

# Awareness and Practice of Global Cancer Prevention Dietary Guidelines among Koreans

Ahyoung Yun<sup>1,\*</sup>, Yoonjoo Choi<sup>1,\*</sup>, Hyein Jung<sup>1</sup>, Byungmi Kim<sup>1,2</sup>

<sup>1</sup>Division of Cancer Prevention, National Cancer Control Institute, <sup>2</sup>Department of Public Health and AI, Graduate School of Cancer Science and Policy, National Cancer Center, Goyang, Korea

Due to rapid westernization, Korean dietary habits have emerged as significant risk factors for chronic disease and cancer. Despite this transition, Korea's cancer prevention guidelines have remained consistent since their establishment about 18 years ago. This study aimed to investigate the degree of awareness and practice to global dietary guidelines among Korean adults and identify demographic and lifestyle factors associated with low practice. A cross-sectional survey conducted in 2023 included 4,000 adults and assessed their awareness and practice of four global recommendations: "Eat a diet rich in whole grains," "Limit consumption of processed meat," "Limit consumption of sugar-sweetened beverages," and "Limit consumption of fast and other processed foods." While more than half of the participants recognized the guidelines' importance for cancer prevention, implementation rates remained below 40%. Furthermore, over 80% of the respondents expressed a compelling requirement for updated and tailored dietary guidelines. Younger individuals, those who were physically inactive, individuals who had not received prior nutrition education, and participants with obesity were more likely to exhibit low practice, particularly to guidelines limiting processed foods and sugary beverages intake. These findings highlight the need to revise Korea's cancer prevention recommendations by incorporating global dietary practices and addressing the westernized eating patterns prevalent within the population. Efforts should focus on promoting these updated guidelines through targeted education and public health interventions that improve practice, especially in high-risk groups, and effectively mitigate the burden of diet-related cancers in Korea.

**Key Words** Cancer prevention, Awareness, Practice, Dietary guidelines, Global

## INTRODUCTION

Cancer is a significant cause of mortality worldwide, with nearly 20 million people being newly diagnosed with cancer and approximately 10 million dying from the disease in 2022 [1]. Since the publication of causes-of-death statistics in 1983, cancer has consistently been the leading cause of death in Korea [2]. Cancer is caused by a combination of genetic, environmental, and lifestyle factors, such as unhealthy nutrition, physical inactivity, alcohol intake, an unhealthy weight, and tobacco use [3]. Approximately 18% of cancer cases in the United States are attributable to behaviors such as poor nutrition, physical inactivity, alcohol intake, and an unhealthy weight [4]. This indicates that these modifiable lifestyle factors play a crucial role in cancer prevention, and positive behavioral changes can significantly reduce cancer risk [5,6].

To effectively minimize the risk of cancer, international organizations, including the World Cancer Research Fund (WCRF), American Institute for Cancer Research (AICR) [5], American Cancer Society (ACS) [7], and European Union (EU) [8], have developed and disseminated evidence-based cancer prevention guidelines. These guidelines provide detailed recommendations on health behaviors that potentially lower cancer risk, including maintaining a healthy weight, engaging in physical activity, adopting a nutritious diet, and limiting alcohol consumption [7]. In Korea, the National Cancer Center and Ministry of Health and Welfare collaborated to establish the 10 Cancer Prevention Recommendations tailored for Korean population in 2006. These guidelines were revised in 2016 and have maintained unchanged since [9].

Both global and domestic guidelines include dietary items for cancer prevention, but there are clear differences in their

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Correspondence to Byungmi Kim, E-mail: kbm5369@ncc.re.kr, <https://orcid.org/0000-0001-8621-9190>

\*These authors contributed equally to this work as co-first authors.



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contents. The dietary recommendations emphasized in global guidelines, particularly those from the AICR/WCRF, ACS, and EU, recommend increasing whole grain consumption, limiting red and processed meat intake, reducing sugary beverage consumption, and restricting fast and highly processed food intake. In contrast, the dietary recommendations included in Korea's cancer prevention guidelines focus on consuming sufficient vegetables and fruits, maintaining a balanced diet with diverse foods, avoiding excessively salty foods, and refraining from burnt food consumption.

However, dietary habits when the Korean cancer prevention guidelines were drafted clearly differ from those prevailing two decades later. The consumption of fat, beverages, meat, and dairy products has increased, whereas that of grains, vegetables, fruits, and carbohydrates has decreased over recent decades [10]. Additionally, trends in the consumption and energy contribution of ultra-processed foods have consistently increased in Korea [11,12]. While Korean dietary habits have become increasingly westernized, the existing cancer prevention guidelines have not been updated to reflect these changes. To effectively prevent cancer risk, it is essential to revise guidelines accounting for these changes.

Meanwhile, assessing the degree of awareness and practice of cancer prevention guidelines is necessary to understanding how effectively these recommendations are integrated into daily life. Awareness reflects the extent to which individuals recognize the importance of these guidelines, while practice indicates the extent to which they actively implement them. Identifying gaps between awareness and practice can provide valuable insights into barriers to adherence and inform targeted interventions that improve compliance with cancer prevention guidelines. With this intent, the Cancer Prevention Awareness Survey has been conducted periodically since 2007 to evaluate the awareness and practice of the 10 cancer prevention recommendations in Korea [13]. Nevertheless, this survey is based on domestic items and does not reflect alterations in dietary habits. Therefore, this study aimed to (1) investigate Koreans' awareness of and practice to dietary guidelines recommended by global, but not domestic, guidelines and (2) identify groups that have limited awareness of and are low adherence with cancer prevention guidelines. Ultimately, this study seeks to explore potential intervention points for dietary policies related to cancer prevention.

## MATERIALS AND METHODS

### Study population

The National Cancer Center has cross-sectionally surveyed the awareness and practice of dietary recommendations for cancer prevention on a biannual basis, selecting participants using proportional quota sampling based on age, sex, and provincial resident population. In 2023, the survey was administered online to Korean adults aged 20 to 69 years from

September 5 to September 25. Of the 5,642 eligible participants, 4,000 were finally included in the analysis after excluding those who neither qualified ( $n = 907$ ) nor completed the survey ( $n = 735$ ). This study was approved by the Institutional Review Board (IRB) of National Cancer Center (IRB number: NCC2023-0251), and all participants provided consent.

### Questionnaires

The questionnaire included questions regarding the degree of awareness and practice of each global dietary recommendation for cancer prevention. The global dietary recommendations included: (1) "Eat a diet rich in whole grains," (2) "Limit consumption of processed meat," (3) "Limit consumption of sugar-sweetened beverages," and (4) "Limit consumption of fast and other processed foods." To evaluate awareness, participants had to indicate the extent to which they considered each recommendation to be related to cancer prevention, with the following six response options: "no relevance," "low relevance," "moderate relevance," "high relevance," "very high relevance," and "do not know." Individuals who answered "no relevance" or "low relevance" were classified as the low-awareness group, those who responded "moderate relevance" as the moderate-awareness group, and those who indicated "high relevance" or "very high relevance" as the high-awareness group. Participants were also asked to rate the extent to which they adhered to each dietary recommendation for cancer prevention, with six possible response options: "never," "almost never," "sometimes," "often," "always practice," and "do not know." Individuals who replied "never practice" or "almost never practice" were categorized into the low-practice group, those who indicated "sometimes practice" into the moderate-practice group, and those who responded "often practice" or "always practice" into the high-practice group. Furthermore, for logistic regression analysis, participants were categorized into low-awareness or practice and moderate-to-high-awareness or practice groups. Additionally, participants had to specify whether they considered each global cancer prevention dietary recommendation to be necessary to Korea. Responses were provided on a scale with the following options: "very necessary," "necessary," "not necessary," "not necessary at all," and "do not know."

This study regarded the following as potentially related factors: sex, age (60-69, 40-59, and 20-39 years), region (urban, mid-sized cities, and rural), education level (college or above, high school, and middle school or below), marital status (married, single, and widowed/divorced/separated), monthly income ( $\geq 6,000,000$  Korean won, 3,000,000-6,000,000 Korean won, and  $< 3,000,000$  Korean won), household type (multi-person or single-person), physical activity (inactive or active based on performing 150 minutes per week of moderate-to-vigorous intensity physical activity), history of received nutrition education (no or yes), history of chronic disease (no or yes), history of cancer (no or yes), and obesity (body mass index [BMI]  $< 18.5 \text{ kg/m}^2$ : underweight,  $18.5 \text{ kg/m}^2 \leq \text{BMI} < 23$

kg/m<sup>2</sup>: normal, 23 kg/m<sup>2</sup> ≤ BMI < 25 kg/m<sup>2</sup>: overweight, and 25 kg/m<sup>2</sup> ≤ BMI: obese).

### Statistical analysis

Statistical analysis was conducted using SAS (version 9.4; SAS Institute Inc.). Descriptive statistics were generated to display participant's responses to survey questions and reported as n (%). Chi-square tests were used to compare the frequencies and proportions of potentially related factors among the varying levels of awareness or practice of each global dietary recommendation for cancer prevention. Multi-variable logistic regression analyses were performed to identify factors associated with the degree of awareness or practice of four dietary recommendations. ORs and 95% CI were estimated. To ascertain groups with low levels of awareness and practice, the "high" and "moderate" groups were used as OR references. The ORs were adjusted for the categorized potentially related factors. Finally, to examine whether practice rates varied by obesity status within specific subgroups, additional analyses stratified by age and household type were conducted. Statistical significance was set at  $P < 0.05$ .

## RESULTS

### General characteristics of the study population

The general characteristics of the participants are shown in Table 1. Most participants were 40 to 59 years of age (44.8%), resided in small and medium cities (49.5%), had a college qualification or above (78.3%), were married (56.8%), had a monthly household income of 3,000,000 to 6,000,000 Korean won (45.7%), and lived in a multi-person household (89.9%). Among the 4,000 participants, 3,302 (82.6%) exhibited awareness of the dietary recommendations for cancer prevention, 869 (21.7%) were classified as overweight, and 1,005 (25.1%) were considered obese. Additionally, 1,358 (34.0%) and 253 (6.3%) reported histories of chronic disease and cancer, respectively.

### Awareness, practice, and perceived necessity rate of each global dietary recommendation for cancer prevention

The awareness and practice rates for each global dietary recommendation for cancer prevention are summarized in Table 2. More than half of the participants (54.8%-60.3%) recognized that each dietary recommendation was considerably related to cancer prevention, whereas less than 10% (8.3%-9.9%) considered it of no or low relevance. The percentage of participants reporting high practice was < 40% (34.6%-39.0%), whereas those reporting low practice accounted for approximately 30% (28.8%-30.7%) across all recommendations.

The perceived necessity of cancer prevention guidelines, including recommendations to consume a diet rich in whole grains and limit the consumption of processed meat, sug-

**Table 1.** General characteristics of the participants

Variable	Total (n = 4,000)
Sex	
Male	2,036
Female	1,964
Age (yr)	
20-39	1,392 (34.8)
40-59	1,792 (44.8)
60-69	816 (20.4)
Region	
Urban	1,749 (43.7)
Mid-sized cities	1,980 (49.5)
Rural	271 (6.8)
Education level	
Middle school or below	44 (1.1)
High school	823 (20.6)
College or above	3,133 (78.3)
Marital status	
Married	2,270 (56.8)
Single	1,431 (35.8)
Widowed/divorced/separated	299 (7.5)
Monthly household income (10,000 Korean won)	
< 300	976 (24.4)
300-600	1,827 (45.7)
≥ 600	1,197 (29.9)
Household type	
Single-person	403 (10.1)
Multi-person	3,597 (89.9)
Physical activity	
Inactive	3,459 (86.5)
Active	541 (13.5)
Nutrition education	
No	3,226 (80.7)
Yes	774 (19.4)
Obesity	
Underweight	281 (7.0)
Normal	1,845 (46.1)
Overweight	869 (21.7)
Obese	1,005 (25.1)
History of cancer	
No	3,747 (93.7)
Yes	253 (6.3)
History of chronic disease	
No	2,642 (66.1)
Yes	1,358 (34.0)
Type of chronic disease	
Hypertension	616 (15.4)
Dyslipidemia	277 (6.9)
Type 2 diabetes	232 (5.8)
Awareness of dietary recommendations for cancer prevention	
No	698 (17.5)
Yes	3,302 (82.6)

Values are presented as number (%). "Physically active" is defined as performing 150 minutes a week of moderate-to-vigorous intensity physical activity.

**Table 2.** Awareness and practice rates of global dietary recommendations for cancer prevention

Variable	Awareness				Practice			
	Low relevance	Moderate relevance	High relevance	Do not know	Low practice	Moderate practice	High practice	Do not know
Eat a diet rich in whole grains	350 (8.8)	1,344 (33.6)	2,192 (54.8)	114 (2.9)	1,160 (29.0)	1,359 (34.0)	1,435 (35.9)	46 (1.2)
Limit consumption of processed meat	365 (9.1)	1,149 (28.7)	2,412 (60.3)	74 (1.9)	1,152 (28.8)	1,423 (35.6)	1,382 (34.6)	43 (1.1)
Limit consumption of sugar-sweetened beverages	397 (9.9)	1,208 (30.2)	2,290 (57.3)	105 (2.6)	1,172 (29.3)	1,231 (30.8)	1,561 (39.0)	36 (0.9)
Limit consumption of fast and other processed foods	329 (8.2)	1,191 (29.8)	2,398 (60.0)	82 (2.0)	1,226 (30.7)	1,332 (33.3)	1,406 (35.2)	36 (0.9)

Values are presented as number (%).

**Table 3.** Perceived necessity of global dietary recommendations for cancer prevention

Variable	Perceived necessity				
	Absolutely necessary	Necessary	Not necessary	Not necessary at all	Do not know
Eat a diet rich in whole grains	903 (22.6)	2,383 (59.6)	411 (10.3)	70 (1.8)	233 (5.8)
Limit consumption of processed meat	1,554 (38.9)	1,857 (46.4)	387 (9.7)	94 (2.4)	108 (2.7)
Limit consumption of sugar-sweetened beverages	1,411 (35.3)	2,060 (51.5)	341 (8.5)	77 (1.9)	111 (2.8)
Limit consumption of fast and other processed foods	1,555 (38.9)	1,929 (48.2)	340 (8.5)	82 (2.1)	94 (2.4)

Values are presented as number (%).

ar-sweetened beverages, and fast and other processed foods, is presented in Table 3. Over 80% of the respondents considered these recommendations “necessary” or “absolutely necessary,” whereas less than 13% deemed them “not necessary” or “not necessary at all.”

### Low vs. moderate-to-high awareness of each global dietary recommendation

The frequencies of the various awareness levels of each global dietary recommendation are presented in Table S1-S4. The ORs of the awareness levels of four recommendations are listed in Table 4. For all four items, males exhibited lower awareness. On assessing the relevance of “eating a diet rich in whole grains” to cancer prevention, low awareness was associated with a younger age (ORs: 1.465 and 1.846 in the 40 to 59- and 20 to 39-year age groups, respectively). Regarding the “Limit consumption of processed meat” recommendation, individuals with a below-high-school level of education exhibited lower awareness. As regards the “Limit consumption of sugar-sweetened beverages” recommendation, individuals residing in rural areas and those with a high school level of education displayed lower awareness. Additionally, individuals with underweight or obesity demonstrated significantly lower awareness. Participants aged 40 to 59 years with a high school level of education exhibited lower awareness of “Limit consumption of fast and other processed foods.”

### Low vs. moderate-to-high practice of each global dietary recommendation

The frequencies of the various practice levels of each global

dietary recommendation are shown in Table S5-S8. Table 5 shows the ORs of the awareness levels of all four guidelines. In terms of practice, individuals exhibiting lower adherence to all four items were characterized by younger age, physical inactivity, and no histories of nutrition education or cancer. Participants displaying lower practice to “Eat a diet rich in whole grains” were generally younger, rural and mid-sized city residents, unmarried, single-person household inhabitants, physically inactive, and of no prior nutrition education or history of cancer. Those exhibiting lower practice to “Limit consumption of processed meat” tended to be younger, rural residents, unmarried, physically inactive, obese, and of no prior nutrition education or history of cancer. Similarly, regarding “Limit consumption of sugar-sweetened beverages,” lower-practice individuals were generally younger, mid-sized city and rural residents, physically inactive, obese, and of no prior nutrition education or history of cancer. Participants who were of a younger age, unmarried, single-person household inhabitants, physically inactive, and of no prior nutrition education or history of cancer exhibited lower practice of “Limit consumption of fast foods and other processed foods.”

The results of the stratified analysis examining differences in practice rates by obesity status across age groups and household types are presented in Table 6. Younger individuals with obesity demonstrated particularly low adherence to limiting the consumption of processed meat and sugar-sweetened beverages. Obesity did not significantly impact adherence in single-person households. Nonetheless, in multi-person households, it was associated with significantly lower practice to limiting the consumption of processed meat,

**Table 4.** aORs for low vs. moderate-to-high awareness across dietary guidelines for cancer prevention in Korea

Variable	Eat a diet rich in whole grains	Limit consumption of processed meat	Limit consumption of sugar-sweetened beverages	Limit consumption of fast and other processed foods
Sex				
Female	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
Male	1.360 (1.071-1.726)	1.366 (1.082-1.725)	1.272 (1.016-1.594)	1.694 (1.321-2.173)
Age (yr)				
60-69	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
40-59	1.465 (1.021-2.101)	1.340 (0.965-1.861)	1.205 (0.893-1.626)	1.627 (1.157-2.287)
20-39	1.846 (1.222-2.787)	1.466 (0.993-2.164)	1.063 (0.736-1.535)	1.470 (0.972-2.223)
Region				
Urban	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
Mid-sized cities	0.915 (0.728-1.150)	0.944 (0.752-1.186)	1.116 (0.894-1.394)	0.986 (0.776-1.252)
Rural	0.654 (0.387-1.107)	1.153 (0.756-1.758)	1.510 (1.020-2.237)	0.993 (0.628-1.570)
Education level				
College or above	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
High school	1.046 (0.781-1.401)	1.480 (1.135-1.930)	1.412 (1.097-1.818)	1.775 (1.357-2.321)
Middle school or below	1.533 (0.529-4.437)	2.761 (1.181-6.457)	1.281 (0.489-3.352)	2.398 (0.971-5.927)
Marital status				
Married	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
Single	1.131 (0.837-1.528)	1.202 (0.890-1.623)	1.077 (0.803-1.446)	1.031 (0.748-1.423)
Widowed/divorced/separated	0.628 (0.353-1.118)	1.193 (0.769-1.852)	1.155 (0.768-1.736)	1.260 (0.814-1.951)
Monthly household income (10,000 Korean won)				
≥ 600	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
300-600	1.041 (0.797-1.359)	0.961 (0.738-1.250)	1.254 (0.964-1.632)	1.044 (0.783-1.390)
< 300	1.005 (0.717-1.408)	0.930 (0.670-1.291)	1.255 (0.909-1.733)	1.278 (0.908-1.801)
Household type				
Multi-person	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
Single-person	1.190 (0.820-1.728)	0.992 (0.679-1.449)	1.101 (0.767-1.582)	1.158 (0.788-1.700)
Physical activity				
Active	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
Inactive	1.285 (0.897-1.842)	1.036 (0.747-1.436)	1.071 (0.781-1.468)	0.910 (0.654-1.267)
Nutrition education				
Yes	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
No	1.177 (0.872-1.587)	1.099 (0.824-1.466)	1.091 (0.826-1.441)	1.137 (0.834-1.549)
History of chronic disease				
Yes	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
No	1.176 (0.912-1.516)	1.207 (0.942-1.547)	1.166 (0.921-1.476)	0.975 (0.757-1.255)
History of cancer				
Yes	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
No	0.928 (0.572-1.508)	0.910 (0.572-1.449)	0.700 (0.465-1.056)	1.189 (0.707-1.998)
Obesity				
Underweight	1.068 (0.675-1.691)	1.011 (0.641-1.596)	1.501 (1.004-2.244)	1.178 (0.736-1.886)
Normal	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
Overweight	0.975 (0.717-1.326)	1.053 (0.788-1.408)	1.085 (0.815-1.444)	1.038 (0.765-1.408)
Obese	1.276 (0.971-1.675)	1.138 (0.867-1.494)	1.370 (1.055-1.780)	1.104 (0.829-1.469)

Values are presented as OR (95% CI). The aORs represent the low-awareness group. The reference is the moderate-to-high-awareness group. The aORs were adjusted for age, sex, region, education level, marital status, monthly household income, household type, physical activity, nutrition education, and chronic disease and/or cancer diagnosis. aORs, adjusted ORs.

sugar-sweetened beverages, and fast and other processed foods.

## DISCUSSION

This study examined the level of awareness and practice to

global dietary recommendations for cancer prevention among Koreans. The survey findings offer initial insights into a population with low awareness and practice.

Global cancer prevention guidelines include dietary recommendations such as limiting processed meats, sugar-sweetened beverages, fast food, and other processed



**Table 5.** aORs for low vs. moderate-to-high practice across dietary guidelines for cancer prevention in Korea

Variable	Eat a diet rich in whole grains	Limit consumption of processed meat	Limit consumption of sugar-sweetened beverages	Limit consumption of fast and other processed foods
Sex				
Female	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
Male	0.948 (0.816-1.101)	1.086 (0.935-1.262)	1.007 (0.868-1.170)	1.063 (0.917-1.233)
Age (yr)				
60-69	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
40-59	1.617 (1.304-2.005)	1.533 (1.235-1.903)	1.507 (1.218-1.865)	1.877 (1.510-2.333)
20-39	2.087 (1.619-2.691)	2.192 (1.701-2.825)	2.249 (1.749-2.892)	2.683 (2.080-3.462)
Region				
Urban	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
Mid-sized cities	1.217 (1.050-1.411)	1.079 (0.931-1.251)	1.186 (1.024-1.374)	1.134 (0.981-1.311)
Rural	1.588 (1.198-2.103)	1.328 (1.001-1.762)	1.358 (1.023-1.803)	1.172 (0.880-1.561)
Education level				
College or above	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
High school	1.029 (0.857-1.236)	1.134 (0.946-1.360)	1.033 (0.861-1.240)	1.096 (0.915-1.314)
Middle school or below	0.862 (0.410-1.813)	0.655 (0.295-1.455)	1.240 (0.625-2.462)	1.127 (0.546-2.324)
Marital status				
Married	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
Single	1.223 (1.008-1.485)	1.226 (1.011-1.487)	1.192 (0.983-1.445)	1.245 (1.030-1.507)
Widowed/divorced/separated	0.943 (0.695-1.278)	0.868 (0.637-1.182)	0.987 (0.730-1.335)	1.132 (0.843-1.521)
Monthly household income (10,000 Korean won)				
≥ 600	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
300-600	0.920 (0.777-1.090)	1.070 (0.901-1.270)	0.863 (0.729-1.021)	0.898 (0.760-1.060)
< 300	0.961 (0.776-1.188)	1.226 (0.991-1.516)	1.008 (0.817-1.244)	0.826 (0.669-1.021)
Household type				
Multi-person	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
Single-person	1.594 (1.254-2.027)	1.230 (0.965-1.567)	0.934 (0.728-1.197)	1.284 (1.008-1.635)
Physical activity				
Active	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
Inactive	1.826 (1.439-2.316)	1.497 (1.192-1.880)	1.565 (1.245-1.968)	1.618 (1.287-2.034)
Nutrition education				
Yes	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
No	1.609 (1.326-1.953)	1.468 (1.212-1.778)	1.656 (1.364-2.009)	1.686 (1.391-2.043)
History of chronic disease				
Yes	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
No	0.882 (0.754-1.032)	0.965 (0.825-1.130)	0.889 (0.761-1.039)	0.975 (0.835-1.140)
History of cancer				
Yes	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
No	1.524 (1.083-2.146)	1.531 (1.086-2.159)	2.085 (1.442-3.016)	2.131 (1.472-3.087)
Obesity				
Underweight	0.899 (0.676-1.197)	0.992 (0.744-1.321)	0.822 (0.614-1.101)	0.892 (0.670-1.187)
Normal	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
Overweight	0.963 (0.796-1.164)	0.976 (0.805-1.183)	0.946 (0.782-1.146)	0.990 (0.820-1.195)
Obese	1.016 (0.850-1.216)	1.380 (1.157-1.646)	1.254 (1.052-1.495)	1.161 (0.974-1.383)

Values are presented as OR (95% CI). The aORs represent the low-practice group. The reference is the moderate-to-high-practice group. The aORs were adjusted for age, sex, region, education level, marital status, monthly household income, household type, physical activity, nutrition education, and chronic disease and/or cancer diagnosis. aORs, adjusted ORs.

foods, increasing whole grains, and avoiding hot food and drinks [5,7,8,14]. These guidelines were established based on extensive research findings demonstrating an association between cancer risk and the consumption of whole grains [15], processed meats [16,17], sugar-sweetened beverages [18], processed foods [19], and hot drinks [20]. This study

assessed awareness and practices regarding four dietary factors including whole grain, processed meat, sugar-sweetened beverages and fast food, commonly recommended by major international institutions. According to our research findings, more than 80% of the respondents considered all global dietary guidelines essential. However, the Korean can-

**Table 6.** Stratified analysis of low vs. moderate-to-high practice of each dietary recommendation for cancer prevention in Korea according to covariates

Variable			Eat a diet rich in whole grains	Limit consumption of processed meat	Limit consumption of sugar-sweetened beverages	Limit consumption of 'fast foods' and other processed foods
Age (yr)	20-39	Not obese	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
		Obese	1.147 (0.881-1.493)	1.590 (1.229-2.056)	1.468 (1.135-1.898)	1.222 (0.946-1.579)
	40-59	Not obese	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
		Obese	0.925 (0.721-1.187)	1.325 (1.038-1.692)	1.214 (0.951-1.551)	1.244 (0.979-1.580)
	≥ 60	Not obese	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
		Obese	0.973 (0.628-1.507)	1.219 (0.788-1.884)	1.119 (0.728-1.720)	0.874 (0.554-1.378)
Household type	Single-person	Not obese	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
		Obese	0.880 (0.544-1.424)	1.216 (0.748-1.977)	1.009 (0.609-1.670)	0.626 (0.380-1.032)
	Multi-person	Not obese	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)	1.000 (Reference)
		Obese	1.067 (0.895-1.274)	1.418 (1.194-1.685)	1.342 (1.131-1.593)	1.259 (1.060-1.494)

Values are presented as OR (95% CI). The aORs represent the obese group. The reference is non-obese group. The aORs were adjusted for age, sex, region, education level, marital status, monthly household income, physical activity, nutrition education, and chronic disease and/or cancer diagnosis. aORs, adjusted ORs.

cancer prevention guidelines do not include the dietary recommendations found in global guidelines. This can be attributed primarily to two factors: (1) the guidelines were established nearly 20 years ago and do not account for the evolution of Korean dietary patterns over time, and (2) studies specifically focusing on the Korean population remain limited. With economic growth and lifestyle transformations, the supply of vegetables, fruits, and grains and energy intake proportion from carbohydrates have decreased compared to two decades ago. Conversely, the supply of beverages, eggs, and dairy products; energy intake proportion from fats; consumption of convenience food; and dining out have increased [10,21]. In addition, previous studies have revealed that the percentage of energy consumed from ultra-processed foods has increased from 23.1% (2010-2012) to 26.1% (2016-2018) in Korea [11]. From 1998 to 2009, the number of people in South Korea who self-reportedly consumed western-style fast foods and sugar-sweetened beverages nearly doubled [22]. Additional research focused on the Korean population is needed to develop evidence-based dietary guidelines for the Korean population. Once a sufficient body of research has been established, dietary guidelines should be revised to incorporate recommendations that reflect changes in dietary patterns among Koreans and support cancer prevention.

The results indicated that more than 50% to 60% of participants recognized a strong connection between global dietary guidelines and cancer prevention, fewer than 40% reported high practice. These figures are notably lower than those reported in a 2021 survey assessing awareness and practice to domestic cancer prevention recommendations. In that survey, 86.4% to 95.8% of participants acknowledged the strong relationship between dietary recommendations and cancer prevention, and 40.8% to 87.6% frequently practiced the recommendations [13]. This discrepancy may be attributed to the limited exposure to global cancer prevention guidelines compared to Korean dietary guidelines, which specifically

designed for the Korean population. Furthermore, the issue is twofold: (1) the relatively low proportion of individuals with strong awareness in this survey and (2) the concerning gap between awareness and actual practice.

Additionally, this study confirmed that the awareness and practice of cancer prevention guidelines are determined by lifestyle factors. Logistic regression analysis indicated that sex was a significant factor influencing awareness across all four guidelines. Males were more likely to recognize a weak association between dietary factors and cancer prevention across all dietary items. This apparently results from sex differences in food knowledge, dietary habits, and health attitudes [23,24]. In terms of practice, the factors associated with all four items were age, nutrition education, physical inactivity, and a history of cancer diagnosis. Respondents who were younger, physically inactive, and of no prior nutrition education or history of cancer were more likely to demonstrate low practice. This exhibits consistency with a previous study wherein younger age was associated with a higher consumption of processed foods and sugary beverages [11]. In addition, educational intervention in cancer prevention aligns with previous studies that aimed to raise awareness and improve attitudes. Educational intervention in cancer risk factor recognition in adolescents reportedly raises awareness of cancer risk factors [25], and cancer prevention programs for elementary school students purportedly enhance knowledge of and improve attitudes toward cancer prevention [26]. Individuals with a history of cancer are likely to have encountered cancer prevention guidelines or paid more attention to their health in order to recover from cancer, potentially encouraging them to adhere to these practices more diligently than those who have never had cancer. Therefore, to effectively prevent cancer, these lifestyle factors need to be healthfully modified.

Finally, excessive body fat is known to create a carcinogenic environment through diverse pathways [27]. Therefore, the ACS recommends achieving and maintaining a healthy

body weight throughout life for cancer prevention [7]. On this premise, reducing obesity presumably contributes to cancer prevention. Although studies on cancer and diet in the Korean population are limited, research on the association between obesity and various dietary factors has been extensive [28-30]. Our results demonstrate that people with obesity are associated with higher odds of low practice than those with a normal weight for the following guidelines: "Limit consumption of processed meat" and "Limit consumption of sugar-sweetened beverages."

Furthermore, a stratified analysis was conducted to examine differences in the practice of dietary recommendations based on obesity status within specific subgroups. Among the factors that significantly influenced dietary practice across all recommendations in the initial analysis, age was selected for stratification, as the impact of obesity on dietary practice may vary by age group. Additionally, this study conducted a stratified analysis based on household type, as the initial results indicated that household type influenced the practice of whole grain and processed food consumption rather than the intake of processed meat and sugar-sweetened beverages, which were more closely associated with obesity. Therefore, this analysis aimed to examine the probability of dietary practice when both household type and obesity status were considered simultaneously. The stratified analysis revealed that younger individuals or those living in multi-person households with obesity exhibited lower practice of limiting processed meat and sugar-sweetened beverage consumption compared to their non-obese counterparts. These findings suggest the need for tailored dietary guidelines targeting populations with lower levels of practice.

This study has several limitations. First, it utilized an online, self-reported questionnaire to assess awareness and practice regarding cancer prevention. However, due to the subjective nature of individual responses, the actual awareness and practice levels may differ from what was reported. Second, as a cross-sectional study, it was unable to establish causal relationships. Specifically, it could not determine whether awareness influences practice or whether practice leads to improved cancer prevention. Despite these limitations, this study is significant in that it is the first to examine the awareness and practice of "processed food intake, processed meat intake, whole grain intake, sugary beverage intake, and cancer prevention" by exploring the evolving eating habits of Koreans. In addition, this study's investigation of low-awareness and low-practice groups, using assorted variables, will provide foundational data for identifying and improving factors that influence cancer prevention awareness and practice.

In conclusion, according to studies targeting the Korean population, improving cancer prevention guidelines based on the evolution of dietary habits over time is indispensable. Additionally, promoting and encouraging the practice of these guidelines are required to more effectively prevent cancer.

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## CONFLICTS OF INTEREST

No potential conflicts of interest were disclosed.

## SUPPLEMENTARY MATERIALS

Supplementary materials can be found via <https://doi.org/10.15430/JCP.24.036>.

## ORCID

Ahyoung Yun, <https://orcid.org/0000-0001-5613-8138>  
Yoonjoo Choi, <https://orcid.org/0000-0001-7903-8324>  
Hyein Jung, <https://orcid.org/0000-0002-2426-0830>  
Byungmi Kim, <https://orcid.org/0000-0001-8621-9190>

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