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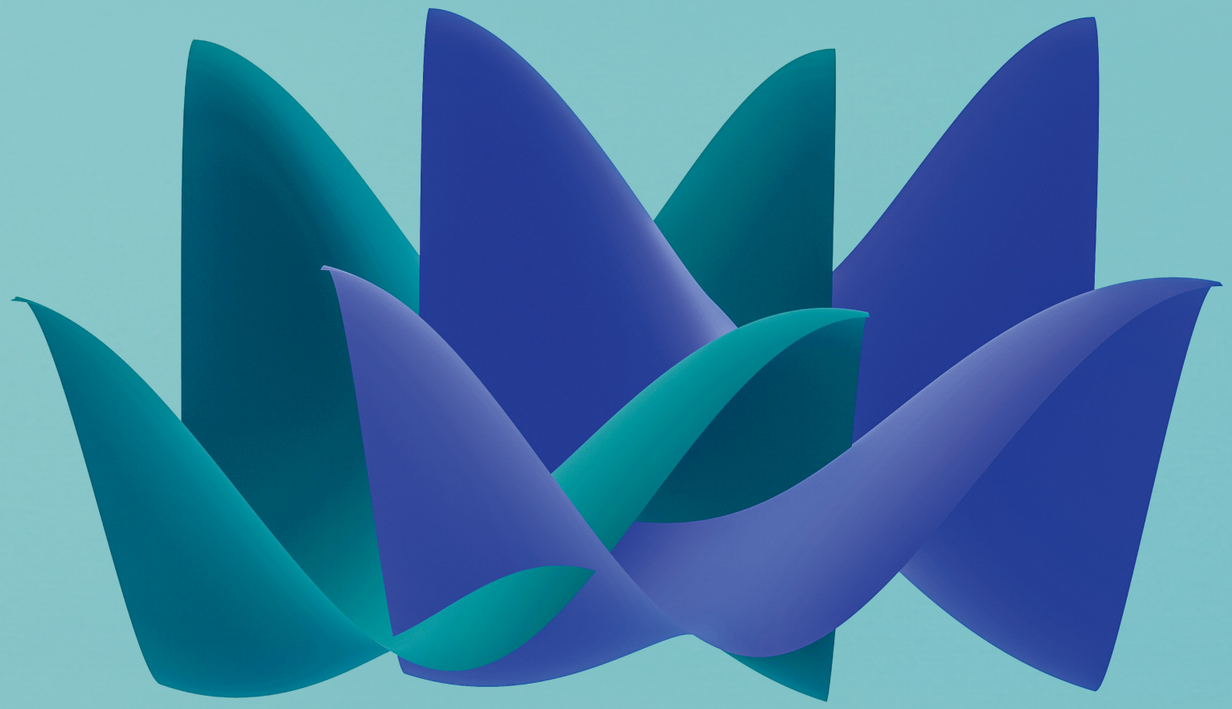

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AIMS AND SCOPE

The *Korean Journal of Community Nutrition* is the official peer-reviewed journal of the Korean Society of Community Nutrition. It was launched in 1996. The previous primary titles were Jiyeog sahoe yeong-yang hag-hoeji (pISSN 1226-0983) from vol. 1, no. 1 to vol 3. no. 5, and Daehan Jiyeok sahoe yeong-yang hakoeji (pISSN 1226-0983, eISSN 2287-1624) from vol. 4, no. 1 to vol. 27 no. 4. The English title (parallel title) was Korean Journal of Community Nutrition from vol. 4, no. 1 to vol. 27 no. 4. The *Korean Journal of Community Nutrition* has been the current primary title since October, 2022 (eISSN 2951-3146). The abbreviated title of the journal is *Korean J Community Nutr.* It is published bimonthly in February, April, June, August, October and December. It began to be published only as an e-journal from 2022.

BACKGROUND

KJCN was first published in March, 1996. Three issues were published in 1996, and then five issues per year was published from 1997 to 2001. Since 2002, KJCN has become a bimonthly journal. It is published in February, April, June, August, October and December. This work was supported by the Korean Federation of Science and Technology Societies(KOFST) grant funded by the Korean government. The abbreviated title of the journal is 'Korean J Community Nutr'.

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ABSTRACTING AND INDEXING

KJCN is abstracted and indexed in the following databases: KoreaScience (1996-), KoMCi (2000-2020.2), Korea Citation Index (2002-), KoreaMed Synapse (2011-2020.2, 2024.8-), KoreaMed (2011-), Science Central (2014-), CrossRef, Chemical Abstracts Service (CAS), CAB Abstracts, Directory of Open Access Journals (DOAJ, 2022-), SCOPUS (2022-), and google scholar.

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Research Note

Pilot evaluation of a cooking-based nutrition education program to promote vegetable intake among children in Seoul, South Korea: a single-group pre–post study

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Objectives: Food neophobia in children is often associated with limited exposure and familiarity to some foods. Cooking-based nutrition education (CBNE), which promotes acceptance through direct experience, may support the development of healthy eating habits. This study aimed to develop and implement a standardized CBNE program for school-aged children in Seoul, South Korea, and to evaluate its effectiveness by assessing changes in raw vegetable intake. Raw vegetable intake is an early indicator of the effectiveness of nutrition education on diverse topics in promoting healthy eating habits.

Methods: A single-group pre–post study was conducted with 37 children aged 6–11 years who participated in a 2-day CBNE program in October 2023. The participants completed pre- and post-education questionnaires and raw vegetable intake assessments. Four low-preference vegetables (bell pepper, carrot, cucumber, and tomato) were selected and served raw (25 g each) before and after the program. Intake changes were analyzed using paired t-tests, and Pearson's correlation and hierarchical regression analyses were performed to identify predictors.

Results: Total raw vegetable intake significantly increased post-education ($P = 0.008$), particularly for carrots ($P = 0.023$). By subgroup, raw vegetable intake significantly increased in girls, upper-grade students, and those who consumed four or more vegetable side dishes per meal. Hierarchical regression analysis revealed that while vegetable preference was initially significant, vegetable-related experiences ($\beta = 0.395$, $P = 0.026$) and diversity of vegetable side dishes per meal ($\beta = 0.403$, $P = 0.032$) were stronger predictors in the final model (adj $R^2 = 0.333$).

Conclusion: The CBNE program may enhance vegetable intake in children. Although preference remained the strongest individual factor, vegetable experience and the diversity of vegetable side dishes per meal had a greater combined effect. These findings underscore the importance of repeated and diverse exposure, not only by supporting previous studies that link such exposure to increased intake but also by suggesting that environmental support may be essential for sustaining healthy eating habits.

Keywords: child; vegetables; diet, healthy; health education; pilot projects

INTRODUCTION

Childhood is a critical period of growth and development, and nutrition and lifestyle during this period facilitate the transition to adolescence and form the foundation for dietary preferences and eating habits in adulthood [1, 2]. Diversity in food choices is essential to achieve balanced nutrient intake; however, children may show the tendency to avoid vegetable consumption while preferring meat, instant foods, and processed foods [3, 4]. Other nutritional problems in children include a preference for energy-dense snacks, irregular meals, picky eating, and increasing obesity due to the excessive consumption of instant and high-energy foods [5]. Processed foods contain high levels of potentially harmful nutritional components, such as sugars, sodium, saturated fats, trans fats, and cholesterol, which increase the prevalence of chronic adult diseases [6]. The proportion of sugar intake through processed foods in children has been reported to be approximately 9.7%, nearly reaching the World Health Organization's recommended limit of 10%; moreover, more than half of the children (79.6% boys and 75.5% girls) were reported to consume fast food at least once per week [7]. The rates of overweight and obesity are the highest among boys aged 10–11 years and girls aged 11–18 years, emphasizing the importance of consuming vegetables, which are low in energy but rich in nutrients [8]. However, vegetables are representative foods that children avoid, with only 13.5% of this age group consuming 500 g or more of fruits and vegetables daily; moreover, the average daily vegetable intake was only 139.4 g, which is significantly lower than the recommended dietary pattern [9, 10]. Vegetable avoidance mainly occurs in children with insufficient nutritional knowledge and poor eating behaviors, resulting in inadequate intake of micronutrients such as vitamins and minerals [4]. Unhealthy eating habits can lead to malnutrition and affect children's physical and mental growth, impeding their psychosomatic development and learning abilities [11, 12].

Children tend to avoid unfamiliar foods that they have not tried or frequently encountered, often citing poor taste as the reason. Food and taste preferences are learned through experience and the surrounding environment, which influence food choices and consumption frequency [13]. Therefore, reducing aversion to unfamiliar foods through experiential nutrition education that allows exposure to various foods is essential. Experiential nutrition education includes sensory education and cooking practice and is defined as a practice-based educational method that enables participants to assign new meanings to foods through educational activities based on taste science and the five senses [14, 15]. In comparison with one-way education, this approach has been reported to yield notable effects on forming proper eating habits, including higher interest and participation among children, improved self-efficacy, and increased acceptance of avoided foods [15, 16].

Children show differences in cognitive development, sensory acceptance, and self-regulation abilities according to age, necessitating standardized experiential nutrition education programs that account for developmental characteristics. Standardized education refers to structured education that ensures consistency and reliability based on certain standards and procedures [17]. Accordingly, children's dietary and nutritional education content and user guides have been developed, providing a systematic framework for designing age-appropriate education with a consistent scope and sequence [18]. However, the demonstration of educational effects using these materials remains insufficient. Therefore, this study developed a cooking-based nutrition education program and related content based on previously developed standardized educational materials, and pilot-tested it with school-aged children residing in Seoul, South Korea. Educational effects were evaluated by focusing on the degree of formation of healthy eating habits in children, using vegetable intake levels as an indicator that can serve as an early measure of learning effects related to healthy food preferences and consumption methods [19].

A representative example of using vegetable intake as an evaluation indicator for cooking-based nutrition education program effects is the Modifying Eating and Lifestyles at School (MEALS) study in the United States [20]. This study assigned professional chefs to elementary schools to develop recipes using whole grains, fresh and frozen produce, unsaturated fats, and seasonings without added salt or sugar; apply these to school meals; and have students repeatedly experience them

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for seven months. As a result, more students chose vegetables after the intervention, and vegetable intake increased approximately twofold [20]. The MEALS study aimed to evaluate changes in raw vegetable intake following education. However, for a more valid interpretation of educational effects as well as the development of practical strategies to promote children's vegetable intake, the major factors influencing vegetable intake require consideration. Therefore, this study aimed to explore the major factors affecting vegetable intake, identify the interactive context between educational effects and these factors, and ultimately contribute to the establishment of evidence-based strategies to promote vegetable intake in children.

METHODS

Ethics statement

Written informed consent was obtained from all participants and/or the guardians for the survey. The survey procedures and protocols were approved by the Institutional Review Board at Hallym University (HIRB-2023-018).

1. Study design

This single-group pre–post study involved children who participated in the pilot application of a cooking-based nutrition education program. The program is described according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines (https://www.strobe-statement.org/).

2. Study participants and period

This study was conducted in Seoul, South Korea. The study participants were school-aged children (age, 6–11 years) who participated in a pilot application of a cooking-based nutrition education program in October 2023. Participants were recruited between August 24 and September 29, with promotions conducted through social networking service platforms and cooperation from the Seoul Metropolitan Government Food Life Support Center. Pre- and post-education surveys and raw vegetable intake assessments were conducted with 37 school-aged children who expressed willingness to participate in the study and received consent from their legal guardians.

3. Planning and implementation of nutrition education

To develop educational programs and content appropriate for the developmental characteristics of the participants, the school-aged children were divided into three groups on the basis of their elementary school curriculum: grades 1–2, grades 3–4, and grades 5–6. The education program and content included information regarding nutrition and hygiene management and prevention of overweight and obesity; the content was prepared by referencing previously developed children's dietary and nutrition education content and user guides for elementary students [18]. On the basis of these references, low-sodium and low-sugar cooking practice recipes, presentation materials (PPT), and activity sheets were developed considering taste science and the five senses, enabling participants to have food experiences that helped them assign new meanings to foods.

To address major nutritional problems in children, including avoidance of fruits and vegetables and excessive consumption of instant and processed foods, the cooking-based nutrition education program was structured with themes of "raw and pickled vegetables" and "salt and salty taste" for grades 1–2, "processed foods and sweets" for grades 3–4, "sustainable eating" for grades 5–6, and "choosing healthy ingredients" and "whole grain experience" for households with school-aged children. Education was conducted in three stages, totaling 80 minutes: theory classes including sensory activities (30 minutes), cooking activities (40 minutes), and wrap-up activities (10 minutes). During the theory classes with sensory activities, nutritional knowledge was delivered using PPT and activity sheets. During the cooking activities, the participants performed hands-on cooking practices under instructor guidance using age-appropriate cooking tools. Cooking practices were conducted according to educational themes: "making salads and pickled vegetables" for grades 1–2, "making low-sugar ice cream" for grades 3–4, "making environmentally friendly rice balls" for grades 5–6, and "making pasta with seasonal vegetables" and "making whole grain granola" for households with school-aged children. During the wrap-up activities, the learning content was summarized, commitment-making and true/false quizzes were conducted, and seasonal low-sodium and low-sugar recipes were provided to help with real-life practice (Table 1).

4. Evaluation of the effects of nutrition education

The effects of nutrition education were evaluated through pre- and post-education surveys and raw vegetable intake assessments. Pre- and post-education surveys were conducted by distributing questionnaires to school-aged children before and after the cooking-based nutrition education. These questionnaires were constructed by modifying and supplementing previously validated items from early childhood healthy eating practice questionnaires, nutrition quotient, and Yook and

Table 1. Cooking-based nutrition education program for school-aged children

Grade	Program title	Theory-based nutrition education with sensory activities (30 min)	Cooking (40 min)	Wrap-up (10 min)
Lower (1st–2nd)	Raw & pickled vegetables	- Sensory characteristics of vegetables, including taste, aroma, and texture	Making a salad and pickled vegetables	Making commitment: putting today's learning into practice
		- Effects of cutting style on vegetable texture		True or false quiz
		- Understanding the characteristics and benefits of seasonal vegetables		Offering seasonal low-sodium and low-sugar recipes
		- Proper techniques for vegetable storage and handling		
	Salt & salty taste	- The role of salt in food and human body		
		- Understanding ingredients and dishes with salty flavor		
		- Identifying foods and ingredients with a salty taste		
		- Experiencing salty taste through sensory activities		
Middle (3rd–4th)	Processed foods & sweets	- Choosing healthy snacks: reading sugar and sodium information	Making low-sugar ice cream	
		- Experiencing differences in sweetness depending on temperature		
		- Understanding the meaning of the consumption date		
		- Recognizing food poisoning situations and prevention methods		
Upper (5th–6th)	Sustainable eating	- Understanding the food system: from farm to table	Making environmentally friendly rice balls	
		- Learning about food mileage and low-carbon eating practices		
		- Reading nutrition labels and food additives		
		- Proper storage and handling of processed foods		
Households with school-aged children	Choosing healthy ingredients	- Identifying spoiled or unsafe ingredients	Preparing pasta with seasonal vegetables	
		- Understanding processed foods and food additives		
		- Reading nutrition labels and choosing healthy snacks		
	Whole grain experience	- Understanding seasonal grains	Making whole grain granola	
		- Observing and identifying different types of grains		
		- Distinguishing between non-glutinous and glutinous rice		
		- Proper storage of grains		
		- Changes in the appearance of grains during cooking		
		- Learning about whole grain snacks		

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Hwang [21] research to fit the participant population of the present study [21-25]. Pre-education questionnaires included questions related to the participants' general characteristics, vegetable awareness, experience, and preference levels, while post-education questionnaires included questions assessing healthy eating efficacy and the diversity of vegetable side dishes consumed per meal (based on the number of types). The general characteristics included name, sex, date of birth, and age. Vegetable awareness, experience, and preference levels were measured using a 5-point Likert scale (1: strongly disagree, 2: disagree, 3: neutral, 4: agree, and 5: strongly agree). Healthy eating efficacy was measured using five items on a 5-point Likert scale (1: strongly disagree, 2: disagree, 3: neutral, 4: agree, and 5: strongly agree), and the diversity of vegetable side dishes consumed per meal (based on the number of types) was evaluated in five categories (1: rarely eat, 2: one type, 3: two types, 4: three types, and 5: four or more types).

The raw vegetable intake assessment evaluated behavioral changes that are difficult to measure through surveys [26, 27], and examined intake changes by providing raw vegetables to participants before and after cooking-based nutrition education. Four types of vegetables that had shown low preference among school-aged children in previous studies [8, 28-31] were provided: bell pepper, carrot, cucumber, and tomato. Considering the vegetable consumption frequency for school-aged children presented in the recommended dietary pattern of the 2020 Korean Dietary Reference Intakes, the median individual serving size was set at 70 g, with 25 g provided before and after nutritional education [10]. The amounts remaining after vegetable provision were weighed and recorded, and intake was calculated by subtracting the remaining amount from the amount provided during data processing.

5. Statistical analysis

All data were analyzed using IBM SPSS Statistics (version 27.0; IBM Corp.), and the significance level was set at $P < 0.05$. Frequencies and percentages were calculated for sex and grade among the participants' general characteristics, and means and standard deviations were calculated for age. Age was calculated as chronological age based on the data collection time, and grades for those participating in family programs with school-aged children were classified as grades 1–2 (age, 6–7 years), grades 3–4 (age, 8–9 years), and grades 5–6 (age, 10–11 years) on the basis of the age at participation in cooking-based nutrition education program. Mean and standard deviation values were calculated for pre-education vegetable awareness, experience, and preference, and post-education healthy eating efficacy. Frequencies and percentages by response category were calculated for the diversity of vegetable side dishes per meal (based on number of types), and mean and standard deviation values were calculated by coding "rarely eat" as 0. Since some groups had small sample sizes, the diversity of vegetable side dishes consumed per meal (based on the number of types) was analyzed by combining adjacent groups for variance estimation and statistical power safety as follows: groups consuming two or fewer types (n = 13), three types (n = 12), and four or more types (n = 12).

Mean differences in raw vegetable intake before and after education were analyzed using paired t-tests, and additional differences between groups were examined in relation to the categorical variables, including sex, grade, and diversity of vegetable side dishes consumed per meal (based on the number of types). To identify the factors influencing the participants' raw vegetable intake, linear relationships between major variables were preliminarily explored using Pearson's correlation analysis, and hierarchical regression analysis was performed after examining multicollinearity.

RESULTS

1. General characteristics of the participants and pre- and post-education survey results

The general characteristics of the participants and the pre- and post-education survey results are presented in Table 2. The participants included 20 girls (54.1%) and 17 boys (45.9%), and their mean age was 9.2 ± 1.6 years. Eleven students (29.7%) in grades 1–2, 16 (43.2%) in grades 3–4, and 10 (27.0%) in grades 5–6 participated in the study, with grades 3–4 showing the highest participation. Vegetable awareness, experience, and preference scores were 4.8 ± 0.3, 4.7 ± 0.5, and 3.8 ± 1.0, respectively. Participants' healthy eating efficacy was 4.0 ± 0.7 points, and the diversity of vegetable side dishes

consumed per meal (based on number of types) was 2.8 ± 1.1, with two or fewer types being the most common (13 participants; 35.1%), followed by three types and four or more types (12 participants each; 32.4%).

2. Raw vegetable intake before and after nutrition education

Changes in the participants' raw vegetable intake before and after education are shown in Table 3. Among the four types of raw vegetables provided, bell pepper intake was 6.8 ± 7.6 g before education and 9.3 ± 11.1 g after education, showing a non-significant but increasing trend after education (P = 0.166). Carrot intake significantly increased from 4.9 ± 6.8 g before education to 8.8 ± 10.3 g after education (P = 0.023). Cucumber intake was 7.7 ± 7.0 g before education and 10.3 ± 10.5 g after education, showing a non-significant but increasing trend after education (P = 0.077). Tomato intake was the highest among the four raw vegetables, showing a non-significant increase from 15.0 ± 11.0 g before education to 18.5 ± 10.5 g after education (P = 0.059). Total raw vegetable intake showed a significant increase from 34.3 ± 19.6 g before education to 46.9 ± 31.3 g after education (P = 0.008).

Table 2. General characteristics of the subjects and results of pre- and post- education questionnaires (n = 37)

Variables	School-aged children
General characteristics	
Sex	
Boys	17 (45.9)
Girls	20 (54.1)
Age (year)	9.2 ± 1.6
Grades	
Lower (1st–2nd)	11 (29.7)
Middle (3rd–4th)	16 (43.2)
Upper (5th–6th)	10 (27.0)
Pre-education questionnaire	
Vegetables	
Awareness	4.8 ± 0.3
Experience	4.7 ± 0.5
Preference	3.8 ± 1.0
Post-education questionnaire	
Healthy eating efficacy	4.0 ± 0.7
Diversity of vegetable side dishes per meal[1)]	
2 fewer types	13 (35.1)
3 types	12 (32.4)
4 or more types	12 (32.4)
Total	2.8 ± 1.1

n (%) or mean ± SD.
[1)]Number of types, including *kimchi*.

3. Raw vegetable intake before and after education in relation to sex, grade, and diversity of vegetable side dishes per meal (based on number of types)

Table 4 summarizes the group-specific results of raw vegetable intake before and after education, stratified by sex, grade, and the diversity of vegetable side dishes per meal. Boys showed increasing trends in the intake of all four raw vegetables after education; however, these differences were not statistically significant. Girls showed significant increases in carrot (P = 0.029), tomato (P = 0.015), and total raw vegetable (P = 0.006) intake after education, whereas bell pepper and cucumber intake showed increasing trends without significant differences after education. When assessed by grade, students in higher grades showed greater increments in raw vegetable intake after education. In terms of individual vegetables, grades 1–2 showed non-significant upward trends in bell pepper, carrot, cucumber, and total raw

Table 3. Changes in raw vegetable intake before and after education (n = 37)

Variables	Raw vegetables intake		Range	t	*P*-value[1)]
	Pre-test	Post-test			
Bell pepper (g)	6.8 ± 7.6	9.3 ± 11.1	0–25	–1.42	0.166
Carrot (g)	4.9 ± 6.8	8.8 ± 10.3	0–25	–2.37	0.023
Cucumber (g)	7.7 ± 7.0	10.3 ± 10.5	0–25	–1.82	0.077
Tomato (g)	15.0 ± 11.0	18.5 ± 10.5	0–25	–1.95	0.059
Total (g)	34.3 ± 19.6	46.9 ± 31.3	0–100	–2.80	0.008

mean ± SD.
[1)]The significance level for statistical analysis was $P < 0.05$. Comparisons were performed using the paired t-test.

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Table 4. Changes in raw vegetable intake before and after education according to sex, grades and diversity of vegetable side dishes per meal (based on the number of types)

Variables	Category	Raw vegetables intake													
		Bell pepper			Carrot			Cucumber			Tomato			Total	
		Pre-test	Post-test	*P*-value[1]	Pre-test	Post-test	*P*-value[1]	Pre-test	Post-test	*P*-value[1]	Pre-test	Post-test	*P*-value[1]	Pre-test	Post-test	*P*-value[1]
Sex	Boys (n = 17)	8.3 ± 8.2	11.2 ± 12.0	0.323	6.4 ± 8.4	8.4 ± 11.1	0.393	9.1 ± 8.3	11.1 ± 11.4	0.446	11.1 ± 11.9	13. 0 ± 11.9	0.582	34.9 ± 25.8	43.8 ± 40.5	0.278
	Girls (n = 20)	5.6 ± 7.2	7.7 ± 10.4	0.352	3.6 ± 4.9	9.1 ± 9.8	0.029	6.4 ± 5.6	9.6 ± 9.9	0.066	18.3 ± 9.1	23.3 ± 6.2	0.015	33.8 ± 12.9	49.6 ± 21.5	0.006
Grades	Lower (n = 11)	6.6 ± 9.6	6.6 ± 10.6	0.965	2.9 ± 7.4	7.3 ± 10	0.094	6.6 ± 9.1	8.3 ± 11	0.462	13.6 ± 11.9	12.3 ± 12.3	0.619	29.7 ± 28.8	34.5 ± 34.6	0.496
	Middle (n = 16)	7.3 ± 7.1	6.7 ± 9.7	0.801	3.3 ± 4.5	7.7 ± 8.7	0.062	5.4 ± 5.5	7.7 ± 8.4	0.258	17.5 ± 10.8	19.6 ± 10.3	0.429	33.4 ± 12.5	41.7 ± 25.7	0.171
	Upper (n = 10)	6.5 ± 6.8	16.5 ± 11.7	0.049	9.5 ± 7.4	12.1 ± 13	0.578	12.4 ± 4.4	16.7 ± 11.1	0.296	12.4 ± 10.4	23.7 ± 3.8	0.012	40.8 ± 16.7	69.0 ± 26.7	0.030
Diversity of vegetable side dishes per meal[2]	2 or fewer types (n = 13)	6.6 ± 8.1	5.3 ± 9.1	0.579	1.6 ± 2.6	3.4 ± 5.2	0.282	4.2 ± 6.3	5.2 ± 7.5	0.656	15.5 ± 11.0	14.5 ± 12.5	0.801	27.9 ± 16.1	28.5 ± 26.2	0.929
	3 types (n = 12)	8.8 ± 7.2	8.8 ± 12.1	0.978	7.8 ± 7.8	8.9 ± 11.2	0.674	9.3 ± 8.1	9.3 ± 10.5	0.975	16.8 ± 11.3	21.8 ± 7.8	0.074	42.6 ± 26.8	48.8 ± 31.3	0.406
	4 or more types (n = 12)	5.2 ± 7.8	14.2 ± 11.1	0.017	5.5 ± 7.8	14.4 ± 11.0	0.034	9.7 ± 5.6	16.8 ± 10.5	0.014	12.7 ± 11.1	19.6 ± 9.8	0.041	33.0 ± 11.2	65.0 ± 26.8	0.002

mean ± SD.
[1]The significance level for statistical analysis was $P < 0.05$. Comparisons were performed using the paired t-test.
[2]Number of types, including *kimchi*.

vegetable intake after education, while tomato intake showed a slight, non-significant decrease. Grades 3–4 showed non-significant but increasing trends in carrot, cucumber, tomato, and total raw vegetable intake after education, while bell pepper intake decreased non-significantly. Grades 5–6 showed significant increments in bell pepper ($P = 0.049$), tomato ($P = 0.012$), and total raw vegetable intake ($P = 0.030$) after education, whereas carrot and cucumber intake showed non-significant but increasing trends. Regarding the diversity of vegetable side dishes consumed per meal (based on number of types), only the group that consumed 4 or more types, showed significant increases in bell pepper ($P = 0.017$), carrot ($P = 0.034$), cucumber ($P = 0.014$), tomato ($P = 0.041$), and total raw vegetable intake ($P = 0.002$) after education.

4. Correlations between raw vegetable intake and major variables

The correlations between total raw vegetable intake and major variables are shown in Table 5. Total raw vegetable intake showed a significant positive correlation with participant age (r = 0.379, $P < 0.05$), vegetable experience (r = 0.405, $P < 0.05$), vegetable preference (r = 0.453, $P < 0.01$), and diversity of vegetable side dishes consumed per meal (based on the number of types) (r = 0.408, $P < 0.05$). In the assessment of correlations between the major variables, vegetable preference showed a significant positive correlation with age (r = 0.353, $P < 0.05$). The diversity of vegetable side dishes consumed per meal (based on the number of types) showed a significantly positive correlation with vegetable preference (r = 0.447, $P < 0.01$) and healthy eating efficacy (r = 0.471, $P < 0.01$). Experience with vegetables was significantly and positively correlated with age (r = 0.326, $P < 0.05$) and vegetable awareness (r = 0.495, $P < 0.01$).

5. Stepwise explanatory power of major predictors for raw vegetable intake

The effects of vegetable awareness, experience, preference, healthy eating efficacy, and diversity of vegetable side dishes consumed per meal (based on the number of types) on total raw vegetable intake were examined stepwise using hierarchical regression analysis (Table 6). The model showed a Durbin–Watson value of 1.754, approximating 2, confirming the independence of resid-

Table 5. Correlation analysis between total raw vegetable intake and major variables (n = 37)

Variables	Age	Awareness	Experience	Preference	Healthy eating efficacy	Diversity of vegetable side dishes per meal[1)]	Total raw vegetable intake
Age	1						
Awareness	0.047	1					
Experience	0.326*	0.495**	1				
Preference	0.353*	0.297	0.257	1			
Healthy eating efficacy	0.121	0.078	0.133	0.315	1		
Diversity of vegetable side dishes per meal[1)]	0.169	–0.036	0.038	0.447**	0.471**	1	
Total raw vegetable intake	0.379*	0.094	0.405*	0.453**	0.040	0.408*	1

[1)]Number of types, including *kimchi*.
*$P < 0.05$, **$P < 0.01$.

uals for the dependent variable, and variance inflation factor values below 10, indicating no multicollinearity problems among the independent variables. In step 1 for the development of the regression model, the model was adjusted by including the control variables sex and age. Model 1 did not show statistical significance (F = 2.857, P = 0.071), but age appeared to be a significant predictor affecting raw vegetable intake (β = 0.377, P = 0.024). Model 1's explanatory power was 14.4%, and its adjusted explanatory power was 9.4%, indicating low explanatory power for raw vegetable intake (R^2 = 0.144, adj R^2 = 0.094). In step 2, vegetable awareness was added, but model significance was not achieved ($\triangle F$ = 0.247, P = 0.623). Among individual variables, age maintained its significance level (β = 0.372, P = 0.028), while vegetable awareness was not statistically significant (β = 0.081, P = 0.623). Model 2's explanatory power was 15.0%, which was higher than that of Model 1, but the adjusted explanatory power of Model 2 (7.3%) was lower than that of Model 1 (9.4%; R^2 = 0.150, adj R^2 = 0.073), indicating that vegetable awareness did not provide independent explanatory power for raw vegetable intake.

In step 3, vegetable experience was added, but the overall model was not statistically significant ($\triangle F$ = 3.791, P = 0.060). In particular, the significance of age, which was maintained in Models 1 and 2, was not achieved (β = 0.262, P = 0.122), and all variables lacked significance. Model 3 showed greater explanatory power (24.0% vs. 15.0%) and greater adjusted explanatory power (14.5% vs. 7.3%) than Model 2, but the improvement was not substantial (R^2 = 0.240, adj R^2 = 0.145). In step 4, vegetable preference was added to achieve model significance (F = 5.329, P = 0.028). Model 4 showed greater explanatory power (35.2% vs. 24.0%) and adjusted explanatory power (24.7% vs. 14.5%) than Model 3, indicating improved explanatory power (R^2 = 0.352, adj R^2 = 0.247). Only vegetable preference was a significant predictor affecting raw vegetable intake (β = 0.376, P = 0.028).

In step 5, healthy eating efficacy was added, and model significance disappeared ($\triangle F$ = 0.809, P = 0.376). However, vegetable experience and vegetable preference appeared as significant predictors (β = 0.374, P = 0.045; β = 0.419, P = 0.020). Model 5's explanatory power was 36.9%, which was greater than that of Model 4, but the adjusted explanatory power was 24.2%, which was lower than that of Model 4 (R^2 = 0.369, adj R^2 = 0.242). This finding indicated that healthy eating efficacy was not suitable for explaining raw vegetable intake (β = –0.138, P = 0.376). In step 6, diversity of vegetable side dishes consumed per meal (based on number of types) was added, and the overall model showed statistical significance ($\triangle F$ = 5.060, P = 0.032). With the addition of variables, vegetable preference's significance, which was maintained in Models 4 and 5, was not achieved, and vegetable experience and diversity of vegetable side dishes consumed per meal (number of types) were confirmed as significant predictors (β = 0.395, P = 0.026; β = 0.403, P = 0.032). Model 6's explanatory power was 46.2%, which was higher than that of Model 5, and its adjusted explanatory power was 33.3%, also higher than that of Model 5 (R^2 = 0.462, adj R^2 = 0.333).

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Table 6. Hierarchical regression analysis of major predictors on total raw vegetable intake (n = 37)

Independent variables	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
	B	SE	t	B	SE	t	B	SE	t	B	SE	t	B	SE	t	B	SE	t
Sex[1]	0.769	7.015	0.110	1.347	7.189	0.187	0.553	6.915	0.080	2.246	6.531	0.344	1.856	6.566	0.283	-3.055	6.537	-0.467
			0.017			0.031			0.013			0.051			0.042			-0.069
Age	5.419	2.290	2.367	5.346	2.320	2.304	3.766	2.371	1.589	1.905	2.367	0.805	1.889	2.374	0.796	2.048	2.229	0.919
			0.377*			0.372*			0.262			0.133			0.132			0.143
Awareness				5.409	10.886	0.497	-6.650	12.150	-0.547	-13.072	11.738	-1.114	-13.695	11.795	-1.161	-10.507	11.160	-0.941
						0.081			-0.099			-0.195			-0.205			-0.157
Experience							17.112	8.788	1.947	16.784	8.249	2.035	17.360	8.300	2.092	18.339	7.801	2.351
									0.369			0.362			0.374*			0.395*
Preference										8.734	3.783	2.309	9.719	3.950	2.460	5.835	4.089	1.427
												0.376*			0.419*			0.251
Healthy eating efficacy													-4.557	5.068	-0.899	-9.675	5.272	-1.835
															-0.138			-0.293
Diversity of vegetable side dishes per meal[2]																8.203	3.647	2.249
																		0.403*
(Constant)	-10.503	23.039	-0.456	-36.674	57.595	-0.637	-42.817	55.393	-0.773	-28.859	52.338	-0.551	-13.374	55.253	-0.242	-15.376	51.863	-0.296
			-			-			-			-			-			-
R^2			0.144			0.150			0.240			0.352			0.369			0.462
ΔR^2			0.094			0.073			0.145			0.247			0.242			0.333
F			2.857			1.945			2.530			3.363*			2.920*			3.565**
ΔF			2.857			0.247			3.791			5.329*			0.809			5.060*

[1]Sex coded as boys = 1, girls = 2.
[2]Number of types, including *kimchi*.
*$P < 0.05$, **$P < 0.01$.

DISCUSSION

This single-group pre–post study was conducted in Seoul, South Korea, with 37 school-aged children (age, 6–11 years) who participated in a pilot application of a cooking-based nutrition education program. This study aimed to evaluate the effects of nutrition education and explore the factors influencing vegetable intake through pre- and post-education surveys and raw vegetable intake assessments. The findings showed significant increments in carrot and total raw vegetable intake after education, which are similar to the results of nutrition education addressing overall healthy eating in young children, where vegetable intake increased after education [26, 27]. In the US nutrition education program "Color Me Healthy," which included club activities where young children could directly taste fruits and vegetables and participate in imaginary journeys, including role-playing about physical activity and eating nutritious foods, vegetable intake continued to increase at 1 week and 3 months post-baseline in exposed young children [26]. Domestically, when eight sessions of nutritional education based on fruits, vegetables, and national common dietary guidelines were provided to young children, vegetable intake significantly increased [27]. However, this study differed in that it measured changes in both total and individual vegetable intake; in particular, significant increments were noted in the intake of carrots, which had the lowest intake before education, highlighting the effects of this approach in reducing vegetable avoidance.

The increments in raw vegetable intake were particularly evident in girls, children in the upper grades, and the group consuming four or more types of vegetable side dishes per meal, consistent with the results reported in previous studies. Girls have previously shown higher preference scores for 10 types of vegetables than boys [29], and girls consume more vegetables per serving than boys [32]. Children in upper grades have been reported to eat more balanced diets and show higher preferences for seasoned vegetables, salads, and *kimchi* than those in lower grades [33], which is closely related to the phenomenon of increased vegetable consumption frequency with increasing age [16, 34]. The diversity of vegetable side dishes is related to home availability,

with children who frequently encounter home-cooked vegetables eating more vegetables [35-37]. These results show that boys, children in lower grades, and children with low diversity in vegetable side dishes consumed per meal may be relatively vulnerable to low vegetable intake, emphasizing the need to develop and apply customized nutrition education for these groups.

Raw vegetable intake was related to age, vegetable experience, vegetable preference, and the diversity of vegetable side dishes, with the major factors affecting increased vegetable intake and the diversity of vegetable side dishes. Vegetable experience as an individual factor could not explain increased raw vegetable intake, but it showed high explanatory power when combined with diversity of vegetable side dishes. As an individual factor, vegetable preference best explained increased intake of raw vegetables. This finding supports the importance of direct vegetable experience and diverse exposures to intake behavior, indicating the importance of cooking-based nutrition education. Previous studies have also confirmed that food neophobia decreased in children with repeated exposure to various vegetables, and vegetable intake tended to increase as exposure duration increased [31, 38]. For vegetable preference, although actual tasting experiences are generally considered necessary for the translation of visual preferences to intake behavior, one study reported that vegetable intake significantly increased in young children who had six months of visual exposure to vegetables. These findings suggest that further research is needed to clarify the relationship between vegetable preferences and actual vegetable intake [39, 40].

In summary, when sufficient vegetable exposure at home is supported, implementing vegetable experience activities, that is, cooking-based nutrition education, is more effective in increasing raw vegetable intake and can have positive effects on forming correct perceptions about vegetable intake and improving dietary efficacy in school-aged children. Vegetable consumption is also an important element of sustainable eating for both human health and the environment. The Eat-Lancet Commission's Global Planetary Health Diet emphasizes that whole grains, fruits, nuts, legumes, and vegetables should account for a large proportion of total food intake [41]. Therefore, education focusing on the importance of vegetable intake for sustainable eating is needed for school-aged children; however, in Korea, related research is still limited to programs such as gardening activities for young children and food ecological transition education [42, 43]. Greater emphasis on sustainable eating education linked to vegetable intake can help school-aged children develop healthy and environmentally friendly eating habits.

Limitations

This pilot study used purposive sampling methods with only 37 school-aged children (ages 6–11 years) who participated in the pilot application of a cooking-based nutrition education program as research participants. Nutrition education was conducted in a single group, and significant increments were observed in carrot and total raw vegetable intake after education. However, some vegetables did not show significant increments in intake and showed only increasing trends. The lack of a control group and the use of only a single session of nutrition education limited the ability to clearly identify the causal relationships between nutrition education and raw vegetable intake. Future studies with more education sessions would be more effective to form correct perceptions of vegetable intake and improve dietary efficacy.

Conclusion

This study divided school-aged children in Seoul, South Korea into three groups, grades 1–2, 3–4, and 5–6, which reflect the rapid physical changes during growth periods rather than the conventional two groups of lower grades (1–3) and upper grades (4–6). This is the first study to present the effects of a cooking-based nutrition education program using previously developed standardized educational materials. The healthy eating habit formation effects of nutrition education, which are difficult to measure through surveys, were evaluated on the basis of raw vegetable intake before and after education, which resulted in significant increments in carrot and total raw vegetable intake after education. These increments in raw vegetable intake were greatly influenced by the vegetable experience and the diversity of vegetable side dishes consumed per meal. This finding suggests that vegetable exposure at home is important for increasing raw vegetable intake and vegetable experience activi-

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ties. Therefore, if cooking-based nutritional education for school-aged children and their families continues through community connections, it will be effective in promoting healthy eating habits.

CONFLICT OF INTEREST

There are no financial or other issues that might lead to conflict of interest.

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DATA AVAILABILITY

Research data is available upon request to the corresponding author.

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Research Article

Safety education status and needs priorities of Korean military food service personnel using the Borich Needs Assessment and the Locus for Focus model: a cross-sectional study

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Objectives: Since the enactment of the *Serious Accidents Punishment Act* in Korea in 2021, the importance of safety management in food service facilities has increased. This study was conducted to examine the status of safety education and to identify educational needs for safety accident prevention among army food service personnel.
Methods: This study included 157 food service personnel from Army units located in Gyeongsangnam-do. Participants were divided into two groups based on the daily number of meals served. Demographic characteristics, the status of safety education, and priority for safety accident prevention education were evaluated.
Results: A total of 97.5% of participants received safety education, with 60.8% attending at least monthly. "Lecture" (63.4%) was the most commonly used educational method. The preferred educational methods were "Lecture" (23.5%) and "Counselling" (23.5%), showing significant group differences ($P < 0.001$). A total of 79.6% of participants reported applying the educational content in their performance. The mean importance score for safety accident prevention (4.78) was higher than the performance score (4.44), with significant differences between the two groups observed in the importance scores ($P < 0.05$). "Slip & burn" had the highest importance score, while "Electric shock and fire" had the highest performance score. The educational needs analysis revealed that the highest priority item for the < 100 meals group was "When moving heavy items, an assistive device or assistance from colleagues should be utilized", while for the ≥ 100 meals group, it was "When using a vegetable cutter or grinder, use an exclusive stick."
Conclusion: This study can serve as a foundational database for developing customized safety education programs tailored to Korean army food service personnel.

Keywords: safety; education; food service; military personnel

INTRODUCTION

In Korea, military food service is a core element directly related to ensuring soldiers' nutritional intake for health and maintaining combat readiness. It also significantly influences the operational efficiency of the military army organization and the quality of life in barracks [1, 2]. Recently, in Korea the *Basic Act on Military*

Food Service was enacted to reflect this importance [3]. Personnel responsible for military food service include logistics officers, supply officers, food service managers, supply and food service coordinators, dietitians, civilian cooks, and military cooks, each with distinct roles and responsibilities. These personnel are responsible for a wide array of tasks, including meal planning, food procurement, production, hygiene, and safety management within space- and time-constrained environments [4]. These facilities are particularly vulnerable to physical, chemical, and biological hazards, resulting in frequent accidents, such as burns, cuts, slips, and musculoskeletal injuries [5-7]. In response to increasing concerns about workplace safety, the *Serious Accidents Punishment Act* was enacted in Korea in 2021 to emphasize the need for more robust safety management in food service settings [8]. Military cooks, who comprise the majority of food service personnel, receive only three weeks of initial training after enlistment, underscoring the need for continuous and practical safety education [9]. However, current education is mostly top-down and instruction-based, often failing to reflect real-world conditions and the specific needs of food service personnel [10]. Therefore, the need for practical and effective education to prevent safety accidents has become apparent. To design such safety education, a prior analysis of education needs that reflects the job roles and circumstances of the target trainees is essential [7, 11].

The Borich Needs Assessment quantitatively prioritizes educational needs by measuring the weighted gap between perceived importance and current performance. While it provides objective and precise identification of priority areas, its results may be less accessible without visual interpretation [12, 13]. The Locus for Focus model complements this by visually mapping importance and performance into four quadrants, facilitating intuitive recognition of critical educational priorities. However, it offers less quantitative precision compared to Borich. Integrating both models leverage their respective strengths, combining robust numerical analysis with clear visual prioritization to enhance the accuracy and usability of needs assessments [14]. These models have been effectively applied across multiple disciplines, including healthcare, education, and food service [7, 12-14, 15, 16]. Despite the critical importance of military food service safety, research in this field remains limited due to concerns over national security and accessibility [17]. Moreover, few studies have examined how variations in unit size and meal volume affect educational needs. Based on the *Food Sanitation Act*, industrial foodservice facilities serving < 100 meals are classified as small-scale and are not required to employ a dietitian or a cook [18]. However, specific standards for the deployment of nutritionists and cooks within military foodservice facilities have not been established.

This study aimed to analyze the educational needs for safety accident prevention among Korean army food service personnel in Gyeongsangnam-do, using the Borich Needs Assessment and the Locus for Focus model. To reflect differences in the scale of food service facilities, the analysis was conducted by dividing participants into groups based on the daily number of meals served (< 100 and ≥ 100). This study is expected to provide practical foundational data not only for identifying the priorities of educational content but also for developing customized safety education programs tailored to the scale of each military unit.

METHODS

Ethics statement

The informed consent was obtained from all participants for the survey. The survey procedures and protocols were approved by the institutional review board of Changshin University (Approval No. 104271-201501-HR-022). Additionally, the Security Office of the army unit conducted a security review.

1. Study design

This cross-sectional study was described with reference to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) reporting guidelines (https://www.strobe-statement.org/).

2. Participants and data collection

Participants were army food service personnel in Gyeongsangnam-do, Korea who understood the purpose and content of the study and participated voluntarily. A survey was conducted online using Google Forms from October to November 2024. The survey link was distributed to participants via a social networking service. Re-

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sponses were collected anonymously, and no personally identifiable information was recorded. The sample was obtained using a convenience sampling method, and the number of participants was 150, the minimum sample size when using the G*Power 3.1.9.2 (the hhu) with an effect size of 0.3, a significance level of 0.05, and a power of 0.95. Considering the anticipated dropout rate, the survey link was shared with a total of 165 people. A total of 163 copies were returned, with 157 used for data analysis, excluding 6 copies that had inconsistent responses or missing important variables.

3. Materials and methods

Demographic data included sex, age, meals served per day, work career, army hierarchy, the number of food service workers. Work career categorized into two groups: less than five years and five years or more. Army hierarchy was classified as either army officers (including commissioned officers, non-commissioned officers, government employees, and civilian cooks) or army cooks. The daily number of meals served was categorized as fewer than 100 or 100 or more, and the number of food service personnel was classified as five or fewer, or six or more. The measurement tool for assessing the importance and performance of safety accident prevention consisted of 22 items, which were directly adopted from used items in previous studies [6, 7]. The items were categorized into six types: slip & burn (4 items), cut & winding & stenosis (4 items), collisions & falling off (4 items), electric shock & fire (4 items), musculoskeletal disease (4 items), and contact with chemical substance (2 items). Each item was measured using a five-point Likert scale for importance, responses ranged from 1 (not at all important) to 5 (very important), and for performance, from 1 (not at all performed) to 5 (very well performed). Higher scores indicated higher levels of importance or performance. The Cronbach's α coefficients for the importance and performance scales were 0.987 and 0.983, respectively.

4. Statistical analysis

All data were analysed using IBM SPSS Statistics version 23.0 (IBM Corp.). The daily number of meals served was the independent variable. The chi-square test and independent samples t-test were used to analyse the differences in proportions and means between groups. The reliability of the measurement tool was examined for internal consistency using Cronbach's α coefficient. The priority of educational content for preventing safety accidents was analysed using the following three steps. In the first step, the difference in means between the importance and performance of safety accident prevention management was tested using a paired sample t-test. The second step was to calculate the Borich Needs in order to prioritize the safety accident prevention education content. The Borich Needs were calculated for each item using the formula '(importance mean – performance mean) × importance mean) / Total item number'. For example, if an item has an average importance of 4.5, an average performance of 3.0, and the total number of items is 22, the calculation would be ((4.5 – 3.0) × 4.5) / 22. In the third step, the Locus for Focus model was employed to visualize the priorities of educational content, with the X-axis representing importance and the Y-axis representing the discrepancy level (i.e., the difference between importance and performance). Quadrants were delineated using the mean values of each axis as the cut-off points. The first quadrant indicates high importance and high discrepancy levels; the second quadrant indicates low importance but high discrepancy levels; the third quadrant indicates low importance and low discrepancy levels; and the fourth quadrant indicates high importance but low discrepancy levels. Items located in the first quadrant represent the highest educational needs and should therefore be prioritized for implementation. The significance level was set at $P < 0.05$.

RESULTS

1. Demographic characteristics

The demographic characteristics of the participants are presented in Table 1. Among the participants, 73.2% were male, with a mean age of 29.5 ± 12.9 years. The majority of participants (80.3%) had less than five years of work career. The proportion of participants with less than five years of work career was higher in the group serving ≥ 100 meals group, although the difference was not statistically significant. The proportion of army cooks (63.7%) was relatively higher than that of army officers (36.3%). Regarding the number of food service

Table 1. Demographic characteristics by the daily number of meals served

Variables	Items	Total (n = 157)	< 100 meals group (n = 87)	≥ 100 meals group (n = 70)	χ^2 or t-value
Sex	Male	115 (73.2)	64 (73.6)	51 (72.9)	0.010
	Female	42 (26.8)	23 (26.4)	19 (27.1)	
Age (year)	-	29.5 ± 12.9	29.7 ± 13.0	29.2 ± 12.8	0.239
Work career (year)	< 5	126 (80.3)	66 (75.9)	60 (85.7)	2.376
	≥ 5	31 (19.7)	21 (24.1)	10 (14.3)	
Army hierarchy	Army officers	57 (36.3)	31 (35.6)	26 (37.1)	0.038
	Army cooks	100 (63.7)	56 (64.4)	44 (62.9)	
Number of food service personnel	≤ 5	105 (66.9)	87 (100)	18 (25.7)	96.635***
	≥ 6	52 (33.1)	0 (0.0)	52 (74.3)	

n (%) or Mean ± SD.
Differences between groups were analyzed using the chi-square test or t-test.
***$P < 0.001$.

personnel, 66.9% of participants reported having 5 or fewer personnel in their unit, nearly twice the proportion of those with six or more (33.1%). By the daily number of meals served, 82.9% of the < 100 meals group had 5 or fewer personnel, whereas 74.3% of the ≥100 meals group had 6 or more personnel ($P < 0.001$).

2. Status of safety education

As shown in Table 2, 97.5% of the participants had received safety education. The most frequently reported frequency of safety education was once a month or more (60.8%), while 9.1% received education only once a year. "Lecture" was the most frequently used method of safety education (63.4%), followed by "Counselling" (15.7%) and "Discussions" (9.8%). In the < 100 meals group, the proportion of "Counselling" was relatively higher, at 26.2%, whereas in the ≥ 100 meals group, "Discussions" and "Practice" were more prevalent, at 14.5% and 13.0%, respectively, showing a significant difference ($P < 0.001$). The preferred education methods indicated equal proportions for "Lecture" and "Counselling", each at 23.5%, followed by "Practice" (15.0%), "Video-based education" (13.7%), "Discussions" (12.4%), and "Social media" (11.8%). In the < 100 meals group, "Counselling" (36.9%), "Video-based education" (15.5%), and "Social media" (14.3%) were the preferred education methods. In contrast, the ≥ 100 meals group showed greater preference for "Lecture" (34.8%) and "Practice" (23.2%) ($P < 0.001$). A total of 79.6% of participants reported implementing the received educational content in their actual performance.

3. The importance and performance of safety accident prevention

Table 3 presents a comparison of the importance and performance of safety accident prevention management between the two groups based on the daily number of meals served. The overall mean score for importance was 4.78 out of 5.0, with the < 100 meals group reporting a significantly higher score than the ≥ 100 meals group (4.86 vs. 4.70) ($P < 0.05$). The overall mean score for performance was 4.44, which was 0.34 points lower than the importance score. Although the < 100 meals group showed a slightly higher performance score than the ≥ 100 meals group (4.51 vs. 4.37), the difference was not statistically significant.

In the analysis of importance by type of safety accident, the "Slip & burn" indicated the highest mean score (4.82), while "Musculoskeletal disease" had the lowest (4.74). However, all six categories scored above 4.5 out of 5, indicating a generally high level of importance across all accident types. The < 100 meals group consistently reported higher importance scores across all accident types. Statistically significant differences were observed in the categories of "Collision & falling off" ($P < 0.01$), "Electric shock & fire" ($P < 0.05$), "Musculoskeletal disease" ($P < 0.01$), and "Contact with chemical substance" ($P < 0.05$), with the < 100 meals group showing a higher importance in each type. The highest level of performance was found in the "Electric shock & fire" (4.55), and the lowest in "Musculoskeletal disease" (4.18). In five out of the six accident types, excluding

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Table 2. Status of safety education by the daily number of meals served

Variables	Items	Total (n = 157)	< 100 meals group (n = 87)	≥ 100 meals group (n = 70)	χ^2 value
Experience of safety education	Yes	153 (97.5)	84 (96.6)	69 (98.6)	0.637
	No	4 (2.5)	3 (3.4)	1 (1.4)	
	Total	157 (100)	87 (55.4)	70 (44.6)	
Frequency of safety education[1)]	Once a year	14 (9.1)	4 (4.8)	10 (14.5)	4.484
	Once every 6 months	17 (11.1)	9 (10.7)	8 (11.6)	
	Once every 3 months	29 (19.0)	17 (20.2)	12 (17.4)	
	≥ Once a month	93 (60.8)	54 (64.3)	39 (56.5)	
	Total	153 (100)	84 (54.9)	69 (45.1)	
Main safety education method[1)]	Lecture	97 (63.4)	51 (60.7)	46 (66.7)	22.458***
	Counselling	24 (15.7)	22 (26.2)	2 (2.9)	
	Discussions	15 (9.8)	5 (6.0)	10 (14.5)	
	Practice	11 (7.2)	2 (2.4)	9 (13.0)	
	Video-based education	6 (3.9)	4 (4.8)	2 (2.9)	
	Total	153 (100)	84 (54.9)	69 (45.1)	
Desired safety education method[1)]	Lecture	36 (23.5)	12 (14.3)	24 (34.8)	28.344***
	Consulting	36 (23.5)	31 (36.9)	5 (7.2)	
	Practice	23 (15.0)	7 (8.3)	16 (23.2)	
	Video-based education	21 (13.7)	13 (15.5)	8 (11.6)	
	Discussions	19 (12.4)	9 (10.7)	10 (14.5)	
	Social media	18 (11.8)	12 (14.3)	6 (8.7)	
	Total	153 (100)	84 (54.9)	69 (45.1)	
Performance of safety education contents	Yes	125 (79.6)	92 (80.0)	33 (78.6)	0.039
	No	32 (20.4)	23 (20.0)	9 (21.4)	
	Total	157 (100)	115 (73.2)	42 (26.8)	

n (%).
Differences between groups were analyzed using the chi-square test.
[1)]Percentages were calculated based on valid responses (n = 153). Total sample size was 157; 4 missing responses.
***$P < 0.001$.

"Musculoskeletal disease", the < 100 meals group reported higher mean performance scores. Statistically significant differences were observed in the types of "Cut & winding & stenosis" ($P < 0.05$), "Collision & falling off" ($P < 0.05$), and "Contact with chemical substance" ($P < 0.05$), with the < 100 meals group demonstrating higher levels of performance.

Among the 22 items, statistically significant differences were observed between the 2 groups in 14 items for importance and in 6 items for performance ($P < 0.05$–$P < 0.01$). For importance, the < 100 meals group reported significantly higher scores in the "When cleaning the gas hood, use the safe ladders and work in pairs" ($P < 0.01$), "When cleaning the trench, install a caution sign and cover it again after cleaning" ($P < 0.01$), "Do stretching exercise before starting and after working" ($P < 0.01$), and "When moving heavy things, use an assistive device or help from colleagues" ($P < 0.01$). In terms of performance, the "When cleaning the trench, install a caution sign and cover it again after cleaning" showed a more pronounced significant difference ($P < 0.01$), with the < 100 meals group demonstrating higher scores.

4. Educational needs and priorities for safety accident prevention

The results of the paired samples t-test conducted to analyze the differences between importance and performance for the 22 safety accident prevention items in the < 100 meals group are presented in Table 4. For all 22 items, the importance scores were higher than the current performance scores, and the differences were statistically significant ($P < 0.001$). To determine the priorities

Table 3. Comparison of the importance and performance of safety accident prevention by the daily number of meals served

Types of safety accidents	Items	Importance[1)]					Performance[2)]				
		Total (n = 157)	< 100 meals group (n = 87)	≥ 100 meals group (n = 70)	t-value	Rank	Total (n = 157)	< 100 meals group (n = 87)	≥ 100 meals group (n = 70)	t-value	Rank
Slip & burn (4)	1. Clean the floor of the work place	4.80 ± 0.44	4.85 ± 0.39	4.73 ± 0.48	1.721	4	4.55 ± 0.60	4.62 ± 0.58	4.46 ± 0.63	1.697	2
	2. When working, wear the apron and non-slip shoes	4.82 ± 0.40	4.86 ± 0.38	4.77 ± 0.42	1.398	2	4.55 ± 0.60	4.61 ± 0.58	4.47 ± 0.63	1.426	2
	3. Arrange in the work place and in the aisle	4.82 ± 0.40	4.85 ± 0.39	4.77 ± 0.42	1.207	2	4.55 ± 0.61	4.62 ± 0.58	4.46 ± 0.65	1.667	2
	4. Pay attention to the burning when using with hot water, oil, and utensils	4.85 ± 0.37	4.89 ± 0.36	4.81 ± 0.39	1.173	1	4.55 ± 0.60	4.63 ± 0.57	4.46 ± 0.63	1.820	2
	Subtotal	19.29 ± 1.54	19.44 ± 1.45	19.09 ± 1.65	1.444	-	18.20 ± 2.38	18.48 ± 2.27	17.84 ± 2.49	1.683	-
	(mean per item)	(4.82 ± 0.38)	(4.86 ± 0.36)	(4.77 ± 0.41)			(4.54 ± 0.59)	(4.62 ± 0.57)	(4.46 ± 0.62)		
Cut & winding & stenosis (4)	5. Wear protective gloves when using sharp cooking utensils	4.82 ± 0.43	4.89 ± 0.36	4.74 ± 0.50	2.002*	2	4.50 ± 0.65	4.60 ± 0.58	4.37 ± 0.70	2.160*	5
	6. Keep the knife at hidden place or do not leave it in sink with water	4.82 ± 0.40	4.86 ± 0.38	4.77 ± 0.42	1.398	2	4.50 ± 0.67	4.62 ± 0.60	4.36 ± 0.72	2.453*	5
	7. When using a vegetable cutter or grinder, use an exclusive stick	4.78 ± 0.46	4.84 ± 0.40	4.70 ± 0.52	1.841	6	4.39 ± 0.82	4.51 ± 0.71	4.26 ± 0.91	1.917	8
	8. Precaution when using a rotating machine with a risk of stenosis	4.82±0.40	4.86±0.38	4.76±0.43	1.597	2	4.55 ± 0.61	4.60 ± 0.58	4.49 ± 0.65	1.136	2
	Subtotal	19.24 ± 1.62	19.45 ± 1.47	18.97 ± 1.77	1.809	-	17.94 ± 2.49	18.32 ± 2.32	17.47 ± 2.65	2.112*	-
	(mean per item)	(4.80 ± 0.40)	(4.86 ± 0.36)	(4.74 ± 0.44)			(4.48 ± 0.62)	(4.58 ± 0.58)	(4.37 ± 0.66)		
Collision & falling off (4)	9. Check the floor and surroundings without running in the kitchen	4.82 ± 0.40	4.89 ± 0.36	4.74 ± 0.44	2.189*	2	4.54 ± 0.64	4.61 ± 0.60	4.44 ± 0.67	1.638	3
	10. Preventing collisions by securing distance and passage between workers	4.79 ± 0.47	4.87 ± 0.40	4.69 ± 0.53	2.473*	5	4.52 ± 0.65	4.61 ± 0.62	4.41 ± 0.67	1.894	4
	11. When cleaning the gas hood, use the safe ladders, and work in pairs	4.76 ± 0.52	4.89 ± 0.39	4.61 ± 0.62	3.186**	8	4.38 ± 0.85	4.53 ± 0.76	4.20 ± 0.93	2.443*	9
	12. When cleaning the trench, install a caution sign and cover it again after cleaning	4.73 ± 0.60	4.86 ± 0.41	4.56 ± 0.74	3.107**	11	4.44 ± 0.76	4.60 ± 0.64	4.24 ± 0.86	2.878**	6
	Subtotal	19.10 ± 1.85	19.51 ± 1.52	18.60 ± 2.11	3.020**	-	17.88 ± 2.61	18.34 ± 2.48	17.30 ± 2.69	2.526*	-
	(mean per item)	(4.77 ± 0.46)	(4.88 ± 0.38)	(4.65 ± 0.53)			(4.46 ± 0.65)	(4.59 ± 0.62)	(4.32 ± 0.67)		

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Table 3. Continued

Types of safety accidents	Items	Importance[1]					Performance[2]				
		Total (n = 157)	< 100 meals group (n = 87)	≥ 100 meals group (n = 70)	t-value	Rank	Total (n = 157)	< 100 meals group (n = 87)	≥ 100 meals group (n = 70)	t-value	Rank
Electric shock & fire (4)	13. Do not touch electric facilities with wet hands	4.81 ± 0.43	4.85 ± 0.42	4.76 ± 0.43	1.366	3	4.57 ± 0.59	4.63 ± 0.59	4.50 ± 0.58	1.398	1
	14. Check the electrical connections and facilities	4.80 ± 0.42	4.86 ± 0.38	4.73 ± 0.45	1.987*	4	4.57 ± 0.60	4.63 ± 0.59	4.49 ± 0.61	1.522	1
	15. When frying, cook do not leave their seats to prevent fire caused by overheated oil	4.80 ± 0.44	4.87 ± 0.37	4.71 ± 0.52	2.180*	4	4.54 ± 0.62	4.63 ± 0.57	4.43 ± 0.65	2.056*	3
	16. Check the operation status of gas breaker frequently	4.80 ± 0.42	4.86 ± 0.38	4.71 ± 0.46	2.177*	4	4.54 ± 0.64	4.60 ± 0.62	4.46 ± 0.65	1.381	3
	Subtotal	19.21 ± 1.64	19.45 ± 1.52	18.91 ± 1.74	2.018*	-	18.22 ± 2.35	18.49 ± 2.32	17.87 ± 2.38	1.655	-
	(mean per item)	(4.80 ± 0.41)	(4.86 ± 0.38)	(4.73 ± 0.44)			(4.55 ± 0.58)	(4.62 ± 0.58)	(4.47 ± 0.59)		
Musculoskeletal disease (4)	17. Do stretching exercise before starting and after working	4.67 ± 0.62	4.80 ± 0.48	4.50 ± 0.74	2.988**	12	3.99 ± 0.95	3.87 ± 0.94	4.13 ± 0.96	−1.674	10
	18. When moving heavy items, an assistive device or assistance from colleagues should be utilized	4.78 ± 0.45	4.87 ± 0.37	4.66 ± 0.51	2.992**	6	4.38 ± 0.80	4.39 ± 0.84	4.37 ± 0.74	0.151	9
	19. When handling heavy objects, the correct posture and proper techniques are observed	4.78 ± 0.49	4.86 ± 0.41	4.67 ± 0.56	2.391*	6	4.41 ± 0.71	4.47 ± 0.71	4.34 ± 0.70	1.131	7
	20. If the workbench height is inadequate, an auxiliary support is used to adjust it	4.74 ± 0.51	4.83 ± 0.44	4.63 ± 0.57	2.410*	10	3.97 ± 1.12	3.83 ± 1.17	4.16 ± 1.02	−1.884	11
	Subtotal	18.96 ± 1.92	19.37 ± 1.61	18.46 ± 2.17	2.923**	-	16.76 ± 3.07	16.56 ± 3.02	17.00 ± 3.15	−0.884	-
	(mean per item)	(4.74 ± 0.48)	(4.84 ± 0.40)	(4.61 ± 0.54)			(4.18 ± 0.76)	(4.14 ± 0.76)	(4.25 ± 0.79)		
Contact with chemical substance (2)	21. Check safety handling method of MSDS applied substance before use	4.75 ± 0.50	4.83 ± 0.44	4.66 ± 0.56	2.082*	9	4.41 ± 0.78	4.53 ± 0.70	4.26 ± 0.86	2.183*	7
	22. Wear protection thing before treating chemical substances	4.77 ± 0.49	4.85 ± 0.42	4.67 ± 0.56	2.230*	7	4.44 ± 0.74	4.54 ± 0.70	4.31 ± 0.79	1.904	6
	Subtotal	9.52 ± 0.98	9.68 ± 0.84	9.33 ± 1.11	2.175*	-	8.84 ± 1.48	9.07 ± 1.39	8.57 ± 1.57	2.102*	-
	(mean per item)	(4.76 ± 0.49)	(4.84 ± 0.42)	(4.66 ± 0.56)			(4.42 ± 0.74)	(4.53 ± 0.69)	(4.29 ± 0.79)		
	Total score	105.32 ± 8.85	106.90 ± 8.04	103.36 ± 9.48	2.486*	-	97.84 ± 13.14	99.28 ± 12.36	96.06 ± 13.93	1.512	-
	(mean per item)	(4.78 ± 0.40)	(4.86 ± 0.36)	(4.70 ± 0.43)			(4.44 ± 0.59)	(4.51 ± 0.56)	(4.37 ± 0.63)		

Mean ± SD.
Differences between groups were analyzed using the chi-square test or t-test.
MSDS, material safety data sheet.
[1]5points Likert scale: 1 (not important at all) to 5 (very important).
[2]5points Likert scale: 1 (not performed at all) to 5 (very performed).
*$P < 0.05$, **$P < 0.01$.

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for educational content, the Borich Needs values were calculated. The item "If the workbench height is inadequate, an auxiliary support is used to adjust it" showed the highest Borich Needs score at 4.740, followed by 'Do stretching exercise before starting and after working' with a score of 4.348. The model visualized using the Locus for Focus model is presented in Fig. 1A. Quadrant I (high importance high discrepancy; HH) represents the highest priority for educational intervention. The items included are "When cleaning the gas hood, use the safe ladders and work in pairs", "When moving heavy items, an assistive device or assistance from colleagues should be utilized", and "When handling heavy objects, the correct posture and proper techniques are observed". Based on the overlap between the Borich Needs and the Locus for Focus model, the item with the highest educational priority was "When moving heavy items, an assistive device or assistance from colleagues should be utilized" (Rank 1). This was followed by "When handling heavy objects, the correct posture and proper techniques are observed" (Rank 2) and "When cleaning the gas hood, use the safe ladders and work in pairs" (Rank 3).

The ≥ 100 meals group also showed statistically significantly higher importance scores than performance scores across all 22 items ($P < 0.001$). The Borich Needs scores were highest for the "If the workbench height is inadequate, an auxiliary support is used to adjust it" (2.235), as in the < 100 meals group (2.235). This was followed by "When using a vegetable cutter or grinder, use an exclusive stick" (2.117). Based on the visualization using the Locus for Focus model in Fig. 1B, the items located in Quadrant I include "Pay attention to the burning when using hot water, oil, and utensils", "Wear protective gloves when using sharp cooking utensils", "Keep the knife in a hidden place or do not leave it in a sink with water", and "When using a vegetable cutter or grinder, use an exclusive stick". The highest educational priority item identified through the integration of the Borich Needs and the Locus for Focus model was "When using a vegetable cutter or grinder, use an exclusive stick" (Rank 1). The next priorities were "Keep the knife in a hidden place or do not leave it in a sink with water" (Rank 2) followed by "Wear protective gloves when using sharp cooking utensils" (Rank 3) and "Pay attention to the burning when

Table 4. Educational priorities for safety accident prevention based on the Borich Needs and the Locus for Focus model by the daily number of meals served

Types of safety accidents	Items	< 100 meals group (n = 87)					≥ 100 meals group (n = 70)				
		Mean difference[1]	Paired t-value	Borich Needs[2]	Borich priorities	The Locus for Focus model's priorities	Top priorities	Mean difference[1]	Paired t-value	Borich Needs[2]	Borich priorities	The Locus for Focus model's priorities	Top priorities
Slip & burn (4)	1. Clean the floor of the work place	0.23 ± 0.54	3.945***	1.103	21			0.27 ± 0.56	4.036***	1.303	18		
	2. When working, wear the apron and non-slip shoes	0.25 ± 0.53	4.425***	1.219	16			0.30 ± 0.57	4.376***	1.446	13		
	3. Arrange in the work place and in the aisle	0.23 ± 0.54	3.945***	1.108	19			0.31 ± 0.58	4.546***	1.515	11		
	4. Pay attention to the burning when using with hot water, oil, and utensils	0.25 ± 0.51	4.618***	1.226	15			0.36 ± 0.54	4.540***	1.732	8	HH	4
Cut & winding & stenosis (4)	5. Wear protective gloves when using sharp cooking utensils	0.29 ± 0.53	4.581***	1.385	9			0.37 ± 0.62	4.432***	1.790	6	HH	3
	6. Keep the knife at hidden place or do not leave it in sink with water	0.24 ± 0.53	4.268***	1.163	17			0.41 ± 0.65	5.348***	1.997	3	HH	2
	7. When using a vegetable cutter or grinder, use an exclusive stick	0.33 ± 0.66	4.719***	1.593	6			0.44 ± 0.86	4.298**	2.117	2	HH	1
	8. Precaution when using a rotating machine with a risk of stenosis	0.26 ± 0.52	4.777***	1.274	11			0.27 ± 0.56	4.036***	1.308	17		

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Table 4. Continued

Types of safety accidents	Items	< 100 meals group (n = 87)						≥ 100 meals group (n = 70)					
		Mean difference[1)]	Paired t-value	Borich Needs[2)]	Borich priorities	The Locus for Focus model's priorities	Top priorities	Mean difference[1)]	Paired t-value	Borich Needs[2)]	Borich priorities	The Locus for Focus model's priorities	Top priorities
Collision & falling off (4)	9. Check the floor and surroundings without running in the kitchen	0.28 ± 0.50	5.161***	1.330	10			0.28 ± 0.50	4.821***	1.446	13		
	10. Preventing collisions by securing distance and passage between workers	0.26 ± 0.52	4.777***	1.266	13			0.27 ± 0.56	4.036***	1.300	19		
	11. When cleaning the gas hood, use the safe ladders, and work in pairs	0.36 ± 0.65	5.140***	1.696	5	HH	3	0.41 ± 0.94	3.687***	1.972	4	LH	6
	12. When cleaning the trench, install a caution sign and cover it again after cleaning	0.26 ± 0.54	0.409***	1.250	14			0.31 ± 0.79	3.876***	1.487	12		
Electric shock & fire (4)	13. Do not touch electric facilities with wet hands	0.22 ± 0.49	4.137***	1.050	20			0.26 ± 0.50	4.288***	1.237	20		
	14. Check the electrical connections and facilities	0.23 ± 0.50	4.298***	1.103	21			0.24 ± 0.55	3.694***	1.166	22		
	15. When frying, cook do not leave their seats to prevent fire caused by overheated oil	0.24 ± 0.48	4.677***	1.159	18			0.29 ± 0.59	4.029***	1.371	15		
	16. Check the operation status of gas breaker frequently	0.26 ± 0.54	4.581***	1.269	12			0.26 ± 0.65	3.298**	1.234	21		
Musculoskeletal disease (4)	17. Do stretching exercise before starting and after working	0.93 ± 0.95	9.143***	4.348	2	LH	5	0.37 ± 0.90	3.439**	1.735	7	LH	8
	18. When moving heavy items, an assistive device or assistance from colleagues should be utilized	0.48 ± 0.76	5.922***	2.308	3	HH	1	0.29 ± 0.62	3.873***	1.366	16		
	19. When handling heavy objects, the correct posture and proper techniques are observed	0.39 ± 0.60	6.100***	1.868	4	HH	2	0.33 ± 0.58	4.716***	1.571	10	LH	10
	20. If the workbench height is inadequate, an auxiliary support is used to adjust it	1.00 ± 1.17	7.963***	4.740	1	LH	4	0.47 ± 0.93	4.250***	2.235	1	LH	5
Contact with chemical substance (2)	21. Check safety handling method of MSDS applied substance before use	0.30 ± 0.57	4.865***	1.420	8			0.40 ± 0.86	3.900***	1.900	5	LH	7
	22. Wear protection thing before treating chemical substances	0.31 ± 0.60	4.851***	1.480	7			0.36 ± 0.74	4.023***	1.704	9	LH	9
	Mean ± SD	0.35 ± 0.47	6.888***					0.33 ± 0.53	5.236***				

Mean ± SD.
HH, high importance high discrepancy; LH, low importance high discrepancy; MSDS, material safety data sheet.
[1)]Importance – performance.
[2)]((Importance – performance) × mean importance) / total number.
**$P < 0.01$, ***$P < 0.001$.

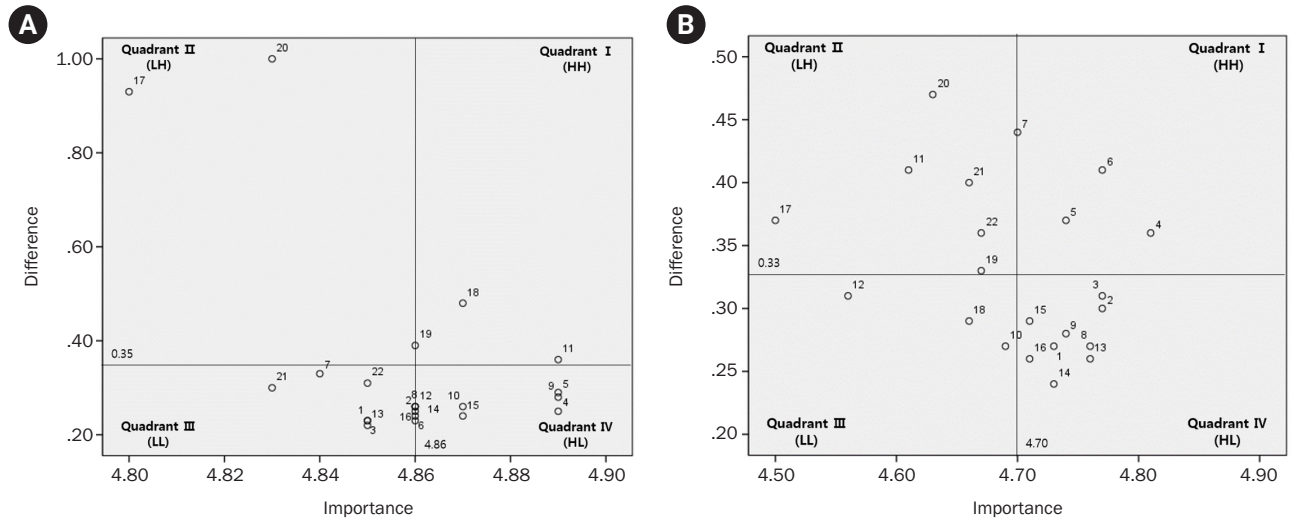

Fig. 1. The Locus for Focus model by daily number of meals served. (A) The result of selecting safety education contents priority using the Locus for Focus model in the < 100 meals group. (B) The result of selecting safety education contents priority using the Locus for Focus model in the ≥ 100 meals group. Difference = Importance – performance. HH, high importance high discrepancy; LH, low importance high discrepancy; LL, low importance low discrepancy; HL, high importance low discrepancy. 1 = clean the floor of the work place; 2 = when working, wear the apron and non-slip shoes; 3 = arrange in the work place and in the aisle; 4 = pay attention to the burning when using with hot water, oil, and utensils; 5 = wear protective gloves when using sharp cooking utensils; 6 = keep the knife at hidden place or do not leave it in sink with water; 7 = when using a vegetable cutter or grinder, use an exclusive stick; 8 = precaution when using a rotating machine with a risk of stenosis; 9 = check the floor and surroundings without running in the kitchen; 10 = preventing collisions by securing distance and passage between workers; 11 = when cleaning the gas hood, use the safe ladders, and work in pairs; 12 = when cleaning the trench, install a caution sign and cover it again after cleaning; 13 = do not touch electric facilities with wet hands; 14 = check the electrical connections and facilities; 15 = when frying, cook do not leave their seats to prevent fire caused by overheated oil; 16 = check the operation status of gas breaker frequently; 17 = do stretching exercise before starting and after working; 18 = when moving heavy items, an assistive device or assistance from colleagues should be utilized; 19 = when handling heavy objects, the correct posture and proper techniques are observed; 20 = if the workbench height is inadequate, an auxiliary support is used to adjust it; 21 = check safety handling method of MSDS applied substance before use; 22 = wear protection thing before treating chemical substances.

using hot water, oil and utensils" (Rank 4).

DISCUSSION

This study examined the current status and perceived needs related to safety education among army food service personnel. Findings revealed that 97.5% of participants had received safety education, a rate comparable to that reported among industrial food service personnel (96.5%) [6], but lower than the 100% observed in school food service settings [9]. In the military, the main providers of safety education are typically food service supervisors or culinary consultants. Whereas the civilian sector benefits from a broader range of instructional agents, including dietitians, the Korea Occupational Safety and Health Agency, and educational institutions, indicating relatively restricted access to diverse and specialized educational resources in the military environment [6, 7]. Only 60.8% of participants reported receiving safety education on a monthly basis, a figure substantially lower than that of their civilian counterparts. Notably, even in the ≥ 100 meals group, where a high proportion of personnel had less than five years of work experience, participation in regular education remained insufficient. These findings underscore the critical need for systematic, continuous safety education programs tailored to less-experienced personnel [19].

The most commonly used method of safety education was "Lecture" (63.4%), albeit less prevalent than in industrial foodservice settings (77.2%) [6]. While the use of

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practical education was relatively higher, accounting for 13.0%. Education methods differed significantly by the scale of food service facilities; individualized "Counselling" was more frequently used in the < 100 meals group, whereas those serving ≥ 100 meals group favored "Discussions" and experiential learning ($P < 0.001$). These results suggest that instructional approaches are being differentiated according to the operational scale of the food service units. Preferences for educational methods were also becoming increasingly diversified. Compared to traditional lectures, which saw a decrease in preference of nearly 40%, other methods, such as "Counselling", "Practice", "Video-based education", "Discussions", and "Social media", were preferred. In particular, participants in the < 100 meals group preferred "Counselling" and "Social media", whereas those in the ≥ 100 meals group favored "Lecture" and "Practice" ($P < 0.001$). This suggests that educational needs vary according to participant characteristics and food service environments [20, 21]. Approximately 79.6% of participants reported that they applied the contents of safety education to their actual work practices, a finding consistent with those among school food service personnel (78.2%) [7]. Nevertheless, previous studies identified dissatisfaction stemming from discrepancies between educational content and the practical work environment (42.3%), and from formalistic or perfunctory delivery modes (19.8%) [7]. The results highlight the necessity of developing contextualized safety education curriculums that reflect both experiential levels and facility characteristics.

Although the perceived importance of accident prevention was high (mean = 4.78), the actual performance was lower (mean = 4.44), reflecting a documented gap between risk perception and behavioral implementation [21-23]. Among the types of safety accidents, "Slip & burn" were perceived as the most important, whereas "Musculoskeletal disease" received the lowest scores in both perceived importance and performance. These findings appear to be related to the most frequently reported types of safety accidents in previous studies, with "burns" (46.4%) being the most common among industrial food service workers [6] and "slips" (66.2%) among school food service employees [7]. It also highlights issues related to risk factors, suggesting that in work environments where repetitive physical tasks are routine, associated hazards may be easily overlooked [24]. Although stretching and the use of assistive devices are critical behaviors for preventing safety accidents, their actual implementation rates were relatively low. Therefore, linking awareness to performance through targeted education on these behaviors may contribute meaningfully to strengthening practical safety outcomes. Comparisons based on the daily number of meals served presented that both overall importance and performance scores were higher in the < 100 meals group compared to the ≥ 100 meals group. Among the 22 items, statistically significant differences were observed between groups in 14 items for importance and 6 items for performance ($P < 0.05$–$P < 0.01$). This difference can be interpreted as reflecting clearer recognition of personnel' roles and responsibilities in smaller-scale units, leading to relatively higher risk awareness. This finding is consistent with previous reports indicating that safety culture and risk perception may vary according to organizational size [25].

The Borich Needs Assessment revealed that, for all 22 items, importance exceeded performance ($P < 0.001$), indicating a widespread demand for educational reinforcement. In both groups, the task "If the workbench height is inadequate, an auxiliary support is used to adjust it" yielded the highest priority score, reflecting the need for ergonomic intervention to mitigate musculoskeletal risk. Previous studies have emphasized the role of repetitive and improper postures as critical risk factors in institutional foodservice settings [26].

The dual analysis model, which combines the Borich Needs Assessment and the Locus for Focus model, is useful for providing practical and strategic intervention directions in educational settings, and its validity has been emphasized in previous studies [11, 12, 14, 15]. The integrated results of the two models in this study indicate that, for the < 100 meals group, the highest educational priorities involve preventing musculoskeletal disorder related to equipment use, which reflect increased physical burdens and heightened accident risks stemming from limited automation and staffing constraints [27]. Conversely, in the ≥ 100 meals group, safety regulations concerning cooking equipment—specifically injuries such as cut & winding & stenosis—emerged as top educational priorities. This finding cor-

responds to the characteristics of the ≥ 100 meals group, where faster cooking speeds and more frequent use of equipment elevate the risks of thermal and mechanical accidents [28]. To effectively address these challenges, comprehensive policy measures at the Ministry of National Defense of the Republic of Korea level are essential. These should include expanding and enhancing training for dedicated safety management personnel, modernizing foodservice facilities through the adoption of advanced safety equipment and automation technologies, developing standardized safety protocols and manuals, and optimizing workforce allocation.

Limitations

This study used a cross-sectional design, analyzing needs at a specific point in time, which limits the ability to reflect changes in safety education needs or long-term effects. Additionally, the use of convenience sampling reduced the representativeness of the study population, and the reliance on self-reported data may have introduced subjective bias from respondents. The samples were limited to army foodservice personnel in Gyeongsangnam-do, Korea, restricting the generalizability of the results to other military branches or civilian industries. Furthermore, external factors, such as the work environment and organizational culture, were not adequately controlled, which may limit the interpretation of the results. Lastly, since this study focused on identifying the priority of educational needs, it did not assess the actual effect of educational programs on accident prevention or the improvement of safety behaviors.

Conclusion

This study is meaningful in that it clearly identifies the priority for safety education among Korean military food service personnel with limited access, by integrating the Borich Needs and the Locus of Control model, and the Locus of Control model, and may provide an empirical basis for establishing detailed provisions to enhance the safety of military foodservice under the recently enacted the *Basic Act on Military Food Service* [3] in Korea. The findings suggest that safety education programs for military foodservice personnel should be tailored and practice-oriented, taking into account factors such as the size of the foodservice facility, working conditions, and types of accidents. The educational content should consistently include topics related to improving the work environment and preventing musculoskeletal disorders. Specifically, for the < 100 meals group, emphasis should be placed on education aimed at fundamental improvements in the work environment and reducing physical burdens, whereas the ≥ 100 meals group should focus more on detailed safety management during food preparation processes and responses to hazardous situations. Furthermore, intervention studies are needed to assess behavioral changes based on the prioritized educational content and to verify whether customized education effectively reduces accidents in Korean military foodservice facilities.

CONFLICT OF INTEREST

There are no financial or other issues that might lead to conflict of interest.

FUNDING

None.

DATA AVAILABILITY

Research data is available upon request to the corresponding author.

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Research Article

Associations between diet quality and regional factors in Korea vary according to individuals' characteristics: a cross-sectional study

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Objectives: Although diet quality is known to be associated with environment and individuals' characteristics, these have not been studied together. We determined the association of diet quality with regional factors stratified by individuals' sociodemographic characteristics.

Methods: This study used nationally representative survey data on regional factors (2010–2020) and the Korea National Health and Nutrition Examination Survey data on individuals' sociodemographic characteristics (2013–2018). Community-dwelling Koreans aged ≥ 20 were included (n = 26,853). Regions were categorized into metropolitan cities or provinces and subsequently according to regional factors (level of educational attainment, income per capita, food security status, physical activity facilities, time to the nearest large retailer, and internet use of the region). Individuals' sociodemographic characteristics included age, education status, income, and number of household members. Diet quality was assessed using the Korean Healthy Eating Index (KHEI).

Results: In the entire population, education status of metropolitan cities was positively associated with the KHEI. Shorter time to retailers and higher internet use were positively associated with the KHEI in metropolitan residents with higher income levels but negatively associated with the KHEI in those with lower income status. Among provincial residents with a low education status or income, regional physical activity facilities were positively associated with the KHEI.

Conclusion: The association between diet quality and regional factors varied depending on the resident's sociodemographic characteristics. Both regional and individual sociodemographic factors must be considered to address gaps in nutritional equity.

Keywords: Diet; feeding behavior; health inequities; health policy; social environment

INTRODUCTION

Diet is one of the most critical modifiable factors in preventing chronic disease and promoting health [1-4], and it is influenced by personal characteristics and environmental factors. Diet quality (DQ) is strongly associated with individual

characteristics, such as age, income, education status, and living alone [5, 6]. In Korea, various policies, such as meal delivery programs and nutrition classes, have been implemented for vulnerable populations, taking individuals' sociodemographic characteristics into consideration. Nevertheless, nutritional disparities between regions are increasing, leading to differences in the prevalence of chronic diseases [7]. On the other hand, regional environment serves as an important background element in an individual's diet and indirectly influences DQ, which can have a greater impact on vulnerable populations. Various studies have reported that access to a variety of foods, affordable food prices, convenient transportation, stable employment conditions, availability of sports and public facilities, and internet accessibility are considered important regional environmental factors that contribute to the improvement of DQ [8-10]. Even high-income individuals may struggle to choose a variety of foods if they live in an area with limited food accessibility. In Korea, regions with a high regional disparity index have been shown to experience negative health outcomes, highlighting the importance of the regional environment, although most studies have primarily focused on urban/rural differences [11]. This suggests that health disparities can arise based on residential area, even among individuals with similar personal characteristics and these disparities may be more pronounced for vulnerable populations. Thus, to reduce regional nutritional disparities, research on both individual characteristics and community-related factors must be conducted simultaneously.

Research has shown that community environment affects food choices; however, whether the association between regional factors and DQ varies according to an individuals' characteristics has not been elucidated. Regional environment can be strongly affected by policy. Therefore, we selected regional characteristics that may be affected by policy (economic status, education status, healthcare-related welfare services, food retailer accessibility, and information availability of a region) and assessed their association with DQ according to participant characteristics that are well known to be associated with DQ (age, income, education, and single person household).

Using regional indicator data from Statistics Korea and the Community Health Survey (CHS) as well as individual sociodemographic data from the Korea National Health and Nutrition Examination Survey (KNHANES) 2013–2018, we aimed to examine regional factors related to DQ in both metropolitan and provincial areas according to individual's sociodemographic characteristics. This study may aid in identifying populations that may be most affected by regional factors to address regional and individual disparities in DQ through public policy.

METHODS

Ethics statement

The KNHANES was approved by the institutional review board of the Korea Centers for Disease Control and Prevention (approval numbers: 2013-07CON-03-4C, 2013-12EXP-03-5C, and 2018-01-03-P-C).

1. Study design

This is a cross-sectional study utilizing national survey data, described according to the strengthening the reporting of observational studies in epidemiology guidelines (https://www.strobe-statement.org/). The participant flow is outlined in Supplementary Figure 1.

2. Region classification

Regions were categorized into metropolitan cities (Seoul, Busan, Daegu, Incheon, Gwangju, Daejeon, Ulsan, and Gyeonggi-do) and provinces (Gangwon-do, Chungcheongbuk-do, Chungcheongnam-do, Gyeongsangbuk-do, Gyeongsangnam-do, Jeollabuk-do, Jeollanam-do, and Jeju-do). Despite some unique characteristics of Jeju-do, residents' dietary patterns and main industry (tourism and agriculture) are similar to those of other provincial regions and was thus included in the analyses [12, 13]. A sensitivity analysis excluding Jeju-do was also performed to account for its distinctiveness. Sejong special Self Governing City, a newly instituted capital, was excluded to minimize confounding factors.

3. Regional factors

Regions were further categorized into three groups per metropolitan area or province using statistical data from Statistics Korea on education level (2015, 2020), income

level (2013–2018), facilities for physical activity (2013–2018), market accessibility (2017–2018) or internet use (2013–2018). The CHS data was utilized to obtain information on regional food security status (2013–2018) of metropolitan cities and provinces. The mean value for the aforementioned study period was calculated for each region and factor. Higher education was classified as ≥ college education for adults aged < 60 years and ≥ high school education for adults aged ≥ 60 years owing to the rapid increase in the number of college graduates within the past 30 years in Korea. Annual income per capita of a region was used for regional income level. Households that responded as "my family sometimes lacked food owing to financial difficulties" or "my family often lacked food because of financial difficulties" were defined as being food insecure. Taking into account policies for physical activity, the area covered by urban parks per 1,000 population and number of sports facilities per 100,000 population were used for metropolitan cities and provinces, respectively, as indirect measurements of local governments' support for health and nutrition due to the lack of publicly available data specific to nutrition policy. Regional factors regarding accessibility included time to the nearest large retailer or traditional market (either by public transportation/on foot or by car). In addition, internet use, as a percentage of the population (≥ 3 years of age) that had used the internet within the preceding month, was a factor used to gauge access to information and online shopping. Metropolitan cities and provinces were each divided into three groups according to the level of each regional factor.

4. Participants' general and dietary characteristics

This study included participants aged 20 years and older from the 2013–2018 KNHANES (n = 36,977). Excluding subjects missing data on DQ, education status, or income, those diagnosed with cancer, and residents of Sejong city resulted in a final of 26,853 participants (Supplementary Figure 1). Individual characteristics included age, education level, income level, and household type (single-person household or not). Age was categorized as 20–39, 40–59, and ≥ 60 years. Education status was categorized into three levels according to age group. Participants aged < 60 years were categorized as middle school graduate or lower, high school graduate, and college graduate or higher; those aged ≥ 60 years were categorized as primary school graduate or lower, middle school graduate, and high school graduate or higher. Household income was classified as low, lower-middle, upper-middle, and high. Household type was categorized into single-person and multiple-person (≥ 2 persons) households. Participants were assigned to their actual place of residence according to the KNHANES database.

DQ was assessed using the Korean Healthy Eating Index (KHEI) available in the KNHANES database [14, 15]. The KHEI score ranges from 0 to 100, with higher scores indicating superior DQ.

5. Other participant characteristics

Body mass index (BMI) was calculated using measured weight and height data. Participant physical activity was self-reported. Disease status was determined according to the KNHANES database, which was based on self-report and laboratory data [14]. Diseases of interest included dyslipidemia, myocardial infarction, angina, renal disease, hypertension, and diabetes.

6. Statistical analyses

Data analysis based on the complex survey design was performed after applying weights, stratification variables, and primary sample units. Analyses were stratified by metropolitan city and province and subsequently by individual characteristics. Values are expressed as n (weighted %), mean ± standard deviation, weighted % (standard error [SE]), or the weighted mean ± SE. Regional differences were assessed using chi-square tests for categorical variables and t-tests for continuous variables. The KHEI scores of individuals residing in the region categories were analyzed using analysis of variance. Individual characteristics corresponding to the regional factor of interest were not adjusted for to avoid over-adjustment bias. Models were adjusted for age, sex, education status, family income, BMI, physical activity, and disease (except for the individual characteristic of consideration). Additionally, sensitivity analysis was performed by excluding Jeju-do from analyses of provinces. All statistical analyses in this study were performed using SAS (version 9.4; SAS Institute Inc.). Statistical significance was set at $P < 0.05$.

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RESULTS

1. Regional factors and participant characteristics

Metropolitan cities had greater proportions of residents with higher education or internet users, exhibited higher income per capita, and took less time to reach the nearest large retailer than provinces. However, the proportion of food secure households was similar between metropolitan cities and provinces (Table 1). The mean (± SE) age of the participants was 46.48 (± 0.17) and mean KHEI was 62.81 (± 0.12) (Table 2). Province-dwelling individuals were older and had higher mean BMI values. Provinces had higher proportions of one-person households, households with low income, education status, or physical activity, and residents with diseases than metropolitan cities. No difference in DQ was observed between the two regions; however, among adults aged ≥ 60 years, those residing in provinces exhibited poorer DQ than their counterparts residing in metropolitan cities. Participants excluded from the analyses were older; had a higher morbidity prevalence; displayed superior DQ; and had a lower income status, and education status than those included in this analysis (Supplementary Table 1). Regardless of regional factors, individual characteristics, such as age, education status, and income, demonstrated strongly positive associations with DQ. In addition, multiple-person households exhibited better DQ than single-person households (data not shown).

2. DQ according to regional factors

In metropolitan cities, DQ was positively associated with the proportion of individuals with higher education (P = 0.012; Supplementary Table 2). However, regional income, food security, facilities for physical activities, time to the nearest large retailer, and internet use were not associated with DQ.

3. DQ by regional factors and individual characteristics

1) Regional education status

The positive association between regional education and DQ in metropolitan cities was consistently observed in metropolitan city residents aged 40–59 years (P < 0.001) and those dwelling in multiple-person households (P = 0.001), while a positive trend was observed in residents with higher personal education status (P = 0.056; Supplementary Table 3). This trend disappeared when Jeju-do was excluded for sensitivity analyses. No association between regional education status and DQ was identified in the provinces.

2) Regional income and regional food security

Regardless of individual characteristics, no relationship was observed between regional income and the KHEI (Supplementary Table 4). However, among metropolitan city residents aged ≥ 60 years and those with a low education status, DQ was positively associated with regional food security status (P = 0.006 and P = 0.034,

Table 1. Comparison of regional factors between metropolitan cities and provinces in Korea

Regional factors	Overall	Metropolitan cities	Provinces	*P*-value
Higher education (%)	54.08 ± 6.60	58.90 ± 4.64	49.26 ± 4.35	0.001
Income per capita (1,000 KRW)	17,535 ± 1,519	18,447 ± 1,717	16,624 ± 312	0.009
Population food secure (%)	56.34 ± 4.32	57.03 ± 4.40	55.65 ± 4.41	0.539
Facilities for physical activity	N/A	7.93 ± 2.07	115.97 ± 11.36	N/A
Time to nearest large retailer (min)	29.71 ± 16.85	14.95 ± 2.49	44.48 ± 10.17	0.005
Internet use (%)	87.75 ± 6.01	92.76 ± 2.51	82.75 ± 3.72	< 0.001

Mean ± SD.
KRW, South Korean won; N/A, not applicable.
Education level was categorized into high: ≥ college, middle: high school, and low: < high school for adults < 60 years of age and high: ≥ high school, middle: middle school, and low: < middle school for adults ≥ 60 years of age. Physical activity facilities were defined as urban park area per 1,000 population (1,000 m^2) for metropolitan cities and number of sports facilities per 100,000 population for provinces. Metropolitan cities include Seoul, Busan, Daegu, Daejeon, Gwangju, Ulsan, Incheon, and Gyeonggi-do. Provinces include Gangwon-do, Chungcheongbuk-do, Chungcheongnam-do, Gyeongsangbuk-do, Gyeongsangnam-do, Jeollabuk-do, Jeollanam-do, and Jeju-do. Comparisons between metropolitan cities and provinces were performed using the t-test or chi-square test. Income per capita and time to the nearest large retailer were compared using the Wilcoxon rank sum test. Regional factors used statistical data from Statistics Korea on education level (2015, 2020), income level (2013–2018), facilities for physical activity (2013–2018), and market (2017–2018) accessibility and internet use (2013–2018). The Community Health Survey was used to determine regional food security (2013–2018).

Table 2. Participant characteristics according to residential area from KNHANES 2013–2018

Participant characteristics	Overall	Metropolitan cities	Provinces	*P*-value
Total	26,853 (100)	18,779 (74.11)	8,074 (25.89)	
Age (year)	46.48 ± 0.17	45.57 ± 0.19	49.09 ± 0.41	< 0.001
Sex, male	49.79 (0.31)	49.67 (0.37)	50.14 (0.56)	0.484
BMI (kg/m^2)	23.88 ± 0.03	23.79 ± 0.03	24.13 ± 0.05	< 0.001
One-person household, Yes	9.08 (0.32)	8.36 (0.37)	11.17 (0.65)	< 0.001
Income				< 0.001
Low	14.75 (0.39)	12.93 (0.44)	19.96 (0.92)	
Lower middle	23.94 (0.47)	22.99 (0.55)	26.67 (0.89)	
Upper middle	29.42 (0.48)	29.95 (0.55)	27.88 (1.01)	
High	31.87 (0.64)	34.10 (0.76)	25.47 (1.22)	
Education				< 0.001
Low	20.07 (0.41)	17.27 (0.43)	28.07 (1.07)	
Middle	34.89 (0.45)	34.73 (0.54)	35.37 (0.85)	
High	45.02 (0.56)	47.99 (0.69)	36.54 (0.99)	
Disease, Yes	61.82 (0.42)	60.56 (0.49)	65.40 (0.85)	< 0.001
Physical activity (min)				< 0.001
< 150	35.88 (0.40)	33.48 (0.46)	42.77 (0.81)	
≥ 150	64.03 (0.40)	66.44 (0.46)	57.13 (0.81)	
Missing	0.07 (0.02)	0.07 (0.02)	0.08 (0.03)	
Mean KHEI				
Overall	62.81 ± 0.12	62.85 ± 0.14	62.72 ± 0.25	0.652
20–39	58.23 ± 0.20	58.14 ± 0.22	58.57 ± 0.47	0.411
40–59	64.70 ± 0.16	64.83 ± 0.18	64.34 ± 0.31	0.177
≥ 60	67.11 ± 0.19	68.07 ± 0.23	65.00 ± 0.32	< 0.001

n (weighted %), weighted % (SE), or mean ± SE.
KNHANES, Korea National Health and Nutrition Examination Survey; BMI, body mass index; KHEI, Korean Healthy Eating Index; SE, standard error.
Education level was categorized into high: ≥ college, middle: high school, and low: < high school for adults < 60 years of age and high: ≥ high school, middle: middle school, and low: < middle school for adults ≥ 60 years of age. Metropolitan cities include Seoul, Busan, Daegu, Daejeon, Gwangju, Ulsan, Incheon, and Gyeonggi-do. Provinces include Gangwon-do, Chungcheongbuk-do, Chungcheongnam-do, Gyeongsangbuk-do, Gyeongsangnam-do, Jeollabuk-do, Jeollanam-do, and Jeju-do. Disease includes dyslipidemia, myocardial infarction, angina, renal disease, hypertension, and diabetes. Comparisons between metropolitan cities and provinces were performed using the t-test or chi-square test.

respectively; Supplementary Table 5). No associations were found in the provinces.

3) Physical activity facilities

In metropolitan cities, urban park area was not associated with DQ (Fig. 1, Supplementary Table 6). However, among provincial residents with low education or income status, those residing in areas with more sports facilities exhibited a higher DQ than those in areas with less sports facilities (P = 0.023 and P = 0.037, respectively; Fig. 1). These associations were similar when Jeju-do was excluded (P = 0.045 and P = 0.041, respectively). The association between DQ and physical activity facilities did not differ by age or household type.

4) Access to retailers and information

In both metropolitan city and provincial residents, DQ was positively associated with shorter time to the nearest large retailer via public transportation or on foot in adults aged 40–59 years (P = 0.029 and P = 0.021, respectively; Supplementary Table 7). In addition, metropolitan adults with higher personal education or income status had greater KHEI scores when living in areas with better access to markets (P = 0.023 and P = 0.034, respectively; Fig. 2). In contrast, DQ decreased in low-income individuals living closer to large retail shops (P = 0.042). The association of time to the nearest traditional markets and DQ was also similar. (Supplementary Table 8). The regional proportion of internet users was used

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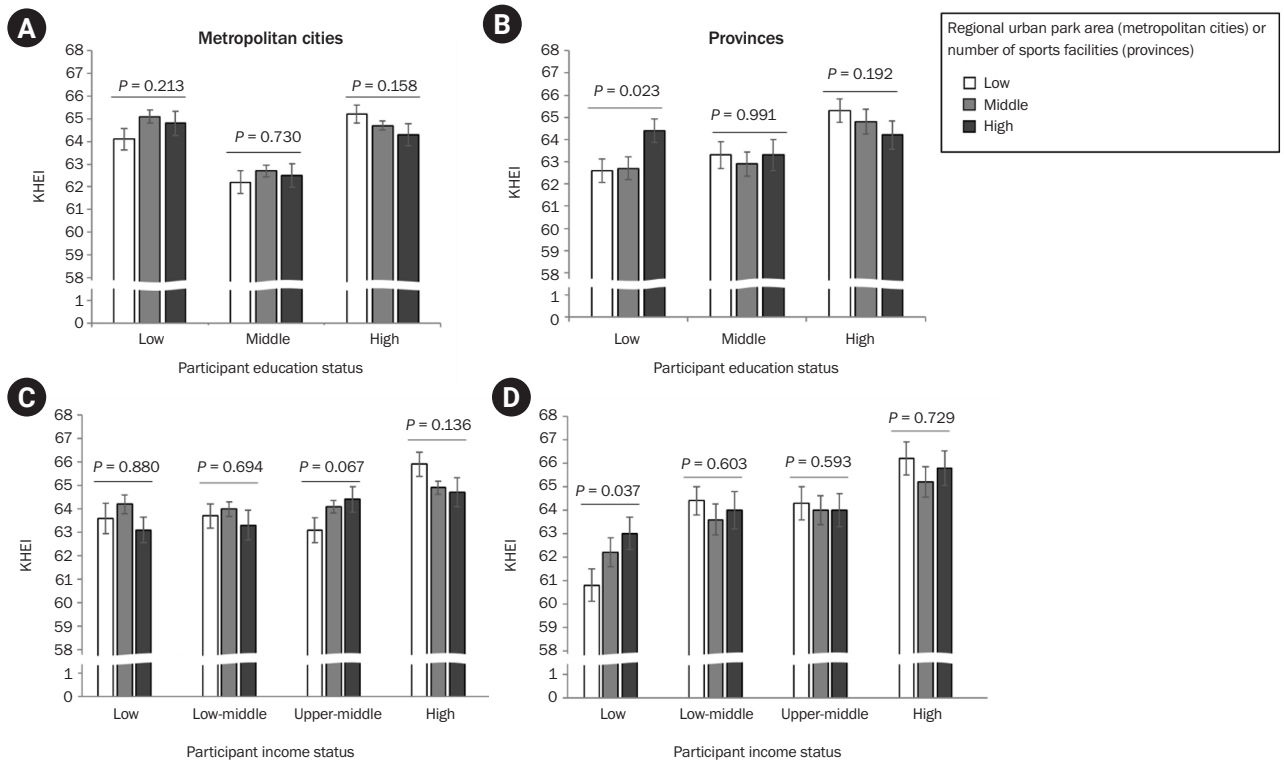

Fig. 1. Weighted adjusted means of the KHEI according to regional physical activity facilities (urban park area [metropolitan cities] or number of sports facilities [provinces]) and individuals' education (A, B) or income status (C, D) of adult participants of the KNHANES.

KNHANES, Korea National Health and Nutrition Examination Survey; KHEI, Korean Healthy Eating Index.

Weights were applied to account for the complex survey design. General linear models were conducted to compare mean KHEI scores. Means were adjusted for participant age, sex, disease, physical activity, body mass index, and education/income. Error bars indicate standard error. Metropolitan cities were classified as low (Daegu, Busan, and Gwangju), middle (Seoul and Gyeonggi-do), and high (Incheon, Daejeon, and Ulsan). Provinces were categorized into low (Gyeongsangnam-do and Chungcheongnam-do), middle (Chungcheongbuk-do, Jeollabuk-do, and Gyeongsangbuk-do), and high (Jeollanam-do, Gangwon-do, and Jeju-do). Education status was categorized differently according to age due to the socioeconomic changes during the past decades in Korea. For adults < 60 years of age education status was categorized as high (≥ college graduate), middle (high school graduate), and low (< high school graduate), while for adults ≥ 60 years of age, education status was categorized as high (≥ high school graduate), middle (middle school graduate), and low (< middle school graduate).

as an indicator of information accessibility. DQ was positively associated with regional internet use in adults aged 40–59 years and those with high income among metropolitan city residents (P = 0.041 and P = 0.017, respectively; Table 3). In contrast, metropolitan city residents with low income and provincial residents with low education status exhibited poorer DQ when residing in regions with higher internet use (P = 0.041 and P = 0.009, respectively). Other results were similar when Jeju-do was excluded from the analyses.

DISCUSSION

The associations between DQ and regional factors with regard to individual's sociodemographic characteristics were assessed using national data. In metropolitan cities, middle-aged adults (40–59 years of age), exhibited superior DQ when living in areas with a higher education status, better market accessibility, greater internet use. In addition, in metropolitan city residents with a high education status KHEI was positively associated with a shorter time to the nearest retailer and higher

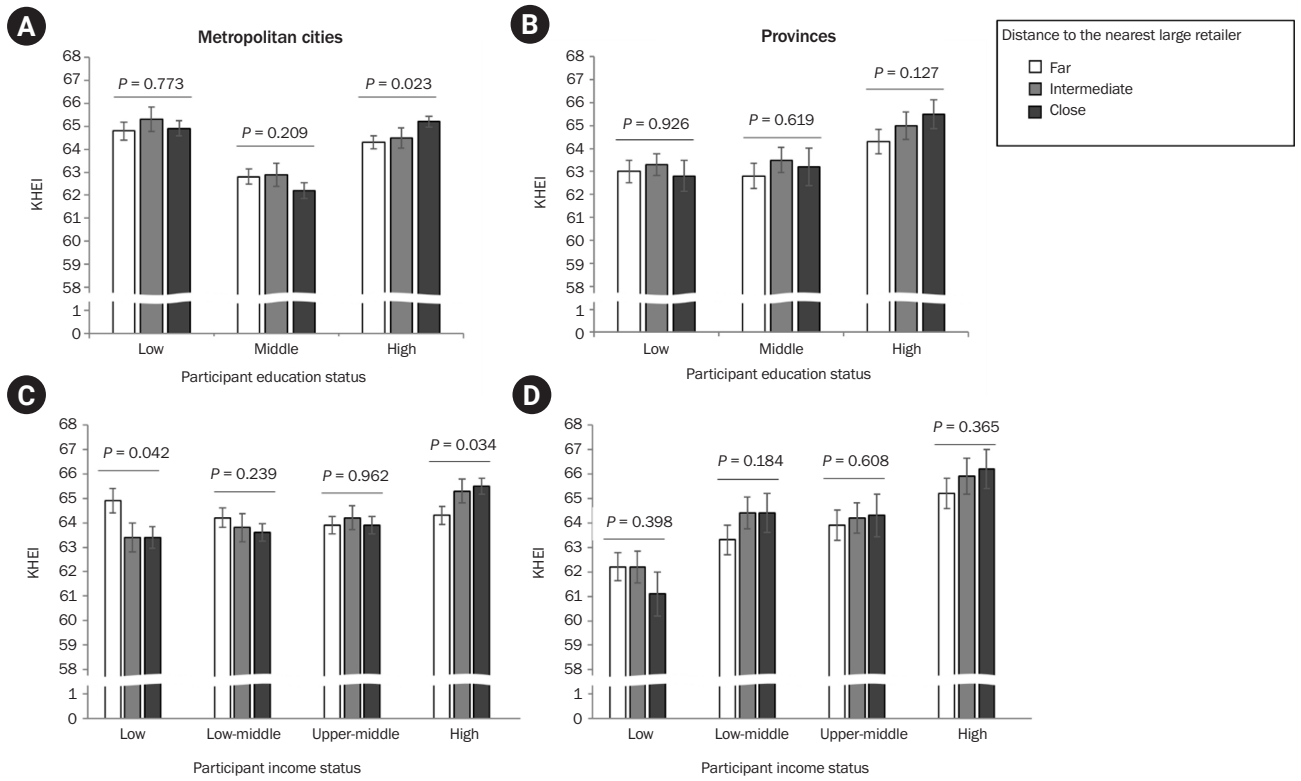

Fig. 2. Weighted adjusted means of the KHEI according to mean time to the nearest large retailer of the region in metropolitan cities and provinces and individuals' education (A, B) or income status (C, D) of adult participants of the KNHANES.
KNHANES, Korea National Health and Nutrition Examination Survey; KHEI, Korean Healthy Eating Index.
Weights were applied to account for the complex survey design. General linear models were conducted to compare mean KHEI scores. Means were adjusted for participant age, sex, disease, physical activity, body mass index, and education/income. Error bars indicate standard error. Metropolitan cities were classified as long (Gyeonggi-do and Ulsan), intermediate (Incheon, Gwangju, and Daejeon), and short (Daegu, Seoul, and Busan). Provinces were categorized into long (Jeollanam-do, Gangwon-do, and Gyeongsangbuk-do), intermediate (Chungcheongnam-do, Chungcheongbuk-do, and Jeollabuk-do), and short (Jeju-do and Gyeongsangnam-do). Education status was categorized differently according to age due to the socioeconomic changes during the past decades in Korea. For adults < 60 years of age education status was categorized as high (≥ college graduate), middle (high school graduate), and low (< high school graduate), while for adults ≥ 60 years of age, education status was categorized as high (≥ high school graduate), middle (middle school graduate), and low (< middle school graduate).

regional internet use; however, the KHEI was negatively associated with these regional factors in low-income adults. Among adults residing in provinces, those with a low education or income status yielded higher KHEI scores when dwelling in areas with more physical activity facilities than those inhabiting areas with less physical activity facilities.

This study is the first to comprehensively analyze both environmental and personal factors that may possibly interact with DQ. The findings confirm that environmental factors, such as food security, education status, the number of physical activity facilities, internet usage rate, and market accessibility are significantly associated with DQ depending on an individual's socioeconomic status or living condition. Although the importance of residential environment for health has been increasingly emphasized in recent years, previous studies have primarily focused on disparities in DQ between urban and rural areas or individual sociodemographic characteristics such as age, income, and education level [16-18]. While identifying individual-level characteristics that influence dietary behavior is undoubtedly important, food choices are also shaped by the regional environments in which individuals live. This is because dispar-

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Table 3. KHEI according to regional internet use (% of population) and participant characteristics

	Metropolitan cities					Provinces				
	Low (87.68%)	Middle (91.40%–92.80%)	High (94.10%–95.20%)	*P*-value	Adjusted *P*	Low (77.13%–77.80%)	Middle (82.08%–83.32%)	High (85.40%–87.22%)	*P*-value	Adjusted *P*
Age (year)										
20–39	57.98 ± 0.34	58.20 ± 0.33	58.27 ± 0.56	0.620	0.918	58.41 ± 1.01	59.02 ± 0.72	58.23 ± 0.80	0.784	0.728
40–59	64.27 ± 0.30	65.15 ± 0.27	65.12 ± 0.43	0.055	0.041	64.29 ± 0.52	64.21 ± 0.56	64.47 ± 0.48	0.750	0.412
≥ 60	68.47 ± 0.41	68.28 ± 0.32	66.93 ± 0.53	0.032	0.069	64.88 ± 0.63	65.12 ± 0.50	64.96 ± 0.54	0.976	0.370
Individuals' education status										
Low	64.16 ± 0.43	64.43 ± 0.35	63.67 ± 0.57	0.589	0.516	63.59 ± 0.60	62.90 ± 0.50	61.95 ± 0.56	0.045	0.009
Middle	61.46 ± 0.38	60.95 ± 0.34	61.94 ± 0.57	0.706	0.857	61.54 ± 0.88	61.96 ± 0.58	62.11 ± 0.66	0.622	0.365
High	62.65 ± 0.31	64.00 ± 0.27	63.49 ± 0.51	0.040	0.128	62.77 ± 0.83	63.37 ± 0.62	63.98 ± 0.56	0.213	0.230
Individuals' income										
Low	63.17 ± 0.59	62.02 ± 0.47	61.15 ± 0.70	0.025	0.041	61.32 ± 0.74	61.04 ± 0.64	60.32 ± 0.70	0.306	0.064
Lower middle	62.06 ± 0.42	62.03 ± 0.39	62.25 ± 0.53	0.817	0.420	61.88 ± 0.99	62.90 ± 0.68	62.09 ± 0.65	0.998	0.973
Upper middle	61.98 ± 0.39	63.07 ± 0.37	62.78 ± 0.59	0.118	0.991	62.48 ± 0.75	62.79 ± 0.64	63.26 ± 0.62	0.408	0.848
High	63.97 ± 0.41	64.17 ± 0.35	64.64 ± 0.61	0.011	0.017	64.69 ± 0.92	63.90 ± 0.77	64.50 ± 0.64	0.991	0.460
Household type										
One-person household	59.70 ± 0.66	59.24 ± 0.61	60.46 ± 0.92	0.645	0.839	59.01 ± 1.16	61.77 ± 0.85	58.89 ± 0.87	0.693	0.049
Multi-person household	62.67 ± 0.24	63.48 ± 0.21	63.18 ± 0.38	0.114	0.701	63.12 ± 0.45	62.86 ± 0.46	63.22 ± 0.41	0.768	0.572

Weighted mean ± SE.

KHEI, Korean Healthy Eating Index

Weights were applied to account for the complex survey design. ANOVA was conducted to compare mean KHEI scores. Adjusted *P*-values were adjusted for participant age, sex, disease, physical activity, body mass index, education, and income. Age was not adjusted for in analyses by age group. Metropolitan cities were classified as low (Gyeonggi-do), middle (Seoul, Incheon, and Busan), and high (Daejeon, Gwangju, Daegu, and Ulsan). Provinces were categorized into low (Gangwon-do and Jeollanam-do), middle (Jeollabuk-do, Chungcheongnam-do, and Chungcheongbuk-do), and high (Jeju-do, Gyeongsangbuk-do, and Gyeongsangnam-do).

ities in food-related infrastructure and resources across regions can directly affect the feasibility of practicing a healthy diet, as shown in the results of the present study. Therefore, this study highlights the need for an integrated approach that considers not only individual characteristics but also regional environmental factors to improve DQ. These findings underscore the necessity of regionally tailored strategies such as improving local infrastructure and expanding access to health information for the development of policies aimed at promoting health equity.

Regional factors variably affect DQ according to an individual's characteristics, such as income, as observed in this study. High-income metropolitan city residents appeared to benefit from residing in close proximity to markets as they had higher KHEI scores than those of similar income status who dwelt in cities more distant from markets. In contrast, low-income adults residing in metropolitan cities with shorter travel time to markets yielded lower KHEI scores than those inhabiting cities more distant to markets. The discrepancy between the 2 income levels in terms of the association of market accessibility with DQ indicates that regional factors potentially affect DQ differently. Closer proximity of marketplaces may be expected to indicate greater competition among markets, resulting in the better quality and lower costs of healthy foods, thus potentially yielding superior DQ, regardless of income. However, the negative relationship between market accessibility and DQ in low-income adults may also suggest a similar competition among marketplaces for unhealthy foods. In addition, areas with favorable market accessibility may be characterized by greater population density, more transportation options, and thus higher housing costs, resulting in less money to spend on food, especially for low-income individuals in metropolitan cities. Better market accessibility, within a reasonable range, may not improve DQ in low-income adults but may actually increase the consumption of convenience foods high in sodium and saturated fats [19, 20]. Therefore, market accessibility per se may not enhance DQ in low income metropolitan residents and additional efforts to identify risk factors are required.

Likewise, regional internet use may also affect DQ variably. In South Korea, where internet usage rates are high, online purchases may be more prevalent [21]. On the other hand, higher regional internet use potentially results in fewer physical stores within proximity from which to purchase food in person as well as higher food prices, creating a disadvantage for those who are not comfortable shopping for food online. This is supported by our results wherein regional internet use was negatively associated with the KHEI in low-income adults in metropolitan cities and low-education-status adults in provinces. Similarly, in the United States, not being able to physically inspect food, especially fruits and vegetables, presents a barrier to online food shopping among Supplement Nutrition Assistance Program recipients [22]. Internet use can be utilized as a source of information and a communication tool about food and nutrition; however, this may lead to contrasting effects based on individual characteristics. Although the difference in associations between DQ and regional internet according to income status is not entirely understood, our results demonstrate that regional factors may potentially affect individuals, but not equally, and possibly introduce more nutritional disparities.

Among the age groups, the 40–59 year age group appeared to be most responsive to regional factors. The DQ of adults in this age group was positively associated with regional education status, time to retailer, and regional internet use, especially in metropolitan cities. Adults in their 40s and 50s are usually more financially stable than those in other age groups; are responsible for feeding the family, including growing children and aging parents; and may experience the onset of chronic disease. Therefore, this age group may have greater interest in diet and nutrition in addition to means of purchase and internet use ability. We and others have found that an individual's education status is positively associated with DQ [23]. Therefore, areas with high proportions of well-educated individuals may exhibit a better selection of foods available in retail outlets. In addition, high regional internet use may increase the dissemination of nutritional information within the community, which may also affect food availability in retail outlets [24-26]. On the other hand, given the lower association observed in younger adults and older adults, the impact of regional policy approaches on DQ varies with age, necessitating an age-differentiated approach

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to environmental factors.

Regional food security status, but not regional income, was positively associated with DQ in metropolitan cities. These associations were observed in residents at high risk of food insecurity, that is, those aged ≥ 60 years and those with a low education level [27]. Income and food security status are known to be closely related in individuals [28]. However, at regional level, they may differ. High-income regions may be characterized by high food prices and greater food insecurity among residents. The poverty rate among older adults in Korea is considerably high, attaining to 0.404 in adults aged > 65 years [29]. Thus, adults aged ≥ 60 years and those with a low education status are at higher risk of food insecurity [30]. These populations exhibit increased DQ when residing in a region with high food security, but not high regional income, compared with those with the same characteristics inhabiting areas with low food security. Food security is not only associated with purchasing power [22, 23] but also with transportation and time to food retailers and access to various food choices, aspects that can be influenced by local welfare systems. Therefore, in metropolitan cities, the positive association of DQ with regional food security in older adults may be because these older adults tend to be beneficiaries of policies that mitigate food insecurity in these regions. On the other hand, provincial residents may have easier and more affordable access to local agricultural and fishery products and engage more in-home gardening practices, potentially resulting in higher fruit and vegetable consumption and thus DQ. This suggests that the association of regional food security status with DQ also differs between metropolitan cities and provinces.

Limitations

This study has certain limitations. First, owing to its cross-sectional design, we are unable to determine causal relationships. Second, while analyzing data at the more immediate town or neighborhood level would have been preferable to categorizing regions into metropolitan cities and provinces, some variables were not available for a more detailed analysis. However, many metropolitan city residents work in different towns than their residential area, which may affect their meal and snack intake, and thus DQ. Therefore, analyzing the regional factors at the city level may be more accurate than smaller units of residential area at least for metropolitan city residents. Third, the KHEI was calculated from a single 24-hour dietary recall which may not fully reflect an individual's usual diet. However, the KNHANES only assesses one day's intake and the KHEI was validated using this method [31]. Furthermore, we were unable to analyze other well-known, influential environmental factors, such as food prices and promotion/marketing, because of the absence of relevant data [32]. Despite these limitations, this study is the first to assess DQ based on both individual characteristics and regional factors which may serve as a basis for national and local nutrition policies.

Conclusion

Based on nationwide data, we found that DQ varies according to both regional factors and individual sociodemographic characteristics. The associations of DQ with regional internet usage and market accessibility differ between low- and high-income metropolitan city residents. Among the age groups, the 40–59-year age group appears to be the most responsive to regional characteristics. The number of sports facilities in the region is positively associated with DQ in low-income and low-education-status provincial residents. Policy efforts should consider both individual sociodemographic characteristics and the regional environment to enhance DQ and alleviate nutrition inequity.

CONFLICT OF INTEREST

There are no financial or other issues that might lead to conflict of interest.

FUNDING

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DATA AVAILABILITY

The data used is publicly available at the Statistics Ko-

rea and the Community Health Survey and the Korean National Health and Nutrition Examination Survey (https://kosis.kr/index/index.do, https://knhanes.kdca.go.kr/knhanes/main.do).

SUPPLEMENTARY MATERIALS

Supplementary Table 1. Comparison of included and excluded participants characteristics.
Supplementary Table 2. Diet quality as assessed using the KHEI according to regional factors in metropolitan cities and provinces.
Supplementary Table 3. Mean KHEI according to regional education level and participant characteristics.
Supplementary Table 4. Mean KHEI according to regional income per capita and personal characteristics.
Supplementary Table 5. KHEI according to regional food security status and participant characteristics.
Supplementary Table 6. KHEI according to urban park area (metropolitan cities) or number of sports facilities (provinces) and personal characteristics.
Supplementary Table 7. KHEI according to time to the nearest large retailer and personal characteristics.
Supplementary Table 8. KHEI according to time to nearest traditional market and personal characteristics.
Supplementary Figure 1. Participant flow chart. KNHANES, Korea National Health and Nutrition Examination Survey; KHEI, Korean Healthy Eating Index.

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Research Article

노인복지시설의 식단 및 영양 관리 실태와 교육 요구도 조사: 어린이사회복지급식관리지원센터 직원 및 노인복지시설 종사자 대상 포커스 그룹 인터뷰

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A study on the diet and nutrition management status and educational needs in elderly care facilities in Korea: focus group interviews with staff from children's and social welfare meal management support centers and elderly care facilities

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Objectives: In this study, we identified the current status of meal and nutritional management in elderly care facilities and analyzed the educational needs of employees, with the goal of proposing effective support strategies for nutritional management and to suggest directions for developing customized educational content.

Methods: Between May and June 2024, we conducted nine focus group interviews with 22 participants recruited from 10 cities across four major regions of Korea, including 13 employees of children and social welfare meal management support centers and nine employees of elderly care facilities.

Results: Our findings revealed that supporting algorithm-based dietary planning, improving communication with caregivers, and providing flexible, practical education tailored to facility conditions, are key elements for enhancing nutritional management in elderly care facilities. To facilitate the translation of these insights into practice, it will be necessary to strengthen collaboration between centers and facilities, combined with efforts to improve the operational environment for applying the algorithm and providing continuous educational support.

Conclusion: The findings of this study emphasize the importance of on-site education and sustainable support strategies based on the diet and nutritional management status and education needs of elderly care facilities. Strengthening practical education, communication systems, and center–facility collaboration is required, and future research needs to verify the efficacy of these measures and define a sustainable support system based on quantitative analysis.

Keywords: nutritional status; long-term care; focus groups

INTRODUCTION

국내 고령 인구 비율은 2024년 19.2%에서 2036년 30.9%로 증가할 것으로 전망되며[1], 이에 따라 노인의 건강 관리를 위한 체계적인 영양 관리의 필요성이 커지고 있다. 노인은 노화에 따른 신체 기능 저하, 식욕 감소, 소화 기능 약화 등으로 인해 충분한 영양소 섭취가 어려우므로[2], 건강 상태 유지와 기능 저하 예방을 위한 맞춤형 영양 관리가 필수적이다[3].

노인 대상 영양 관리는 단순한 식사 제공을 넘어 만성질환 예방, 신체 기능 유지, 사회적 소속감 증진, 돌봄 체계 내 협력 강화 등 다양한 측면에서 노인의 삶의 질 향상에 기여한다[4, 5]. 특히, 일상적인 식사 준비가 어려운 노인의 경우, 외부에서 제공되는 급식에 대한 의존도가 높으며, 이에 따라 요양 시설, 재가노인복지시설, 복지관, 경로당 등 다양한 형태의 노인 급식 제공 시설이 전국적으로 확대되고 있다[6]. 이러한 시설은 지역 사회 내에서 노인 식생활 지원의 전달 체계로 기능하며, 노인의 영양 상태 개선에 중요한 역할을 수행한다[7–9].

이들 시설에서는 노인의 생리적 특성과 건강 상태를 고려한 맞춤형 식사 제공과 위생적인 급식 환경 조성이 필수적이다[10]. 그러나 실제 현장에서는 영양에 대한 이해 부족과 전문 인력 부재로 등으로 인해 급식 관리에 어려움이 있으며, 이는 급식의 질 저하뿐 아니라 노인의 영양 상태 및 건강 전반에 영향을 미칠 수 있다[11].

이와 같은 문제를 해결하고자 어린이사회복지급식관리지원센터에서는 노인복지시설을 대상으로 식단 제공, 영양상태 평가, 위생 점검, 영양관리카드 활용, 종사자 교육 등 다양한 지원을 수행하고 있다[12]. 특히, 현장 종사자 대상 교육은 급식의 위생 수준과 영양 서비스의 질에 직접적인 영향을 미치는 요소로, 노인의 건강과도 밀접한 관련이 있다. 센터는 실무 적용이 가능한 사례 중심 교육을 제공하고 있으나, 현재 교육 프로그램은 이론 중심으로 구성되어 있어 현장 여건을 충분히 반영하지 못하고 있으며, 이에 따른 실효성 저하가 나타나고 있다. 실제 적용 가능한 실무 중심의 교육 콘텐츠 개발과 종사자의 역량을 강화를 위한 전략 마련이 요구된다.

노인 시설을 대상으로 한 선행 연구는 급식 운영 관리 실태[13], 영양사 고용 여부에 따른 영양 섭취 상태 비교[14], 영양 교육의 효과성 평가[15], 영양·식생활관리 프로그램 요구 분석[16] 등으로 대부분 입소자의 영양 상태나 교육 프로그램의 효과에 한정되어 있다. 반면, 급식·영양 지원을 담당하는 어린이사회복지급식관리지원센터와 시설 종사자의 경험을 통합적으로 분석한 연구는 부족한 실정이다.

따라서 본 연구는 어린이사회복지급식관리지원센터 직원과 노인복지시설 종사자를 대상으로 포커스 그룹 인터뷰를 실시하여, 노인 시설의 식단 및 영양 관리 실태와 종사자의 교육 요구도를 종합적으로 분석하고자 하였다. 이를 통해 현장에서 활용 가능한 교육 콘텐츠 개선 방향과 영양 지원 전략을 제시하며, 노인복지시설의 급식 및 영양 관리 체계 강화를 위한 기초 자료로 활용될 수 있다.

METHODS

Ethics statement

This study was approved by the Institutional Review Board of Sangmyung University (IRB-SMU-S-2024-1-007). All participants were informed about the study's purpose and procedures, and their consent was obtained via email.

1. 연구설계

본 연구는 질적 연구로 포커스 그룹 인터뷰(focus group interview)를 실시하였으며, COREQ (Consolidated Criteria for Reporting Qualitative Research) 보고 지침을 참고하여 연구를 설계하고 기술하였다(https://www.equator-network.org/reporting-guidelines/coreq/).

2. 연구대상 및 기간

본 연구는 센터 직원 13명(전원 영양사)과 노인 시설 종사자 9명, 총 22명을 대상으로 포커스 그룹 인터뷰를 실시하였다. 일정 조율이 어려운 일부 참여자는 일대일 심층 인터뷰로 대체하였다. 연구 참여자는 센터 그룹과 노인 시설 그룹으로 구분하여 모집하였으며, 센터 직원은 식생활안전관리원을 통해 협조 공문을 발송한 후, 해당 기관의 홍보를 통해 전국 단위로 모집하였다. 시설 종사자는 센터 참여자의 소개 및 권유를 통해 눈덩이표집법(snowball sampling) 방식으로 모집하였으며, 온라인 신청서를 통해 연구 참여 신청을 받은 후 최종 선정하였다. 인터뷰는 수도권, 충청권, 전라권, 경상권 등 주요 권역의 참여자를 포함하여, 지역적 대표성을 고려하여 구성되었다. 2024년 5월부터 6월까지 약 두 달간 진행되었으며, 참여자의 일정에 따라 총 9회에 걸쳐 비대면 방식으로 실시되었다.

3. 연구내용 및 방법

1) 인터뷰 방법

본 인터뷰는 센터 직원 그룹과 노인 시설 종사자 그룹으로 나누어 진행되었으며 회당 6명 이하의 참여자로 구성되었다. 센터 그룹에서는 4회, 노인 시설 그룹에서는 5회 인터뷰가 진행되었으며 회당 약 1시간 내외로 이루어졌다. 인터뷰에 시작 전, 연구의

목적과 절차를 참여자에게 충분히 설명하였으며, 모든 인터뷰는 사전 동의를 받은 후 녹음하였다.

2) 인터뷰 질문지

연구 대상자의 인터뷰 질문지는 노인 시설 영양 교육 관련 선행 연구[17-19]를 바탕으로 재구성하였다. 일반사항(성별, 직업, 근무 경력), 식단 관리(운영방식, 특징, 선호/비선호 음식, 가공식품 사용빈도), 영양 관리(운영 실태, 개선점), 교육(시설 종사자/조리사/입소자 대상 교육 방식, 요구도, 어려운 점)으로 구성되었으며 반구조화된 질문지로 작성하였으며, 인터뷰 질문 예시는 Table 1과 같다.

3) 분석 방법

인터뷰 종료 후 녹음된 음성 데이터를 전사한 뒤, Glaser와 Strauss [20]의 반복적 비교(constant comparison) 분석법을 활용하여 인터뷰 자료를 분석하였다. 반복적 비교분석법은 근거이론(grounded theory)의 핵심 절차로 수집된 자료를 지속적으로 비교하면서 개념과 범주를 도출하고 이들 간의 관계를 구조화하는 방식이다[20]. 본 연구는 반복적 비교분석 절차에 따라 개방코딩, 범주화, 범주 확인의 3단계로 분석을 진행하였다[21]. 특히, 센터 직원과 노인 시설 종사자의 역할과 관점의 차이를 고려하여 두 집단을 구분하여 독립적으로 분석하였다. 먼저, 개방코딩 단계에서는 세 명의 연구자가 전사 자료를 반복적으로 비교분석하면서 의미 있는 내용을 독립적으로 도출하고 초기 코드를 생성한 후 논의를 통해 유사한 코드를 통합하거나 조정하였다. 범주화 단계에서는 도출된 초기 코드를 유사한 속성과 주제별로 하위 범주를 구성하고, 이를 포괄적으로 통합하여 상위 범주로 체계화하였다. 이 과정에서 연구자들은 반복적인 검토를 통해 각 범주가 자료의 의미를 충실히 반영하는지 확인하였다. 마지막으로, 범주 확인 단계에서는 구성된 범주가 자료의 본래 의미를 정확히 반영하는지 검토하기 위해, 연구자들이 전사본과 분석표를 반복 대조하며 점검하였다. 또한, 연구 참여자에게 전사 내용과 주요 분석 결과를 전달하여 본인의 진술이 적절히 반영되었는지 확인함으로써, 분석 결과의 신뢰성을 확보하였다.

RESULTS

1. 일반사항

본 연구 대상자의 일반사항은 Table 2와 같다. 센터 직원은 팀장 11명(84.6%), 팀원 2명(15.4%)이며, 평균 근속 년도는 5년 8개월으로 조사되었다. 노인 시설 그룹은 시설장 3명(33.3%), 사회복지사 4명(44.4%), 간호조무사 1명(11.1%), 요양보호사 1명(11.1%)이며, 근속 연도는 평균 9년 6개월으로 조사되었다. 본 연구에 참여한 노인 시설은 의료복지시설 3곳과 재가노인복지시설 6곳이었다.

2. 식단 관리

조사에 참여한 9개 노인복지시설 중 5개(55.6%) 시설은 직영으로 급식을 운영하고 있었으며, 이는 2019년도 전국 731개 노인요양시설의 급식 운영 실태를 분석한 선행 연구[22] 보고된 직영 급식 비율(74.6%)보다 낮은 수준이다. 반면, 위탁급식 비율은 본 연구에서 상대적으로 높은 경향을 보였다. 직영급식 시설은 가공식품 사용을 최소화하는 경향이 있었던 반면, 위탁급식 시설은 조리의 효율성과 편의성을 이유로 가공식품 사용 빈도가 높아 이에 대한 별도의 관리가 필요한 것으로 나타났다.

센터 직원들은 식단 작성 시 가장 중요하게 고려 요소로 대상

Table 1. Interview questions for for study participants

Category	Interview themes	Example of interview questions
General information	- Gender	- What is your gender?
	- Job	- What is your current job?
	- Work experience	- How many years of work experience do you have?
Meal management	- Meal management methods	- What is the current system or method of meal provision?
	- Meal characteristics	- What are the preferred foods of elderly?
	- Preferred foods and non-preferred foods	- What are the non-preferred foods of elderly?
	- Frequency of processed meal usage	- How often are processed meals provided?
Nutrition management	- Operational status	- How is nutrition management typically conducted?
	- Improvement points	- What are the key areas for improvement in nutrition management?
Nutrition and hygiene education	- Overall education	- What education method are currently conducting?
	- Education reflecting the characteristics of each target group	- What are education needs?
		- What are the difficulties in education?

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Table 2. Characteristics of the study participants (n = 22)

Group	Participant ID	Gender	Job	Work experience
Children's and social welfare meal management support center	C1	F	Team leader (dietitian)	11 years 10 months
	C2	F	Team leader (dietitian)	7 years 3 months
	C3	F	Team leader (dietitian)	4 years 5 months
	C4	F	Team member (dietitian)	9 months
	C5	F	Team leader (dietitian)	5 years
	C6	F	Team leader (dietitian)	2 years 10motnhs
	C7	F	Team member (dietitian)	2 years 1month
	C8	F	Team leader (dietitian)	10 months
	C9	F	Team leader (dietitian)	2 years
	C10	F	Team leader (dietitian)	10 years 9 months
	C11	F	Team leader (dietitian)	10 years
	C12	F	Team leader (dietitian)	8 years
	C13	F	Team leader (dietitian)	8 years
Elderly care facilities	D1	F	(Medical and welfare institutions for senior citizens) Facility manager	16 years
	D2	F	(Commuting system welfare facility for senior citizens at home) Facility manager	2 years
	D3	F	(Medical and welfare institutions for senior citizens) Social worker	1 year 6 months
	D4	M	(Commuting system welfare facility for senior citizens at home) Social worker	8 years
	D5	F	(Commuting system welfare facility for senior citizens at home) Social worker	13 years
	D6	F	(Medical and welfare institutions for senior citizens) Facility manager	1 year 6 months
	D7	F	(Commuting system welfare facility for senior citizens at home) Nursing assistant	13 years
	D8	F	(Commuting system welfare facility for senior citizens at home) Social worker	1 year 3 months
	D9	F	(Commuting system welfare facility for senior citizens at home) Care assistant	4 years 11 months

F, female; M, male.

자의 영양소 충족 여부와 기호도를 언급하였다. 노인의 경우 부드러운 식재료와 찌는 조리법을 선호하며, 매운 음식이나 딱딱한 식품은 기피하는 경향이 있었으며, 이러한 특성은 의료복지시설과 재가노인복지시설에서 공통적으로 나타났다. 이는 노인을 대상으로 한 식품 선호도 선행 연구[23, 24] 결과와도 일치하며, 찜, 국, 조림과 같은 부드러운 조리법에 대한 선호가 높게 나타난 반면, 튀김과 부침에 대한 선호도는 낮은 것으로 나타났다.

"어르신들이 좀 연세가 노인 의료시설 같은 경우에는 치아 저작이나 이런 게 잘 씹기가 어렵기 때문에 거의 부드러운 식재료를 많이 사용을 하고 계시더라고요... 그리고 맛은 너무 맵지 않고 약간 슴슴한 그런 음식을 원하셨습니다.." (참여자 C3)

직영급식 시설의 경우, 센터에서 제공하는 표준 식단보다는 자체적으로 구성한 식단을 활용하는 비율이 높았다. 시설 종사자들은 조리 인력이 익숙하지 않은 식재료나 조리 경험이 부족한 메뉴를 접할 경우, 조리 방법에 대한 이해 부족으로 실행에 어려움을 겪는 경우가 많다고 응답하였다. 결과적으로 표준 식단이 현장에 효과적으로 적용되기 위해서는 조리 인력의 이해도와 숙련도를 고려한 교육 및 실행 지원이 병행되어야 함을 시사한다.

"간혹 조리원 선생님이 모르는 그런 반찬이나 새로운 게 나왔을 때 조리 방법이나 이런 거에 대한 문제가 있는데요..." (참여자 D7)

시설 종사자들은 조리 인력의 부족과 조리의 환경 제약으로 인해 질환별 맞춤 식단 제공이 현실적으로 어렵다고 응답하였다. 현재 연하곤란식, 다짐식, 알레르기식 등은 시설별로 제한적

으로 제공되고 있으며, 질환식의 경우에도 메뉴별 제공량 조절이나 특정 식재료 제거와 같은 간접적인 방식으로 운영되고 있는 것으로 나타났다. 또한, 노인의 경우 익숙하지 않은 식재료나 양념으로 조리된 새로운 메뉴에 대한 거부감이 높아, 다양한 식재료와 조리법을 활용한 급식 운영에 어려움이 있다고 응답하였다. 따라서 향후에는 노인의 기호도와 식사 순응도를 함께 고려한 단계적이고 현실적인 식단 운영 전략 마련이 필요하다.

"현실적으로 저희가 조리사님은 한 분인데 그거를 조리사님이 다 조리를 한다고 하시면 시간도 부족하고… 두세 분은 더 있어야 되는거든요…" (참여자 D8)

"(질환식의 경우) 크게 연연하지 않으시는 보호자님이 많고 어르신들도 얼마나 살겠느냐 그냥 맛있게 먹고 싶다는 그런 분이 많으셔서…" (참여자 D3)

"본인이 거부하시게 되면 일반식으로 제공하고 있고…" (참여자 D6)

3. 영양 관리

노인 시설에서의 영양 관리는 단순한 식단 제공을 넘어, 입소자의 영양 상태를 정기적으로 평가하고 그 결과에 기반한 상담 및 맞춤형 지원을 포함한다. 특히, 만성질환 유병률이 높은 노인의 특성을 고려할 때, 질환 상태에 따른 식생활 조절과 체계적인 영양 상담은 노인의 건강 유지와 질환 예방을 위한 필수적 요소이다[25].

그러나 대부분의 입소 노인이 인지 기능 저하를 겪고 있어, 직접적인 의사소통을 통한 영양 상담에는 제한이 있다. 센터 직원들은 영양 상담의 효과를 높이기 위해서는 대상자의 영양 상태에 대한 정확한 평가가 선행되어야 하며, 이에 기반한 체계적인 상담이 필요하다고 응답하였다. 그러나 실제로는 직접 상담이 어려운 경우가 많아, 협조적인 기관에 한하여 시설 관리자나 보호자를 통한 간접적 방식으로 영양 상태를 파악하고 상담을 진행하는 경우가 많았다.

"시설에서 노인분들이 상담하기 어렵다고 하시더라고요. 그래서 직접적으로 입소자분들께 설명은 해드리지 않고 그 담당자 선생님과 시설장분께 따로 영양 상담 부분 안내를 해드리는 편입니다." (참여자 C4)

노인 시설 종사자들은 인지 기능이 유지된 일부 노인의 경우 직접적인 영양 상담이 가능하나, 대부분의 경우 시설 관리자와 보호자를 통해 영양 평가 결과를 제공하고 있다고 응답하였다. 또한 보호자의 요청이 있을 경우, 추가 상담이 병행되는 것이 바람직하다고 언급하였다.

"일단은 어르신들 상담 같은 경우는 대화가 일상적으로 가능하신 분들은 당연히 좋긴 하겠지만 그렇지 않은 분들이 거의 대다수여서 결과지 같은 경우를 시설로 보내서 시설에서 보호자에게 직접 전달하는 방식이 좀 더 적절한 것 같아요. 그래서 문제가 있는 경우에는 추가적인 상담을 통해 개선할 수 있을 것 같고…" (참여자 D4)

센터 직원들은 시설 관리자 및 보호자 대상의 영양 상담 교육을 통해 간접 상담의 효과를 높이는 것이 필요하다고 언급한 반면, 시설 종사자들은 보호자와의 소통 과정에서 오해나 갈등이 발생할 수 있는 가능성을 우려하였다. 특히, 일부 보호자는 상담 결과를 단순한 정보 제공으로 인식하기보다는, 시설 운영의 질을 평가하는 근거로 활용할 수 있어 그에 따른 부담이 발생할 수 있다고 언급하였다.

"시설은 어차피 보호자한테 내용을 전달해도 보호자가 직접적인 관리를 할 수 없잖아요. 그러면 오히려 보호자는 '왜 이렇게 했느냐'를 따지는 자료로 활용될 가능성이 있어요. 기대 수준과 실제 운영 간 차이가 발생하면 그에 대한 리스크가 생길 수 있죠." (참여자 D1)

4. 영양 및 위생 교육

1) 교육 일반

교육은 연 1–2회 실시되며, 영양 및 위생 관련 내용을 중심으로 운영되고 있다. 센터 직원들은 강의와 실습을 병행한 구조화된 교육 방식을 선호하며, 교육 효과를 높이기 위해 시청각 자료 활용과 사례 중심의 구성 방식을 도입하고 있다고 언급하였다. 또한, 교육 대상자의 이해도를 고려한 평이한 용어 사용과 현장에서 즉시 적용 가능한 실무 중심 정보의 포함이 필요하다고 강조하였다.

노인 시설 종사자들 역시 동영상 자료, 체크리스트 기반 교육, 사례 중심 실무형 교육을 선호하였으며, 단순한 이론 중심보다는 현장의 문제 해결에 실질적으로 도움이 되는 교육 내용이 요구된다고 응답하였다. 한편, 근무 시간과 높은 업무 강도로 인해 교육 참여에 어려움이 있다는 현실적인 제약도 언급하였다.

2) 대상자별 특성을 반영한 교육

(1) 시설 종사자 교육

시설 종사자를 대상 교육은 주로 노인 식단 구성 및 영양 관리에 중점을 두고 있으며, 평균 연령대가 50대 이상인 종사자의 특성을 고려하여 시청각 자료 활용, 실습 병행, 쉬운 용어 사용 등을 통해 이해도와 참여도를 높일 필요가 있다고 응답하였다. 그러나 현재 제공되는 교육의 대부분은 이론 중심으로 구성되어 있어 실제 식사 제공 및 돌봄 지원 과정에서의 적용성과 실효성에는 한계가 있었다.

센터 직원들은 연하곤란이나 사래 걸림 등 노인의 신체적 특성을 반영한 실무 중심 교육 내용의 필요성을 강조하였으며, 현장에서 즉시 적용 가능한 교육 콘텐츠 개발이 필요하다고 언급하였다.

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"시설 종사자분들 교육 같은 경우에는 연하곤란이라든지 이런 영양적인 부분에 조금 더 관심이 많으신 것 같아서 그쪽에 이제 초점을 두어서 교육 주제를 선정해서 진행을 하고 있습니다." (참여자 C7)

"이론적인 부분에 대해서는 자료가 워낙 일전에도 주신 것도 찾으면 많이 나오니까 이론적인 부분에 대해서는 자료를 잘 정리해서 드리긴 하지만 또 저희는 좀 나아가 그거를 현장에 좀 적용할 수 있는 부분들이 있어 좋겠다라는 생각을 좀 했습니다..." (참여자 C1)

노인 시설 종사자들은 근무 시간과 교육 시간의 중복을 주요 제약 요소로 언급하였으며, 이에 따라, 30분 이내의 단시간 교육 또는 교대 참여가 가능한 분할 교육 운영이 보다 효과적일 것으로 보인다. 또한, 교육 내용은 위생·감염 관리뿐만 아니라 영양관리, 연하곤란 대응 등 실제 돌봄 현장에서 활용 가능한 주제로의 다양화가 필요하다는 요구도 함께 나타났다.

"교육 시간이 저희 근무하는 시간이라서 시간을 빼기는 쉽지는 않아요..." (참여자 D3)

(2) 조리 종사자 교육

조리 종사자 교육에 대해 센터와 시설 모두 위생 관리 및 맞춤형 식단 제공 역량 강화의 중요성에 공감하였다. 센터 직원들은 위생 관리, 조리법 개선, 식중독 예방 등의 내용을 중심으로 교육 자료를 구성하고 이론 교육, 실습 활동, 시청각 매체를 병행하는 방식을 통해 실무 중심 교육이 효과적이라고 응답하였다.

"조리사 같은 경우에는 이제 체크리스트 중심으로 해가지고 위생 관리로 주제를 잡고 있고요..." (참여자 C13)

노인 시설 종사자들은 조리 종사자가 틈틈이 참고할 수 있도록 영상 자료와 인쇄물의 병행 제공이 필요하며, 교육 시간은 배식이 종료된 오후 2시–2시 30분이 적절하다고 응답하였다. TV 기반 영상 교육은 접근성과 참여율을 높일 수 있는 방식으로 제안되었다.

"조리사님도 마찬가지로 그냥 영상으로도 보여주시는데 종이로도 뽑아 주셔야 될 것 같아요...틈틈이 좀 읽으실 수 있게..." (참여자 D8)

"급식을 만들어야 될 시간인데 교육을 또 따로 하셔야 돼 가지고 이것 때문에 불평 불만이 조금 있으셨고요..." (참여자 D4)

결과적으로, 조리 종사자 교육의 실효성을 높이기 위해서는 센터 차원에서 현장 맞춤형 콘텐츠를 개발하고 시설 차원에서는 교육 접근성을 높일 수 있는 유연한 운영 방식을 마련할 필요가 있다. 또한, 체크리스트 활용, 인쇄물 제공, 교육 시간 조정 등 현장 여건을 반영한 센터-시설 간 협력 체계 강화를 통해 교육의 현장 적용성과 효과성을 극대화할 수 있을 것으로 생각된다.

(3) 입소 대상자 교육

입소 대상자 교육은 시설 유형에 따라 운영 방식에 차이가 있었다. 의료복지시설의 경우 인지 및 신체 기능 유지를 목적으로 한 체험형 자체 프로그램이 주로 운영되고 있었으며, 재가노인복지시설은 어린이사회복지급식관리지원센터, 지자체 등 외부 기관과의 협력을 통해 감염병 예방, 위생 관리, 보행 운동 등 일상생활과 밀접한 주제 중심의 교육이 이루어지고 있었다.

센터 직원들은 인지 기능이 저하된 노인의 경우 색칠하기, 만들기 등 소근육 활동이 교육 효과 및 참여율을 증진시키는 데 효과적인 방법이라고 언급하였다.

"색칠하기나 이런 것들 스티커 붙이는 거 이런 거는 굉장히 잘 따라와 줬습니다. 그래서 활동 위주로 교육을 진행하고 있습니다..." (참여자 C3)

"어르신들한테는 이제 보통 자리에 앉으셔서 만들기라든지 이렇게 조그만하게 만들기를 할 수 있는 그런 소근육을 발달시킬 수 있는 그런 것들이 더 필요하다고 느껴졌고요. 그래서 작년 같은 경우에는 저희가 어르신들 대상으로 교육할 때 색칠하기를 했었어요..." (참여자 C7)

노인 시설 종사자들은 교육 내용이 단순한 놀이 중심보다는 실생활에서 적용 가능한 실용적인 주제를 포함해야 하며, 교육 전달 방식 또한 이해하기 쉬운 직관적 방식으로 구성되어야 한다고 강조하였다. 일부 응답자는 오히려 유치원 수준의 단순한 교육 방식이 오히려 효과적일 수 있다고 보았으며, 교육 메시지를 놀이 속에 자연스럽게 포함시키는 방식이 참여도를 높이는데 도움이 될 것이라고 응답하였다.

"아주 간단하게 누가 정말 유치원생이 지나가도 이해를 할 수 있을 만한 수준의 내용으로 해야만 어르신들도 이해를 하세요..." (참여자 D7)

"직접적인 교육이나 이런 거 말고 어떤 놀이나 약간 이런 거에 조금 교육을 녹여서 진행하면 그래도 참여율이 조금은 나을 것 같긴 합니다..." (참여자 D4)

노인의 경우, 교육의 목적이 어린이와 달리 건강 증진보다는 기능 유지 및 건강 악화 지연에 중점을 두기 때문에, 대상자의 건강 상태와 이해 수준에 따라 교육 내용과 방식에 차별화가 필요하다. 이에 따라 시설과 센터 간 유기적인 소통과 협력을 바탕으로, 노인의 건강 상태와 개별적 욕구를 반영한 맞춤형 교육 설계가 설계될 때 교육 효과와 참여도를 제고할 수 있을 것이다. 이상의 내용을 종합하여 시설 종사자, 조리 종사자 및 입소 대상자 별 교육 요구도의 주요 내용은 Table 3에 제시하였다.

"어르신들 건강 유지에 도움이 되는 걸 많이 알려주시면 잘 따라 하시더라고요…그런 부분에 대해서는 긍정적으로 반응하시고, 보행 운동 같은 것도 건강에 좋다고 하면 적극적으로 하시려

Table 3. Educational needs of study participants (n = 22)

Category	Common needs	Children's and social welfare meal management support center needs (n = 13)	Elderly care facilities needs (n = 9)
Overall education	Care settings–focused competency-based education	Blended learning that integrating theoretical instruction and practical application	Standardized lessons using checklist-based teaching guides
	Case-based learning approaches that reflect real care situations	Use of easy to understand language and teaching methods suited to the cognitive levels of older adults	Practical problem-solving methods based on care field situations
	Use of audiovisual materials to support diverse learning styles		Develop short and flexible educational sessions that fit into the facility's work schedule
Education needs of facility workers	Use experiential learning approaches that emphasize practical application over passive knowledge acquisition	Enhance practice-based education designed for care facility environments and job-specific skills	Use a variety of teaching methods including visuals, practical application and easy-to-understand language
	Encourage active participation and support learners' understanding of contents	Use teaching methods to fit the physical condition and functional ability of older adults	Develop short and flexible educational sessions that fit into the facility's work schedule
			Develop multidimensional education programs (physical, cognitive, and psychosocial needs of older adults)
Education needs of foodservice workers	Enhance applied competencies in hygiene and individualized nutrition planning	Develop targeted educational materials focused on food safety and cooking practices	Use both print and audiovisual materials to support different learning styles
	Use structured teaching tools such as checklists to support practical application	Blended learning that integrates lectures, practical application, and varied instructional resources	Develop time-flexible instructional sessions suitable for institutional foodservice operations
Education needs of elderly residents	Develop customized educational programs based on the health conditions of older adults	Develop and apply fine motor programs for older adults with cognitive decline	Enhance daily independence through practical education on everyday activities
	Enhance the effectiveness of education through collaboration between support centers and care facilities	Use play-based teaching methods to support learning among older adults	Use teaching methods suited to the cognitive and literacy levels of older adults
			Enhance learner engagement by integrating educational contents with structured play activities

고 해요…" (참여자 D11)

DISCUSSION

본 연구는 포커스 그룹 인터뷰를 통해 노인 시설의 식단 및 영양 관리 실태, 교육 요구도를 종합적으로 파악하고, 이를 바탕으로 센터가 현장에 적합한 맞춤형 교육 콘텐츠를 보다 효과적으로 설계·운영할 수 있는 실질적인 방향을 제시하고자 하였다.

연구 결과, 다수의 시설에서는 조리 인력의 고령화, 전문성 부족, 시설 인프라의 제약 등으로 인해 질환별 맞춤형 식단 제공에 어려움을 겪고 있었으며, 대부분 일반식을 기반으로 식사량을 조절하는 방식으로 대응하고 있었다. 이는 선행 연구[26, 27]에서 제기된 맞춤형 식단 제공의 한계와 일치하며, 건강 상태와 기능적 제약이 다양한 노인의 영양 요구를 현행 급식 체계만으로는 충분히 충족시키기 어려운 실정이다. 따라서 시설의 인력 수준과 운영 여건을 고려하면서도 지속 가능한 급식 지원 체계 도입이 필요하다. 2025년부터 어린이사회복지급식관리지원센터에서 운영 중인 연령, 주요 질환, 연하 및 저작 기능 상태 등 대상자의 특성을 반영한 식사 유형과 영양 수준을 자동 제시하는 알고리즘 기반의 영양관리 표준모델[28]은 조리 인력의 전문성 부족을 보완할 수 방안이 될 수 있다. 그러나 이러한 알고리즘 제공만으로는 한계가 있으며, 조리 종사자 대상의 실질적 교육과 시설

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여건을 반영한 실행 지원이 병행되어야 한다.

노인 시설의 영양 관리는 단순한 식단 제공을 넘어, 대상자의 건강 상태를 정확히 파악하고 상담 결과를 효과적으로 제공할 수 있는 통합적 접근이 필요하다. 그러나 다수의 입소자의 인지 기능 저하 및 의사소통의 어려움으로 인해 보호자나 시설 관리자에 의존한 간접 상담이 대부분을 차지하였다. 이로 인해 상담의 실효성이 낮아지고, 보호자와 시설 간 인식 차이에 따른 갈등 가능성이 나타났다. 이러한 한계를 보완하기 위해서는 상담이 단편적 정보 제공에 그치지 않고, 보호자-시설-센터 간 신뢰 기반의 쌍방향 피드백 체계 구축이 필수적이다. 또한, 시각화된 평가 결과 제공, 표준화된 상담 자료 개발, 정기적인 소통 채널 구축과 디지털 플랫폼, 휴대전화, 전자 문서 등 현대적 소통 수단을 활용한 효율적 정보 전달 방안 마련이 요구된다[29].

교육 측면에서는 시설 대상별 차별화된 전략의 필요성이 요구된다. 시설 종사자는 연하곤란 대응이나 식사 보조와 같은 직접 돌봄 활동과 관련된 내용을 중심으로 짧고 유연한 교육 방식을 선호하였으며, 이는 시설 유형과 종사자 역량 차이를 고려한 맞춤형 교육의 필요성을 강조한 선행 연구[30]와 일치한다. 조리종사자는 위생 관리, 조리법 개선 등 현장에서 즉시 활용 가능한 교육 주제를 선호하였으며, 교육 시간과 집중도를 고려한 적정 분량과 시청각 자료 등 흥미를 유발할 수 있는 구성 요소가 효과적인 것으로 나타났다[31]. 따라서 교육 효과를 극대화하기 위해서는 인쇄물 제공, 교육 시간 조정 등 현장 여건을 반영한 센터와 시설 간의 긴밀한 협력 체계 구축이 필요하다. 입소 대상자 교육의 경우, 기능 유지 및 건강 악화 지연을 목적으로 직관적이고 체험 중심의 방식을 선호하였다. 특히, 색칠하기나 만들기 같은 소근육 활동이 참여도를 높였으며, 놀이적 요소와 교육 메시지를 결합한 콘텐츠가 효과적인 방법으로 나타났다. 실제로, 노인 21명을 대상으로 한 영양 교육 프로그램[32]에서도 시각 자료가 흥미도 향상에, 게임 요소는 실천도 증진에 긍정적인 영향을 미치는 것으로 확인되었다. 이에 따라, 시설 유형과 입소자의 상태에 따라 교육 내용을 세분화하고 놀이 요소와 교육적 메시지를 결합한 실용적 콘텐츠 구성이 바람직하다.

결론적으로, 센터의 지원은 단기적 개입을 넘어, 현장 적용 가능성을 높일 수 있는 지속 가능한 체계로의 전환이 요구된다. 이를 위해 센터는 교육 콘텐츠 개발 및 조리 인력의 현장 역량 강화를 위한 실습 기반 교육을 지속적으로 모색해야 하며, 보호자와의 소통을 위한 구조화된 피드백 체계 구축 또한 병행되어야 한다. 이와 더불어 시설 차원에서는 종사자의 역할과 직무 특성을 반영한 자체 학습 체계의 정비와 입소자의 인지 및 기능 수준을 고려한 교육 접근성 제고 등 실천 가능 범위 내에서의 개선 노력이 요구된다. 이러한 다차원적 접근은 급식·영양 관리의 질적 수준 향상뿐만 아니라 센터와 시설 간의 기능적 연계를 강화함으로써 노인 영양 관리 체계의 지속 가능성을 높이는 데 기여할 수 있을 것으로 사료된다.

Limitations

본 연구에는 다음과 같은 한계점이 존재한다. 첫째, 질적 연구 방법을 활용함에 따라 정량적 데이터를 통한 객관적인 비교 및 통계적 분석이 제한되었으며, 각 시설의 영양 상태나 식단 운영이 대상자의 건강에 미치는 영향을 구체적으로 평가할 수 있는 정량적 자료가 포함되지 않았다. 둘째, 인터뷰 참여자의 주관적 경험과 인식에 기반하므로, 응답자의 개인적 배경이나 상황에 따른 편향이 개입되었을 가능성이 존재한다. 따라서 향후 연구에서는 다양한 지역과 시설을 대상으로 표본을 확대하고 정량적 연구를 병행하여 데이터 기반의 분석을 강화해야 한다. 또한, 시설 종사자뿐만 아니라 입소 대상자인 노인의 직접적인 의견을 포함한 연구를 수행하여 보다 다각적이고 포괄적인 결과를 도출할 필요가 있다. 이를 통해 현장의 문제점을 체계적으로 파악하고, 실질적이고 효과적인 개선 방안을 제시할 수 있을 것으로 사료된다.

Conclusion

본 연구는 포커스 그룹 인터뷰를 통해 노인 시설의 식단 및 영양 관리 실태, 종사자의 교육 요구도를 분석하였으며, 이를 통해 현장 맞춤형 교육 콘텐츠 개발의 필요성을 확인하였다. 연구 결과, 영양관리 표준모델 알고리즘 기반 식단 운영 지원, 보호자와의 소통 체계 개선, 시설의 운영 여건을 고려한 유연하고 실용적인 교육 설계가 핵심 요소로 도출되었다. 이를 효과적으로 실현하기 위해서는 센터-시설 간 협력과 알고리즘의 실질적인 현장 활용을 위한 실행 환경 개선과 교육 지원이 함께 이루어져야 한다. 향후 정량적 연구를 통해 실천 효과를 검증하고, 지속 가능한 지원 체계를 구체화할 필요가 있다.

CONFLICT OF INTEREST

There are no financial or other issues that might lead to conflict of interest.

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None.

DATA AVAILABILITY

The participants in this study did not provide written consent for their data to be shared publicly; therefore, due to the sensitive nature of the research, supporting data are not available.

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Research Article

노인요양시설 급식담당 인력현황과 급식서비스 질과의 관련성 분석

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Analysis of the relationship between foodservice staffing and foodservice quality in elderly care facilities in Korea: a cross-sectional study

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Objectives: This study was performed to investigate the relationship between foodservice staffing and foodservice quality in elderly care facilities.

Methods: Data was obtained from the Korean Long-term Care Institute Database and used to analyze 2,084 elderly care facilities operating on-site foodservice. The presence of dietitians and staffing levels for cooking personnel were analyzed by categorizing size according to staffing criteria. Foodservice quality was assessed using food sanitation management and meal service provision as indicators. Descriptive statistical analysis, chi-square test, Fisher's exact test, and Cochran-Mantel-Haenszel test were conducted to analyze relationships between staffing level and foodservice quality.

Results: Presence of a dietitian correlated with food sanitation management and meal service provision in groups with 30 or more recipients ($P = 0.027$, $P = 0.049$). Elderly care facilities with dietitians had better foodservice quality. After adjusting for size, the presence of dietitians was also found to correlate with food sanitation management ($P = 0.024$). Staffing levels for cooking personnel were found to correlate with meal service provision only in groups with 38 to 62 recipients. Institutions with larger staffs provided better meal service quality compared to those with basic staffing.

Conclusion: Inclusion of a dietitian and cooking staff size each contribute to enhanced foodservice quality in elderly care facilities, with dietitian inclusion showing a particularly significant association with food sanitation management. These findings suggest the need to revise current staffing and related regulatory standards to optimize deployment of foodservice personnel in elderly care settings. Future studies should focus on developing effective policies for securing qualified foodservice staff and establishing robust quality management systems to enhance overall foodservice quality in long-term care facilities.

Keywords: long-term care; dietitian and cook; staffing; foodservice quality

INTRODUCTION

우리나라는 최근 노인인구의 비중이 급격히 증가하며 노인장기요양 서비스의 중요성이 점점 커지고 있다. 75세 이상 후기 노인인구가 2024년 기준 약 411만 명(7.9%)이고 2030년 542만 명(10.6%), 2040년 898만 명(17.9%)으로 빠른 속도로 증가할 것으로 예측되고 있다[1]. 후기 노인인구의 증가는 돌봄의 증가로 이어질 수 있다.

정부는 노인 돌봄문제 해결을 위해 2008년부터 노인장기요양보험제도를 시행해오고 있다. 노인장기요양보험제도는 고령 또는 노인성 질병의 사유로 일상생활을 혼자서 수행하기 어려운 노인 등에게 신체활동 및 가사활동 등을 지원하여, 노후의 건강증진 및 삶의 질을 향상시키는 것을 목적으로 하고 있다[2]. 급속한 인구 고령화를 겪고 있는 우리나라에서 장기요양보험 수급자에게 돌봄서비스를 제공하는 장기요양기관은 노인의 삶의 질 유지와 개선의 역할을 한다는데 있어 중요성이 크다[3].

노인 돌봄에 있어 중요한 역할을 하는 장기요양기관은 「노인복지법」에 따라 시·군·구에 설치 신고 해야하며, 운영 시에는 각 급여유형별로 국가차원의 인력배치기준을 준수해야 한다[4].

장기요양기관의 인력배치기준은 서비스 이용자에게 필요한 적정 서비스를 제공하기 위한 최소한의 법정 기준이라고 할 수 있다. 「노인복지법 시행규칙」 별표 4, 별표 9에 따라 장기요양기관 인력배치기준에 포함된 직종은 시설장, 사무국장, 사회복지사, 의사 또는 계약의사, 간호사 또는 간호조무사, 물리치료사 또는 작업치료사, 요양보호사, 영양사, 조리원 등이 있다. 이 가운데 장기요양급여 이용자의 건강 및 기능상태 유지를 위한 필수서비스의 하나인 식사와 관련된 직종은 영양사와 조리원이다. 영양사는 입소자 30인 이상의 노인요양시설에만 인력배치기준이 있는 반면에 조리원은 식사를 제공하는 모든 장기요양기관에 해당된다고 할 수 있다. 노인요양시설은 입소자 규모에 따라 30인 이상의 경우, 영양사는 1회 급식인원 50인 이상이면 1명을 의무배치 해야 하고, 조리원은 입소자 25인당 1명을 의무배치 해야한다. 현원 규모 10인 이상–30인 미만 노인요양시설의 경우, 영양사 배치에 대한 기준은 없고 조리원은 1명을 의무배치하도록 되어 있다[5]. 법정 인력배치기준을 준수하지 못한 장기요양기관에 대해서는 급여비용을 감산하는 감산제도, 법정 인력배치기준을 초과하여 조리원을 배치하는 경우에는 장기요양급여비용 가산제도가 있다[6]. 한편, 영양사 및 조리원이 소속되어 있는 업체에 급식을 위탁하는 경우 영양사 및 조리원을 두지 않을 수 있다는 예외조항도 있다(Table 1) [5].

노인요양시설에서 적정 돌봄 인력의 수는 감염, 낙상, 병원 입원율, 삶의 질 등 입소자의 건강결과와 종사자의 소진, 건강상태, 그리고 이직률과도 유의한 관련성이 있다고 보고되고 있다[7–9]. 하지만 이러한 연구결과는 주로 간호인력을 대상으로 하여 이루어진 것이다. 국외의 노인요양시설과 관련한 연구에서 요양보호사, 간호사, 건가강관리 인력 등의 낮은 종사자 배치수준이 입소자의 영양불량과 상관성이 있고[10], 급식 관련 종사자 배치수준이 영양관련 서비스 품질에 영향을 끼친다는 연구가 보고된 바 있다[11]. 국내에서도 영양사 배치여부는 노인요양시설의 영양불량상태와 영양관리 실태에 유의한 차이가 존재한다는 결과가 있다[12, 13]. 하지만 영양사 인력 배치여부가 급식서비스의 품질과 어떠한 관련성이 있는지에 대한 연구는 드물다.

또한 조리인력의 배치여부 및 배치수준이 급식서비스의 품질에 어떠한 영향을 끼치는가에 대해 살펴본 연구는 많지 않으며, 수행된 연구는 학교급식을 대상으로 한 연구가 주를 이루고 있다. 학교급식에 대한 연구들에서 급식의 질적 향상을 위해 급식시설, 식재료 선택의 중요도뿐만 아니라 조리인력의 역할도 매우 중요하다고 강조하였다[14–16]. 경로식당 급식서비스 실태 분석에서는 급식의 체계적이고 효율적인 관리를 위해 급식 관련 전문인력의 필요성을 언급하였다[17]. 급식서비스 품질에 있어 조리인력 배치현황은 중요한 관계로 여겨지나 노인요양시설 조리인력 배치수준과 급식서비스 품질과의 관련성을 국내에서 살펴본 바 없다.

노인요양시설에서 운영되는 급식은 입소자의 영양상태 그리고 건강 및 기능상태에 주요한 영향을 끼치는 것으로 알려져 있다[18–20]. 노인요양시설의 급식관리를 담당하는 영양사, 조리업무를 담당하는 조리원의 배치여부 및 배치수준이 급식서비스의 질에 어떠한 영향을 끼치는지를 살펴보는 것은 급식관리 정

Table 1. Standards for staffing related to foodservice at elderly care facilities

Elderly care facility	Dietitian	Cook	Exceptions
30 or more recipients	1 staff (limited to cases where the number of people served per meal is 50 or more)	1 staff per 25 recipients	In case where foodservice are outsourced to a company that employs dietitians and cooks, the institution may not be required to have dietitians and cooks on staff
Under 30 recipients	-	1 staff	

Data from Korean Law Information Center (https://www.law.go.kr/%EB%B2%95%EB%A0%B9/%EB%85%B8%EC%9D%B8%EB%B3%B5%EC%A7%80%EB%B2%95%EC%8B%9C%ED%96%89%EA%B7%9C%EC%B9%99) [5].

책개발의 핵심적인 기초자료가 될 수 있다.

본 연구의 목적은 급식 관련 종사자인 영양사 배치여부와 조리원 배치수준이 노인요양시설의 급식서비스 질과 어떠한 관련성이 있는지 탐색하여 노인장기요양보험 급식관리 정책개발의 기초자료를 제공하는 것이다.

METHODS

Ethics statement

The informed written consent was obtained from each participant. The study protocol was approved by the Institutional Review Board of Health Insurance Research Institute (approval number:연-2023-HR-03-001).

1. 연구설계

본 연구는 2022년 노인요양시설 급식서비스 및 인력현황 자료를 분석한 단면연구로 Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) 보고 지침을 참고하여 기술하였다(https://www.strobe-statement.org/).

2. 연구대상

다음의 3가지 조건을 만족하는 노인요양시설을 연구대상으로 하였다. 첫째, 2022년 12월 기준으로 휴·폐업이 아닌 운영상태 중인 노인요양시설이면서 장기요양급여비용에 대한 청구 및 지급이 완료된 기관(2023년 8월까지 비용이 지급 완료된 기관)을 대상으로 하였다. 둘째, 급식을 직영 방식으로 운영하는 기관으로 조리원이 배치된 기관을 대상으로 하였다. 직영급식기관은 급식위탁현황 database (DB)를 기준으로 급식위탁 계약을 체결하지 않은 기관으로 정의하였다. 셋째, 노인요양시설의 급식서비스 관련 질을 확인하기 위한 목적으로 2021년 장기요양기관 시설급여 정기평가를 통해 평가등급을 받은 기관을 대상으로 하였다. 장기요양기관의 정기평가는 「장기요양기관 평가방법 등에 관한 고시」 2015.1.30. 개정에 따라 2015년부터 3년을 주기로 시행된다. 본 분석에서는 노인요양시설을 대상으로 한 최근의 정기평가자료(대상연도: 2021년, 평가수행연도: 2022년)를 활용하였다.

3가지 조건을 모두 만족하여 연구대상으로 선정된 노인요양시설은 총 2,084개소였다.

3. 분석자료

분석을 위해 국민건강보험공단의 장기요양 DB를 활용하였다. 2022년 12월 기준의 장기요양기관 현황자료, 급식위탁 현황자료, 종사자 현황자료와 2021년 기준의 장기요양기관 정기평가자료를 활용하였다.

노인요양시설에서 급식 담당 인력현황과 서비스 질과의 관련성을 확인하기 위한 분석변수로 노인요양시설의 일반적인 특성(설립주체, 도시유형, 규모), 장기요양 서비스 질 평가, 인력현황(영양사 및 조리원 배치여부, 조리원 배치수준)으로 정하였다.

노인요양시설의 일반적 특성 변수로 설립주체는 '지방자치단체', '법인', '개인(기타 포함)'으로 구분하며, 도시유형은 '대도시', '중소도시', '농어촌'으로 구분하였다. 규모는 2가지 방법으로 정의하였는데, 첫 번째 방법은 현원 기준 규모를 고려한 방법으로 30인 미만, 30인 이상–50인 미만, 50인 이상–70인 미만, 70인 이상–100인 미만, 100인 이상 5개 범주로 구분하였다. 두 번째 방법은 조리원 배치 기준에 따른 의무배치 인원수를 고려한 방법으로 1인에서부터 6인 이상 배치까지 6개 범주로 구분하였다. 장기요양 급식서비스 질 지표는 정기평가 지표 중 급식관련 지표인 '식품위생관리', '식사제공' 2개 지표로 구성하고, 지표 내 등급은 우수, 양호, 보통, 미흡 4개 등급으로 구분하였다. 평가지표 식품위생관리와 식사제공의 세부 평가기준은 Table 2와 같다[21].

급식담당 인력현황은 영양사와 조리원을 대상으로 배치여부 및 배치수준을 조작적 정의하여 분석하였다. 2022년 12월 근무시간을 기준으로 배치여부 및 배치수준을 기본배치 및 추가배치로 정의하였다. 의무배치 인원수는 현원 30인 미만에서는 조리원 1인 배치, 30인 이상에서는 입소자 25인당 조리원 1인을 적용하였다. 실 근무 조리원 수는 근무시간 총량(full time equivalent, FTE)을 활용하였으며, 기관 소속 전체 조리원의 월 기준 FTE를 월 기준 근무시간(일 × 8시간)으로 나누어 산출하였다[22]. 추가배치는 시설 내 배치된 조리원 수가 의무배치 조리원 수에 비해 0.5인 이상인 경우로 정의하고, 0.5인 미만인 경우에는 기본배치로 정의하였다.

4. 통계분석

통계분석은 SAS Enterprise Guide 7.1 (SAS Institute) 프로그램을 사용하였고, 분석결과의 통계적 유의수준은 $P < 0.05$를 기준으로 하였다.

분석방법으로는 첫째, 연구대상기관의 일반적 특성을 파악하기 위해 기술통계분석을 수행하여 빈도 및 백분율을 확인하였다. 둘째, 연구대상기관의 인력배치 현황과 급식서비스 질의 관련성을 파악하기 위해 카이제곱검정(chi-square test) 및 피셔정확검정(Fisher's exact test)을 수행하였다. 셋째, 기관의 규모를 보정한 후, 급식담당 인력배치에 따른 급식서비스 질 차이를 살펴보기 위해 코크란-멘텔-헨젤 검정(Cochran-Mantel-Haenszel test)을 수행하였다.

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Table 2. Foodservice quality indicators in elderly care facilities

	Quality indicators and criteria
Food sanitation manage-ment	Manage food, restaurants, kitchens, etc. sanitarily
	① Comply with food expiration dates and disinfect cooking room and utensils at least once a week
	· Checklist : date, inspection details, inspector
	② Keep the dining room, cooking room, food storage rooms, and refrigerators clean
	③ Keep the clothing and sanitation of employees working in the cooking room clean
	· Checklist : Wearing ad sanitary hat, clothing cleanliness, etc.
Meal service provision	Provide meals according to the functional status of the recipients
	① Post a menu of at least three meals per meal prepared by a dietitian. Provide meals while keeping it warm according to the menu
	② Provide appropriate meals considering the recipient's chewing and digestive functions. Take appropriate action for recipients who show significant changes or problems with food intake
	· Checklist: Meals provided according to functional status, checking daily food intake, appropriate action
	③ Support recipient to eat in places other than their beds
	④ According to functional status of recipient, try to ensure that drinking water is available at all times
	⑤ Considering the recipient's remaining ability, provide support so that they can eat on their own
	· Utilization of eating utensils according to functional status, adjustment table height, etc.

National Insurance Health Service (2021 Long-term care institution (elderly care facility); 2021. p. 79-165) [21].

RESULTS

1. 연구대상기관의 일반적 특성과 급식담당 인력배치 현황

연구대상인 노인요양시설 2,084개소를 대상으로, 기관 특성, 급식 관련 서비스 질과 급식담당 인력배치 현황을 살펴본 결과는 Table 3과 같다.

전체 기관 중 개인 설립 기관이 52.4%, 법인 설립이 43.4%였으며, 기관이 소재한 도시의 유형은 농어촌 46.1%, 중소도시 29.2%, 대도시 24.8% 순이었다. 현원 기준의 규모로 나누어 보면 30인 미만 규모의 기관이 46.3%로 가장 많았으며, 30인 이상–50인 미만 규모가 21.8%, 50인 이상–70인 미만 규모가 14.1%으로, 기관의 80% 이상이 70인 미만의 규모이었다. 조리원 배치 기준에 따른 규모로 나누어 보면 38인 미만 규모가 54.9%로 가장 많았다. 기관평가 등급은 B등급 31.4%, A등급 23.9%, C등급 21.3%, D등급 12.1%, E등급 11.2%였다. 급식서비스 평가지표 '식품위생관리'에서 우수 등급은 92.7%로 대부분의 기관이 우수였으며, '식사제공'에서는 우수는 88.6%, 양호는 7.5%였다.

연구대상인 2,084개소 중 853개소(40.9%)에 영양사가 배치되어 있었다. 영양사가 배치된 그룹에서 법인 설립의 비율은 65.7%로 높았으며, 기관 규모측면에서 소규모 기관에서 영양사 배치 비율이 높지 않았다. 기관평가등급은 영양사가 배치된 기관에서 A, B 등급의 비율이 높았으며, 식품위생관리와 식사제공 서비스 질 지표에서도 우수 등급 비율이 높게 나타났다.

조리원 배치수준을 기본배치와 추가배치 2개 그룹으로 구분하여 살펴본 결과, 기본배치는 984개소(47.2%)였으며, 추가배치는 1,100개소(52.8%)였다. 조리원을 추가배치한 그룹에서 법인 설립의 비율이 51.7%로 높았으며, 30인 미만의 소규모 기관의 비율이 30.7%로 높았다. 식품위생관리와 식사제공 서비스 질 지표에서 우수 및 양호의 등급이 90% 이상으로 높은 비율을 보였다.

2. 규모별 급식담당 인력배치 현황과 급식서비스 질과의 관련성

장기요양기관은 기관 규모에 따라 영양사 배치 의무와 조리원의 의무배치 인원수가 달라진다. 따라서 기관의 규모를 고려하여 급식담당 인력배치 현황(영양사 배치여부, 조리원 배치수준)과 급식서비스 질과의 관련성을 살펴보았다.

1) 영양사 배치여부와 급식서비스 질

영양사 배치여부와 급식서비스 질과의 관련성을 분석한 결과는 Table 4와 같다. 식품위생관리 평가에 대한 기관 평가등급은 우수, 미흡 등급으로만 구성되어 있었다. 30인 미만 규모에서 우수의 비율은 영양사 배치 기관이 94.7%, 영양사 미배치 기관이 91.1%로 영양사 배치기관에서 우수 비율이 더 높았으나 통계적으로 유의한 관련성은 없었다(P = 0.319). 30인 이상 규모 대상에서 우수의 비율은 영양사 배치 기관이 94.8%, 영양사 미배치 기관이 91.2%로 영양사 배치여부와 식품위생관리 서비스 질과의 관련성이 통계적으로 유의하다는 것을 확인하였다(P = 0.027).

Table 3. Institutional characteristics, foodservice quality, and staffing in elderly care facilities

Characteristic	Total (n = 2,084)	Presence of dietitian			Staffing level for cook		
		Yes (n = 853)	No (n = 1,231)	*P*-value[1)]	Basic staffing (n = 984)	Additional staffing (n = 1,100)	*P*-value[1)]
Type of establishment				< 0.001			< 0.001
Local government	89 (4.3)	70 (8.2)	19 (1.5)		28 (2.8)	61 (5.5)	
Corporation	904 (43.4)	560 (65.7)	344 (27.9)		335 (34.0)	569 (51.7)	
Personal (including others)	1,091 (52.4)	223 (26.1)	868 (70.5)		621 (63.1)	470 (42.7)	
Type of city				0.008			0.001
Large city	516 (24.8)	241 (28.3)	275 (22.3)		208 (21.1)	308 (28.0)	
Small and medium city	608 (29.2)	241 (28.3)	367 (29.8)		298 (30.3)	310 (28.2)	
Rural area	960 (46.1)	371 (43.5)	589 (47.8)		478 (48.6)	482 (43.8)	
Size based on current recipients				< 0.001			< 0.001
Under 30	965 (46.3)	19 (2.2)	946 (76.8)		627 (63.7)	338 (30.7)	
30 or more–under 50	455 (21.8)	199 (23.3)	256 (20.8)		198 (20.1)	257 (23.4)	
50 or more–under 70	293 (14.1)	276 (32.4)	17 (1.4)		75 (7.6)	218 (19.8)	
70 or more–under 100	280 (13.4)	270 (31.7)	10 (0.8)		69 (7.0)	211 (19.2)	
100 or more	91 (4.4)	89 (10.4)	2 (0.2)		15 (1.5)	76 (6.9)	
Size based on the staffing criteria for cook (required number of staff)				< 0.001			< 0.001
Under 38 (1)	1,144 (54.9)	68 (8.0)	1,076 (87.4)		668 (67.9)	476 (43.3)	
38 or more–under 63 (2)	464 (22.3)	329 (38.6)	135 (11.0)		183 (18.6)	281 (25.5)	
63 or more–under 88 (3)	312 (15.0)	297 (34.8)	15 (1.2)		94 (9.6)	218 (19.8)	
88 or more–under 113 (4)	101 (4.8)	98 (11.5)	3 (0.2)		26 (2.6)	75 (6.8)	
113 or more–under 138 (5)	31 (1.5)	31 (3.6)	0 (0.0)		10 (1.0)	21 (1.9)	
138 or more (6 or more)	32 (1.5)	30 (3.5)	2 (0.2)		3 (0.3)	29 (2.6)	
Grade of facility care evaluation				< 0.001			< 0.001
A	499 (23.9)	311 (36.5)	188 (15.3)		183 (18.6)	316 (28.7)	
B	655 (31.4)	289 (33.9)	366 (29.7)		294 (29.9)	361 (32.8)	
C	444 (21.3)	142 (16.6)	302 (24.5)		222 (22.6)	222 (20.2)	
D	253 (12.1)	47 (5.5)	206 (16.7)		140 (14.2)	113 (10.3)	
E	233 (11.2)	64 (7.5)	169 (13.7)		145 (14.7)	88 (8.0)	
Food sanitation management				0.002			0.192
Excellent	1,931 (92.7)	809 (94.8)	1,122 (91.1)		904 (91.9)	1,027 (93.4)	
Good	0 (0.0)	0 (0.0)	0 (0.0)		0 (0.0)	0 (0.0)	
Fair	0 (0.0)	0 (0.0)	0 (0.0)		0 (0.0)	0 (0.0)	
Poor	153 (7.3)	44 (5.2)	109 (8.9)		80 (8.1)	73 (6.6)	
Meal service provision				< 0.001			0.145
Excellent	1,847 (88.6)	787 (92.3)	1,060 (86.1)		858 (87.2)	989 (89.9)	
Good	156 (7.5)	50 (5.9)	106 (8.6)		82 (8.3)	74 (6.7)	
Fair	0 (0.0)	0 (0.0)	0 (0.0)		0 (0.0)	0 (0.0)	
Poor	81 (3.9)	16 (1.9)	65 (5.3)		44 (4.5)	37 (3.4)	

n (%).
[1)]*P*-value obtained by chi-square test. Rows with all-zero frequencies were excluded from chi-square test.

식사제공 평가지표에서 30인 이상 규모의 우수 비율은 영양사 배치 기관이 92.4%, 영양사 미배치 기관이 89.8%로, 영양사가 배치된 기관에서 식사제공 서비스 질이 통계적으로 유의하게 높았다($P = 0.049$).

2) 조리원 배치수준과 급식서비스 질

조리원 배치수준과 급식서비스 질과의 관련성을 분석한 결과는 Table 5와 같다. 식품위생관리 평가지표를 각 규모별로 보면 38인 미만, 38인 이상–63인 미만, 88인 이상–113인 미만 기관에서 조리원을 추가배치한 기관에서 우수 비율이 높았으나, 통계

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Table 4. Correlations between dietitian staffing status, facility size, and foodservice quality

Characteristic	Total (n = 2,084)	Presence of dietitian		
		Yes (n = 853)	No (n = 1,231)	*P*-value[1]
Food sanitation management				
Under 30				0.319[2]
Sub total	965 (100.0)	19 (100.0)	946 (100.0)	
Excellent	880 (91.2)	18 (94.7)	862 (91.1)	
Good	0 (0.0)	0 (0.0)	0 (0.0)	
Fair	0 (0.0)	0 (0.0)	0 (0.0)	
Poor	85 (8.8)	1 (5.3)	84 (8.9)	
30 or more				0.027
Sub total	1,119 (100.0)	834 (100.0)	285 (100.0)	
Excellent	1,051 (93.9)	791 (94.8)	260 (91.2)	
Good	0 (0.0)	0 (0.0)	0 (0.0)	
Fair	0 (0.0)	0 (0.0)	0 (0.0)	
Poor	68 (6.1)	43 (5.2)	25 (8.8)	
Meal service provision				
Under 30				0.589[2]
Sub total	965 (100.0)	19 (100.0)	946 (100.0)	
Excellent	820 (85.0)	16 (84.2)	804 (85.0)	
Good	90 (9.3)	1 (5.3)	89 (9.4)	
Fair	0 (0.0)	0 (0.0)	0 (0.0)	
Poor	55 (5.7)	2 (10.5)	53 (5.6)	
30 or more				0.049
Sub total	1,119 (100.0)	834 (100.0)	285 (100.0)	
Excellent	1,027 (91.8)	771 (92.4)	256 (89.8)	
Good	66 (5.9)	49 (5.9)	17 (6.0)	
Fair	0 (0.0)	0 (0.0)	0 (0.0)	
Poor	26 (2.3)	14 (1.7)	12 (4.2)	

n (%).
[1]*P*-values obtained by chi-square test. Rows with all-zero frequencies were excluded from the chi-square test.
[2]*P*-value from Fisher's exact test.

적으로 유의한 차이는 아니었다.

식사제공 평가지표는 38인 이상–63인 미만 규모에서 조리원 추가배치 기관의 우수, 양호 비율은 각각 89.7%, 9.6%이고, 조리원 기본배치 기관의 우수, 양호 비율은 90.2%, 6.0%로 나타나 조리원 배치수준과 식사제공 서비스 질의 관련성이 확인되었다 (P = 0.026). 식사제공 등급 중 우수와 양호의 비율을 고려할 때 조리원 추가배치 기관이 기본배치한 기관에 비해 식사제공 서비스 질이 더 양호한 것으로 나타났다.

3. 기관의 규모 보정 후 급식담당 인력배치 현황과 급식서비스 질과의 관련성

코크란-멘텔-헨젤 검정(Cochran-Mantel-Haenszel test)을 통해 기관의 규모를 보정한 후, 급식담당 인력배치와 급식서비스 질과의 관련성을 분석하였다.

1) 영양사 배치여부와 급식서비스 질

현원 기준 기관의 규모를 보정한 후, 영양사 배치여부와 급식서비스 질과의 관련성을 분석한 결과는 Table 6과 같다. 식품위생관리 평가항목에서 영양사 배치에 따라 평가 등급에 차이가 있으며, 영양사가 배치된 기관은 식품위생관리 평가에서 더 높은 등급을 받았다는 것을 확인하였다(P = 0.024). 다만 식사제공 평가지표는 영양사 배치여부와 관련성이 유의하지 않았다.

2) 조리원 배치수준과 급식서비스 질

조리원 의무배치 인원수를 구분하는 기관의 규모를 보정한 후, 조리원 배치수준과 급식서비스 질과의 관련성을 분석한 결과는

Table 5. Correlation between staffing levels for cooking personnel, facility size, and foodservice quality

Characteristic	Total (n = 2,084)	Staffing levels for cook		*P*-value[1]
		Basic staffing (n = 853)	Additional staffing (n = 1,231)	
Food sanitation management (required number of staff)				
Under 38 (1)				0.897
Sub total	1,144 (100.0)	668 (100.0)	476 (100.0)	
Excellent	1,044 (91.3)	609 (91.2)	435 (91.4)	
Good	0 (0.0)	0 (0.0)	0 (0.0)	
Fair	0 (0.0)	0 (0.0)	0 (0.0)	
Poor	100 (8.7)	59 (8.8)	41 (8.6)	
38 or more–under 63 (2)				0.190
Sub total	464 (100.0)	183 (100.0)	281 (100.0)	
Excellent	430 (92.7)	166 (90.7)	264 (94.0)	
Good	0 (0.0)	0 (0.0)	0 (0.0)	
Fair	0 (0.0)	0 (0.0)	0 (0.0)	
Poor	34 (7.3)	17 (9.3)	17 (6.0)	
63 or more–under 88 (3)				0.183[2]
Sub total	312 (100.0)	94 (100.0)	218 (100.0)	
Excellent	301 (96.5)	93 (98.9)	208 (95.4)	
Good	0 (0.0)	0 (0.0)	0 (0.0)	
Fair	0 (0.0)	0 (0.0)	0 (0.0)	
Poor	11 (3.5)	1 (1.1)	10 (4.6)	
88 or more–under 113 (4)				0.106[2]
Sub total	101 (100.0)	26 (100.0)	75 (100.0)	
Excellent	96 (95.0)	23 (88.5)	73 (97.3)	
Good	0 (0.0)	0 (0.0)	0 (0.0)	
Fair	0 (0.0)	0 (0.0)	0 (0.0)	
Poor	5 (5.0)	3 (11.5)	2 (2.7)	
113 or more–under 138 (5)				
Sub total	31 (100.0)	10 (100.0)	21 (100.0)	
Excellent	31 (100.0)	10 (100.0)	21 (100.0)	
Good	0 (0.0)	0 (0.0)	0 (0.0)	
Fair	0 (0.0)	0 (0.0)	0 (0.0)	
Poor	0 (0.0)	0 (0.0)	0 (0.0)	
138 or more (6 or more)				> 0.999[2]
Sub total	32 (100.0)	3 (100.0)	29 (100.0)	
Excellent	29 (90.6)	3 (100.0)	26 (89.7)	
Good	0 (0.0)	0 (0.0)	0 (0.0)	
Fair	0 (0.0)	0 (0.0)	0 (0.0)	
Poor	3 (9.4)	0 (0)	3 (10.3)	
Meal service provision (required number of staff)				
Under 38 (1)				0.078
Sub total	1,144 (100.0)	668 (100.0)	476 (100.0)	
Excellent	981 (85.8)	568 (85.0)	413 (86.8)	
Good	97 (8.5)	66 (9.9)	31 (6.5)	
Fair	0 (0.0)	0 (0.0)	0 (0.0)	
Poor	66 (5.8)	34 (5.1)	32 (6.7)	

(Continued to the next page)

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Table 5. Continued

Characteristic	Total (n = 2,084)	Staffing levels for cook		
		Basic staffing (n = 853)	Additional staffing (n = 1,231)	*P*-value[1)]
38 or more–under 63 (2)				0.026
Sub total	464 (100.0)	183 (100.0)	281 (100.0)	
Excellent	417 (89.9)	165 (90.2)	252 (89.7)	
Good	38 (8.2)	11 (6.0)	27 (9.6)	
Fair	0 (0.0)	0 (0.0)	0 (0.0)	
Poor	9 (1.9)	7 (3.8)	2 (0.7)	
63 or more–under 88 (3)				0.442
Sub total	312 (100.0)	94 (100.0)	218 (100.0)	
Excellent	292 (93.6)	86 (91.5)	206 (94.5)	
Good	14 (4.5)	5 (5.3)	9 (4.1)	
Fair	0 (0.0)	0 (0.0)	0 (0.0)	
Poor	6 (1.9)	3 (3.2)	3 (1.4)	
88 or more–under 113 (4)				0.334[2)]
Sub total	101 (100.0)	26 (100.0)	75 (100.0)	
Excellent	95 (94.1)	26 (100.0)	69 (92.0)	
Good	6 (5.9)	0 (0.0)	6 (8.0)	
Fair	0 (0.0)	0 (0.0)	0 (0.0)	
Poor	0 (0.0)	0 (0.0)	0 (0.0)	
113 or more–under 138 (5)				
Sub total	31 (100.0)	10 (100.0)	21 (100.0)	
Excellent	31 (100.0)	10 (100.0)	21 (100.0)	-
Good	0 (0.0)	0 (0.0)	0 (0.0)	
Fair	0 (0.0)	0 (0.0)	0 (0.0)	
Poor	0 (0.0)	0 (0.0)	0 (0.0)	
138 or more (6 or more)				> 0.999[2)]
Sub total	32 (100.0)	3 (100.0)	29 (100.0)	
Excellent	31 (96.9)	3 (100.0)	28 (96.6)	
Good	1 (3.1)	0 (0.0)	1 (3.4)	
Fair	0 (0.0)	0 (0.0)	0 (0.0)	
Poor	0 (0.0)	0 (0.0)	0 (0.0)	

n (%).
[1)]*P*-values obtained by chi-square test. Rows with all-zero frequencies were excluded from the chi-square test.
[2)]*P*-value from Fisher's exact test.

Table 7과 같다. 기관의 규모를 보정하기 전의 경우 조리원 기본 배치, 추가배치수준에 따라 식품위생관리와 식사제공 급식서비스 질이 유의한 차이를 보였으나, 기관의 규모를 보정한 후 식품위생관리와 식사제공 평가지표 모두에서 차이가 통계적으로 유의하지 않음을 확인하였다.

DISCUSSION

본 연구는 급식을 직접 운영하는 노인요양시설을 대상으로 급식담당 인력배치와 급식서비스 질과의 관련성을 분석하여, 노인장기요양보험 급식관리 정책개발의 기초자료를 마련하기 위한 목적으로 수행되었다. 주요결과를 중심으로 급식서비스 질 개선과 관련된 시사점을 정리하면 다음과 같다.

첫째, 급식관리 전문인력인 영양사에 의한 관리체계를 마련하여야 한다는 것이다. 영양사 배치여부와 급식서비스 질과의 관련성을 확인하기 위한 방법으로 2가지 방법을 적용하였다. 영양사 배치 의무가 있는 규모와 배치 의무가 없는 규모로 분석대상기관을 구분하여 규모별로 관련성을 분석하는 방법과 규모를 보정한 후 관련성을 분석하는 방법이었다. 첫 번째 방법으로 입소자 현원을 30인 미만과 30인 이상으로 구분하여 영양사 배치여부에 따른 식품위생관리와 식사제공 서비스 질과의 차이를 본 결과, 30인 이상 규모에서 영양사가 배치된 기관의 식품위생

Table 6. Correlation between dietitian staffing and foodservice quality, adjusted for size based on current recipients

Characteristic	Total (n = 2,084)		Size based on current recipients				*P*-value[1)]
			Under 30 (n = 965)		30 or more (n = 1,119)		
	Frequency	Ratio of dietitian presence (%)	Frequency	Ratio of dietitian presence (%)	Frequency	Ratio of dietitian presence (%)	
Food sanitation management							0.024
Excellent	1,931	41.8	880	2.0	1,051	75.3	
Good	0	0.0	0	0.0	0	0.0	
Fair	0	0.0	0	0.0	0	0.0	
Poor	153	28.8	85	1.2	68	63.2	
Meal service provision							0.565
Excellent	1,847	42.6	820	2.0	1,027	75.1	
Good	156	0.0	90	1.1	66	74.2	
Fair	0	0.0	0	0.0	0	0.0	
Poor	81	19.8	55	3.6	26	53.8	

[1)]*P*-value from Cochran-Mantel-Haenszel test.

관리, 식사제공 서비스 질 등급이 유의하게 높음을 확인하였다. 두 번째 방법으로 규모를 보정하여 영양사 배치여부와 서비스 질과의 관련성을 본 결과, 30인 이상 규모에서 영양사가 배치된 기관의 식품위생관리 평가등급이 더 높았다.

노인요양시설에서 급식 및 영양 관리는 노인의 건강 상태와 밀접한 관련이 있으며, 질병을 예방하는데 중요한 역할을 하기에 [13], 급식서비스의 질 담보가 중요하다고 할 수 있다. 노인의 건강에 직접적인 영향을 미치는 급식에 있어, 영양사 역할의 중요성은 다수의 연구에서 확인이 가능하며, 특히 급식 위생관리, 식사의 양과 질 향상에 있어 관련이 있다고 알려져 있다[12, 23-25].

재가노인기관을 대상으로 영양사 유무에 따른 급식서비스 위생관리 수행도를 비교한 결과를 보면, 영양사가 있는 기관에서 위생교육 실시 비율이 더 높았다[23]. 영양사가 있는 기관에서 수시로 교육을 수행하는 비율이 50%였으나, 영양사 없는 기관에서는 31.4%의 비율을 보여 위생교육 수행 비율이 낮았으며, 거의 수행하지 못 한다는 비율에 있어 영양사가 있는 기관은 0%인 반면, 영양사가 없는 기관은 38.1%로 영양사 배치 유무에 따른 위생관리 교육 수행비율에 큰 차이를 보였다. Seo와 Park [24]의 연구에 따르면 노인거주복지시설을 대상으로 노인의 영양섭취상태의 차이를 영양사 유무로 비교한 결과, 영양사가 있는 시설에서 식사만족도뿐 아니라, 음식섭취빈도와 영양소섭취상태가 더 양호함을 확인하였다. 또한 노인요양시설에서 영양사 배치에 따른 영양관리를 비교한 결과, 영양사가 배치된 기관에서 질병상태, 저작능력, 연하능력, 체중, 알레르기, 식사력, 약물복용에 대해 모니터링 수행 비율이 높았으며, 식품 및 영양소 제공, 타학문 분야 협력과 같은 영양중재에 있어서도 수행 비율이 높게 나타났다[13].

본 연구 결과에서도 30인 이상의 노인요양시설의 경우 영양사가 배치된 기관에서 그렇지 않은 기관에 비해 급식위생관리, 식사제공 서비스 질 등급이 높음을 알 수 있었다. 이처럼 급식서비스에 있어 영양사 배치여부는 영양전문가로서 체계적인 영양관리, 양질의 식사 제공, 위생관리에 영향을 미치며, 노인의 건강 상태와 밀접한 관련이 있다고 할 수 있다. 따라서 장기요양급여를 이용하는 입소자 모두가 양질의 급식서비스를 제공받을 수 있도록 영양사 배치기준 강화가 필요하다. 현재의 인력배치 기준에서는 30인 이상의 노인요양시설만을 대상으로 1회 급식인원이 50인 이상인 경우에 한정하여 영양사 1인을 의무배치하도록 하고 있어, 30인 미만의 소규모 기관에서는 영양사 배치가 의무가 아니다. 본 연구 결과를 보면, 입소자 30인 미만 기관 전체 965개소 중 영양사가 배치된 기관은 19개소로 2.0%에 불과하다. 기관의 규모와 상관없이 모든 입소자가 양질의 급식서비스를 제공받을 수 있도록 30인 미만의 소규모 기관에서도 영양사를 고용할 수 있는 기전을 마련할 필요가 있다. 영양사 배치 의무가 없는 소규모 기관에서 영양사를 배치하는 경우에 인건비의 일부를 보상하는 인력배치 가산 적용 또는 영양사 공동 채용을 고려해 볼 수 있을 것이다. 또한, 전국 지방자치단체별로 1개소씩 설치·운영을 목표로 하고 있는 '사회복지급식관리지원센터'에 등록하여, 소속 영양사로부터 급식과 관련된 영양, 위생·안전관리 컨설팅을 지원받는 방법도 있을 수 있다[26].

다만 영양사 배치여부와 식품위생관리에서의 급식서비스 질 관련성 분석결과에서 영양사 배치 기관의 우수 비율이 94.8%였고, 미배치 기관의 우수 비율이 91.2%로 해당 차이가 유의미했으나, 영양사 미배치기관에서도 우수 비율이 90%를 넘는 수준으로 노인요양시설 기관 전반적으로 식품위생관리 수행이 양호

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Table 7. Correlation between staffing levels for cooking personnel and foodservice quality, adjusted for size based on staffing criteria for cook

Characteristic	Total (n = 2,084)		Size based on staffing criteria for cook												*P*value[1]
			Under 38 (n = 1,114)		38 or more–under 63 (n = 464)		63 or more–under 88 (n = 312)		88 or more–under 113 (n = 101)		113 or more–under 138 (n = 31)		138 or more (n = 32)		
	Frequency	Ratio of additional staffing (%)	Frequency	Ratio of additional staffing (%)	Frequency	Ratio of additional staffing (%)	Frequency	Ratio of additional staffing (%)	Frequency	Ratio of additional staffing (%)	Frequency	Ratio of additional staffing (%)	Frequency	Ratio of additional staffing (%)	
Food sanitation management															0.095
Excellent	1,931	53.2	1,044	41.7	430	61.4	301	69.1	96	76.0	31	67.7	29	89.7	
Good	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
Fair	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
Poor	153	47.7	100	41.0	34	50.0	11	90.9	5	40.0	0	0.0	3	100.0	
Meal service provision															0.639
Excellent	1,847	22.4	981	42.1	417	60.4	292	70.5	95	72.6	31	67.7	31	90.3	
Good	156	19.9	97	32.0	38	71.1	14	64.3	6	100.0	0	0.0	1	100.0	
Fair	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
Poor	81	39.5	66	48.5	9	22.2	6	50.0	0	0.0	0	0.0	0	0.0	

[1]*P*-value from Cochran-Mantel-Haenszel test.

함을 확인할 수 있었다. 노인요양시설의 규모를 보정한 후, 영양사 배치여부와 입소자의 기능상태에 따른 식사제공에 대한 평가등급과는 유의한 관계가 없었다. 이는 식사제공 평가지표가 영양사 배치여부와 함께 입소자의 씹는 기능 및 소화기능 평가, 침대 외 장소에서 식사할 수 있도록 지원, 입소자 스스로 식사할 수 있도록 지원 등 서비스 제공 인력의 배치여부나 수준에 영향을 받기 때문으로 여겨진다. 더불어 30인 미만의 노인요양시설의 경우는 영양사 배치여부와 급식서비스 2개 지표와 유의한 관련성이 없는 것은 30인 미만 소규모 노인요양시설은 영양사 의무배치 기관이 아니라 영양사 배치비율 그 자체가 현저히 낮기 때문으로 여겨진다.

둘째, 노인요양시설 입소자의 기능상태에 적합한 식사를 제공하기 위해서는 조리원의 수를 추가할 필요가 있다. 식사제공과 관련된 급식서비스 질은 특정 구간이기는 하지만 조리원 배치수준과 관련이 있음을 확인하였다. 조리원 배치 기준에 따른 규모로 구분하여 보았을 때, 38인 이상–63인 미만의 규모에서 조리원을 추가배치한 기관이 기본배치한 기관에 비해 식사제공 서비스 질 등급이 더 높았다. 다만 다른 규모 및 규모를 보정한 경우에는 조리원 배치수준과 급식서비스 질과의 관련성은 확인되지 않았지만, 6개 규모 구간 중 5개 규모에서 조리원을 추가배치한 기관의 우수 및 양호 비율이 높거나 같음이 확인되었다.

현재 노인요양시설의 조리원 배치수준과 급식서비스 질과의 관련성을 분석한 연구는 전무한 상황으로, 특정 규모(38인 이상–63인 미만)구간이긴 하나 조리원 배치수준이 급식서비스 질과 관련이 있음을 확인하였다는데 의의가 있다. 조리원이 아닌 다른 직종의 종사자를 대상으로 한 연구이나, 기관 종사자 배치수준이 거주 노인의 영양상태와 영양관련 서비스 품질에 영향을 미친다는 연구결과가 있다. Hong Kong 노인요양시설에서 간호 및 요양보호 관련 종사자 배치수준이 노인요양시설 입소자의 저체중과 관련이 있다고 확인되었고[10], 미국 노인요양시설을 대상으로 한 연구에서 영양사와 급식서비스 관련 종사자, 간호조무사 배치수준이 높을수록 급식서비스 결함 평가를 받는 가능성이 낮다는 연구 결과가 있었다[11]. 현재 노인장기요양보험제도에 있어서 조리원 인력배치는 기본배치기준과 함께 추가배치에 대한 가산 방식의 제도를 운영하고 있다. 하지만, 추가배치된 조리원의 수와 관계없이 최대 1인까지만 인정하고 있어 한계점이 존재한다. 장기요양기관에서 가산을 통해 조리원 배치수준을 높일 수 있도록 장기요양기관의 규모를 고려하여 추가배치 가산인정 인원수를 조정할 것을 제안한다. 다만, 본 연구에서는 기관의 규모를 보정한 후 노인요양시설의 조리원 추가배치여부와 식품위생관리와 식사제공 두 급식서비스 질 평가지표와는 통계적으로 유의한 관련성을 확인하지는 못하였

다. 향후, 조리원뿐만 아니라 입소자의 씹는 기능, 소화기능, 연하기능 등을 평가하는 인력, 식사 돌봄서비스 제공 인력 등 노인요양시설 내 입소자의 식사섭취와 관련된 인력의 배치수준과 급식서비스의 질과의 관계를 종합적으로 검토하는 연구가 필요하다고 여겨진다.

셋째, 노인요양시설 급식서비스 질을 파악하기 위하여 영양관리 영역 등 평가지표를 보완할 필요가 있다. 본 연구에서는 급식서비스 품질 수준을 파악하기 위해, 장기요양기관 평가지표 중 급식서비스와 밀접한 관련이 있는 식품위생관리와 식사제공 2개의 평가지표를 활용하였다. 현재 장기요양기관 평가제도 안에서 급식서비스 품질을 평가하기 위한 지표는 분석에 활용한 2개의 지표뿐이다. 2개 지표의 세부기준을 살펴보면 식품, 식당, 조리실 등의 위생에 대한 내용과 입소자의 건강 및 기능 상태를 고려하여 적절히 식사를 제공하는지 여부에 대한 내용으로 구성되어 있어 영양관리에 대한 평가항목이 부족한 상황이다. 여러 연구를 통해 장기요양기관에 머무르는 노인에게 급식은 적정 영양을 공급하여 건강 및 기능 상태에 영향을 미치는 주요한 서비스 요소로 알려져 있다[18-20]. 영양사가 있는 노인거주시설에서 노인의 영양섭취상태가 양호하다는 연구[24]와 종사자 배치수준이 노인요양시설 입소자의 저체중과 관련이 있다는 연구[10]를 고려할 때, 장기요양기관의 급식서비스 품질 관리를 위해 영양관리 측면의 지표 신설을 고려해 볼 수 있다. 미국의 연방정부는 노인요양시설의 'CMS Nursing Home Compare Five-Star Quality Rating System'을 통해 서비스 질 평가를 수행하며, 급식서비스 질 평가지표는 급식위생관리, 식사제공 이외에도 메뉴 및 영양의 적정성, 영양학적 가치와 맛, 치료식 제공, 식사 횟수, 보조장치 제공 등 입소자의 영양관리를 위한 세부적인 기준을 포함하고 있다[27]. 또한 미국 노인거주시설에서의 식사와 영양서비스 품질 지표에 대한 전문가 중요도 평가의 결과로, 식당 환경과 식품서비스 운영에 대해 전문가의 57%, 67%가 동의한 반면, 일반 영양과 치료 영양서비스에 대해 전문가의 65%, 70%가 중요하다고 동의하여, 노인거주시설에서 영양관리가 중요하다는 점을 확인할 수 있다[28]. 일본의 경우는 영양관리에 대한 평가지표는 없으나, 영양관리에 대한 수가제도를 운영 중이다[29]. 개호보험시설에서 구강 및 영양관리를 위해 경구 섭식에 대한 지원, 경관영양 입소자를 다시 경구로 섭취할 수 있도록 지원, 입소자의 질환에 맞춰 적절한 식사가 제공될 수 있도록 하는 지원을 가산제도를 통해 유도하고 있다. 또한 이용자의 영양상태 개선 및 유지를 위해 영양관리를 하지 않는 경우에는 감산을 적용하기도 한다. 독일은 장기요양급여 평가지표에 입소자의 영양과 수분 공급을 지원할 때 의사 및 기타 전문 그룹의 협력이 포함되어야 하며, 영양실조 또는 수분 섭취 부족, 음식 과민증, 흡인 위험 징후 등 영양 상황에 대한 전문적인 평가가 수행되도록 명시하고 있다. 또한 음식과 수분 섭취에 대한 충분한 지원이 이루어지고 있는지, 보조도구들이 적절히 제공되는지를 평가사항에 포함하고 있다[30]. 우리나라는 영양관리를 위해 '식사제공' 평가지표에서 영양관리를 위한 여러 요소를 포함하고 있으나, 국외의 평가지표와 비교해보면 입소자의 영양상태 평가, 다학제적 접근, 메뉴와 영양의 적정성 평가 영역이 미흡하다고 볼 수 있다. 급식의 영양학적 관리와 식사의 질 향상을 위해 장기요양기관 평가지표에 영양관리에 대한 요소를 강화하는 것에 대한 논의도 필요하다고 여겨진다.

Limitations

본 연구는 노인요양시설의 급식담당 인력 현황과 급식서비스 질과의 관련성을 살펴본 첫 번째 연구로서, 영양사 배치여부와 급식서비스 질과의 관련성, 조리원 배치수준과 급식서비스 질과의 관련성을 살펴봄으로써 향후 급식관련 인력 관리 정책 개발의 기초자료를 생산하였다는데 의의가 있다. 그러나 본 연구는 다음과 같은 한계를 지니고 있다.

첫째, 노인요양시설의 기관 특성 및 급식담당 인력 현황 분석을 위해 2022년 12월 DB를 활용하였으나, 장기요양기관 서비스 질 평가등급은 2021년을 대상으로 한 평가결과를 활용하여 자료 간 시점 차이가 존재하는 점이다. 인력현황이 자주 변동되지는 않으나, 평가 시점 이후의 인력현황이 반영되었다는 점에서 한계점이 존재한다. 장기요양기관 평가는 「장기요양기관 평가방법 등에 관한 고시」에 따라 2015년부터 3년을 주기로 실시된다. 즉, 2021년의 평가결과는 이후 평가 시기인 2024년 평가결과가 나오기 전까지는 유지되는 것이므로, 연구결과 해석에는 문제가 없다고 할 수 있다. 추후 연구로 장기요양기관 평가 수행 연도와 급식담당 인력 현황의 자료 시점을 맞춰 추가 분석을 추진해볼 수 있을 것이다.

둘째, 영양사의 배치여부를 상근과 비상근, 병설기관 겸직 여부를 고려하지 못했다는 점이다. 조리원의 경우, 근무시간 FTE를 고려하여 인력배치기준에 해당하는 인원을 구체적으로 산출하였으나, 영양사의 경우 기관 내에 배치되어 있는지 여부만을 적용하여 분석하였다는 한계점이 있다. 향후 영양사의 고용 형태 특성을 반영한 연구를 수행할 필요가 있다고 여겨진다.

셋째, 연구대상으로 노인요양시설 중 기관에서 직접 조리하여 급식을 제공하는 직영급식기관만을 대상으로 하였다는 점이다. 영양사 및 조리원이 소속되어 있는 업체에 급식을 위탁하는 위탁급식기관을 포함하지 않았다. 본 연구에서는 직영급식기관과 위탁급식기관 간의 급식서비스 품질이 차이가 있는지에 대한 분석이 이루어지지 않아, 향후 급식유형에 따라 급식서비스 질과 급식담당 인력과의 관련성에 차이가 있는지에 대한 추가

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연구가 필요하다고 여겨진다.

넷째, 식사제공 평가지표의 평가기준이 조리원 업무 역할과 연관성이 적다는 점이다. 식사제공 평가기준(Table 2) [21]은 영양사가 작성한 식단표 게시/식단표에 따른 보온상태의 음식 제공/입소자의 저작 및 소화 기능 상태를 고려한 식사 제공 및 조치/적절한 장소에서의 식사 지원/식수 제공/스스로의 식사가 가능토록 식사 도구 등을 지원하고 있는지 여부를 평가하도록 구성되어 있어 조리원의 업무 역할보다 영양사, 간호인력, 요양보호사의 역할과의 연관성이 크다고 볼 수 있다. 조리원의 배치수준에 따라 급식서비스 품질 차이가 있는지를 평가하고자 하였으나, 평가지표 자체가 조리원 업무와의 연관성이 적다는 한계점이 있다. 향후 조리원 배치수준에 따른 급식서비스 품질 차이를 확인할 수 있는 지표를 선정하여 추가 분석을 수행할 필요가 있다.

Conclusion

본 연구는 영양사 배치여부와 조리원 배치수준이 특정 규모의 기관에서 급식서비스의 일부 영역과 유의한 관련성이 있음을 관찰한 결과로서 장기요양기관에서 양질의 급식서비스 제공을 담보하기 위해 급식담당 인력 배치에 대한 제도 개선이 필요함을 확인할 수 있었다. 장기요양기관에서의 급식은 입소자의 건강 및 영양상태에 영향을 미치는 주요한 요인이다. 하지만, 장기요양기관의 급식서비스 수준을 평가하거나 급식서비스 질의 영향요인에 대한 연구는 드물다. 앞으로 급식서비스 질 제고 정책개발을 위하여 식품위생관리, 식사제공뿐만 아니라 영양관리 등을 포함하여 전반적인 급식서비스 질을 평가하고, 이에 영향을 미치는 요소가 무엇인지에 대해 체계적으로 검토하고 제도를 개선해나가는 연구가 지속되어야 할 것이다.

CONFLICT OF INTEREST

There are no financial or other issues that might lead to conflict of interest.

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DATA AVAILABILITY

The institutional evaluation information of elderly care facilities in this study is not provide written consent for their data to be shared publicly; therefore, due to the sensitive nature of the research, supporting data are not available.

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Research Article

신문기사 속 유치원·학교급식 키워드 및 소비자의 인식도, 건강성, 기호도 조사

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Survey on consumer perceptions, health benefits and preferences of kindergarten and school foodservices in Korea, including related keywords reported in newspaper: a mixed-methods study

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Objectives: With the rapid development of social culture, the perception of kindergarten and school foodservice, as well as opinions on its health benefits, has changed significantly. However, research on this topic remains scarce. We conducted a survey in South Korea on consumers' perceptions, healthiness, and preferences regarding kindergarten and school foodservice.

Methods: With the nationwide cooperation of 17 city and provincial education offices, online and offline surveys were conducted targeting the parents of kindergarten and lower-grade elementary school children, as well as upper-grade elementary, middle, and high school students. In addition, keywords in newspaper reports were analyzed using the Big Kinds platform. A total of 532 valid questionnaires were collected, and statistical analysis was performed using IBM SPSS Statistics version 27.0 (IBM Co.).

Results: The average age of the parents and students was 40 and 12.5 years, respectively, with 36.4% of the students attending schools in the Seoul and Gyeonggi areas. The main keywords reported in newspaper articles, as analyzed using the Big Kinds platform, were "eco-friendly agricultural products," "food ingredients," "safety," and "marine products." The perception of kindergarten and school foodservice was very positive, especially regarding the attributes of safe ingredient use (4.44), menu variety (4.29), cafeteria cleanliness (4.31), cleanliness of plates, spoons, and utensils (4.24), thorough hygiene management (4.2), nutritional excellence (4.24), and support for proper eating habits (4.18). The healthiness of school foodservice was highly rated, although there is still room for improvement in terms of "not serving fried foods more than twice a week". In terms of preference for school meals, the most preferred items were meat side dishes, followed by chicken, noodles, fried food, beverages, and bread. In contrast, soybean paste soup, vegetables, and mixed-grain rice received relatively low preference.

Conclusion: The results described above may be used to develop educational programs or policies that inform students and parents about the goals of school foodservice and help address common misunderstandings.

Keywords: kindergarten/school foodservice; perception; health benefits; preference

INTRODUCTION

학교급식은 1981년에 학교급식법이 제정된 이후 양적으로 뿐 아니라 질적으로 크게 성장해 왔다. 1998년에 초등학교가, 2003년에는 중·고등학교가 100% 급식을 실시하게 되었고[1], 현재 국내 학교급식 참여율은 99.8%로 전 세계에 유래 없는 높은 급식 참여율을 보이고 있다. 한편, 2020년 학교급식법 개정에 따라 원아 수 50명 이상의 유치원급식도 학교급식법의 적용을 받게 되어[2], 어린이의 건강 유지와 신체발달에 기여하고 올바른 식습관 및 식사예절 확립을 도모하고 있다[3]. 2022년 기준으로 학교급식 재정 규모는 약 7조 831억 원이며[4], 식품비 3조 6,382억 원(51.4%), 인건비 2조 5,684억 원(36.2%)으로 인력 고용창출 효과와 농가·식품분야·급식설비업계의 경제 성장에 기여하며, 사회·환경·경제 차원의 지속가능성(sustainability) 실현에 크게 이바지하고 있다.

학교급식은 성장기 학생들에게 위생적이고 영양적인 식사를 제공함으로써 학생들의 성장발달과 건강 증진을 돕고, 학생의 올바른 식습관 형성과 전통 식문화의 계승·발전을 목적으로 제공되는 교육급식이다[1]. 또한 학교급식은 학생들에게 무상으로 급식을 제공하여 빈부격차 없이 영양적으로 균형 잡힌 한 끼의 식사를 공급하고, GAP (Good Agricultural Practices, 농산물우수관리제도)를 포함한 친환경농산물의 지속적인 공급과 소비를 통한 농촌지역의 경제 활성화를 촉진하며, 학교 텃밭을 이용한 친환경농산물 재배로 지속가능한 식생활 확산을 조장하는 공공성을 띤다[5]. 한 사례로 서울시 자치구와 농촌 지자체가 상호협약을 맺어 도농상생의 공공급식을 조성하는 한편 학교급식에 건강한 식재료 공급과 농촌지역의 경제발전에 기여하고 있다.

학교급식은 위생적이고 안전한 식사 제공을 위하여 믿을 수 있고 안전한 식재료의 구매, HACCP (Hazard Analysis and Critical Control Point, 식품안전관리인증기준)에 근거한 생산공정을 포함하여 사전예방적 차원의 위생관리체계를 구축하여 운영하고 있다. 식중독 예방을 위해 교육부는 2001년에 HACCP 방식에 근거한 '학교급식위생관리지침서'를 개발한 이래 현재 5차 개정판을 발간하여 학교급식 현장에서 활용되고 있다[6]. 학교급식관계자의 이와 같은 노력에도 불구하고, 국가 식품안전 지표로 학교급식 발생 식중독 환자수가 설정되어 있고, 식품의약품안전처에서 매년 발표하는 식중독 발생 통계에서 국내 식중독사고의 주요 원인이 학교급식이라는 오해를 야기한다. 보건복지부 산하 한국건강증진개발원에서 제시한 2020-국민건강증진종합계획에 따르면 식품안전수준의 선진화 지표는 '식중독 예방 관리를 통한 식중독 발생률 증가 예방'이며, 성과목표치를 학교급식 십만 명당 발생 환자수 40명으로 정하고 있다[7]. 식품의약품안전처에서는 2022년 식중독 발생건수 331건 중 8%, 환자수 5,501명 중 20%가 학교급식에서 발생한 것으로 보고하고 있다[8]. 이러한 단편적인 사실로 인해 소비자들은 학교급식이 학생 건강 증진에 기여한다는 효과를 인지하지 못하고 오히려 학교급식에 대한 잘못된 인식을 갖게 되기도 한다.

교육부와 17개 시·도교육청에서는 소비자 요구를 반영한 안전한 학교급식을 창출하기 위하여 영양관리기준에 적합한 식사, 영양 및 위생이 확보된 식생활 실천 교육, 매년 학교급식만족도 평가 및 위생안전관리점검을 실시하고 있다[1, 9, 10]. 첫 번째 예시로 학교급식은 영양적으로 균형잡힌 식사 제공을 위하여 학생의 성장 및 건강상태, 활동정도, 지역적 상황 등을 고려하여 영양관리 기준을 설정하고 식사 계획에 반영한다. 계절별로 연속 5일간 학생이 섭취한 식사를 모니터링하여 평균 영양섭취량을 산출하고 영양관리의 적정성을 평가한다. 둘째, 학교에 배치된 영양교사는 학생에게 식생활 교육을 실시하여 식생활 속에서 영양과 위생을 확보하고 식사예절, 한국 식문화 계승과 발전을 유도한다. 이러한 성과는 중학생을 대상으로 15차시 영양교육을 실시한 연구에서[11] 잘 나타난다. 학생들의 영양지식 및 식품선택과 식품준비 능력이 향상되었고 자아효능감이 개선되었으며, 식생활 실천수준은 교육 전 3.33점에서 교육 후 3.79점으로 향상되었고, 영양표시 확인과 무리한 체중감량을 하지 않는 행동을 보였다. 셋째, 교육부와 시도교육청은 학교급식 만족도를 높이기 위하여 매년 학교급식 운영 방침을 설정하고 학교급식 식재료 구매, 위생, 영양관리, 식생활 지도 관련 지침을 제시한다. 한 예로 영양교육과 급식, 먹거리 생태전환을 연계하여 채식에 대한 학생들의 생태친화적 인식 강화 및 그린급식 실천, 친환경급식과 교육과정을 연계한 먹거리 생태전환 교육, 음식물쓰레기 줄이기 실천 등에 관한 가이드를 제시하고 있다[12]. 선행연구에서 학교급식의 인식에 관한 연구는 학교급식 만족도를 측정하는 것으로 영양적으로 균형 잡힌 식사, 우수한 식재료의 사용, 위생적이고 안전한 조리, 급식에 관한 적극적인 의사소통, 올바른 식사, 영양 교육 제공 등을 주요 속성으로 설정하고 학생과 학부모 대상으로 학교급식 인식도를 조사하였다[4]. 학교급식 기호도 연구는 학교급식에서 제공되는 개별품목에 대하여 학교 단위별로 선호도를 조사하는 수준이었고, 잔반량을 측정하여 기호 성향을 분석하거나 음식물쓰레기 감량화 방안을 타진하는 방식이었다[13, 14]. 그러나 학교급식 개별단위의 메뉴기호도가 아니라 전체 모집단의 기호도를 파악할 수 있도록 식품 유형별로 구분하여 기호도를 분석한 연구는 부족하다. 또한 학교급식의 식사 건강성을 확보하기 위하여 영양교사가 식단작성에 준수하는 식사계획 지침[9]에 대한 소비자들의 의견을 분석한 연구는 전무한 실정이다.

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이상과 같이, 유치원·학교급식은 국내 우수 농산물 이용, 영양적으로 균형 잡힌 식사 제공, HACCP에 기반하여 안전한 식사를 제공할 뿐 아니라 건전한 식생활 문화와 미래를 이끌어 갈 학생들의 건강증진에 크게 기여하고 있다[5]. 그러나 최근에 유치원급식이 학교급식법에 적용을 받는 시점 이후에 유치원·학교급식 학부모와 학생을 대상으로 인식도, 건강성, 기호도를 전국 단위로 조사한 연구가 진행된 바 없으며, 더욱이 신문기사와 뉴스에서 전달하는 학교급식 정보는 학부모와 학생들이 갖는 학교급식 인식도에 영향을 미치지만 유통되는 주요 정보를 분석한 연구는 없다. 따라서 본 연구에서는 학교급식 관련 신문기사의 키워드를 분석하고, 유치원·초등학교 저학년 학생은 학부모를 대상으로, 초등학교 고학년과 중·고등학교는 학생을 대상으로 학교급식 관련 인식도, 건강성, 기호도를 조사하고 비교·분석하고자 한다. 이를 통해 소비자들이 학교급식에 대해 잘못 알고 있는 부분을 확인하고 학교급식에 대한 올바른 인식을 확산시킬 수 있는 방안을 제시하고자 한다.

METHODS

Ethics statement

The informed written consent was obtained from each participant or their quardians. The study protocol was approved by the institutional review board (IRB) of the Dankook University Review Committee (approval number: 2022-10-063-001).

1. 연구설계

본 연구는 전국 단위의 횡단적 설문조사 연구로서, 유치원 및 학교급식 소비자의 인식, 건강성, 기호도를 조사하고 신문기사 키워드 분석을 병행한 혼합연구이다. 연구는 STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) 보고지침(https://www.strobe-statement.org/)을 준수하여 기술하였다.

2. 빅카인즈 활용한 유치원·학교급식 키워드 분석

언론에 비친 학교급식에 관한 정보는 학교급식 소비자인 학부모와 학생들의 인식에 영향을 미치므로 신문기사에서 학교급식의 주요 키워드를 분석하였다. 한국언론진흥재단 뉴스분석시스템인 빅카인즈(Big Kinds, www.bigkinds.or.kr)에서 제공하는 자료를 활용하여 2019년 11월 24일부터 2022년 11월 23일까지 최근 3년간의 신문기사를 분석하였다. 전국 대상 뉴스 기사에 '학교급식'을 검색한 결과, 총 236건의 기사가 검색되었으며, 이 중에서 현 시점의 학교급식 운영 및 인식에 대하여 직접적으로 관련이 없는 '코로나19'과 관련된 기사들을 제외하고 총 106건의 기사를 검색하였다. 이 중에서 지자체·기업 홍보 자료 및 비연관 기사를 제외하고 최종적으로 76건을 분석(분석률 32.2%)하였다.

3. 유치원·학교급식 인식도 설문조사

1) 조사 대상 및 기간

설문조사는 2022년 12월 1일부터 12월 28일까지 온라인 설문조사와 오프라인 조사가 동시에 진행되었다. 전국 17개 교육청의 협조를 받아 온라인 설문조사를 진행하였고, 일부 설문조사는 연구참여자의 소개를 통해 샘플을 늘려가는 눈덩이표집(snowball sampling) 방식을 활용하여 유치원 유아의 학부모, 초등학교 4–6학년, 중·고등학생을 대상으로 전국적으로 진행하였다. 설문지는 단국대학교 IRB 위원회로부터 승인을 받아 진행하였다. 회수된 설문지 538부 중 응답이 불성실하여 유효하지 않은 설문지 6부를 제외하고 총 532부를 분석에 이용하였다.

2) 조사내용

설문지는 일반사항, 학교급식 인식도 15항목, 학교급식 건강성 7항목, 학교급식의 기호도 12항목, 학교급식 관련 알고 싶은 주제 16항목으로 구성하였다. 일반사항은 나이, 아버지 학력, 어머니 학력, 월평균가구 수입, 거주지역으로 구성하였다. 설문항목에 '응답을 원치 않는 경우 응답하지 않아도 됨' 문구를 넣어 응답자가 편안하게 응답할 수 있도록 하였다.

(1) 유치원·학교급식 인식도

인식도는 학생, 학부모, 교직원 등이 학교급식의 목적, 운영방식, 영양적 가치, 위생 및 안전성, 교육적 기능 등에 대해 인지하고 있는 수준과 태도를 의미한다. 유치원·학교급식 인식도는 15개 항목(영양적 우수, 안전한 식재료 사용, 올바른 식습관 형성에 도움, 철저한 위생관리, 친환경농산물 사용, 전통 식문화를 학습, 사회·경제·환경에 도움, 학생/학부모의 의견이 반영, 식판/숟가락/젓가락 등 식기의 청결, 급식실의 식탁/의자 등 청결, 메뉴의 다양성, 음식물쓰레기 저감화를 위한 프로그램 진행, 맛있는 음식, 식사하는 장소[식당 또는 학급]의 청결, 무항생제 축산물 사용)으로 구성하였다[1, 4, 10, 15–19]. 인식도는 5점 척도(1: 전혀 그렇지 않다, 2: 그렇지 않다, 3: 보통이다, 4: 그렇다, 5: 매우 그렇다)로 평가하게 하였고, 모를 경우 '모름'에 응답하게 하였다.

(2) 유치원·학교급식 건강성

학교급식의 건강성이란 학교에서 제공되는 식사가 학생의 영양 요구를 충족하고, 성장과 발달 지원, 그리고 식습관 개선에 기여할 수 있는지를 의미한다[1, 7, 10]. 건강성은 7항목(고트랜스 지방식품/고열량·저영양식품 거의 제공하지 않음, 패스트푸드/가공식품을 거의 사용하지 않음, 곡류/육류/채소류/과일류 등 다양한 식재료 사용, 다양한 조리법 사용, 지나치게 짜거나 달지 않게 제공, 자연식품과 계절식품을 사용, 기름에 튀긴 음식을 주2회 이하로 제공)으로 구성하였으며, 인식도 평가체계와 동일한 5점 척도로 평가하게 하였다.

(3) 유치원·학교급식의 기호도

학교급식 기호도란 급식에 대해 느끼는 맛, 외형, 냄새, 온도, 질감, 익숙함 등의 전반적인 만족도와 선호도를 의미한다. 기호도는 12개 항목(육류찬, 과일류, 음료수류, 치킨류, 된장국, 생선류, 채소류, 면류, 빵류, 잡곡류, 튀김류, 김치류)으로 구성하였으며[20, 21], 평가방법은 5점 척도(1: 전혀 선호하지 않음, 2: 선호하지 않음, 3: 보통, 4: 선호, 5: 매우 선호)를 이용하였다.

설문 문항의 신뢰도를 검증하기 위하여 Cronbach's α 값을 산출하였다. 인식도 15문항의 신뢰도는 Cronbach's α = 0.891, 건강성 7문항은 0.869, 기호도 12문항은 0.756으로 나타나, 전반적으로 양호하거나 수용 가능한 수준의 내적 일관성을 확보하였다.

4. 통계 분석

회수된 설문지 중 유효한 설문지 총 532부를 이용하여 IBM SPSS Statistics version 27.0 (IBM Co.)을 활용하여 통계분석 하였다. 변수별 빈도, 백분율, 평균, 표준편차를 산출하였고, 유치원·초등학교 저학년, 초등학교 고학년, 중·고등학교로 구분하여 통계적인 차이를 검증하기 위하여 일원분산분석(one-way analysis of variance)을 실시한 후 유의성이 나타났을 때 Scheffé 사후검정을 하였다. 모든 통계분석의 유의수준은 $P < 0.05$로 검증하였다.

RESULTS

1. 빅카인즈 이용한 학교급식 뉴스 키워드

학교급식 뉴스기사 컨텐츠를 분석한 결과, 소비자 인식과 직접적으로 관련된 기사 내용은 거의 없었으며, 학교급식에 대하여 긍정적 혹은 부정적 인식에 대한 기사도 찾기 어려웠다. 관련 기사를 주제별로 묶어본 결과, 위생안전, 지역농산물, 친환경 식재료, 교육 및 연수, 조리종사자의 업무 과중, 채식식단 제공, 학교급식법, IT, 영양교육, 식단개발, 급식 홍보, 급식 예산 관리 등으로 구분할 수 있었다. 워드클라우드 분석 결과는 Fig. 1과 같다. 워드클라우드는 기사에서 제공하는 키워드의 빈도수를 반영하여 시각적으로 표현한 것으로 빈도수가 높을수록 키워드 크기가 크게 표시된다. 주요 핵심 키워드는 친환경농산물, 전남도, 식재료, 코로나19, 경기교육청, 안전성, 수산물 등이 주요 이슈로 나타났다.

2. 연구 참여자 일반사항

설문조사 참여자는 유치원, 초등학교 3학년생 이하를 둔 학부모 101명, 초등학교 4학년 이상의 학생 152명, 중·고등학생 279명이며, 그 결과는 Table 1과 같다. 학부모의 평균 연령은 40세, 학생들의 평균 나이는 12.5세였다. 부모의 최종 학력을 조사한 결과, 아버지는 96.2%가 대학교 졸업 이상, 어머니는 92.0%가 대학교 졸업 이상으로 대부분의 학부모들이 고학력자에 해당하였다. 가구별 월 평균 수입은 25.0%가 900–1,500만 원 미만이었으며, 24.1%가 450–600만 원 미만이었다. 750–900만 원 미만이 19.4%, 600–750만 원 미만이 14.8%였으며, 대부분 응답자가 450만 원에서 1,500만 원 미만에 해당되었다. 설문조사 응답자

Fig. 1. Keywords related to kindergarten and school foodservices in mass-media analyzed with the Big Kinds. Keywords originally extracted in Korean; translated English equivalents are provided below: 친환경농산물, eco-friendly agricultural products; 고등학교, high school; 식재료, food ingredients; 경기도교육청, Gyeonggi provincial office of education; 전남도, Jeonnam-do; 경기도, Gyeonggi-do; 경기도교육청, Gyeonggi-do Office of Education; 학부모, parents; 수산물, marine products; 코로나19, COVID-19; 영양사, nutritionist; 공공급식지원센터, Public Foodservice Support Center; 안전성, safety.

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Table 1. Participant characteristics

Category	School level			Total (n = 532)	*F* or t
	Parents of kindergarten/the lower grades of elementary school students (n = 101)	Upper elementary school students (n = 152)	Middle and high school students (n = 279)		
Age (year)	40.29 ± 5.56[c, 1)]	10.66 ± 2.44[a]	14.96 ± 2.37[b]	17.83 ± 10.58	2672.688***
Father's highest educational level[2)] (n = 156)					8.299
High school graduate or less	1 (1.6)	1 (2.8)	4 (7.1)	6 (3.8)	
College graduate	42 (65.6)	23 (63.9)	44 (78.6)	109 (69.9)	
Post graduate education	21 (32.8)	12 (33.3)	8 (14.3)	41 (26.3)	
Mother's highest educational level[2)] (n = 150)					13.134
Elementary or less	0 (0.0)	2 (5.4)	0 (0.0)	2 (1.3)	
High school graduate or less	2 (3.2)	2 (5.4)	6 (11.8)	10 (6.7)	
College graduate	42 (67.7)	28 (75.7)	37 (72.5)	107 (71.3)	
Post graduate education	18 (29.0)	5 (13.5)	8 (15.7)	31 (20.7)	
Average monthly household total income[2)] (n = 108, unit: 10,000 won)					15.185
150–300 less	2 (3.5)	1 (4.5)	0 (0.0)	3 (2.7)	
300–450 less	6 (10.5)	2 (9.1)	1 (3.2)	9 (8.2)	
450–600 less	14 (24.6)	4 (18.2)	8 (25.8)	26 (23.6)	
600–750 less	8 (14.0)	4 (18.2)	4 (12.9)	16 (14.5)	
750–900 less	11 (19.3)	2 (9.1)	8 (25.8)	21 (19.1)	
900–1,500 less	15 (26.3)	4 (18.2)	8 (25.8)	27 (24.5)	
More than 1,500	1 (1.8)	5 (22.7)	2 (6.5)	8 (7.3)	
Residential area[3)] (n = 528)					208.656***
Seoul	34 (34.0)	22 (14.8)	41 (14.7)	97 (18.4)	
Busan	1 (1.0)	0 (0.0)	0 (0.0)	1 (0.2)	
Incheon	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Daegu	2 (2.0)	0 (0.0)	0 (0.0)	2 (0.4)	
Daejeon	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Gwangju	0 (0.0)	1 (0.7)	1 (0.4)	2 (0.4)	
Ulsan	0 (0.0)	1 (0.7)	1 (0.4)	2 (0.4)	
Sejong	3 (3.0)	1 (0.7)	24 (8.6)	28 (5.3)	
Gyeonggi-do	26 (26.0)	44 (29.5)	27 (9.7)	97 (18.4)	
Chungcheongbuk-do	0 (0.0)	12 (8.1)	33 (11.8)	45 (8.5)	
Chungcheongnam-do	7 (7.0)	7 (4.7)	14 (5.0)	28 (5.3)	
Jeollabuk-do	2 (2.0)	2 (1.3)	3 (1.1)	7 (1.3)	
Jeoollanam-do	1 (1.0)	51 (34.2)	33 (11.8)	85 (16.1)	
Gyeongsangbuk-do	1 (1.0)	2 (1.3)	2 (0.7)	5 (0.9)	
Gyeongsangnam-do	3 (3.0)	0 (0.0)	17 (6.1)	20 (3.8)	
Gangwon-do	9 (9.0)	5 (3.4)	80 (28.7)	94 (17.8)	
Jeju island	11 (11.0)	1 (0.7)	3 (1.1)	15 (2.8)	

n(%) or Mean ± SD.
[1)]Post hoc tests were conducted using Scheffé's method. Different subscript letters (a–c) indicate statistically significant differences at $P < 0.05$.
[2)]Optional, not required.
[3)]Percentage was calculated as the ratio excluding the number of non-respondents.
***$P < 0.001$.

의 거주 지역은 서울과 경기도가 각 18.4%로 전체의 36.8%를 차지하였고, 강원도 17.7%, 전라남도 16.0% 순으로 확인되었다.

3. 유치원·학교급식 인식도

학교급식에 대한 학부모와 학생 사이에 인식도가 학부모와 학생 사이에 어떤 차이가 있는지 알아보았다(Table 2). 인식도가 4점 이상으로 높게 나타난 항목은 안전한 식재료 사용(4.44), 메뉴의 다양성(4.29), 식사 장소 깨끗(4.31), 식판/숟가락/젓가락 등의 식기 청결(4.34), 식습관에 도움(4.18), 위생관리 철저(4.29), 영양적으로 우수(4.24), 친환경농산물 사용(4.53), 급식의 맛(4.13), 무항생제 축산물 사용(4.77), 식탁/의자 청결(4.21)로 나타났다. 반면에 전통식문화 학습(3.91) 문항은 인식도가 낮게 나타났다. '사회경제환경 측면에 도움', '음식물쓰레기 저감화 프로그램 전개'는 초등학교 고학년이 중·고등학생보다 높게 평가하였고, '학생 학부모 의견 반영'은 초등학교 고학년과 중·고등학생이 유치원·초등학교 저학년 학부모보다 높게 평가하였다. '무항생제 축산물 사용'의 인식도는 초등학교 고학년 학생이 유치원·초등학교 저학년 학부모보다 높았다. 유치원·학교급식에는 무항생제 축산물이 사용된다는 항목에 대해서는 학부모 28.7%, 학생 37.8%가 모르고 있는 것으로 나타났으며, 학부모

Table 2. Parents' and students' perceptions of school foodservice by school level

Category	Preference score by school level			Total (n = 532)	*F*
	Parents of kindergarten/the lower grades of elementary school students (n = 101)	Upper elementary school students (n = 152)	Middle and high school students (n = 279)		
School meals are nutritionally excellent	4.24 ± 0.74[1)]	4.21 ± 1.01	4.26 ± 0.80	4.24 ± 0.85	0.148
School meals use safe ingredients	4.42 ± 0.68	4.57 ± 0.93	4.38 ± 0.76	4.44 ± 0.80	2.872
School meals help students develop proper eating habits	4.29 ± 0.79	4.15 ± 1.06	4.16 ± 0.94	4.18 ± 0.95	0.78
School meals are strictly hygienic	4.42 ± 0.71	4.24 ± 1.08	4.27 ± 0.87	4.29 ± 0.91	1.272
Eco-friendly agricultural products are used in school meals	4.39 ± 1.01	4.62 ± 1.07	4.53 ± 0.97	4.53 ± 1.01	1.539
School meals help students learn about traditional food culture	3.71 ± 1.10	4.01 ± 1.35	3.94 ± 1.22	3.91 ± 1.24	1.813
School meals are helpful for social, economic, and environmental aspects	4.32 ± 0.87[ab, 2)]	4.52 ± 1.28[b]	4.14 ± 1.10[a]	4.28 ± 1.13	5.685**
Student/parent opinions are reflected in school meals	3.63 ± 1.20[a]	4.41 ± 1.35[b]	4.19 ± 1.11[b]	4.15 ± 1.23	13.116***
School lunch utensils, including plates, spoons, and chopsticks, are clean	4.40 ± 0.76	4.48 ± 1.06	4.24 ± 0.87	4.34 ± 0.91	3.564
The dining room tables, chairs, etc. are clean	4.30 ± 0.81	4.26 ± 1.29	4.15 ± 0.91	4.21 ± 1.02	1.011
The school lunch menu is diverse	4.40 ± 0.74	4.35 ± 1.00	4.22 ± 0.95	4.29 ± 0.93	1.851
A program is underway to reduce food waste	4.23 ± 1.24[ab]	4.57 ± 1.16[b]	4.06 ± 1.23[a]	4.23 ± 1.23	8.570***
School lunches are delicious	4.13 ± 0.91	4.11 ± 1.18	4.14 ± 1.01	4.13 ± 1.04	0.043
The dining area (restaurant or class) is clean	4.35 ± 0.70	4.34 ± 1.12	4.27 ± 0.81	4.31 ± 0.89	0.391
Antibiotic-free livestock products are used in school meals	4.48 ± 1.24[a]	4.97 ± 1.11[b]	4.77 ± 1.13[a, b]	4.77 ± 1.16	5.524**

Mean ± SD.
[1)]5-point scale: 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree.
[2)]Post hoc tests were conducted using Scheffé's method. Different subscript letters (a, b) indicate statistically significant differences at $P < 0.05$.
**$P < 0.01$, ***$P < 0.001$.

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와 학생 간의 인식의 차이가 존재함을 알 수 있었다. 하지만, 유치원·학교급식의 영양, 안전한 식재료, 위생관리, 친환경농산물 사용, 전통 식문화 학습, 메뉴의 다양성, 식기의 청결 정도, 음식물 쓰레기 저감화 프로그램, 맛 등에 대해서는 유의적인 인식의 차이가 나타나지 않았다. 한편, 학부모들은 유치원·학교급식이 학생들의 올바른 식습관 형성에 도움이 된다고 생각하였으나 학교급별로 유의적인 차이가 없었다.

4. 유치원·학교급식 건강성

급식 식사에 대한 건강인식도는 Table 3과 같다. 학교급식의 건강성 인자 중에서 다양한 식재료 사용(4.33), 다양한 조리법(4.11), 자연식품과 계절식품 사용(4.04)은 높게 평가된 반면, 고트랜스지방식품, 고열량·저영양식품을 미제공(3.58), 패스트푸드, 가공식품을 미사용(3.61), 기름에 튀긴 음식을 주 2회 이하로 제공(3.69)은 상대적으로 낮게 평가되었다. 유치원·초등학교 저학년 학부모는 초등학교 고학년·중학생·고등학생보다 '고트랜스지방식품, 고열량·저영양식품 미제공' (F = 6.318, P < 0.01), '패스트푸드, 가공식품을 거의 제공하지 않는다'에 낮은 점수를 주었다(F = 4.584, P < 0.05). 유·초등저학년 학부모와 초등학교 고학년 학생은 중·고등학교 학생에 비해 '곡류, 육류, 채소류, 과일류 등 다양한 식재료 사용' (F = 11.073, P < 0.001), '자연식품과 계절식품을 많이 사용' (F = 7.261, P < 0.001)한다고 평가하였다. 유·초등저학년 학부모는 초등학교 고학년 및 중·고등 학생 보다 '기름에 튀긴 음식을 주2회 이하로 제공' (F = 5.493, P < 0.01)을 높게 평가하였다.

5. 유치원·학교급식 기호도

학교급식 기호도는 Table 4에 제시하였다. 학부모, 학생이 평가한 식품유형별 기호도는 과일(4.41)과 육류찬(4.35)에서 높은 기호도를, 잡곡류(3.70), 김치류(3.78)는 낮은 선호도를 보였

Table 3. Parents' and students' opinions on the healthiness of kindergarten and school foodservice by school level

Category	School level			Total (n = 532)	F
	Parents of kindergarten/the lower grades of elementary school students (n = 101)	Upper elementary school students (n = 152)	Middle and high school students (n = 279)		
Kindergarten and school lunches rarely provide high-trans fatty acid foods or high-calorie, low-nutrition foods	3.86 ± 0.94$^{b, 1), 2)}$	3.41 ± 1.00^{a}	3.56 ± 0.98^{a}	3.58 ± 0.99$^{2)}$	6.318**
Kindergarten and school meals rarely contain fast food or processed foods	3.81 ± 0.96^{b}	3.43 ± 1.05^{a}	3.63 ± 0.96^{a}	3.61 ± 0.99	4.584*
Kindergarten and school meals use a variety of ingredients, including grains, meat, vegetables, and fruits	4.55 ± 0.59^{b}	4.44 ± 0.83^{b}	4.18 ± 0.78^{a}	4.33 ± 0.78	11.073***
Kindergarten and school lunches use a variety of cooking methods	4.26 ± 0.73	4.12 ± 1.02	4.05 ± 0.89	4.11 ± 0.90	2.051
Kindergarten and school lunches use a variety of cooking methods	4.14 ± 0.93	3.95 ± 1.14	3.95 ± 0.88	3.99 ± 0.97	1.490
Kindergarten and school lunches use a lot of natural and seasonal foods	4.29 ± 0.78^{b}	4.11 ± 0.87^{ab}	3.92 ± 0.91^{a}	4.04 ± 0.89	7.261***
Kindergarten and school lunches provide fried food no more than twice a week	3.97 ± 0.96^{b}	3.72 ± 1.09^{ab}	3.58 ± 0.97^{a}	3.69 ± 1.01	5.493**

Mean ± SD.
[1)]5-point scale: 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree.
[2)]Post hoc tests were conducted using Scheffé's method. Different subscript letters (a, b) indicate statistically significant differences at P < 0.05.
$^{*}P$ < 0.05, $^{**}P$ < 0.01, $^{***}P$ < 0.001.

Table 4. School meal preference results by school level

Category	Preference score by school level			Total (n = 532)	*F*
	Parents of kindergarten/the lower grades of elementary school students (n = 101)	Upper elementary school students (n = 152)	Middle and high school students (n = 279)		
Meat side dishes (beef, chicken, pork, etc.)	4.34 ± 0.70[1)]	4.28 ± 0.93	4.39 ± 0.72	4.35 ± 0.78	0.874
Fruits	4.50 ± 0.69	4.38 ± 0.85	4.39 ± 0.79	4.41 ± 0.79	0.805
Beverages	2.99 ± 1.03[a, 2)]	4.30 ± 0.99[b]	4.46 ± 0.86[b]	4.12 ± 1.08	94.709***
Chicken	3.71 ± 0.90[a]	4.26 ± 1.06[b]	4.27 ± 0.87[b]	4.16 ± 0.96	14.394***
Doenjang-gug	3.98 ± 0.88[b]	3.66 ± 1.22[a]	3.69 ± 1.01[ab]	3.74 ± 1.05	3.385*
Fish	3.87 ± 1.07[b]	3.34 ± 1.25[a]	3.18 ± 1.22[a]	3.36 ± 1.22	12.247***
Vegetables	4.12 ± 0.92[b]	3.45 ± 1.23[a]	3.55 ± 1.06[a]	3.63 ± 1.12	13.018***
Noodles (e.g. udon, spaghetti, rice noodles)	3.88 ± 0.82[a]	4.36 ± 0.96[b]	4.33 ± 0.88[b]	4.26 ± 0.91	10.947***
Bread (e.g. pies, tarts, etc.)	3.51 ± 0.87[a]	3.96 ± 1.13[b]	4.20 ± 0.93[b]	4.00 ± 1.02	18.511***
Multigrain rice	3.85 ± 0.90	3.68 ± 1.12	3.66 ± 0.97	3.70 ± 1.00	1.397
Fried food	3.36 ± 0.87[a]	3.82 ± 1.14[b]	3.98 ± 1.03[b]	3.82 ± 1.06	12.975***
Kimchi	3.74 ± 0.91	3.78 ± 1.19	3.80 ± 1.04	3.78 ± 1.06	0.118

Mean ± SD.
[1)]5 point scale: 1 = never preferred; 2 = not preferred; 3 = neutral; 4 = preferred; 5 = strongly preferred.
[2)]Post hoc tests were conducted using Scheffé's method. Different subscript letters (a, b) indicate statistically significant differences at $P < 0.05$.
*$P < 0.05$, ***$P < 0.001$.

다. 한편, 음료(학부모 2.99, $P < 0.001$), 치킨류(학부모 3.71, $P < 0.001$), 면류(학부모 3.88, $P < 0.001$), 빵류(학부모 3.51, $P < 0.001$), 튀김류(학부모 3.36, $P < 0.001$)에 대한 초등학교 고학년이나 중·고등학교 학생의 기호도는 유치원 또는 초등학교 저학년 학부모가 인지하는 자녀의 기호도 보다 더 높은 점수를 보였다. 반대로 생선류(학부모 3.87, $P < 0.001$), 된장국(학부모 3.98, $P < 0.05$), 채소류(학부모 4.12, $P < 0.001$)는 학부모가 평가한 기호도 점수가 초등학교 고학년, 중·고등학생이 평가한 점수 보다 더 높게 나타났다.

DISCUSSION

학교급식은 학생에게 성장발달 수준에 맞는 한 끼의 균형 잡힌 식사제공과 더불어 신체적, 정신적인 성장발달과 전통 식문화의 계승 발전, 및 국민 건강 증진을 목적으로 전략적으로 실시되는 급식이다[1]. 종래에 학교급식 인식도에 관한 조사가 진행된 바 있으나, 최근에 유치원급식이 학교급식에 포함되는 상황에서 유치원 학부모의 유치원급식에 관한 인식도를 확인할 필요가 있고, 초·중·고등학생들의 식행동의 변화[22] 불구하고 최근에 학교급식에 대한 소비자의 인식도, 건강성, 기호도에 관한 조사가 없는 상황이어서 전국 학교급식을 대상으로 본 연구를 실시하였다.

학교급식은 학부모의 식사준비 부담을 줄여주고, 학생에게 영양적으로 균형잡힌 식사제공으로 특히 저소득층 학생들에게 식품안정성을 확보하고, 학생의 신체적, 정신적 성장 발달에 기여한다[23–27]. 본 연구에서 학교급식의 건강성은 학교급식법 시행규칙 제5조 영양관리기준에 근거하여 학생들의 건강 증진을 위하여 식단계획에 포함되는 사항으로 정의하였다. 건강성의 지표는 다양한 조리법 사용, 지나치게 짜거나 달지 않게 제공, 계절식품 활용, 기름에 튀긴 음식은 주 2회 이하로 제한, 패스트푸드와 가공식품을 거의 사용하지 않음, 고트랜스지방식품 고열량 저영양식품을 제공하지 않음 등에 관한 기준이다[9]. 본 연구에서 유치원·초등학교 저학년 학부모는 중·고등학생보다 학교급식의 건강성을 높게 평가하였다. 특히 학부모는 곡류, 육류, 채소류, 과일류 등 다양한 식재료 사용(4.55), 자연식품과 계절식품을 많이 사용(4.29), 기름에 튀긴 음식을 주 2회 이하 제공(3.96), 고트랜스지방식품·고열량·저영양식품(3.86), 패스트푸드·가공식품을 거의 사용하지 않음(3.81)과 같은 건강 유익성에 대해 중·고등학년 학생들보다 더 높게 평가하였다($P < 0.05$). 그러나, 다양한 조리법 사용, 지나치게 짜거나 달지 않게 제공

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은 세 집단 모두 평균값에 유의적 차이를 보이지 않았다. 학교급식의 건강성은 학교급식에서 섭취한 식사가 집, 편의점에서 섭취한 식사보다 영양적이었다는 선행 연구[28]에서 제시된 바 있다. 학교급식 식사가 집, 편의점에서 섭취한 식사보다 비타민 C, 칼슘, 철분, 엽산, 비타민 A, 비타민 B_1, 나이신의 index of nutritional quality (INQ)가 높았다. 비타민 A의 INQ는 학교(1.2), 편의점(1.2), 집(1.0) 순이었고, 비타민 B_1 학교(2.0), 집(1.7), 편의점(1.6)이었다. 비타민 C, 칼슘, 철분, 엽산의 경우에는 학교에서 제공받은 식사는 1 이상의 INQ지수를 보인 반면에 다른 장소에서 식사한 경우 1을 넘지 못했다.

그러나 일부 학생들의 편식, 기호식품 추구로 인해 잔반량 증가와 1끼 식사의 영양섭취기준을 채우지 못하는 경우가 있다[17]. 최근 우리 사회의 인구구조 및 라이프스타일 등 복합적인 여러 요소들로 인해 식생활이 변화되고 있는데 특히, 아침 식사 결식률이 증가[29], 가정간편식(home meal replacement, HMR)과 같은 편의식품의 섭취가 증가되고 있으며[30] 이에 따른 문제점들이 야기되고 있다. 미국에서 수행된 연구[25]에서는 학부모의 90% 이상이 학교에서 학생에게 건강한 식사와 적절한 신체활동을 제공한다고 응답하였다. 과일/채소를 5회 이상 섭취하는 학생은 학교식사에 대한 건강성을 높게 인식하였고, 무료/할인 혜택을 받는 학부모는 100% 급식비를 내는 학부모들보다 학교식사의 개선이 필요하다고 지적하였다[25]. 버지니아주 저소득층 학생을 대상으로 학기 중에는 아침, 점심, 저녁 3끼의 무료 학교급식을 제공하고 주말과 방학에는 식품보따리를 제공한 결과 식품안정성(food security)이 확보되었다[26]. 시험군의 식품안정성이 확보되지 않은 비율은 25.9%로 목표한 수치보다 다소 낮았지만, 학교급식프로그램이 저소득층 가구 학생들의 식품안정성 확보에 기여함을 확인하였다. 인천 지역 초등학생과 학부모를 대상으로 무상학교급식 인식도를 조사한 연구에서 학생 97.2%가 무상급식이 필요하며, 학교급식이 영양적(36.7%)이며 좋은 맛(18.3%)과 좋은 질의 식재료(13.4%)를 사용하는 것으로 인식하였다. 또한 학부모들은 학교급식을 통해 가정 형편이 어려운 학생에게 차별방지와 복지서비스에 도움이 된다고 인식하였다[23]. 이상의 결과는 학교급식이 학생들의 신체적, 정신적 성장발달에 크게 기여함을 보여준다. 따라서 학교급식 건강성에 관한 평가 결과에서 좋은 평가를 받은 '다양한 식품군을 균형있게 공급', '다양한 조리법을 활용'하여 식사를 제공한다는 것을 교육영상을 통해 적극 홍보하고, 트랜스지방산, 고열량저영양식, 패스트푸드가공식품 사용을 자제한다는 내용을 학교 e-알리미를 통해 학생과 학부모에게 적극 소통하는 활동이 필요하다.

본 연구의 학교급식 인식도 조사에서 안전한 식재료 사용(4.33), 메뉴 다양성(4.26), 식사 장소 깨끗(4.26), 식판/숟가락/젓가락 등의 식기 청결(4.24), 식습관에 도움(4.12), 위생관리 철저(4.2) 항목에서 높은 점수를 보였고, 반면 전통 식문화 교육(3.7), 학부모 및 학생 의견 반영(3.9), 음식물쓰레기 줄이기 진행(3.9) 항목이 낮게 평가되었다. 인천 지역 초등학생과 학부모는 학교급식 만족도를 5점 중 4.57점으로 높게 평가하였고, 저학년일수록 만족도가 높았다. 그러나 위생 만족도는 낮아서 식판, 수저, 컵과 배식대, 식탁, 의자의 위생 개선이 지적되었다[19]. 또한 학부모의 급식 활동 참여 기회의 확대, 가정통신문을 활용한 홍보자료 배포, 학교 홈페이지에 메뉴 사진 게시를 통해서 급식에 대한 이해도를 개선해야 함이 지적되었다[23]. 천안 지역 초등학생을 대상으로 학교급식에서 가장 중요한 속성은 '위생' (50.1%)이며, 그 다음 순으로 '영양' (21.3%), '신선한 식재료' (18.2%), '맛' (9.4%), '급식의 양' (1.0%)을 중요하게 인식하였다[31].

학교급식 중학생의 식습관 및 학교급식 인식도 조사에서 40.5% 학생들이 학교급식서비스에 만족하였으나, 54.2%가 영양교육을 받은 적이 없으며, 45.1%가 영양교육이 꼭 필요하다고 응답하였다[32]. 미국에서 진행된 영양교육 프로그램 운영실태에서는 학교 가드닝[33]이 영양교육 주제로 포함되어야 함을 지적하고, 가든 기반 영양교육 프로그램을 위해서 행정부와 관할지역에서 재원 마련, 교사 가든 훈련, 가드닝 교육과정 제공, 가드닝 리더십 위원회 구성, 지역위원회 조직과 파트너십 구축과 같은 적극적인 지원이 필요함을 지적하였다.

학교급식의 기호도 측면은 학부모(유치원·초등학교 저학년)와 학생(초등학교 고학년 이상)간에 유의적인 차이를 보였다. 전반적으로 학생들은 생선류, 채소류, 잡곡류, 된장국 순으로 낮은 기호도를 보였고, 과일류, 육류, 면류, 치킨류, 음료수 순으로 높은 기호도를 나타냈다. 이러한 결과는 청소년 식행동을 10년간 추세분석한 연구[22] 결과와 유사하였다. 청소년의 아침식사, 과일, 우유 섭취율은 지속적으로 감소 추세이고, 청소년의 탄산음료와 단맛음료 섭취도 증가세가 둔화 양상을 보이긴 하지만 제외국과 비교시 여전히 에너지 음료 섭취 빈도가 높아 주의가 필요하였다. 아침 결식으로 '삼시 세끼'라는 식사의 틀이 무너지고 있고, 입맛과 편의에 따라 즐기는 섭취 행태가 우세하였고, 단맛 주 3회 이상 섭취율이 63.6%에 이르고, 청소년의 기호와 구매력이 단맛의 섭취에 영향을 미쳤다. 한편, 학교급식에서 제공하는 식사를 100% 섭취하고 잔식을 최소화하기 위해서는 학생, 학부모를 대상의 식사 기호도를 조사하고 편식식품의 섭취를 개선하기 위한 조리법 전략 개발과, 수요자와 공급자 간의 열린 소통을 통한 기호도 증진 및 잔반량 감량화 전략이 필요하다. 특히 기호도가 낮은 식품인 생선류, 채소류, 잡곡류를 학생들이 골고루 섭취할 수 있도록 영양교육프로그램 개발과 조리법 개선이 요구되었다. 중학생을 대상으로 급식 잔

반율을 조사한 연구에서 잔반율은 남학생 30.9%, 여학생 38.8%를 보였고, 제공식사의 67% 정도만 섭취[13]하는 것으로 나타났다. 이러한 결과는 학생들의 기호도 개선이 학교급식의 음식물 쓰레기 감량에 주요한 동기요인임[34]을 보여준다. 뉴욕시에서 실시한 여름방학 학교급식 프로그램 연구에서 뉴욕 소재 학교는 다양한 국적을 가진 학생들로 구성되므로 다민족 식문화를 반영하여 식사계획을 해야 함을 강조하였다[35]. 따라서 학교급식관리자는 한국 학생들의 변화하는 기호도를 반영하는 것은 물론이고 늘어나는 다문화 가정(예: 베트남, 필리핀, 대만, 중국 등) 학생들의 식문화를 반영한 식사계획을 수립하고, 새로운 메뉴에 대한 학생들의 기호도를 모니터링하여 식단데이터베이스를 구축하여야 할 것이다. 학생들이 생선류, 된장국, 채소류 음식을 싫어하는 이유를 조사하고, 레시피와 조리법을 수정하여 학생들의 입맛에 맞는 레시피 개발도 필요하다. 한편, 학교급식 잔반량이 늘어나면 그 만큼 영양소 공급량이 줄어들고 일부 영양소의 부족 현상이 발생될 수 있으므로 학교급식을 온전히 섭취하는 것이 성장 발달에 도움됨을 학부모와 학생들에게 적극 알려야 한다. 영양관리에 문제가 되는 학생들의 식행동(예: 편식)이나 기호도(예: 생선류, 국류, 채소류 미섭취)을 영양교육 주제로 설정하여 영양교육 프로그램을 개발하거나, 급식게시판과 학교 e-알리미를 활용하여 식습관 교정 행동 지침을 소개하는 활동을 적극 전개하여야 한다.

학교급식에서 학교장은 급식관리와 운영을 위하여 급식계획, 영양과 위생 및 식재료, 작업관리, 예산관리, 식생활 지도 등에 필요한 계획을 수립하고, 학교운영위원회를 통해 관련 계획을 보고 및 논의하며, 학부모가 학교급식에 참여하는 수요자 중심의 열린 운영을 전개하고 있다[19]. 이러한 노력에도 불구하고 본 연구에서 유치원·학교급식에 소비자 인식에 개선이 필요한 요소로 (1) 고트랜스지방식품, 고열량·저영양식품, 패스트푸드 가공식품을 거의 사용하지 않고, 기름에 튀긴 음식은 주 2회 이하로 제공한다는 건강성 측면을 학부모와 학생이 낮게 인식하였고, (2) 식품의 편향적인 기호성(치킨류, 면류, 튀김식품, 음료, 빵류의 높은 기호도, 채소류, 잡곡류, 생선류, 된장국의 낮은 기호도)이 지적되었다. 따라서 학교급식관계자들은 앞에서 제시한 활동을 포함하여 개선방안을 마련하고 학부모와 학생들과 학교급식 인식도, 건강성, 기호도에 대해 적극적인 의사소통을 전개해야 할 것이다.

Limitations

본 연구의 제한점은 다음과 같다. 본 연구에서 실시한 설문조사는 단면조사연구로 특정 시점에 일회성의 조사연구로 진행되었으므로 연구 결과를 일반화하기 어렵다는 점이다. 그러므로 연구결과 해석시 단면조사 연구의 제한점을 인지하고 유의해야 할 것이다. 이 제한점을 극복하기 위해 본 연구는 전국 17개 시도교육청의 협조를 얻어 전국적으로 모집단을 대표할 수 있도록 연구를 설계하였다. 그러나 연구참여자의 자발적 참여 의사에 따라 연구가 진행되어서 인천, 대전, 광주 지역에서는 연구참여자를 전혀 확보하지 못했다. 즉 일부 지역에서 연구 참여자가 없었다는 점이 연구의 제한점으로 지적된다. 그럼에도 불구하고, 본 연구는 유치원급식이 학교급식법 적용을 받는 현 시점에 학부모와 학생을 대상으로 전국 모집단을 대상으로 학교급식의 인식도, 건강성, 기호도를 살펴본 최초의 연구라는 점에 의미가 있다. 본 연구의 소비자 욕구 분석 결과에서 낮은 점수를 보인 인식도, 학교급식의 건강성, 기호 식품을 기초로 급식서비스 개선활동을 전개하고, 영양교육의 주요 주제로 설정하여 학생과 학부모에게 올바르고 정확한 정보를 제공하고 소통한다면 학교급식을 바로 이해하는 데 크게 기여할 것이다.

Conclusion

본 연구는 유치원·학교급식에 대한 소비자의 인식, 건강성, 기호도를 전국 단위로 조사하고 언론 보도를 분석한 최초의 시도로, 학교급식이 학생의 성장과 건강 증진뿐 아니라 지속가능한 식생활 문화 형성에도 중요한 기여를 하고 있음을 확인하였다. 유치원·학교급식에 관한 학부모와 학생들의 인식도는 매우 높은 점수를 보였다. 이 연구를 통해 학교급식이 학령기 아동과 청소년의 식생활과 건강에 중요한 역할을 하는 것이 논증되었다. 일부 건강성 지표와 기호도에서 학교급식의 목적성을 학생과 학부모가 인지하는 못하고 있는 점에 대해서는 영양교육 확대를 통해 인식과 태도의 개선이 필요함을 시사한다. 따라서 학교급식은 안전성과 영양 균형을 기반으로 학생들의 편식을 완화하고 전통 식문화를 계승할 수 있는 교육적 기능을 강화해야 하며, 학부모와 학생을 대상으로 학교 e-알리미, 급식게시판, 영양교육 등을 통한 적극적 소통 전략이 병행되어야 할 것이다. 본 연구 결과는 학교급식의 정책 개발, 급식개선활동, 영양교육 설계 등에 유용하게 활용될 수 있을 것이다.

CONFLICT OF INTEREST

There are no financial or other issues that might lead to conflict of interest.

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DATA AVAILABILITY

Research data is available upon request to the corresponding author.

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투고규정

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1. 학회지의 특성

본 학회지는 대한지역사회영양학회의 학술지로서, 전문가 심사를 거친 논문만을 게재하고, 논문 전문은 학회 홈페이지를 통해 공개된다. 학회지는 2개월마다(2월, 4월, 6월, 8월, 10월, 12월) 발행되며, 발행일은 발간월의 마지막 날이다. 생애주기영양, 영양판정, 영양교육, 영양역학, 식행동, 임상영양, 국제영양, 영양정책, 급식 및 외식 관리, 식문화와 기타 지역사회영양학 분야의 연구논문(research articles), 종설(reviews), 연구단보(research notes), 교육자료(educational materials) 등을 게재할 수 있다.

2. 투고 자격

저자 중 적어도 1명이 대한지역사회영양학회 회원이어야 투고할 수 있으며, 비회원의 경우 편집위원회에서 위촉 또는 국외 기관에 소속된 저자가 투고할 시 가능하다.

3. 원고의 종류

1) **연구논문:** 지역사회영양학 분야의 새로운 논문
2) **종설:** 특정 주제에 대하여 간결하고 정확하게 최신문헌 및 견해를 기술한 논문, 체계적인 문헌고찰은 PRISMA 가이드라인을 따라야 함
3) **연구단보:** 지역사회영양학과 관련된 새로운 아이디어, 연구방법, 정책적 이슈 등에 대한 토의 보고
4) **교육자료:** 영양교육 프로그램의 내용과 활용, 또는 새로운 교육 접근방법 등에 관한 논문

4. 연구 및 출판윤리

1) **이중게재:** 원고는 다른 학회지에 발표되거나 투고되지 않은 것이어야 한다.
2) **저자됨:** 원고의 저자는 연구설계, 자료 수집 및 분석, 원고 작성에 기여를 하고, 연구와 관련된 문제의 조사와 해결에 책임을 다할 것을 동의한 자이어야 한다.
3) **피험자 보호:** 연구의 대상이 사람인 경우 헬싱키 선언에 입각하여 피험자를 보호하여야 하며, 연구를 수행하기 전 기관생명윤리위원회(Institutional Review Board; IRB)의 승인을 받아야 한다.
4) **이해관계:** 연구를 지원하는 회사나 기관과 경제적 또는 개인적 관계가 있는 경우 이를 논문에 명백하게 기술해야 한다.
5) **윤리규정 준수:** 저자는 본 학회 연구윤리규정을 준수하여야 하며, 본 규정에 언급되지 않은 연구 및 출판윤리에 대해서는 국제표준출판윤리규정(http://publicationethics.org/international-standards-editors-and-authors)을 적용한다.
6) **저작권:** 본 학회지에 게재된 논문의 저작권은 본 학회에 귀속된다. 논문투고 시 모든 저자는 저작권이전동의서에 사인하여 제출해야 한다.
7) **프리프린트(preprint):** 본 학회지는 프리프린트로 사전 공유된 연구논문을 허용하지 않는다.

5. 성(SEX)/젠더(GENDER)에 대한 고려

논문에서 결과에 영향을 줄 수 있는 인자로 생물학적 성(sex) 또는 사회문화적 성인 젠더(gender)를 인식하고 이에 대한 아래 내용을 논문에 포함하여야 한다.

- 성별 기술에서 성(sex)과 젠더(gender)를 구분하여 올바르게 기술한다.
- 연구 대상에 남성과 여성을 대상으로 포함하여 연구하고 그 결과를 비교분석하여 논문을 발표한다.
- 단일 성을 대상으로 연구한 경우는 학술적으로 타당한 근거를 제시한다.

6. 논문투고

교신저자는 온라인투고시스템(https://submit-kjcn.or.kr)으로 저자정보가 삭제된 원고파일을 제출한다. 저자정보가 포함된 표지, 모든 저자의 서명이 작성된 IRB 승인서 사본, 저자체크리스트는 온라인 투고사이트 '첨부파일'에 업로드 한다.

7. 전문가 심사

편집위원장 또는 편집위원은 저자정보가 삭제된 투고논문을 두 명의 전문가에게 심사하도록 보내고, 심사자는 대한지역사회영양학회지의 심사규정에 따라 심사한다. 편집위원장은 심사자의 의견에 따라 첫 번째 결정을 내리고 6주 안에 교신저자에게 알린다.

두 명의 심사자의 의견이 다를 때에는 또 다른 심사자에게 심사하도록 한다.

8. 원고 작성법

1) 원고 작성: 원고는 MS 워드를 사용하여 한글 또는 영문으로 작성한다. 글자 크기는 11 point, 행간은 200% 또는 2줄 간격으로 하며, 영문 글꼴은 Times New Roman으로 한다. 영문초록을 1쪽으로 하여 쪽번호를 표기하며, 원고 왼쪽 여백에 줄 번호를 매긴다.

2) 표지: 다음의 내용을 포함한다.

- 원고의 종류(연구논문, 종설, 연구단보, 교육자료)
- 압축한 제목(Running head)은 공백 포함 50자 이내의 영문으로 기재
- 제목을 국문논문은 국문과 영문 모두 기재, 영문논문은 영문만 기재
- 영문 제목은 기본적으로 소문자로 작성(단, 문장의 첫 단어와 고유 명사는 대문자로 작성). 관찰 연구(단면조사연구, 환자-대조군 연구 또는 전향적 코호트 연구), 임상 연구, 체계적 문헌고찰 또는 메타 분석의 경우 제목 또는 부제목에 연구디자인 제시
- 저자, 소속 및 직위를 국문과 영문으로 기재, 단 영문논문의 경우 영문으로만 기재

  교신저자 이름 뒤에는 "†" 표시를 윗첨자로 하여 붙이고, 소속기관이 다를 경우는 저자이름 끝에 1), 2), 3)을 윗첨자로 하여 순서에 따라 붙이고, 해당인의 소속기관명 앞에 같은 숫자를 붙인다. 소속이 같으나, 직위가 다를 경우에도 1), 2), 3)을 윗첨자로 하여 순서에 따라 붙인다. 연구자의 직위(교수, 강사, 학생, 연구원 등)는 영문의 경우 소속 앞에 기재한다. 소속과 직위가 없는 경우에는 이름만 기재한다. 현재 소속이 없는 미성년자의 경우 최종 소속, 직위, 재학년도를 별도로 제출한다.

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  모든 저자는 ORCID 등록시 소속과 직위를 등록해야하며, 이는 추후 저자신분 확인이 필요할 경우 자료로 활용할 수 있다. 모든 저자의 ORCID 번호를 블라인드 없이 표기하며, 그 예는 다음과 같다.

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  해당하는 내용이 없더라도 'None.' 으로 기재한다.

〈예〉

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3) 원고의 구성: 원고의 부제목은 모두 영문으로 작성하고, 구성은 다음과 같다. Title page, Abstract, Introduction, Methods, Results, Discussion, Conflict of Interest, Acknowledgments, Data Availability, References, Tables, Figures 순으로 한다. 단, 교육자료의 경우 결과와 고찰의 내용을 콘텐츠(Contents), 평가(Evaluation), 시사점(Implications) 등의 내용으로 구성할 수 있다. 종설의 경우 연구논문의 구성과 달리 서론, 본론, 결론의 구성으로 기술할 수 있다. 그러나 주제범위 고찰(scoping review)이나 체계적 고찰(systematic review)은 연구논문의 구성을 따라야 한다.

본 학회지는 EQUATOR 네트워크(http://www.equator-network.org/home/)와 미국국립보건원/국립의학도서관(http://www.nlm.nih.gov/services/research_report_guide.html)에서 안내하는 보고지침에 따라 원고를 구성하도록 권장한다.

- 연구윤리(Ethics Statement)

저자는 "방법(Method)" 연구윤리에 관해 영문으로 기술해야 한다. 부제목 바로 아래에 제시하며 종설, 연구노트, 교육자료 등의 경우에는 서론 뒤(본론 전)에 제시한다.

〈예〉
The informed written consent was obtained from each participant. The study protocol was approved by the Institutional Review Board of *** (approval number: IRB승인번호).
〈예〉
Obtainment of informed consent was exempted by the institutional review board.

• 연구설계(Study design)
저자는 "방법(Methods)" 연구설계에 연구설계(기술분석, 무작위 대조연구, 코호트 연구 또는 메타 분석 등) 및 참고한 보고지침을 제시한다.

〈예〉 This was a cross-sectional study. It was described according to the STROBE statement (https://www.strobe-statement.org/).

• 고찰(Discussion)
저자는 결과를 해석하고 "고찰(Discussion)"의 후반부에 Limitations 및 Conclusion을 제시한다.

• 이해상충(Conflict of Interest)

〈예〉
There are no financial or other issues that might lead to conflict of interest.
〈예〉
Kildong Hong has been an editor since 2021. However, he was not involved in the review process of this manuscript. Otherwise, there was no conflict of interest.

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We thank the physicians who performed the sample collection.

• 데이터가용성(Data Availability)
저자는 데이터가용성에 대한 설명을 작성해야하며, 데이터에 대해 접근을 허용하는 것은 선택사항이다.
〈예〉
The data that support the findings of this study are openly available in [repository name e.g "KNHANES"] at http://doi.org/[doi].

4) 영문초록: 영문초록은 목적(Objectives), 연구방법(Methods), 결과(Results), 결론(Conclusion)의 소제목으로 구분하여 250~300단어로 작성한다. 초록 아래쪽에 주제어(Keywords)를 영문으로 표기한다.

5) 키워드: 전문 용어를 제외한 1~2개의 단어로 구성된 3~5개의 키워드를 기재한다. 해당 키워드는 MeSH(https://meshb.nlm.nih.gov/search) 에 검색되는 단어로 작성한다. 키워드는 고유명사를 제외하고 모두 소문자로 표기하며, 구분 기호는 세미콜론(;)으로 작성한다.

6) 약어: 제일 처음 나오는 곳에 완전한 이름을 먼저 표기한 후 괄호 안에 약어를 표기하며, 표 또는 그림에 사용된 약어는 각주 또는 그림 설명에서 설명한다.

7) 수량 및 단위: 수량은 아라비아 숫자로, 도량단위는 SI 단위를 권장한다. %, ℃를 제외한 모든 단위는 숫자와 띄어쓴다.

8) 참고문헌

• 본문 중에는 인용된 순서대로 [ ] 안에 번호로 기재한다.
• 본문의 한 문장에서 여러 개의 참고문헌을 인용할 때에는 다음과 같이 기재한다.

〈예〉 Kim [3]은, Park & Lee [5]는, Brown 등[7]은

• 본문 중에 참고문헌의 저자를 기재하는 경우 영문 last name을 표기한다. 저자가 2명일 경우에는 두 저자 사이에 &를 삽입하고, 3인 이상일 때는 제1저자만 표기하고 "등"을 쓴다.

〈예〉 Kim [3]은, Park & Lee [5]는, Brown 등[7]은

• 참고문헌 목록은 인용된 순서에 따라 아라비아 숫자와 함께 영문으로 표기한다.
• The National Library of Medicine (NLM) 표준체제(http://www.nlm.nih.gov/citingmedicine)를 따라 작성한다.
• 학회지명은 약어로 표기하되 국제 약어 관례(PubMed 등재지 검색 사이트 http://www.ncbi.nlm.nih.gov/journals) 또는 KoreaMed 등재지 검색 사이트(http://www.koreamed.org/JournalBrowserNew.php)를 참고한다.
• 학위논문은 필요한 경우 3개 이내로 인용한다.

(1) 학술지

① 출판된 학술지 논문

저자명. 논문명. 학술지약어 연도; 권(호): 시작페이지-마지막 페이지. 순으로 기재

〈예〉

Mo YJ, Kim SB. Sodium related recognition, dietary attitude and education needs of dietitians working at customized home visiting health service. Korean J Community Nutr 2014; 19(6): 558-567.

저자가 7인 이상일 경우, 처음 6인까지 기재하고 et al. 을 사용

〈예〉

Yon MY, Lee HS, Kim DH, Lee JY, Nam JW, Moon GI et al. Breastfeeding and obesity in early childhood - based on the KNHANES 2008 through 2011-. Korean J Community Nutr 2013; 18(6): 644-651.

② 출판 예정 학술지 논문

저자명. 논문명. 학술지약어 연도. Forthcoming. 순으로 기재

〈예〉

Kim YS, Lee HM, Kim JH. Sodium-related eating behaviors of parents and its relationship to eating behaviors of their preschool children. Korean J Community Nutr 2015. Forthcoming.

(2) 저서

① 단행본

저자명. 서명. 판차사항. 출판사; 연도. p. 시작페이지-마지막페이지 순으로 기재

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Park YS, Lee JW, Seo JS, Lee BK, Lee HS, Lee SK. Nutrition education and counselling. 5th ed. Kyomunsa; 2014. p. 32-55.

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Ministry of Health and Welfare (KR), The Korean Nutrition Society. Dietary reference intakes for Koreans 2020: Minerals. Ministry of Health and Welfare; 2020. p. 25-46.

② 단행본 내의 한 장(book chapter)

장(chaper) 저자. 장(chapter) 제목. In: 편집자, editors. 서명. 판차사항. 출판사; 연도. p. 시작 페이지-마지막페이지. 순으로 기재

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Tamura T, Picciano MF, McGuire MK. Folate in pregnancy and lactation. In: Bailey LB, editor. Folate in Health and Disease. 2nd ed. CRC press; 2010. p. 111-131.

③ 번역본

역자. 번역서명(translated version). 판차사항. 원저자국가 original written by 원저자명. 출판사;출판연도. p. 시작페이지-마지막페이지. 순으로 기재

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Mo SM, Kwon SJ, Lee KS. Do you know dining table of children? (translated version). 1st ed. Japanese original written by Adachi M. Kyomunsa; 2000. p. 20-22.

(3) 연구보고서

저자. 보고서 제목. 출판기관; 연도 월. Report No. 출판번호. 순으로 기재

〈예〉

Lee YM. A study on development of food safety and nutrition education program for preschooler. Ministry of Food and Drug Safety; 2013 Nov. Report No. 13162consumer110.

(4) 학위논문

저자. 논문명 [학위 유형]. 수여대학; 연도. 순으로 기재 석사학위논문은 master's thesis, 박사학위논문은 dissertation으로 기재한다.

〈예〉

Ahn SY. The perception of sugar reduction in nutrition teachers or dieticians in charge of school meals and their use of added sugar in Seoul. [master's thesis]. Sookmyung Women's University; 2014.

(5) 학술대회 및 심포지엄 자료

저자. 발표제목. Proceedings of 학술대회명; 연도 월 일; 지역: p. 시작 페이지-마지막 페이지. 순으로 기재

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Shim JE. Infant and child feeding practices for development of healthy eating habits. Proceedings of 2014 Annual Conference of the Korean Society of Community Nutrition; 2014 Nov 14; Seoul: p. 195-213.

(6) 기사

① 잡지 기사

저자. 제목. 잡지명. 연도 월: 페이지. 순으로 기재

〈예〉

Lee BM. Nutrition treatment of hereditary metabolic diseases. Nutrition and Dietetics. 2013 Dec: 12-19.

② 인쇄 신문 기사

저자 또는 기관. 기사제목. 신문명. 연도 월 일; 부문: 페이지. 순으로 기재

〈예〉

Lee JH. Sodium reduction need to readjust policy. Food and Beverage News. 2014 Sep 29; Sect. A: 1.

(7) 온라인 자료

① 웹사이트

저자 또는 기관. 제목 [Internet]. 제공기관; 연도 [cited 연도 월 일]. Available from: 웹주소 순으로 기재

〈예〉

The Korean Society of Community Nutrition. Nutrient story [Internet]. The Korean Society of Community Nutrition; 2007 [cited 2015 May 12]. Available from: http://www.dietnet.or.kr/

② 웹페이지

저자 또는 기관. 제목 [Internet]. (제공기관). 연도 [updated 연도 월 일; cited 연도 월 일]. Available from: 웹주소 순으로 기재

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Ministry of Food and Drug Safety. Winter food poisoning, be careful of norovirus [Internet]. Ministry of Food and Drug Safety; 2014 Nov 14 [updated 2014 Dec 11; cited 2015 Feb 1]; Available from: http://www.mfds.go.kr/fm/article/view.do?articleKey=1245&-searchTitleFlag=1&boardKey=4&menuKey=167& currentPage-No=1

9) 표 또는 그림

표와 그림은 영문으로 작성하며, 합하여 10개 이내로 하고, 한 장에 하나씩 작성하여 인용된 순서대로 본문 뒤에 첨부한다. 본문에 인용할 때는 Table 1 또는 Fig. 1 등으로 표기한다. 표 작성 시에는 종선은 사용하지 않는 것을 원칙으로 하며, 표의 제목은 표의 상단에, 그림의 제목은 그림의 하단에 기재한다. 각주는 $^{1), 2), 3)}$ 등으로 나타내고 하단에 그 내용을 표시한다. 단, 통계분석의 유의성 표시는 표 본문에 *P*-values를 제시하는 것으로 하고, 필요한 경우 *, **, *** 등으로, 다중 범위 검정에서는 $^{a, b, c}$ 등으로 사용한다.

9. 출판

심사가 끝난 논문은 내용이나 저자를 바꿀 수 없다. 교신저자는 교정본 PDF 파일을 e-mail로 받으면 3일 이내에 교정하여 보내야 한다. 원하는 저자에 한하여 게재된 논문의 별쇄본 20부를 제공한다. 저자는 게재된 논문의 게재료로 원고 편집비, 참고문헌 교정비, 파일 가공비 등 소요되는 비용을 부담한다. 단, 심사과정이 시작된 이후 논문을 철회한 경우에는 논문의 심사 단계에서 발생한 심사료 비용을 부담한다. 본 규정에 명시되지 아니한 사항은 편집위원회의 심의를 거쳐 결정한다.

논문투고와 출판 관련 모든 문의사항은 편집사무실로 연락한다.

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The code of research ethics of the Korean Society of Community Nutrition

Enactment Jan 21, 2008
1st revision April 19, 2010
2nd revision March 28, 2014
3rd revision February 28, 2020

I. GENERAL RULES

1. Title

This code is titled as 'The Code of Research Ethics of the Korean Society of Community Nutrition.'

2. Purpose

The purpose of the code is to establish the standard for the research ethics observed by the members of the Korean Society of Community Nutrition and the contributors to the Korean Journal of Community Nutrition, and determine the establishment and operation of the Committee on the Research Ethics (hereafter the 'Committee') for fair and systematic verification in the case of the scientific misconduct.

II. ETHICS CODE FOR A RESEARCHER

3. Integrity of Researcher

A researcher should conduct research and publish research results with research integrity.

4. Inclusion of Scientific Misconduct

(1) Fabrication refers to the act of creating, documenting, or reporting the data or the research results that do not exist.
(2) Falsification refers to the act of creating the documentation that do not match study results by manipulating the research materials, equipment, or procedures or changing or omitting data or research results.
(3) Plagiarism refers to steal others' ideas, procedures, results, or records without legitimate authorization.
(4) The improper authorship refers to the act which confers authorship on the person without any academic contribution due to gratitude or seniority, or does not reward with authorship without proper cause to the person who academically contributes or devotes the research contents or results.
(5) It includes the acts which seriously exceed generally accepted criteria.

5. Prohibition of Duplicate Submission or Duplicate Publication of Research Product

A researcher should not submit or publish the same research results in two different places.

6. Authorship

Contributors who have made substantive intellectual contributions to a paper are given credit as author and authorship is based on the following four criteria.
(1) Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
(2) Drafting the work or reviewing it critically for important intellectual content; AND
(3) Final approval of the version to be published; AND
(4) Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

7. Record of Published Work

(1) An author should accept the credit for only the accomplishments of the research he/she conducted or contributed to and take responsibility for them.

(2) The order of the authors (including translators) of articles or other publications should be determined with fairness according to the extent of the contribution to research regardless of relative positions. Simply being in a particular position should not guarantee a credit as a co-author, the first author, or a corresponding author. Neither the act of not crediting the sufficient contribution to research with authorship can be justified. When the contribution to research is low, a statement of appreciation is expressed in a footnote, a preface, or an acknowledgement.

8. Citation and Reference

(1) An author who cites academic materials should make efforts to describe them accurately and state their sources clearly. The materials that are obtained from personal communication can be cited with the permission from the researcher who provides information.

(2) When an author cites or makes a reference to others' words, he/she should state the fact in a footnote, and distinguish them from his/her original thoughts or results of interpretation.

9. Role and Ethics for a Journal Editor

(1) An editor should request a reviewer with expertise in the field, objectivity, and impartial judgment for the evaluation of submitted manuscripts.

(2) An editor should not disclose the information about the author or the content of the manuscript until the submitted manuscript is decided to be published.

10. Role and Ethics for a Reviewer

(1) A reviewer should evaluate the manuscript under review with commitment and impartiality within a specified period and notify a journal editor of results.

(2) A reviewer should notify a journal editor immediately of the intention to resign from reviewing a manuscript when he/she believes oneself to be unsuitable for reviewing the manuscript.

(3) A reviewer should evaluate a manuscript with objective criteria and impartiality without consideration of one's academic beliefs or personal relationship with its author. A reviewer should not reject a manuscript without logical reasons or on the reason that it is in conflict with his/her own view or interpretation, and rate a manuscript without reading it thoroughly.

(4) A reviewer should respect an author's personality and individuality as an intellectual and use comments in a polite and gentle manner as much as possible, and should not use degrading or insulting expressions.

(5) A reviewer should maintain confidentiality of a manuscript under review and should not cite the content of a manuscript prior to its publication.

III. ESTABLISHEMENT AND OPERATION OF THE COMMITTEE

11. Function of the Committee

The Committee reviews and decides the issues below related to the research ethics of the members of the Korean Society of Community Nutrition.

1. The establishment of the research ethics
2. The prevention and investigation on the scientific misconduct
3. Whistleblower protection and confidentiality
4. Verification on the violation of the research ethics, process of the verification results and follow-up measures
5. Restoration in the honor of the examinee
6. Other issues imposed by the chair of the Committee

12. Organizing Principles of the Committee

The Committee consists of 5 members. The committee is chaired by the President of the Society and the Editor-in-chief serves as the associate chair of the committee. The other three are appointed by the President of the Society with the recommendation from the Executive Board.

13. Report and Receipt of the Scientific Misconduct

The whistle-blower may provide the information to the secretariat of the editorial board in the Korean Society of Community Nutrition directly or through the telephone, written document or e-mail on the real name. However, if the contents and evidence of the misconduct are specific, the report provided by an anonymous informant is considered as the case by the real-name person.

14. Authority for Verification and Recommendation of the Committee

The Committee is authorized to conduct an investigation about the allegation of the violation of the ethics code using a wide range of evidence from informants, the person under investigation, witnesses, and reference materials. The committee reviews and decides the status of violation of the ethics code based on the results of investigation, and recommends appropriate sanctions to the president based on the decision.

15. Verification Process of the Committee

The verification process for the act of violation of research ethics proceeds in the order of preliminary inquiry, investigation, and judgment. The investigation should be completed within 6 months. However, when the investigation is unlikely to be completed within the time frame, the investigation period may be extended with the committee chair's approval. When an informant or the person under investigation disagrees with the decision, he/she may file an appeal within 30 days from receiving notification, and the Committee may conduct reinvestigation if necessary.

16. Assurance of Opportunity to Be Heard

The member who is alleged to violate the Code of Research Ethics should be given a written notice of the overview of the issue under investigation. He/she is guaranteed to have an opportunity to submit a letter of explanation, and as long as he/she whishes, an opportunity to attend one or more of the Committee meetings in the investigation procedure and provide an oral explanation.

17. Confidentiality Duty for a Member of the Committee

A member of the Committee shall not disclose the identification of the reporter and the member suspected of the research ethics violation until the final decision is confirmed by the society.

18. Disciplinary Procedures and Content

In the event of proposed disciplinary measures by the Ethics Committee, the committee chair convenes the Executive Board and makes a final decision on the status and the content of discipline. The member who is determined to have violated the Code of Research Ethics may be given disciplines including warning, ban on manuscript submission for a specified period, and suspension or cancellation of membership depending on the severity of the issue, and the article may be retracted and the results may be disclosed if necessary.

19. Revision of the Code of Research Ethics

Revision procedure of the Code of Research Ethics follows the revision procedure of the code of the Society.

Author's checklist

Revised in October 15, 2024

Authors' quick submission checklist

(※ Please include the checklist when submitting the manuscript to the submission site.)

Category		Items to review	Check
Title page	1. Title	- Spelling and typographical errors in paper titles. - Titles should be written in sentence case, with only the first word of the text and proper-nouns capitalized. The study design should be included in the title or subtitle. e.g., Development and Effectiveness Evaluation of the STEAM Education Program on Food Groups for Kindergarteners -> Development and effectiveness evaluation of the STEAM education program on food groups for kindergarteners: a non-randomized controlled study e.g., Program Evaluation using the RE-AIM Framework: A Systematic Review and Application to a Pilot Health Promotion Program for Children -> Evaluation of the pilot health promotion program for children: a systematic review	
	2. Author Information	- Include all author titles and affiliations, and indicate the position before the affiliation	
	3. Submission	- The title page, the copyright transfer agreement, and IRB approval are all included when submitting your paper to the submission site by uploading them to the 'Attachment' section. - Remove the cover page including author information from the submitted paper before submitting	
	4. ORCID	- ORCID should be stated for all authors e.g., Gildong Hong: https://orcid.org/https://orcid.org/0000-0000-0000-0000	
	5. Funding	e.g., This research was supported by a grant from the National Research Foundation of Korea (Grant No. 000). - When there is no funding associated with the manuscript, 'None.' should be stated.	
Abstract	1. Structure	- Objectives-Methods-Results-Conclusion	
	2. Keywords	- Three to five keywords are recommended with one or two words except for technical terms. - The terminology should be listed, in principle, in MeSH (www.nlm.nih.gov/mesh/MBrowser.html). - Keywords are written in lowercase letters except for proper nouns, and keywords are separated by a semicolon (;).	
	3. Abbreviations	- Abbreviations should only be used if they are repeatedly used throughout the abstract. If an abbreviation is not used after it has been defined, use the full name instead - Define an abbreviation the first time it appears in the abstract	
Main body	1. Structure	- Title page, Abstract, Introduction, Methods (including ethics statement), Results, Discussion, Conflict of Interest, Acknowledgments, Data Availability References, Tables, and Figures - Include 'Study Design' in Method, subheadings in Results, and 'Limitations' and 'Conclusion' in Discussion - Upload tables and figures as a single file and do not separate them	
	2. Statistical software	- Enter the correct type and version of statistical software e.g., IBM SPSS Statistics 25 (IBM Corp.) e.g., SAS 9.4 (SAS Institute)	
	3. Ethics Statement	- Authors should present an "Ethics Statement" immediately after the heading "Methods". In case of reviews, research notes and educational materials, "Ethics statement" should be presented after introduction section e.g., The informed written consent was obtained from each participant. The study protocol was approved by the Institutional Review Board of *** (approval number: ***). *IRB approval statement will be included in the final version, but do not include specific IRB information (e.g., institution name) when submitting. e.g., Obtainment of informed consent was exempted by the institutional review board.	

(continued to the next page)

(Continued)

Category		Items to review	Check
	4. Conflict of Interest	- Conflict of interest must be stated. e.g., There are no financial or other issues that might lead to conflict of interest. e.g., Gildong Hong has been an editor since 2021. However, he was not involved in the review process of this manuscript. Otherwise, there was no conflict of interest. *Author information will be included in the final version but do not include it when submitting.	
	5. Acknowledgments	- List individuals who contributed to the writing or research, but do not meet the criteria for authorship. e.g., We thank the physicians who performed the sample collection. *This information will be included in the final version, but do not include it when submitting.	
	6. Data Availability	- Authors should provide a data availability statement. Providing access to research data is optional. e.g., The data that support the findings of this study are openly available in [repository name e.g "KNHANES"] at http://doi.org/[doi].	
	7. References	- Notation method: [1], [2, 5], [15-20], etc. without spaces before square brackets, when adding commas between references, add a space after commas. e.g., research on something [1] or Kim & Lee's research [2, 5] - References in the text should be listed in numerical order - The number of citations for the type of dissertation should not exceed 3. - Verify that the reference adheres to the KJCN guidelines	
	8. Other indications such as units	- Write numbers and units with a space (50 kg, 600 kcal), but attach % and °C. - g/dl (X), g/dL (O) - When indicating P-value, use capital, italic P: e.g., *P*-value - Use a en-dash "–" to indicate a range of numbers: e.g., 20–25 - Use comma notation to separate thousands (this also applies to text and tables): For example, 65,450,000.	
	9. Tables, figures	- Capitalize only the first letter of table and figure titles - Capitalize only the first letter of variables in the table - Use lowercase 'n' in tables and figures. - Additional checklists for tables and figures can be found in the section below.	

*Examples shown in the tables are based on recent publication, 2024.

GUIDELINE FOR TABLES AND FIGURES

Please adhere the following guidelines for tables and figures.

1. To indicate the total number of items outside of the table's body, include it in parentheses at the end of the table's title. For example, "Sociodemographic characteristics of children (n = 80)"
2. The table heading should provide a descriptive title for the values presented, rather than simply using "Mean ± SD" as the title.
3. When describing the contents of the table in the text:
   ① To present an average value, use Mean ± SD or Mean ± SE, and be mindful of spacing (e.g., 22.0 ± 2.3, with a space before and after the '±' symbol)
   ② Units should be written in parentheses within the table (e.g., Energy (kcal/day)) instead of next to it (Energy, kcal/day)
4. Footnotes or legends explanations for tables or figures should be written in English
5. The footnotes or legends should be arranged in the following order: Values displayed as statistical outcomes, statistical analysis method, indication of significance, etc.
   ① The presentation of values of statistical outcomes, such as n (%), Mean ± SD, n (%) or Mean ± SD, etc, are displayed in the first line of the footnote without comment numbers.
   ② Statistical analysis method and significance indication - Both statistical analysis methods and significance are discussed. - Post-hoc analysis results can only be presented when the ANOVA test yields significant results.
   ③ The full name of any abbreviations used in the title or table body should be provided in the footnote.
   ④ Any other content that requires explanation should be accompanied by corresponding comment numbers, following the submission guidelines. Verify that the comment numbers match the numbers indicated in the table body.

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Instructions for authors

KJCN
Korean Journal of Community Nutrition

Revised in October 15, 2024

1. GENERAL INFORMATION

The *Korean Journal of Community Nutrition* (KJCN), the official journal of the Korean Society of Community Nutrition, is a peer-reviewed, open access journal. It is published bimonthly in February, April, June, August, October and December. KJCN aims to publish original research articles and reviews covering all aspects of community nutrition. The journal also welcomes research notes and educational materials that provide a wide range of findings of community nutrition field. Topics of interest include nutrition throughout the life cycle, nutrition assessment, nutrition education, nutritional epidemiology, dietary behavior, clinical nutrition, international nutrition, nutrition policy, food service management, food culture and other topics related to the improvement of human nutritional status.

2. AUTHORS' QUALIFICATIONS

It is essential that at least one author of the manuscript is a member of the Korean Society of Community Nutrition. Exceptions will be made when the Editorial Committee invites authors and when researchers affiliated with institutions outside Korea submits.

3. TYPES OF MANUSCRIPTS

1) **Research articles:** Research articles are reports of original research in the area of community nutrition.
2) **Reviews:** Reviews provide concise and precise updates on the latest progress made within the scope of the journal. Systematic reviews should follow the PRISMA guidelines.
3) **Research notes:** Research notes discuss new ideas, research methods, or policy issues relevant to community nutrition.
4) **Educational materials:** Educational materials describe contents of nutrition education program, its application or new approaches to nutrition education.

4. RESEARCH AND PUBLICATION ETHICS

1) **Duplicate publication:** The manuscript must be original and not published or submitted for publication in other scientific journals.
2) **Authorship:** All authors listed in a manuscript must have contributed substantially to the research design, collection and analysis of data, or preparation of the manuscript. And they should agree to be responsible for investigating and solving research-related problems.
3) **Protection of human subjects:** Research carried out on human subjects must be in compliance with the Helsinki Declaration, and authors should specify that it was reviewed and approved by an Institutional Review Board (IRB).
4) **Conflicts of interest:** Authors must disclose any financial or personal relationships with the company or organization sponsoring the research.
5) **Adherence to the ethics guidelines:** Authors should adhere to the research ethics regulations and guidelines of Korean Society of Community Nutrition. For the policies on the research and publication ethics not stated in these instructions, international standards of publication ethics for editors and authors (http://publicationethics.org/international-standards-editorsand-authors) can be applied.
6) **Copyright:** Copyright of the published article belongs to the Korean Society of Community Nutrition. A copyright transfer form should be signed by all author(s) and sent when the manuscript is submitted.
7) **Preprints:** The journal does not accept research articles that have been shared as preprints.

5. CONSIDERATION OF SEX/GENDER

In all studies, sex (a biological variable) or gender (a socio, cultural, and psychological trait) should be factored into research designs and analyses and reported in a manuscript as follows.

- Sex and gender should be described separately and correctly.
- Both sexes/genders should be included in the human studies, and the differences between the sexes/genders should be analyzed and reported.
- If only one sex/gender is reported, or included in the

study, the reason the other sex/gender is not reported or included should be explained based on reasonable and scientific basis.

6. SUBMISSION

A manuscript file without authors' information must be submitted through our online submission system (https://submit-kjcn.or.kr) by the corresponding author. In addition, authors should remember to upload the author's information separately. This includes the title page, copyright transfer agreement signed by all authors, IRB approval, and author checklist. You can upload these documents to the "Attachment" section on the submission site.

7. PEER REVIEW

A submitted manuscript without authors' information is sent to two independent reviewers selected by an editor-in-chief or an editor. Reviewers review the manuscript in detail according to the KJCN review guidelines. The editor-in-chief then makes an initial decision based on the reviewers' comments and notifies the corresponding author of the decision within six weeks of receipt of a manuscript. One additional reviewer can be appointed when the two reviewers' comments are not in agreement.

8. MANUSCRIPT PREPARATION

1) **General:** Text must be written in Korean or English using MS Word program. The designated font style for English is Times New Roman in 11-point and the text should be 200%-spaced or double-spaced. Each page must be numbered beginning with the abstract page. Manuscripts are to have line numbers in the left margin.
2) **Title page:** The title page should include the following:
   - The type of manuscript (research articles, reviews, research notes, and educational materials)
   - The running head summarizing in Englisgh (50 characters or less including spaces)
   - Titles should be written in sentence case (only the first word of the text and proper nouns are capitalized). For observational studies (cross-sectional, case-control, or prospective cohort), clinical trials, systematic reviews, or meta-analyses, the subtitle should include the study design.
   - The names and affiliations, positions of all authors

A corresponding author should be marked with "†" at the end of the name. If some of the authors have different affiliations, superscript 1), 2), 3) should be placed at the end of each author's name in this order and the same number should be placed in front of the affiliation. 1), 2), 3) are attached in the same order, even if they belong to the same organization but have different positions.

The position of the researcher (professor, lecturer, student, researcher, etc.) should be listed in front of the affiliation. If there is no position and title, only the name is given. For minors who are not currently affiliated, submit the final affiliation, position, and school year separately.

<Example>
Youngok Kim[1)], Jin-Sook Yoon[2)†], Kil-dong Hong[3)], Na-ra Kim[4)]
[1)]Professor, Department of Food and Nutrition, Dongduk Women's University, Seoul, Korea
[2)]Professor, Department of Food and Nutrition, Keimyung University, Daegu, Korea
[3)]Student, Graduate School of Education, Keimyung University, Daegu, Korea
[4)]Student, OO High School, Daegu, Korea

- The name, address, telephone number, fax number, and email address of the corresponding author in English. Country code is also indicated for telephone and fax numbers.

<Example>
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Tel: +82-2-749-0747
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- ORCID (https//orcid.org/)
  All authors should register their affiliation and position at ORCID. When author identification is required, this information can be used. ORCID numbers of all authors should be indicated without blinding.

<Example>
Kil-Dong Hong https://orcid.org/****-****-****-****

• Funding

When there is no funding associated with the manuscript, “None” should be stated.

<Example>

This research was supported by a grant from the National Research Foundation of Korea (Grant No. ***).

3) Arrangement of research articles: Each manuscript should be divided into the following sections in the order: Title page, Abstract, Introduction, Methods, Results, Discussion, Conflict of Interest, Acknowledgments, References, followed by Tables and Figures. These section headings and subheadings should be written in English. In case of educational materials, the contents of the results and discussion can be composed of contents, evaluation, and implications. In the case of a review, unlike the structure of a research articles, it can be described as an introduction, body, and conclusion. However, a scoping review or a systematic review should follow the structure of the research articles.

The journal encourages authors to describe the study according to the reporting guidelines relevant to their research design, such as those outlined by the EQUATOR Network (http://www.equator-network.org/home/) and the United States National Institutes of Health/ National Library of Medicine (http://www.nlm.nih.gov/services/research_report_guide.html).

• Ethics Statement

Authors should present an “Ethics statement” immediately after the heading “Methods”. In case of reviews, research notes and educational materials, “Ethics statement” should be presented after introduction section.

<Example>

The informed written consent was obtained from each participant. The study protocol was approved by the Institutional Review Board of *** (approval number).]

<Example>

Obtainment of informed consent was exempted by the institutional review board.

• Study Design

Authors should present the study design (e.g., descriptive analysis, randomized controlled trial, cohort study, or meta-analysis) and any reporting guidelines referenced in the "Methods" section.

<Example>

This was a cross-sectional study. It was described according to the STROBE statement (https://www.strobe-statement.org/).

• Discussion

Authors should interpret the results and provide the Limitations and Conclusion in the latter part of the “Discussion” section.

• Conflict of Interest

<Example>

There are no financial or other issues that might lead to conflict of interest.

<Example>

Kildong Hong has been an editor since 2021. However, he was not involved in the review process of this manuscript. Otherwise, there was no conflict of interest.

• Acknowledgments

Describe the person who helped write the thesis or research but was not appropriate as an author.

<Example>

We thank the physicians who performed the sample collection.

• Data Availability

Authors should provide a data availability statement. Providing access to research data is optional.

<Example>

The data that support the findings of this study are openly available in [repository name e.g “KNHANES”] at http://doi.org/[doi].

4) Abstract: A structured abstract of 250~300 words must be written in English under the following headings: Objectives, Methods, Results, and Conclusion. Abstracts should be accompanied by keywords in English.

5) Keywords: A Three to five keywords are recommended with one or two words except for technical terms. The terminology should be listed, in principle, in MeSH (www.nlm.nih.gov/mesh/MBrowser.html). Keywords are written in lowercase letters except for proper nouns,

and keywords are separated by a semicolon (;).

6) **Abbreviations:** All abbreviations must be defined in parentheses at first mention in the text. Abbreviations used in a table or figure should be defined in their respective table footnote or figure legend.

7) **Numbers and measurements:** Numbers should be presented in Arabic numerals. For most measurements, the International System of Units (SI) is recommended. The unit symbol should be placed after the numerical value and a space should be left between the numerical value and the unit symbol except %, ˚C.

8) **References**

- References should be numbered consecutively in the order in which they appear in the text using Arabic numerals in brackets.
- When more than one reference is cited at the same point in the text, they are included in the same bracket as below.

<Example>
[1-3] or [4, 7]

- When the authors' names of the references are inserted in the text, the last names of the authors are given in English. When the reference has two authors, both authors' names should be joined by '&,' and when the reference has more than two authors, the first author's name should be given followed by *'et al'.*

<Example>
Kim [2], Park & Lee [5], Brown et al. [7]

- Reference list should be given in English in numerical order corresponding to the order of citation in the text.
- References should follow the National Library of Medicine (NLM) style guide (http://www.nlm.nih.gov/citingmedicine).
- Abbreviations of journal names should be written according to the international rules for the abbreviation (https://www.ncbi.nlm.nih.gov/journals) or KoreaMed (https://www.koreamed.org/JournalBrowserNew.php).
- Master's thesis and doctoral dissertation should be cited less than three.

(1) Journal articles

① *Published journal articles*

Authors. Article title. Journal title Year of publication; Volume(Issue): Start page-Last page.

<Example> Mo YJ, Kim SB. Sodium related recognition, dietary attitude and education needs of dietitians working at customized home visiting health service. Korean J Community Nutr 2014; 19(6): 558-567.

When an article has more than six authors, the names of the first six authors should be given followed by 'et al.'

<Example> Yon MY, Lee HS, Kim DH, Lee JY, Nam JW, Moon GI et al. Breast-feeding and obesity in early childhood - based on the KNHANES 2008 through 2011-. Korean J Community Nutr 2013; 18(6): 644-651.

② *Forthcoming journal articles*

Authors. Article title. Journal title Year of publication. Forthcoming.

<Example> Kim YS, Lee HM, Kim JH. Sodium-related eating behaviors of parents and its relationship to eating behaviors of their preschool children. Korean J Community Nutr 2015. Forthcoming.

(2) Books

① *Entire books*

Authors. Title. Edition. Publisher; Year of publication. p. Start page-Last page.

<Example> Park YS, Lee JW, Seo JS, Lee BK, Lee HS, Lee SK. Nutrition education and counselling. 5th ed. Kyomunsa; 2014. p. 32-55.

<Example> Ministry of Health and Welfare (KR), The Korean Nutrition Society. Dietary reference intakes for Koreans 2020: Minerals. Ministry of Health and Welfare; 2020. p. 25-46.

② *Book chapter*

Chapter authors. Chapter title. In: Editor names, editors. Book title. Edition. Publisher; Year of publication. p. Start page-Last page.

<Example> Tamura T, Picciano MF, McGuire MK. Folate in pregnancy and lactation. In: Bailey LB, editor. Folate in Health and Disease. 2nd ed. CRC press; 2010. p. 111-131.

③ *Translated books*

Translators. Translated title(translated version). Edition. Original language originally written by authors. Publisher; Year of publication. p. Start page-Last page.

<Example> Mo SM, Kwon SJ, Lee KS. Do you know dining table of children? (translated version). 1st ed. Japanese original written by Adachi M. Kyomunsa; 2000. p. 20-22.

(3) Scientific reports

Authors. Report title. Performing organization; Year of publication Month of publication. Report No. Report number.

<Example> Lee YM. A study on development of food safety and nutrition education program for preschooler. Ministry of Food and Drug Safety; 2013 Nov. Report No. 13162consumer110.

(4) Thesis and dissertaion

Author. Title. [Book type]. Publisher; Year of publication. master's thesis for master degree, dissertation for doctoral degree

<Example> Ahn SY. The perception of sugar reduction in nutrition teachers or dieticians in charge of school meals and their use of added sugar in Seoul. [master's thesis]. Sookmyung Women's University; 2014.

(5) Conference papers

Authors of paper. Title of paper. Proceedings of Conference title; Year Month Day; Place of conference: p. Start page-Last page.

<Example> Shim JE. Infant and child feeding practices for development of healthy eating habits. Proceedings of 2014 Annual Conference of the Korean Society of Community Nutrition; 2014 Nov 14; Seoul: p. 195-213.

(6) Articles in magazine or newspaper

① *Magazine articles*

Author. Article title. Magaxine title. Year Month: Page.

<Example> Lee BM. Nutrition treatment of hereditary metabolic diseases. Nutrition and Dietetics. 2013 Dec: 12-19.

② *Newspaper articles*

Author or Organization. Article title. Newspaper title. Year Month Day; Section: Page.

<Example> Lee JH. Sodium reduction need to readjust policy. Food and Beverage News. 2014 Sep 29; Sect. A: 1.

(7) Materials on the internet

① *Web sites*

Author or Organization. Title [Internet]. Publisher; Year [cited Year Month Day]. Available from: electronic address

<Example> The Korean Society of Community Nutrition. Nutrient story [Internet]. The Korean Society of Community Nutrition; 2007 [cited 2015 May 12]. Available from: http://www.dietnet.or.kr/

② *Web page*

Author or Organization. Title [Internet]. Publisher; Year [updated Year Month Day; cited Year Month Day]. Available from: electronic address

<Example> Ministry of Food and Drug Safety. Winter food poisoning, be careful of norovirus [Internet]. Ministry of Food and Drug Safety; 2014 Nov 14 [updated 2014 Dec 11; cited 2015 Feb 1]; Available from: http://www.mfds.go.kr/fm/article/view.do?articleKey=1245&searchTitleFlag=1&boardKey=4&menuKey=167&currentPageNo=1

9) Tables and Figures: Tables and Figures must be written in English, and limited to a maximum of 10 altogether. Each table and figure should be prepared on a separate page and placed at the end of the text according to the order cited in the text. Citation of tables or figures in the text is as Table 1 or Fig. 1. Vertical lines are not used in tables. A title should be placed at the top of a table or at the bottom of a figure. The footnotes of the table are presented on Arabic numerals as superscripts 1), 2), 3). In case of indicating levels of significance, *P*-values should be presented in the body of each table, and if necessary, symbols can be used as *, **, ***, etc. To indicate the result of multi-range tests, letters such as a, b, c, etc. can be used.

9. PUBLICATION

Once the review process is completed, the manuscript cannot undergo any modifications in their contents or changes of the authors. PDF page proofs will be emailed

to the corresponding author and should be returned within 3 days. The author pays the publication fee for the published paper, including manuscript editing fees, reference proofreading fees, and file processing fees. Authors who choose to withdraw a manuscript after it has undergone peer-review will be charged the review fee.

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대한지역사회영양학회지 연구윤리규정

제정 2008. 1. 21
1차 개정 2010. 4. 19
2차 개정 2014. 3. 28
3차 개정 2020. 2. 28

제1장 총칙

제1조 (명칭)
이 규정은 “대한지역사회영양학회 연구윤리규정”이라 한다.

제2조 (목적)
이 규정은 대한지역사회영양학회 회원 및 대한지역사회영양학회지 투고자가 지켜야 할 연구윤리의 기준을 확립하고, 연구부정행위 발생 시 공정하고 체계적인 검증을 위한 연구윤리위원회(이하 “위원회”라 한다)의 설치 및 운영에 관한 사항을 규정함을 목적으로 한다.

제2장 연구자의 윤리규정

제3조 (연구의 진실성)
연구자는 연구의 진실성을 준수하여 연구를 수행하고 그 결과를 발표하여야 한다.

제4조 (연구부정행위의 범위)
연구부정행위는 다음 각 호와 같다.
1. 위조란 존재하지 않는 데이터나 연구 결과를 만들어 내고 이를 기록하거나 보고하는 행위를 의미한다.
2. 변조란 연구자료, 장비 또는 과정을 조작하거나, 데이터나 연구 결과를 변경하거나 생략하여 연구 기록이 연구결과와 부합하지 않게 하는 행위를 의미한다.
3. 표절이란 정당한 권한 없이 타인의 아이디어, 과정, 결과 또는 기록을 도용하는 것을 의미한다.
4. 부당한 논문저자 표시란 연구내용 또는 결과에 대하여 학문적으로 공헌 또는 기여를 한 사람에게 정당한 이유없이 논문저자 자격을 부여하지 않거나, 학문적으로 공헌 또는 기여를 하지 않은 자에게 감사의 표시 또는 예우 등을 이유로 논문저자 자격을 부여하는 행위를 말한다.
5. 기타 통상적으로 용인되는 범위를 심각하게 벗어난 행위를 포함한다.

제5조 (연구물의 중복 투고 및 이중 게재금지)
연구자는 연구결과를 중복 투고 및 이중 게재 하지 않아야 한다.

제6조 (저자됨)
저자는 출판하는 논문의 연구에 지적인 공헌을 한 자로서 다음 각 호의 자격을 모두 충족하여야 한다.
1. 연구의 구상이나 설계 또는 자료의 수집이나 분석이나 해석을 하는 데 있어서 상당한 공헌을 한 자
2. 논문의 초안을 작성하거나 주요 내용을 검토한 자
3. 출간될 원고를 최종 승인한 자
4. 연구의 정확성이나 무결성과 관련된 문제를 적절히 조사하고 해결하는 것에 책임이 있음을 동의한 자

제7조 (출판 업적의 명기)

① 저자는 자신이 행하거나 기여한 연구에 대해서만 업적을 인정받으며 그에 대한 책임을 진다.

② 논문이나 기타 출판의 저자(역자 포함)의 순서는 상대적 지위에 관계없이 연구에 기여한 정도에 따라 공정하게 정해져야 한다. 단순히 특정 직책으로 인하여 공동저자, 제1저자, 또는 교신저자가 될 수 없다. 연구에 충분히 기여했음에도 저자로 인정되지 않는 행위 또한 정당화될 수 없다. 연구에 대한 기여도가 낮을 경우 각주, 서문, 사의 등에서 사사의 글로 표시한다.

제8조 (인용 및 참고 표시)

① 저자가 학술 자료를 인용할 경우에는 정확하게 기술하도록 노력해야 하고 출처를 명확히 밝혀야 한다. 개인적인 접촉으로 얻은 자료의 경우에는 정보를 제공한 연구자의 동의를 받은 후 인용할 수 있다.

② 저자가 타인의 글을 인용하거나 참고할 경우에는 각주를 통해 인용 및 참고 여부를 밝혀야 하며, 선행연구의 결과인 부분과 저자의 독창적인 견해 또는 해석의 결과인 부분이 구분될 수 있도록 하여야 한다.

제9조 (논문 편집위원회의 역할및 윤리)

① 편집위원은 투고된 논문을 해당 분야의 전문적 지식과 객관적이고 공정한 판단 능력을 지닌 심사위원에게 평가 하도록 의뢰하여야 한다.

② 편집위원은 투고된 논문의 게재가 결정될 때까지는 저자에 대한 사항이나 논문의 내용을 공개하지 않아야 한다.

제10조 (논문 심사위원의 역할및 윤리)

① 심사위원은 심사 대상 논문을 심사규정이 정한 기간 내에 성실하고 공정하게 평가하고 결과를 편집위원에게 통보하여야 한다.

② 심사위원은 자신이 논문의 내용을 평가하기에 적임자가 아니라고 판단될 경우에는 편집위원에게 즉시 사퇴의사를 통보하여야 한다.

③ 심사위원은 심사 대상 논문을 개인적인 학술적 신념이나 저자와의 사적인 친분 관계를 떠나 객관적 기준에 의해 공정하게 심사하여야 한다. 충분한 근거를 명시하지 않은 채 논문을 탈락시키거나, 심사자 본인의 관점이나 해석과 상충된다는 이유로 논문을 탈락시켜서는 안 되며, 심사 대상 논문을 제대로 읽지 않은 채 평가하지 않아야 한다.

④ 심사위원은 전문 지식인으로서의 저자의 인격과 독립성을 존중하여야 하고, 평가의견은 가급적 정중하고 부드러운 표현을 사용하며 저자를 비하하거나 모욕적인 표현을 해서는 안 된다.

⑤ 심사위원은 심사 대상 논문에 대한 비밀을 지켜야 하며, 논문이 게재된 학술지가 출판되기 전에 논문의 내용을 인용해서는 안 된다.

제3장 연구윤리위원회의 설치와 운영

제11조 (위원회의 기능)

위원회는 대한지역사회영양학회 회원의 연구윤리와 관련된 다음 각 호의 사항을 심의, 의결한다.

1. 연구윤리 확립에 관한 사항
2. 연구부정행위의 예방, 조사에 관한 사항
3. 제보자 보호와 비밀유지에 관한 사항
4. 연구윤리 위반 검증 및 검증결과 처리와 후속조차에 관한 사항
5. 피조사자 명예회복 조치에 관한 사항
6. 기타 위원회 위원장이 부여하는 사항

제12조 (위원회의 구성)

위원회는 위원 5인 이상으로 구성하며, 위원장은 학회장으로 하고 부위원장은 편집위원장으로 하며 그 외 3인은 상임 이사회의 추천을 받아 학회장이 임명한다.

제13조 (연구부정행위의 제보 및 접수)

제보자는 대한지역사회영양학회 편집위원회 사무국에 직접 또는 전화, 서면, 전자우편 등으로 제보할 수 있으며 실명으로 제보해야 한다. 단, 익명제보라 하더라도 구체적인 연구부정행위의 내용과 증거를 포함하여 제보한 경우 이를 실명제보에 준한다.

제14조 (위원회의 검증 및 심의 권한)
위원회는 윤리규정 위반으로 보고된 사안에 대하여 제보자, 피조사자, 증인, 참고인 및 증거자료 등을 통하여 폭넓게 조사를 실시할 수 있고, 그러한 조사 결과에 따라 윤리규정 위반여부를 심의·판정한다.

제15조 (위원회의 검증 절차)
연구윤리 위반행위에 대한 검증절차는 예비조사, 본조사, 판정의 단계로 진행하며 모든 조사 일정은 6개월 이내에 종료되어야 한다. 단, 이 기간 내에 조사가 이루어지기 어렵다고 판단될 경우에는 위원장의 승인을 거쳐 조사 기간을 연장할 수 있다. 제보자 또는 피조사자가 판정에 불복할 경우에는 통보를 받은 날로부터 30일 이내에 이의신청을 할 수 있으며, 윤리위원회에서 이를 검토하여 필요한 경우 재조사를 실시할 수 있다.

제16조 (소명기회의 보장)
연구윤리규정 위반으로 보고된 회원에게는 조사대상이 된 사안의 개요를 서면 통지하고 정해진 기간 내에 소명서를 제출할 기회를 보장하고 본인이 희망하는 경우 본 조사 절차 중 1회 이상 윤리위원회의 회의에 출석하여 구술로 해명할 수 있는 기회를 주는 등 충분한 소명 기회를 주어야 한다.

제17조 (연구윤리위원의 비밀 보호 의무)
연구윤리위원은 제보자의 신원을 노출시켜서는 안 되며, 학회의 최종 결정이 내려질 때까지 연구윤리규정 위반으로 보고된 회원의 신분을 공개해서도 안 된다.

제18조 (징계의 절차 및 내용)
위원회의 징계 건의가 있을 경우, 위원장은 상임이사회를 소집하여 징계 여부 및 징계 내용을 최종적으로 결정한다. 연구윤리규정을 위반했다고 판정된 회원에 대해서는 사안의 경중을 고려하여 경고, 일정기간의 논문투고금지, 회원자격의 정지 또는 박탈 등의 징계를 할 수 있으며, 필요한 경우 논문 게재 취소와 그 결과를 공개할 수 있다.

제19조 (연구윤리규정의 개정)
연구윤리규정의 개정 절차는 본 학회의 규정 개정절차에 준한다.

자가점검표

(2024년 10월 15일 개정)

[논문 투고 전 저자 확인사항]
(※ Check 후 투고사이트에 함께 제출합니다.)

구분		확인사항	Check
논문표지	1. 제목	– 논문제목 철자 및 오타 – 영문 제목은 기본적으로 소문자로 작성(단, 문장의 첫 단어와 고유 명사는 대문자로 작성) 관찰 연구(단면조사연구, 환자-대조군 연구 또는 전향적 코호트 연구), 임상 연구, 체계적 문헌고찰 또는 메타 분석의 경우; 제목 또는 부제목에 연구디자인 제시 예) Development and Effectiveness Evaluation of the STEAM Education Program on Food Groups for Kindergarteners –› Development and effectiveness evaluation of the STEAM education program on food groups for kindergarteners: a non-randomized controlled study 예) Program Evaluation using the RE-AIM Framework: A Systematic Review and Application to a Pilot Health Promotion Program for Children –› Evaluation of the pilot health promotion program for children: a systematic review	
	2. 저자정보	– 저자, 소속 및 직위를 국문과 영문으로 기재, 단 영문논문의 경우 영문으로만 기재, 영문 기재시 소속 앞으로 직위 표기 – 저자 중 1인 이상은 학회 회원일 것. 단, 비회원의 경우 편집위원회에서 위촉 또는 국외 기관에 소속된 저자가 투고할 시 가능	
	3. 제출	– 논문표지는 본 체크리스트 및 저작권이전동의서, IRB승인서와 함께 투고사이트 '첨부파일'에 업로드 (투고사이트에 논문 제출시 동시 제출, 투고논문에는 표지부분 삭제)	
	4. ORCID	– 모든 저자의 ORCID 기술 예) Gildong Hong: https://orcid.org/0000-0000-0000-0000	
	5. Funding (연구지원내역)	예) This research was supported by a grant from the National Research Foundation of Korea (Grant No. 000). – 해당하는 내용이 없더라도 'None.' 으로 기재	
영문초록	1. 작성순서	– Objectives-Methods-Results-Conclusion 의 순서	
	2. 키워드	– 전문 용어를 제외한 1~2개의 단어로 구성된 3~5개의 키워드 기재 – 키워드는 MeSH (https://meshb.nlm.nih.gov/search)에 검색되는 단어로 작성 – 키워드는 고유명사를 제외하고 모두 소문자로 표기하며, 구분 기호는 세미콜론(;)으로 작성	
	3. 약어사용	– 약어를 정의하고, 그 약어가 논문에서 더 이상 사용되지 않는다면 약어 사용할 필요 없음. 전체 명칭 (full name)으로 작성 – 약어를 두 번 이상 본문에서 사용할 경우, 맨 처음 약어가 등장할 때 전체 명칭에 대해 약어 정의	
논문본문	1. 작성순서	– 원고의 부제목은 모두 영문으로 작성 Title page, Abstract, Introduction, Methods, Results, Discussion, Conflict of Interest, Acknowledgments, Data Availability, References, Tables, Figures 순서로 작성 – Method의 Study design, Results의 소제목, Discussion의 Limitations, Conclusion 반드시 작성 – 투고 시 표, 그림을 포함하여 하나의 파일로 업로드	
	2. 통계 패키지 정보 기입	– 종류 및 버전 정확히 기입 예) IBM SPSS Statistics 25 (IBM Corp.) 예) SAS 9.4 (SAS Institute)	
	3. Ethics Statement (연구윤리)	– 저자는 "방법(Method)" 부제목 바로 아래에 연구윤리에 관해 영문으로 기술. 종설, 연구노트, 교육자료 등의 경우에는 서론 뒤(본론 전)에 영문으로 제시. 예) The informed written consent was obtained from each participant. The study protocol was approved by the Institutional Review Board of *** (approval number: ***). *IRB 기관표시는 최종본에 기재(투고시 내용 삭제후 업로드) 예) Obtainment of informed consent was exempted by the institutional review board.	
	4. Conflict of Interest (이해상충)	예) There are no financial or other issues that might lead to conflict of interest. 예) Gildong Hong has been an editor since 2021. However, he was not involved in the review process of this manuscript. Otherwise, there was no conflict of interest. *저자정보는 최종본에 기재(투고시 내용 삭제후 업로드)	

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(Continued)

구분		확인사항	Check
	5. Acknowledgments (감사의 글)	– 논문작성이나 연구를 도왔지만 저자로서 적절하지 않은 분 등을 기술. 예) We thank the physicians who performed the sample collection. *관련내용은 최종본에 기재(투고시 내용 삭제후 업로드)	
	6. Data Availability (데이터가용성)	– 저자는 데이터가용성에 대한 설명을 작성해야하며, 데이터에 대해 접근을 허용하는 것은 선택사항 예) The data that support the findings of this study are openly available in [repository name e.g "KNHANES"] at http://doi.org/[doi].	
	7. 참고문헌	– 표기방법: 대괄호[ ] 앞 띄어쓰기 없이 [1], [2, 5], [15–20] 등 표기, 문헌 사이 쉼표 추가시, 쉼표 뒤 띄어쓰기 예) ~에 관한 연구[1] 또는 Kim & Lee의 연구[2, 5] – 본문 내 참고문헌의 인용이 번호순으로 되어 있는지 확인 – 학위 논문 인용은 3개 이내로 제한 – 참고문헌 표기 규정에 맞는지 확인	
	8. 단위 등 기타 표시	– 숫자와 단위 띄어쓰기(50 kg, 600 kcal), 단, %, ℃ 붙임 – g/dl(X), g/dL(O) – P값 표기 시 : P 대문자, 기울임체 : 예) *P*–value – 숫자 등의 범위 표기 시 '–'를 사용: 예) 20–25 – 천 단위 쉼표 표기(본문, 표에도 적용): 예) 65,450,000	
	9. 표, 그림	– 표와 그림 제목: 첫 글자만 대문자 – 표에서 변수들 영문 표기시 : 첫 글자만 대문자 – 표와 그림에서 n을 소문자로 표기 – 투고규정에 따르며 그 외 형식은 별첨한 가이드라인에 따름	

*예시는 2024년도 최근 게재논문을 참고.

[논문 투고 전 저자 확인사항_표와 그림]

표와 그림 작성 시 다음의 사항을 유의하여 주시기 바랍니다.

1. 자료의 전체 수를 표 본문의 내용 밖으로 표시하고자 할 때는 표 제목 끝의 괄호 안에 제시
   예) Sociodemographic characteristics of children (n = 80)

2. 표 본문의 제목줄(table head)은 가능하면 제시된 값을 설명하는 것으로 하고, 단순히 Mean ± SD 등 만을 제목으로 하는 것을 지양함

3. 표 본문의 내용 작성 시
- 평균값을 제시하는 경우 Mean ± SD, Mean ± SE 으로 사용, 띄어쓰기 확인
  예) 22.0 ± 2.3 : ' ± ' 앞뒤로 띄어쓰기
- 표에서 단위는 괄호 안에 넣어서 표기
  예) Energy (kcal/day) (O)
  Energy, kcal/day (X)

4. 표와 그림을 설명하는 주석은 모두 영문으로 표기

5. 주석의 기술 순서는 가능하면 자료의 형태, 통계분석 방법 및 유의성 표시, 기타의 순서로 작성함
   1) 자료의 형태 제시
      예) n (%), Mean ± SD, n (%) or Mean ± SD 등 주석 번호 없이 첫줄에 제시
   2) 통계분석 방법 및 유의성 표시
      ① 통계적 유의성 뿐 아니라 통계분석 방법도 함께 제시함
      ② 사후검정 결과는 분산분석 등의 유의확률 제시가 선행되어야 함
   3) 약어를 사용한 경우 전체 명칭(full name)을 주석으로 제시함
   4) 기타 설명이 필요한 내용은 이후 투고규정에 따라 순서대로 번호를 달고 각주로 제시하며 표 본문에 표기한 번호와의 일치여부 확인