiHS framework through intervention studies. Thus, when exploring the process of KT with focus on nutrition using the AOSC methodology, it should be done in relation to a theoretical framework.

This study reports on the use of AOSC as an intervention to promote the conceptual use of new knowledge concerning eating and nutrition in nursing homes in Sweden, using the Promoting Action on Research Implementation in Health Sciences (PARiHS) framework as the explanatory theoretical model.

*Aim.* The aims were to explore nursing home staffs’ views of participating in action-oriented study circles focused on eating and nutrition, to compare participants with non-participants, and to describe goals set by study circle participants.

## 2. Methods

In this study, both quantitative methods (structured questionnaires, comparisons between groups and over time) and qualitative methods (knowledge-to-action goals and focus group interviews) were used. The quantitative data focused on the content of the AOSC, the participants and non-participants self-evaluation of their knowledge about eating and nutrition, and on how they thought the management acted upon ideas regarding food and mealtimes. The qualitative methods were used to explore nursing home staffs’ views of participating in AOSC and to capture the knowledge-to-action goals set by the study circle participants.

*2.1. Description of the Project as a Whole.* The project as a whole is built up by one all-embracing “knowledge-to-action process” [5] as well as by smaller action processes within each study circle. The knowledge-to-action process described in this study is based on Graham et al. [5]. First of all, the problems with nutrition were identified by a large survey of nutritional status and nutritional care in 2005, capturing the care gap [29]. Following this, a study circle manual, with reference to relevant literature, was developed [30]. Thus, based on the manual, as well as on the findings from the survey in 2005, the identified knowledge was adapted to the local context by the participants in AOSC. In addition, each study circle had the possibility to further adapt the knowledge to their particular setting. Barriers to using the knowledge were continuously assessed by regular evaluations and through dialogues with the front-line staff. Within each study circle, interventions were selected, tailored, and implemented to promote the use of knowledge (i.e., implement the change). The instrumental use of

TABLE 1: Number of study circles and participants every six months.

Period	Number of study circles	Number of participants
Spring 2006	6	49
Autumn 2006	11	92
Spring 2007	14	111
Autumn 2007	7	63
Spring 2008	12	109
Autumn 2008	21	168
Total	71	592

knowledge was monitored in 2007, by repeating the survey of nutritional status and nutritional care, and comparing findings with baseline data from 2005 [2]. The conceptual use of knowledge was monitored every six months (during the two years in which the study circles were going on). To evaluate whether sustained instrumental knowledge use was achieved, a final survey (with the same methodology as in 2005 and 2007) was conducted in 2009 [3].

**2.2. This Study.** The focus of this study was the conceptual use of knowledge. In order to evaluate the process of change and the important ingredients in that process, both qualitative and quantitative methods were used, that is, focus group interviews and questionnaires. Wallin [7] states that qualitative research is particularly helpful in uncovering why something happens and in identifying the active ingredients of an intervention. Further, Titler [31] advocates using “natural experiments,” in the study of KT, as it makes it possible to capture “real world” initiatives that otherwise are not feasible to investigate or would be too costly [31].

**2.3. Sample.** The study involved 24 nursing homes (with one to nine units in each nursing home) and three home care areas. The number of participants from each nursing home or home care area was in median 24 (range 6–74 participants).

This study describes the results from three to some extent overlapping samples:

- (A) Participants ( $n = 592$ ) in all study circles (71 study circles, about 8 participants/AOSC) continuously evaluated their experiences (structured questionnaires) (during spring 2006 till autumn 2008) (Table 1). The target group for the study circles was front-line staff working in the nursing homes (long-term care facilities) as well as staff working in the kitchens (Table 2).
- (B) AOSC participants ( $n = 74$ ) and AOSC non-participants ( $n = 115$ ), staff working in nursing homes attending an education day (spring 2007) with focus on eating and nutrition. Thus, the non-participants were those that no yet had been involved in AOSC but were attending the education day.
- (C) At the end of the project period (December 2008), a focus group interview was carried out with project

TABLE 2: Characteristics of participants and their evaluation of the study circles.

	$n = 592$
Age, mean (SD)	45.2 (10.0)
Gender, men/women, %	4/96
Profession, %	
Auxiliary nurses or nursing assistants	80
Cook, kitchen helpers	12
Registered nurses	3
Team head, students, dietician	3
Home care, auxiliary nurses	2
Number of years in current workplace, %	
Less than one year	2
One to five years	14
Six to ten years	18
Eleven to fifteen years	6
Sixteen to twenty years	16
More than twenty years	44
Content-interesting, %	
Very interesting	42
Interesting	56
Neither nor	2
Fairly/totally uninteresting	0
Content-relevant, %	
Very relevant	33
Relevant	61
Somewhat relevant	6
Not very/not at all relevant	0
Level of difficulty, %	
Very difficult	0
Difficult	1
Neither difficult nor easy	46
Easy	46
Very easy	7

leaders ( $n = 2$ ), study circle leaders ( $n = 5$ ), both leader and participant ( $n = 1$ ), and participants ( $n = 4$ ) (in total  $n = 12$ ). The managers contacted the previous AOSC participants and asked if they would like to participate in the focus group.

**2.4. Intervention: Action Oriented Study Circles.** Inspired by Kitson and colleagues’ [12] ideas about the three key elements (evidence, context and facilitation) for a successful implementation of evidence and knowledge into practice, the AOSC intervention is here described.

**2.4.1. Evidence.** A manual for the study circles was developed by Elisabet Rothenberg and the author of this paper (AW) [30]. Six themes were discussed: (1) the importance of

food for the care recipient, (2) difficulties with eating, (3) routines, tools and responsibility, (4) food as medicine, (5) food hygiene and (6) when the mealtime becomes a question of life and death. In the manual, references were made to chapters in two books from the National Food Administration [32, 33], as well as to scientifically based texts online written by researchers in the field. Besides this, the staff also had access to results from the survey of nutritional status and care done in 2005 [29].

The pedagogical method included the identification of specific nutritionally related problems that the participants decided to discuss and a brainstorming session about ways to solve the problem in their own context, at their own unit. A structured plan of action was developed in order to achieve the necessary changes, bridging the gap between knowledge and care. The participants were encouraged to use the power of the group to achieve the changes. More than one study circle could be held at each unit.

**2.4.2. Facilitation.** The facilitation that was provided can mainly be considered “holistic,” that is, sustained and enabled personal development and system transformation [12]. External facilitation was provided by the project leaders for the study circle intervention and the management. The project leaders coordinated the circles and evaluated them regularly (every six months). They also ordered and distributed the material and had discussions with politicians and managers. The project leaders were not involved in the study circles but could be invited to the groups for discussions. The intervention was supported by the management. Thus, managers ensured that the staff got time to prioritise the study circles. Internal facilitation was provided by the study circle leaders, who acted as facilitators for the participants.

The role of the study circle leader was to administer the circles, facilitate discussions, and ensure that the participants focused on the issues. The study circle leader did not need to be an expert in the focused field. As Strombeck ([20] page 10) states, “the function of the leader is to help promote a positive environment in which participants are encouraged to analyze, discuss and critically examine what they have read.” The study circle leaders were provided training in their forthcoming role. Before the first six months of study circles the leaders were given half a day of training, and after the six-month evaluation, it was decided that the new leaders should be given a full day of training. In addition, it was decided after six months that the management should work towards recruiting homogenous groups (persons from the same nursing home and ward) instead of having the groups be heterogeneous (persons from different nursing homes and wards), and that instead of having six meetings that last for one and a half-hour each, there should be three meetings that last for three hours each. Thus, most (about 65) of the AOSC had three meetings that lasted for three hours each.

Based on the study circle manual and related references, the individuals made decisions about the value, usefulness, and appropriateness of the particular knowledge to their settings and circumstances. The topic area, the particular knowledge to implement, was agreed upon (local consensus)

in each study circle and arose from the awareness that there was a need to improve the older persons’ experiences from mealtimes and outcomes relating to nutrition. Each of the study circle teams was required to define the problem, work on how to create a potential for change, and then hopefully improve the older persons’ experiences and outcomes. Thus, they tailored or customised the knowledge to their particular context. What knowledge to implement could vary from circle to circle, and it was not at all stressed that they should focus on screening for undernutrition and on what measures to take for those who were at risk for undernutrition, that is, the outcomes measured in the previously mentioned two studies [2, 3] of which this study is a part.

**2.5. Data Collection.** Structured questionnaires after each study circle, focusing on content, level of difficulty [23], and knowledge were used (sample a). The participants retrospectively rated their knowledge, thus, they rated their knowledge before the intervention and after in the same questionnaire. Besides this, qualitative data regarding goals for quality improvements set within each study circle ( $n = 71$ ) were collected.

In addition, a questionnaire was given to participants attending an education day (sample b). They filled in the questionnaire before the education began. Both staff that previously had been AOSC participants ( $n = 74$ ) and staff that no yet had been involved in AOSC ( $n = 115$ ) answered the questionnaire that focused on knowledge development and perception of management engagement.

Within the focus group (sample c), experiences from participating or leading study circles were discussed. The interview took three hours. Each participant gave written consent to participate and agreed to have the interview tape-recorded. The interview was transcribed verbatim and analysed using conventional and directed content analysis [34–36].

## 2.6. Analysis

**2.6.1. Quantitative analysis.** Parametric and non-parametric statistics were used depending on the level of data and based on unpaired comparisons between two groups. The following tests were applied: *T*-test, Chi-square test, Wilcoxon signed ranks test, and Mann Whitney *U* test. The level of statistical significance was set at *P*-value < 0.05. Analyses were performed using PASW Statistics 18.0.

**2.6.2. Qualitative analysis.** Conventional (latent and manifest) and directed content analysis was chosen as the method of analysis for the focus group interviews in order to clarify deeper or latent meanings in the text [34, 36]. Both manifest and latent content analysis include an interpretation of the text material, although both vary with regard to interpretation depth and abstraction level [35].

The text was read several times in order to gain an overall understanding. On the basis of the first readings, distinguished patterns emerged from the texts. These patterns made up the first results: “the naive understanding”. These first thoughts and reflections on the text contents were

TABLE 3: Study circle participants' ( $n = 592$ ) retrospective self-evaluation of their knowledge development.

	Study circles		<i>P</i> -value
	Before, %	After, %	
<b>Knowledge, %</b>			
I have sufficient/great knowledge	72	96	<0.0005 <sup>(1)</sup>
I feel insecure whether my knowledge is sufficient or not	25	3	
<u>I do not have sufficient knowledge</u>	3	1	

<sup>(1)</sup>Wilcoxon signed ranks test.

recorded in the margins and were used continuously during the remaining stages of the analysis. Step-by-step, the material was analysed with the aim of the study in mind. "Meaning units" were then identified, that is, assertions from the contents of the text. Meaning units with similar content were organised into different areas (categories) with the study aim in focus. The meaning units were condensed (the sentences were shortened while preserving the core) [34]. Subcategories were created for sorting out the analysed material. At the last stage, the subcategories were linked together into two main categories that in turn were linked to a core category. Afterwards, the concepts from the PARiHS framework [12] were deduced to the qualitative findings (directed content analysis) [36]. Categories at different levels were ordered in relation to *Evidence, Context, Facilitation and Successful Implementation*.

**2.7. Ethics.** The ethics for conducting scientific work were followed. This study was approved in each municipality. The respondents were asked for informed consent. Both verbal and written information were given and respondents were guaranteed confidentiality (no personal identification numbers or names were collected). Within the focus group, each participant gave written consent to participate and agreed to have the interview tape recorded. As the study was part of an overall quality development project, no formal approval by an ethical committee was required, according to the Swedish Act concerning the Ethical Review of Research Involving Humans [37].

### 3. Results

**3.1. All Study Circles.** During three years (2006–2008), 592 persons from 24 nursing homes participated in the study circles, according to the filled-in and returned questionnaires. There were 71 study circles in total with an average of eight persons per circle (Table 1).

566 women (96%) and 26 men (4%) participated, with a mean age of 45 years (min 20, max 66, q1–q3 39–51 years). The most common profession participating in study circles was auxiliary nurses or nursing assistants (80%). Most participants had been working in their current line of work for more than 20 years (Table 2).

The most common combination of staff in each circle was one person working in the kitchen, who usually also was the circle leader, and seven auxiliary nurses or nursing assistants. The staff members attending each study circle usually came

from the same unit, except during the first six months of study circles (six study circles).

**3.1.1. Evidence and Knowledge.** Of those attending the study circles, 98% regarded the content as interesting/very interesting, 94% thought that it was relevant/very relevant and 92% considered that the difficulty level was easy/neither difficult or easy (Table 2).

When participants retrospectively rated their knowledge about food and nutrition before and after having participated in the study circle, there was a significant improvement. Before the study circle, 72% stated that they had sufficient or great knowledge and afterwards 96% stated the same thing (Table 3).

**3.1.2. Action Orientation Goals for Quality Improvement.** The action orientation of the study circles included the identification of specific nutritionally related problems that the participants decided to discuss and brainstorm in order to find ways to solve the problem in their own context, at their own unit. A structured plan of action was developed by the participants in order to achieve the necessary changes. Thus, each study circle worked with setting goals to work towards within each group's workplace. These goals could be grouped into environment, food, hygiene, routines, shortening overnight fast, the ability to choose, and cooperation (Table 4).

### 3.2. Comparisons between Those Participating and Those Not

**3.2.1. Facilitation and Knowledge.** In total 189 structured questionnaires were returned during the education day and it is unclear how many did not answer them. There were no differences in age, gender, or in number of years in current workplace between AOSC participants and non-participants. However, there was a significant difference in professions, with more cook/kitchen helpers and less registered nurses among the AOSC participants (Table 5).

More among those who had participated than among those who had not participated in the study circles agreed totally/partly that the management was engaged in and took care of ideas regarding food and mealtimes (80% and 66%, *P*-value = 0.009). In addition, more of those who had participated in study circles than among those who had not felt that they had great or sufficient knowledge about the field (69% versus 63%, *P*-value = 0.044) (Table 5).

TABLE 4: Knowledge-to-action goals set within study circles focusing on eating and nutrition.

Goal category	Example of focus
Mealtime environment	Create a homelike environment
	Bake at the unit, fragrance impressions from food, tease the appetite
	Create a calm atmosphere in the dining room
Food	Offer alternatives to oral supplements
	Spices on the table
	Individually adapted food and consistencies
Hygiene	Be careful with hand hygiene
	Keep cold food cold and warm food warm (check temperature)
	Improve mouth care
Routines	Ask newly admitted about food habits
	Control weight for those moving in and continually
	Inform substitute staff about goals and routines
Shorten the overnight fast	Offer evening coffee/tea/sandwich
	Postpone evening meal
	Have night staff offer sandwich and milk
The ability to choose	Have the residents serve themselves food
	Have the residents choose between different dishes
	Offer the residents assistance to go to the dining room
Cooperation	Improve cooperation between kitchen, registered nurses and other professions

**3.3. Focus Group Interview.** The analysis of the focus group interview with project leaders ( $n = 2$ , one man and one woman), circle leaders ( $n = 5$ , all women of whom two worked in kitchen), and participants ( $n = 4$ , all women) in the study circles resulted in one core category: “nutritional knowledge translation expressed as *going from feeding to serving*.” This was the most concluding description of what was achieved. This core category captures an awareness that includes both the meaning of the mealtime environment, being together, and staff that is service minded, lays the table and presents the food in an appealing way. It also captures the two categories that it was built up from (Table 5).

- (i) Socioculturally Mediated knowledge spread.
- (ii) Facilitation of knowledge spread and sustainability

**3.3.1. Socio-Cultural Mediated Knowledge Spread.** The main impression from this category was that the socio-culturally mediated knowledge spread contributed to a shared vision among the staff. This category was built up from three subcategories (Table 6).

- (i) Together and from the same place we are stronger.
- (ii) Getting together broadens one’s perspective and improves the work atmosphere.
- (iii) Through discussions, the gap between knowledge and practice can be bridged.

The participants expressed both that one person achieves less change than many and that one study circle achieves less change than many. “One swallow does not make a summer” can here be used as a metaphor (developed by the researcher)

to illustrate that one single person who attends a training was described as having difficulties in achieving changes in the workplace. Staff members say that attending a training day as the only representative from their workplace made it difficult to gain interest and understanding for what they had learned and what they wanted to change. It became clear that the staff experienced the study circle as the superior method, since it meant that several persons from the same setting came together and discussed and set goals that were adapted to their own workplace, their own context. In addition, many participants expressed a preference for homogenous groups rather than heterogeneous groups. Study circles with participants from different workplaces made it difficult for participants to mutually agree on the same goals, and more difficult to communicate the goals to their own workplace. Furthermore, “rings on the water” can be used as a metaphor to say that the more study circles that had taken place at the same workplace, the greater was the possibility of achieving positive changes. To summarise, “together and from the same place we are stronger.”

Broadening one’s perspective signifies that the participants in the study circles experienced a greater understanding for each other and each other’s work tasks, saw new dimensions of their work, and communicated more with each other. The understanding between the staff improved, especially between those working in the ward and those working in the kitchen. The work atmosphere improved.

The participants felt that the gap between knowledge and practice could be bridged through the discussions in the study circles. The ward culture and personal engagement were thought to have improved as a consequence of the knowledge-focused discussions between colleagues. The staff

TABLE 5: Comparisons between staff members who had participated in study circles ( $n = 74$ ) and those not ( $n = 115$ ).

	Study circles		
	Non-participants, $n = 115$	Participants, $n = 74$	P-value
Age, mean (SD)	45.7 (9.7)	47.5 (10.0)	0.241 <sup>(1)</sup>
Gender, men/women %	3/97	6/94	0.286 <sup>(2)</sup>
Profession, %			<0.0005 <sup>(2)</sup>
Auxiliary nurses or nursing assistants	75	86	
Cook, kitchen helpers	0	11	
Registered nurses	20	3	
Home care, auxiliary nurses	5	0	
Number of years in current workplace, %			0.677 <sup>(3)</sup>
Less than one year	3	0	
One to five years	13	8	
Six to ten years	15	16	
Eleven to fifteen years	12	16	
Sixteen to twenty years	10	11	
More than twenty years	47	49	
Knowledge, %			0.044 <sup>(3)</sup>
I have sufficient/great knowledge	63	69	
I feel insecure whether my knowledge is sufficient or not	33	31	
I do not have sufficient knowledge	4	0	
The management is engaged in and takes into account ideas regarding food and mealtimes, %			0.009 <sup>(3)</sup>
Completely/partly agree	66	80	
Can't decide	23	10	
Completely/partly disagree	11	10	

<sup>(1)</sup>t-test.<sup>(2)</sup>Chi-square test.<sup>(3)</sup>Mann Whitney U test.

felt that they had gained a deeper knowledge about food and mealtimes, knowledge that was based on evidence and the groups' experiences, and not only on the individuals' own experiences. They also said that they had changed their attitudes regarding the food, from being negative to being more positive. The food and mealtime was regarded more and more important. In addition, they described how incorrect routines or a negative ward culture could be improved through relearning.

**3.3.2. Facilitation of Knowledge Spread and Sustainability.** The category "facilitation of knowledge spread and sustainability" was built up from three subcategories (Table 6):

- (i) action-oriented goals
- (ii) facilitation by anchoring and feedback
- (iii) facilitation of sustainability

It was seen as valuable to set and evaluate goals within the study circles. At wards where there had been many study circles, it became, in the end, difficult to set new goals. Participants also described different ways of making the staff more aware of the goals, for instance, to write down all goals in a document that was framed and hung in a place where everyone could see it. Staff members also talked about how they informed new staff and substitutes about the goals. Many improvements were also described as being an effect of the set goals, improvements that for instance meant a calmer and more homelike mealtime environment, and better measuring and followup of weight, and so forth.

Facilitation by anchoring and feedback of results was seen as important. A lot of information and persuasion were required in order to make the management understand the importance of the study circles. When management got feedback of the results from each six-month evaluation, their motivation to support and back up the intervention increased.

TABLE 6: Inductive results structured into core category, categories, subcategories, and quotations (different quotations are separated by a slash). The PARiHS (Promoting Action on Research Implementation in Health Sciences) framework deduced to the inductive results.

Core category	Categories	Subcategories	Quotations	PARiHS framework
		Together and from the same place we are stronger	After training, when you come back, usually alone, it is hard to get people to listen. It is difficult to adapt the new knowledge to your own workplace. / ...initially, we had one participant from each unit, then with participants from the same unit, there was an enormous difference. / If you carry out one study circle at a unit, then you might achieve some things, but it is when the second study circle is formed that you can really achieve changes.	Context
Nutritional knowledge translation expressed as “going from feeding to serving” <sup>(a)</sup>	Socioculturally mediated knowledge spread	Getting together broadens one’s perspective and improves the work atmosphere	People have a greater understanding for one another, are more open, and feel free to ask questions about different things. One broadens one’s views, one can actually do things differently, if you don’t try–nothing happens.	Context
		Through discussions, the gap between knowledge and practice can be bridged	You get a new perspective, think differently than before./ I would absolutely not want to have missed this time, never in my life, I have learned so much that I can make use of. / We will try to figure out everything that we can do, instead of focusing on things we can’t do. / A culture can develop that is not justified.	Evidence
	Action-oriented goals		The study circles have been goal-directed, it is easier to explain to the others together what to do. / These documents stating goals...they have led to so many changes at the units. / There is cooperation between all of us: team manager, staff, kitchen, and the actual health care. Everyone works towards the same goal: we have a human being who we want to feel well, and it is our job to do what we can to make it possible.	Evidence
	Facilitation of knowledge spread and sustainability	Facilitation by anchoring and feedback	There has been a lot of persuasion, and a lot of marketing...geared towards team managers and the management group. Then there are the politicians as well.	Facilitation
		Facilitation of sustainability	We have put in a lot of work on this and we have to make sure that it continues even though the study circles end. / It is not supposed to end just because the three years have passed, it is a process that is supposed to continue. / Yes, it is easy to fall back into old habits...there should perhaps be some sort of follow-up. / Finally, we have made a dent at the shortcomings we have had, and now we will continue forward.	Facilitation

<sup>(a)</sup>“Successful implementation” is deduced using the PARiHS framework. The idea for labelling this core category stemmed from an actual statement in the focus group interview, “we are thinking more in terms of service, it is not a matter of feeding anymore.”

Facilitation of sustainability in order to maintain and achieve new improvements in practice was mainly focused on the time after finishing the project. It was clear from the focus group interviews that both the study circle participants

and the leaders wanted to maintain and further develop the improvements that were initiated or achieved from the study circles. Suggestions were put forward regarding how the work could be continued, for instance, by discussing food

and mealtimes at workplace meetings and to continue with study circles for those who had still not participated in any (Table 6).

**3.4. Directed Content Analysis.** The deductive/directed content analysis, using the PARiHS framework, of the findings from the conventional/inductive analysis showed that the category “socio-culturally mediated knowledge spread” related to the components context and evidence, while the category “Facilitation of knowledge spread and sustainability” was related to the two categories facilitation and evidence. The core category “nutritional knowledge translation expressed as *going from feeding to serving*” was considered to manifest successful implementation.

## 4. Discussion

Study circles focusing on eating and nutrition were found to have a positive effect on learning and the workplace context (conceptual use of knowledge). In an earlier study, the study circle intervention was shown to also have positive effects on nutritional care and on care recipients’ nutritional status (instrumental knowledge use) [2, 3]. The study circle intervention seems to give quality improvements leading to professional development (learning), better system performance (care), and better patient outcomes (health), by integrating evidence, context, and facilitation in the efforts to achieve KT.

Different methods were used to evaluate the effects of study circles. In some cases, the findings from using one method were confirmed by using another method. For instance, through the focus group interview some results found through the quantitative continuous evaluations were confirmed. This can be considered a methodological strength. It could be seen as a shortcoming that the results are based on the staff’s self-reflections, for instance, when it comes to reflecting on one’s own knowledge development retrospectively. Anyhow, this result was indirectly confirmed when comparing the results of those who had participated in the intervention and those who had not, and it was confirmed by the focus group interviews. Another example of what could be studied more directly is the improvements related to the working place context, for instance better working routines and work atmosphere. However, staff members are a part of and create the working place context, and their views are important to capture. In addition, some actual improvements in the provided care were described in the previous studies [2, 3]. Even so, it seems worthwhile to conduct more studies directly focusing on the actual interaction between team members and between staff and care recipients during an intervention with study circles.

In the efforts to achieve a successful implementation, it is of utmost importance to consider the context and the power of teamwork. This was evident in several ways in the results, not the least in the category “socio-culturally mediated knowledge spread.” Thus, the systematic implementation of study circles creates a favourable context, including workplace climate, that also leads to a more positive view

among management and staff of what the circles can achieve for individuals, for the team, and for the care recipients.

Improving teamwork is not easily achieved by traditional methods, and single interventions have limited impact in KT [38, 39]. In this study, using multifaceted interventions, it was found that skills were developed within the study circles, by the teams, and that this in time could develop the overall capacity of the organisation, allowing further improvements. In a study by Zeitz et al. [40], it was found that the complexity behind the so-called “simple care” (providing warm drinks, appetizing food, energy enriched food, and oral supplements) relied on the active management and broader transformation of the system. In order to achieve improvements in such pragmatic issues as giving care recipients good nutrition, organisational aspects had to be tackled, such as teamwork, communication processes, and organisational and individual values and beliefs [40]. When using AOSC as an intervention method, it is important to have homogenous groups and to understand that more study circles in the same workplace can possibly lead to better transformation of the system. AOSC seems to be an optimal pedagogical method that gives priority to the context in order to achieve KT. These conceptual outcomes of KT are most likely generalizable also to other care settings implementing AOSC with focus on nutrition and eating.

The focus on eating and nutrition, and the fact that the staff came together in the study circles, contributed to competence development and led to positive outcomes. Overall, participants experienced a high degree of satisfaction through participating in the study circles. This could be attributed to the format of the study circle, which provided the opportunity for participants to engage in sustained and meaningful discussions about eating and nutrition. It might, however, come as a surprise that the work atmosphere improved through an intervention focusing on improving nutritional care. There could be at least two reasons for this: first of all that the staff came together from the same workplace, and secondly that the focus was on eating and nutrition. In another study, “food” seemed to be a medium through which other themes were discussed, for example respect, teamwork, communication and redesigning systems of care delivery [40]. Thus, the successful conceptual outcome could be due to both the AOSC and the actual focus within these, that is, an integration of context and evidence. This might in turn strengthen the fact that the directed content analysis connected both the PARiHS concept context and evidence to the category “socio-culturally mediated knowledge spread”. Also, Gougoulaikis [15] states in a thesis that learning in study circles is socio-culturally conditioned—knowledge is created and grows in the meeting and communication with others in study circles. In this perspective, knowledge is not something that is only registered. Instead, it is developed in collaboration, relates to the participants’ context, and a propitious learning atmosphere that comes about when participants have an exchange without competition [15].

By attending study circles, individuals felt that they developed their competence. This became apparent in several

ways. For instance, when staff retrospectively self-rated their knowledge, before and after attending the study circles, a significant improvement was indicated. In addition, the participants in the SC considered their knowledge more sufficient than what non-participants rated. Thus, in study circles a socio-culturally mediated knowledge spread, including collaborative learning, takes place that can form the basis for KT and quite likely a successful implementation of evidence.

In order to be successful in the KT, staff needed support from project leaders, management, and from trained circle leaders. The intervention needed to be anchored in the management and the management received feedback that in turn made them more eager to support the intervention. Anchoring and feedback (every six months) was provided by the project leaders. Both quantitative and qualitative findings support the need for facilitation. Participants experienced that the management was engaged in and took care of ideas regarding food and mealtimes to a greater extent than what the non-participants experienced. In addition, the need for facilitation was evident in the category “facilitation of knowledge spread and sustainability.” In addition, the staff needed facilitation from the circle leaders. A full-day training in the study circle leader role was effective in helping them to get the group to focus on the tasks for the circle, which in turn most likely enhanced learning in the group.

There were no experts involved in the study circles, which might have contributed to the high degree of satisfaction, as the power was evenly distributed between participants and symmetric relationships emerged, corresponding to Piaget’s ideas about “cooperative relations” [17]. Participants also found it important that kitchen staff attended the study circles. This contributed to better communication between staff at the unit and staff working in the kitchen. From a project leader perspective, there needed to be a balance between structuring the process of study circles and enabling teams to maintain ownership and control. It might be that if the study circles had a more explicit focus on nutritional screening and management of residents with nutritional risk, the instrumental outcomes would have been even better than found in previous studies [2, 3]. However, this could be at the cost of conceptual outcomes, that is, understanding, knowledge, and attitudes. Correspondingly, not only improvements in knowledge but also in the perception of how work was carried out, in the view of care recipients, working atmosphere and cooperation were described.

The study circle participants and leaders wanted to continue the work, and felt that the work had only just begun—similarly to what was found in a study by Wiechula et al. [39]. Thus, facilitation was emphasised to continue also after the intervention period. also it most likely did continue to some extent, as some positive instrumental outcomes (provision of energy enriched food and/or oral supplements) were seen also one year after the project ended [3]. Thus, facilitation from different levels in the organisation, together with regular evaluations and feedback from project leaders, is likely to contribute to a “learning organisation”, and it needs to continue also after the project has been completed. In the concept “a learning organisation” the two PARiHS

concepts facilitation and evidence get connected, as it is also evident in the category “facilitation of knowledge spread and sustainability” found in this study.

By making the study circles action oriented, several positive effects are achieved. Besides the findings in this paper, also a few earlier studies have shown positive effects, both in the care provided and for the care recipients [2, 3, 28]. The PARiHS framework can be used to understand the interactions and complexities involved in KT activity. The positive changes achieved can possibly be attributed to the fact that complex interventions were developed in the study circles that fit the local contexts. Melding and implementing evidence involves negotiation and shared understanding [12]. In addition, the need to consider the context in order to achieve quality improvements as emphasised by Kitson and colleagues [12] is supported by the findings from this study.

## 5. Conclusions

KT in nursing homes is a complex and challenging activity. Through action-oriented study circles, priority is given to the staff’s experiences, feelings, values and beliefs, and teamwork when striving towards quality improvements. Knowledge to action is achieved through socio-culturally mediated knowledge spread, including collaborative learning, and through facilitation of knowledge spread and sustainability in a learning organisation.

The study circle seems to be an outstanding pedagogical method for getting staff in care and service from the same unit, in the same context, to focus on a specific knowledge area. By making study circles action oriented, several positive effects can be achieved for the staff’s learning, team collaboration, care provision, and most importantly, for the care recipients’ health. The findings from this study have implications for other care settings implementing AOSC with focus on eating and nutrition.

## Conflict of Interests

The author declares that no Conflict of interests.

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