

## Korean Female Adolescents' Food Attitudes and Food Intake Relative to the Korean Food Tower (II) : Food Attitudes

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### ABSTRACT

The food attitudes of 285 Korean female students attending a secondary school in Seoul were examined with respect to the 5 food groups of the Korean Food Tower : grain products, vegetables and fruits, meat, milk, and fats and sweets. An instrument with 22 items was utilized to measure food attitudes toward the five food groups. The items were categorized into five factors through factor analysis to obtain a description of the participants' food attitudes. The five factors are conscious choice of food, health concerns, economics and time influence, interest in foods, and foods that energize. Several facts emerged from examining the food attitudes. The most evident was their response to the items concerning the influence of economics and time on food choice, which the majority consider not limiting their food consumption. Most participants gave favorable responses for vegetables and fruits on all the five factors, but gave unfavorable responses for meat group and fats and sweets in health concerns. They also gave favorable responses for "foods that energize" for all except fats and sweets. Four of the total 25 relationships among food intake (five groups) and food attitudes (five factors) were found to have significant positive correlations ( $p < .01$ ). (*J Community Nutrition* 4(3) : 180~186, 2002)

**KEY WORDS :** Korean female adolescents · food attitudes · Korean Food Tower.

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### Introduction

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An unbalanced diet was pointed out in I : Food Intake as one of the serious concerns facing Korean female adolescents (Kim & Amos 2002). Although the mean of the total standardized serving frequency in each food group was 10% to 77% above what is recommended by the dietary guideline of the Korean Nutrition Society (KNS) except in fats and sweets where it was 12.5% below, all five food groups had a significant percentage of respondents who did not meet the recommended serving frequencies. It was shown that 65.7% and 54.7% of the participants were in need of foods from the fats and sweets group and the meat group, and that a substantial percentage of the participants fell short of the recommendation in more than one food group, only 20% satisfying the guidelines in all five groups. An unbalanced

diet was an apparent fact that characterized the respondents' food intake.

Food choices are influenced by many factors : food supply and availability ; income and food prices ; other demographic factors ; environmental factors ; biological factors ; sociocultural factors ; food preferences, cognition, and attitudes ; and food beliefs (Betts et al. 1997 ; Borah-Giddens & Falciglia 1993 ; Boyle & Morris 1994 ; Drewnowski & Popkin 1997 ; Harnack et al. 1997 ; Hunt & Pope 1996 ; Keim et al. 1997 ; Lewis et al. 1988 ; Neumark-Sztainer et al. 1997 ; Parraga 1990 ; Pope et al. 1997 ; Story et al. 1998 ; Velempini & Travers 1997). Although there has been some research investigating the relationships among demographic factors, personal attributes, and food behavior of Korean adolescents (Cho et al. 1994 ; Kim et al. 1998 ; Kim et al. 1998 ; Lee & Lee 1986 ; Lee & Yoo 1997 ; Moon et al. 1989), it is hard to find articles examining the food attitudes of Korean adolescents in detail. The purpose of this study was to examine Korean adolescents' food attitudes and to determine the relationships between participants' food intake and attitudes. The study will provide baseline data to

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develop future nutrition education programs, to design nutrition education materials, and to improve the home economics curriculum for secondary school students in Korea.

## Method

### 1. Instrument

Twenty-two items were employed to examine the participants' attitudes toward food. A five-point Likert-type scale was used to indicate : 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. After the instrument was reviewed by four expert judges, their comments about the instrument were incorporated into the final revision of the instrument.

### 2. Pilot testing

A pilot test was conducted with 20 Korean secondary school students to check the adequacy and reliability of the instrument, data collection techniques, data processing procedures, and data analysis methods. All of the participants fulfilled the necessary sample selection criteria : 14 to 18 year old secondary school students and Korean. The Korean version of the instrument was administered to them and the collected data were analyzed by using SPSS sub-programs.

### 3. Data collection

One secondary girls' school in Seoul, Korea, was selected by convenience sampling. The sample (N = 285 students) was composed of 81 female students from the third year of middle school (9<sup>th</sup> grade in American school system), 96 from the first year of high school (10<sup>th</sup> grade in American school system), and 108 from the second year of high school (11<sup>th</sup> grade in American school system). The Korean version of the instrument was administered to them during their home economics classes.

### 4. Data analysis

The 22 attitude items on the instrument were categorized into five factors through factor analysis using the SPSS FACTOR sub-program to obtain a description of the participants' food attitudes. Reliability for the food attitude scale was checked by calculating Cronbach's coefficient alpha using a SPSS sub-program. Descriptive statistics were obtained in order to describe food attitudes with regard to the five factors. The relationships among food intake and food attitudes were examined by obtaining Pearson product-

moment correlation coefficients.

## Results

### 1. Food attitudes

In order to describe the participants' food attitudes, the 22 items on the instrument were categorized into five factors through factor analysis. The factor analysis utilized an extraction method (principal components analysis) and a rotation method (Varimax with Kaiser normalization), which produced, as a result, a rotated orthogonal component matrix for each of the five food groups. The rotated component

**Table 1.** Reliability of all the items in each factor with respect to the total food groups<sup>a</sup>

| Factor                        | Reliability for the total five food groups |
|-------------------------------|--|
| 1. Conscious choice of food   | 0.69                                       |
| 2. Health concerns            | 0.74                                       |
| 3. Economics & time influence | 0.84                                       |
| 4. Interest in foods          | 0.62                                       |
| 5. Foods that energize        | 0.74                                       |

a : Reliability for the total 5 food groups is based on 7 items in factor 1, 6 items in factor 2, 4 items in factor 3, 3 items in factor 4, and 2 items in factor 5. Sample size, N = 285

**Table 2.** Food attitude scores by the five factors and the five food groups (N = 285)

| Factor                        | Food group | Grain products | Vegetables & fruits | Meat | Milk | Fat & Sweets |
|-------------------------------|------------|----------------|---------------------|------|------|--------------|
| 1. Conscious choice of food   | Mean       | 3.25           | 3.55                | 3.27 | 3.15 | 3.01         |
|                               | S.D.       | 0.47           | 0.50                | 0.50 | 0.54 | 0.54         |
|                               | Mode       | 3.43           | 3.71                | 3.43 | 3.29 | 2.71         |
| 2. Health concerns            | Median     | 3.29           | 3.57                | 3.29 | 3.14 | 3.00         |
|                               | Mean       | 3.09           | 4.15                | 2.64 | 3.39 | 2.12         |
|                               | S.D.       | 0.57           | 0.57                | 0.51 | 0.57 | 0.55         |
| 3. Economics & time influence | Mode       | 3.00           | 4.00                | 2.67 | 3.50 | 2.17         |
|                               | Median     | 3.00           | 4.17                | 2.67 | 3.33 | 2.17         |
|                               | Mean       | 4.01           | 3.92                | 3.51 | 4.11 | 3.86         |
| 4. Interest in foods          | S.D.       | 0.57           | 0.66                | 0.75 | 0.59 | 0.57         |
|                               | Mode       | 4.00           | 4.00                | 4.00 | 4.25 | 4.00         |
|                               | Median     | 4.00           | 4.00                | 3.50 | 4.25 | 4.00         |
| 5. Foods that energize        | Mean       | 3.09           | 3.70                | 3.10 | 3.47 | 2.90         |
|                               | S.D.       | 0.66           | 0.72                | 0.67 | 0.77 | 0.70         |
|                               | Mode       | 3.00           | 3.67                | 3.00 | 3.33 | 3.00         |
| 5. Foods that energize        | Median     | 3.00           | 3.67                | 3.00 | 3.67 | 3.00         |
|                               | Mean       | 3.60           | 3.60                | 3.87 | 3.68 | 2.96         |
|                               | S.D.       | 0.86           | 0.82                | 0.76 | 0.79 | 0.83         |
| 5. Foods that energize        | Mode       | 3.50           | 3.50                | 4.00 | 3.50 | 3.00         |
|                               | Median     | 3.50           | 3.50                | 4.00 | 3.50 | 3.00         |

matrix provided the information necessary to isolate the items pertaining to a specific factor. Five factors, thus determined, were named, based on the content of the items : 1) conscious choice of food, 2) health concerns, 3) economics and time influence, 4) interest in foods, and 5) foods that energize. The reliability for all of the items pertaining to each factor was calculated with respect to the total food groups ; these results are presented in Table 1. The reliabilities of factors 1, 2, 3, 4, and 5 are 0.69, 0.74, 0.84, 0.62, and 0.74, respectively. The overall trend in attitudes is summarized in Table 2, where the mean, standard deviation, mode, and median for each food group are displayed for each factor. The items belonging to each factor are given in Tables 3 through 7, along with their mean scores.

### 1) Factor 1 : Conscious choice of food

Table 2 displays median values ranging from 3.00 to 3.57, and mean scores from 3.01 to 3.55, with standard deviations near 0.5, "fats and sweets" and "vegetables and fruits" being the lower and upper limit of both median and mean, respectively. The scores higher than 3.0 indicate a more favorable

attitude toward the food group as it relates to conscious choice of food. The data indicate that, in general, the majority of the participants chose foods consciously, especially "vegetables and fruits."

Individual mean scores for the 7 items in factor 1 are shown in Table 3. The data in Table 3 reveal at least two facts that are hidden in Table 2. First, the response to item 7 was "disagree" (mean = 2.15 to 2.63) in all food groups, reflecting that the majority, in general, did not make a conscious effort to eat the recommended number of servings of the foods. The removal of item 7 would move the general attitude for "conscious choice of food" closer to the "agree" side. Another fact is that three items (2, 3, and 7) of the seven items had mean scores for "fats and sweets" on the "disagree" side, and the other four items (5, 6, 14, and 15) on the slightly "agree" side. It is also indicated in Table 3 that the respondents ate better at home (item 3), except for "fats and sweets," and with others (item 2) except for "milk" and "fats and sweets." They did not seem to have much difficulty in learning to like a variety of foods whether familiar (item 14) or new (item 6), and ate enough (item 15)

**Table 3.** Means for the seven items on factor 1 indicating "conscious choice of food" for the five food groups (N = 285)

| Questionnaire item  | Food group | Grain products | Vegetables & fruits | Meat | Milk | Fats & sweets |
|---|------------|----------------|---------------------|------|------|---------------|
| 2. I eat better when I eat with others.                                     |            | 3.20           | 3.62                | 3.83 | 2.42 | 2.81          |
| 3. I eat better when I eat at home.   |            | 3.79           | 3.88                | 3.35 | 3.28 | 2.63          |
| 5. Teenage girls are concerned about eating more                            |            | 2.75           | 3.81                | 3.05 | 3.56 | 3.37          |
| 6. I do not know what to do when it comes to new choices for <sup>a</sup>   |            | 3.54           | 3.51                | 3.12 | 3.54 | 3.26          |
| 7. I need to make a conscious effort to consume the recommended servings of |            | 2.22           | 2.15                | 2.46 | 2.26 | 2.63          |
| 14. I can learn to like these foods.  |            | 3.35           | 4.07                | 3.55 | 3.65 | 3.11          |
| 15. I think I eat enough of these foods.                                    |            | 3.90           | 3.85                | 3.53 | 3.39 | 3.23          |

a : Scoring is reversed to account for the negative valence.

**Table 4.** Means for the six items in factor 2 indicating "health concerns" for the five food groups (N = 285)

| Questionnaire item  | Food group | Grain products | Vegetables & fruits | Meat | Milk | Fats & sweets |
|---|------------|----------------|---------------------|------|------|---------------|
| 1. I would feel healthier if I would eat more                                 |            | 3.27           | 4.40                | 2.73 | 4.10 | 2.21          |
| 9. Consuming a variety of these foods will decrease my risk of heart disease. |            | 3.03           | 2.24                | 2.44 | 3.05 | 2.15          |
| 12. Individuals who eat these foods are health conscious.                     |            | 3.31           | 4.30                | 2.94 | 3.87 | 2.27          |
| 16. Individuals who consume these foods are healthier.                        |            | 3.53           | 4.19                | 3.19 | 3.91 | 2.39          |
| 20. Individuals who consume these foods are female weight watchers.           |            | 2.66           | 4.51                | 2.10 | 3.19 | 1.77          |
| 22. When I eat these foods, I am afraid of the residues of pesticides.        |            | 2.73           | 3.76                | 2.42 | 2.22 | 2.12          |

regardless of the food group. The response to item 5 indicates that the participating girls had a slightly unfavorable (mean = 2.75) preference for “grain products.”

## 2) Factor 2 : Health concerns

The five food groups were divided into three sub-groups depending upon the participants' judgment about health concerns : affecting positively, neutral, or affecting negatively (Table 2). Judging from the median, 4.17 for “vegetables and fruits,” with mean = 4.15 (S.D. = 0.57), and 3.33 for “milk,” with mean = 3.39 (S.D. = 0.57), the majority of the participants considered the two food groups to be health-promoting, especially “vegetables and fruits.” “Grain products” generally were considered neutral in health concerns, with median = 3.00 and mean = 3.09 (S.D. = 0.57). The remaining two groups, “meat,” with median = 2.67 and mean = 2.64 (S.D. = 0.51), and “fats and sweets,” with median = 2.17 and mean = 2.12 (S.D. = 0.55), were considered to have a negative effect on health, especially “fats and sweets.”

The responses to the six items for factor 2 are shown in Table 4. “Vegetables and fruits” and “milk” were evaluated highly for feeling healthier (item 1), health consciousness (item 12), and being healthier (item 16), with mean scores of 4.19 to 4.40 for the former group and 3.87 to 4.10 for the latter. The majority considered “vegetables and fruits” best for female weight watchers (item 20) as was evident in the highest mean, 4.51, but “fats and sweets” and “meat” were

lowest, with mean scores of 1.77 and 2.10, respectively. However, “vegetables and fruits” obtained a substantially lower score, 2.24, in item 9, when asked if its consumption would decrease the risk of heart disease, and the highest score relative to concern about pesticide residues (mean = 3.76 in item 22). “Fats and sweets” received scores below 2.4 for all of the items in factor 2 ; whereas, “meat” was rated almost neutral in health consciousness (item 12, mean = 2.94) and being healthier (item 16, mean = 3.19).

## 3) Factor 3 : Economics and time influence

Table 2 indicates the median and mode to be 4.00 or above for all of the food groups, except “meat (3.50).” The average was 3.51 for “meat,” and above 3.86 for the other four groups, with standard deviations of 0.57 to 0.75. The data indicated that economics and time had little influence on food choice for the majority.

The data in Table 5, showing the means of individual items for each food group, are in accord with the general information contained in Table 2. No single item had a mean score on the “disagree” side. The means for item 8, about budget, were all above 4.00, suggesting that economics offered almost no limitations in the respondents' food consumption. “Meat” means were the low in items 8, 10, and 17, asking, respectively, about the influence of budget, time, and other possible limitations, although the means were all on the “agree” side. For item 19, concerning the influence of availability, the mean for “meat” was lowest (3.39) as was

**Table 5.** Means for the four items in factor 3 indicating “economics and time influence” for the five food groups (N = 285)

| Questionnaire item  | Food group | Grain products | Vegetables & fruits | Meat | Milk | Fats & sweets |
|---|------------|----------------|---------------------|------|------|---------------|
| 8. My parents have a limited budget to purchase these foods. <sup>a</sup> |            | 4.53           | 4.32                | 4.09 | 4.44 | 4.44          |
| 10. I do not have enough time to eat these foods. <sup>a</sup>            |            | 3.68           | 4.02                | 3.30 | 4.25 | 4.07          |
| 17. Nothing keeps me from eating these foods.                             |            | 3.86           | 4.11                | 3.26 | 4.02 | 3.36          |
| 19. I eat these foods only when they are readily available. <sup>a</sup>  |            | 3.96           | 3.24                | 3.39 | 3.72 | 3.57          |

a : Scoring is reversed to account for the negative valence.

**Table 6.** Means for the three items in factor 4 indicating “interest in foods for the five food groups (N = 285)

| Questionnaire item   | Food group | Grain products | Vegetables & fruits | Meat | Milk | Fats & sweets |
|--|------------|----------------|---------------------|------|------|---------------|
| 4. I have no interest in learning more about eating <sup>a</sup> |            | 2.92           | 3.30                | 3.19 | 3.15 | 3.08          |
| 11. I am not concerned about how much I consume of these foods.  |            | 3.20           | 3.96                | 2.90 | 3.67 | 2.66          |
| 13. I do not care if I eat these foods <sup>a</sup>              |            | 3.18           | 3.84                | 3.22 | 3.60 | 2.95          |

a : Scoring is reversed to account for the negative valence.

the case for "vegetables and fruits" (mean = 3.24). In the case of the latter this may reflect the fact that some vegetables and fruits are available only in season.

#### 4) Factor 4 : Interest in foods

It is indicated in Table 2 that the "grain products," "meat," and "fats and sweets" groups all have medians and modes of 3.00, with mostly neutral means, and with standard deviations of 0.66 to 0.70. For the "vegetables and fruits" and "milk" groups, the median, 3.67 for each, suggests that the majority of the respondents had a positive interest in the groups, especially for "vegetables and fruits," whose mode and mean were 3.67 and 3.70, respectively (S.D. = 0.72).

The data in Table 6 suggest that the participants were, in general, not concerned about how much they eat of the foods (item 11) in the groups, for example, "vegetables and fruits" (mean = 3.96), and "milk" (mean = 3.67). However, they showed a slight concern for "fats and sweets" (mean = 2.66). It also is noted that the majority cared if they ate the foods (item 13) in the "vegetables and fruits" (mean = 3.84) and "milk" groups (mean = 3.60). They reported a slightly favorable attitude in learning more about eating the foods from "vegetables and fruits," "meat," and "milk" groups (item 4) with means of 3.30, 3.19, and 3.15, respectively. These interests could be taken into account relevant to recommending

nutrition education intervention. For "grain products" and "fats and sweets" groups they indicated almost neutral attitudes in learning more about eating foods from those two food groups with means of 2.92 and 3.08, respectively.

#### 5) Factor 5 : Foods that energize

It is indicated in Table 2 that the response to the items in factor 5 measuring the respondents' evaluation of the "foods that energize," was generally on the "agree" side (all medians, modes, and means of 3.5 or above), except for the foods in "fats and sweets." It is noted that "meat" received the most favorable evaluation (mean = 3.87) in the "foods that energize."

It is revealed in Table 7 that the "meat" group was considered most necessary (mean = 4.31) for athletes (item 21). The participants seemed to understand meat as main source of energy, which is a misconception to be dealt with in education. It is interesting to note that all of the food groups except "fats and sweets" were, in general, considered necessary to be energetic and athletic.

## 2. Relationship between food intake and food attitudes

Table 8 summarizes Pearson product-moment correlation coefficients for the intake of the five food groups as they

**Table 7.** Means for the two items in factor 5 indicating "foods that energize" for the five food groups (N = 285)

| Questionnaire item  | Food group | Grain products | Vegetables & fruits | Meat | Milk | Fats & sweets |
|---|------------|----------------|---------------------|------|------|---------------|
| 18. Individuals who consume these foods are more energetic. |            | 3.39           | 3.49                | 3.43 | 3.49 | 2.77          |
| 21. Individuals who consume these foods are athletes.       |            | 3.82           | 3.70                | 4.31 | 3.88 | 3.15          |

**Table 8.** Intercorrelation matrix between total standardized serving frequency of five food groups and five factors of food attitudes

| Food group                               | 5 factors in food attitudes | Conscious choice of food | Health concerns | Economics & time influence | Interest in foods | Foods that energize |
|--|-----------------------------|--------------------------|-----------------|----------------------------|-------------------|---------------------|
| Grain products<br>(N = 269) <sup>c</sup> | r <sup>a</sup>              | -.068                    | .078            | -.015                      | .033              | .086                |
|  | p <sup>b</sup>              | .268                     | .204            | .804                       | .590              | .159                |
| Vegetables & fruits<br>(N = 271)         | r                           | .080                     | .125            | .117                       | .164**            | .188**              |
|  | p                           | .190                     | .040            | .054                       | .007              | .002                |
| Meat<br>(N = 271)                        | r                           | .155                     | .142            | .142                       | .124              | .009                |
|  | p                           | .010                     | .019            | .019                       | .041              | .881                |
| Milk<br>(N = 284)                        | r                           | .245**                   | .094            | .226**                     | .132              | .069                |
|  | p                           | .000                     | .113            | .000                       | .026              | .249                |
| Fats & sweets<br>(N = 282)               | r                           | .119                     | .106            | .096                       | .014              | .132                |
|  | p                           | .046                     | .076            | .106                       | .814              | .027                |

a : Pearson product-moment correlation coefficients

b : Significance level (2-tailed) : \*\* : at the p < .01 level

c : N = sample size

relate to the five attitude factors. The data for food intake were presented in a companion article (Kim & Amos 2002). Four of the 25 relationships arising from the 5 food groups versus 5 factors were estimated to be significant at  $p < .01$ . Significant correlations were not found in the intake of "grain products," "meat," and "fats and sweets" with respect to any of the five food attitudes. The consumption of "vegetables and fruits" was shown to be related to two of the attitudes: interest in foods ( $r = .164, p < .01$ ) and foods that energize ( $r = .188, p < .01$ ). Intake of the milk group correlated with "conscious choice of food" ( $r = .245, p < .01$ ) and "economics and time influence" ( $r = .226, p < .01$ ).

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### Discussion

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The 22 items were classified into five factors to evaluate the participants' attitudes regarding 1) conscious choice of food, 2) health concerns, 3) economics and time influence, 4) interest in foods, and 5) foods that energize. Several points have emerged from examining data about their food attitudes.

The most evident is related to the response to the items asking about the influence of economics and time on food choices. For the majority of the participants, there were no serious external restrictions such as economics, time, and other noticeable obstacles that they considered limiting to their food consumption, in general. Especially item 8 in Table 5 indicated that the participants do not feel that their parents have a limited budget to purchase foods in all the five food groups. However, in part I the parents' income as reported by the students was a predictor for the consumption of food items in the meat, milk, and fats and sweets groups (Kim & Amos 2002). There may be two probable explanations. One is that the participants may not like the food items in the meat, milk, and fats and sweets groups, and therefore, they have less desire to purchase foods in those three groups and feel no limitation for the budget to buy them. The other is that children often do not have accurate information about their family income. The second point includes the exceptionally favorable attitude toward "vegetables and fruits," which was highly rated on all five factors. The third point is the unfavorable attitude toward "fats and sweets" relative to health concerns. "Fats and sweets" were rated near neutral on the other factors except on "economics and time influence." The "meat" group also was considered unfavorably in

"health concerns." The group was rated favorably in "foods that energize" and "conscious choice of food," and near neutral in "interest in foods." The mean scores for the "milk" group were all on the favorable side. "Grain products" were rated near neutral in "health concerns" and "interest in foods," and were considered favorably in "foods that energize" and "conscious choice of food."

Of the total 25 relationships among food intake (five food groups) and food attitudes (five factors), four were found to have positive significant correlations ( $p < .01$ ): 1) vegetable and fruit intake and interest in food, 2) vegetable and fruit intake and foods that energize, 3) milk group intake and conscious choice of food, and 4) milk group intake and economics and time influence.

An unbalanced diet was pointed out previously in part I (Kim & Amos 2002) in the discussion of food frequency as one of the serious concerns for adolescents. All five food groups had a significant percentage of the respondents who did not meet the recommendation for serving frequency. It was shown that 65.7% and 54.7% of the respondents need more of the "fats and sweets" and the "meat" group, respectively. It is interesting to note that these two groups were the most unfavorably rated for "health concerns."

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### Implications for Research and Practice

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One limitation of this study is that only one school was included. Thus, it is difficult to generalize findings from this study to all Korean female adolescents. Results must be interpreted with this in mind, since respondents may differ from non-respondents. This study should be repeated using other adolescents of different gender and living in other areas in Korea.

This study suggests that food intake is correlated with food attitudes with some unexpected associations. Negative orientations should be addressed through nutrition education programs aimed at developing healthy food attitudes and behaviors that will meet the nutritional needs of adolescents. In turn, the students will be better able to handle the rigors of school and related activities. Therefore, the study will provide baseline data to develop future nutrition education programs, to design nutrition education materials, and to improve the home economics curriculum for secondary school students in Korea.

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