

## A Study on the Factors Related to the Seafood Preference of Elementary School Children\*

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### ABSTRACT

This study was undertaken with 237 fifth grade children to investigate the factors affecting the seafood preference of elementary school children as one of the approaches to find strategies to promote these children's acceptance of seafoods. Subjects for this study were from one public elementary school under meal service located each in Boryeong-city, Chungcheongnam-Do(coastal area) and Cheolwon-gun, Gangwon-do(land-locked area). The preferences for most fish, shellfish, cephalocoda and dried seafoods but not for processed seafoods of total children in the Cheolwon were lower than those in Boryeong and differences in many items were significant. Among four area-gender groups, girls in Cheolwon had the lowest preference for most seafood items except cephalocoda, for which the preference of boys in Cheolwon was the lowest. Making soup was the least preferred method to cook fish regardless of gender and area, while grilling was the most or the second most preferred in each gender-area group. Compared to girls, boys had a higher preference for deep frying. The seafood preferences of mothers in both areas were similar to those of their children except for processed seafoods, which were even more preferred by the children than their mothers. Gender, distance from the sea and the method of preparation/cooking seemed to affect the children's preference more than their mother's preference and frequency of serving in the case of seafood. And the effect of gender, distance from the sea and cooking methods differed for each seafood category. The several suggestions to improve seafood preference, especially in land-locked areas are discussed. (*J Community Nutrition* 3(1) : 40-52, 2001)

**KEY WORDS :** seafood · elementary school children · preference · distance from the sea · cooking method.

### Introduction

It is important for growing children to consume adequate amounts of animal protein, which provide better composition of essential amino acids than plant protein. Red meats can have negative effects on human health due to the high content of saturated fatty acids (Scollan et al. 2001), while some prospective studies have shown an inverse association between fish intake and risk of stroke(Iso et al. 2001). It has also been suggested that the consumption of fish-at least once a week-may reduce the risk of sudden cardiac death in man(Albert et al. 1998). The protective effect can be attributed to omega-3 fatty acids such as eicosanoic

acid(20 : 5) and docosahexanoic acid(22 : 6) which were suggested to affect the susceptibility of LDL to oxidation(Higgins et al. 2001).

Moreover, seafood intake may reduce the risk of some kinds of cancer. There was a progressive decline in the risk of colorectal cancer with an increased intake of fish and shellfish(Kato et al. 1997). Another studies showed an inverse association between percent calories from fish and breast cancer rates, confirming the findings of others that dietary fat is strongly associated with international variation in breast cancer rates(Kaizer et al. 1989).

Seafoods, especially most kinds of shellfish, is the food group that is the best source of taurine, which has an enormous range of physiological functions including bile acid conjugation, osmoregulation, detoxication and antioxidant, as well as special functions in the heart, retina and brain, especially in the development of those organs ones(Lee 1992). Moreover, most fishes are less expensive than domestic meats, while the safety of imported meats has been causing

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excessive debate world-wide regarding Bovine Spongiform Encephalopathy(BSE) and foot-and-mouth disease, recently.

Studies on food preferences of elementary school children in several areas of this country showed that they preferred seafood less than other animal protein sources(Kim et al. 1998 : Lee 1998 : Yoon & Rhie 2000). Considering their concern about the overconsumption of dietary fat in certain groups of people in this country, the result of the study of Lee et al.(1999) reported that children of low-fish/high-meat group had significantly higher intake of energy and fat than those of high-fish/low-meat group suggests the importance of the study children's preference for seafoods.

The importance of nutrition while school-aged is widely recognized. Nutritional requirements are increased and food habits are established at this age. Experiencing and eating diverse foods at this age helps to promote desirable eating behavior(Birch 1987). Healthy eating behavior acquired during childhood will continue into a later life. In addition, inadequate nutrition during this age may result in poor growth and decreased academic performance in school.

According to the study of Harneck and coworkers (Harneck et al. 1997), taste preference appears to be barrier to dietary change for many Americans. Food preference not only decides an individual's nutritional status but also is reflected in their physical and mental health status(Yatley et al. 1980). Han et al.(1997) also found that food preference was more difficult to change than nutrition knowledge by nutrition education. Food preferences are determined also by various environmental factors including geographical and dietary habits of the family. Moon et al.(1979) reported that food preference of children was affected by their parents by 64.8% and Cheong(1995) found that elementary school children's preference for carbohydrate and calcium sources increased with their mother's food habit scores. Food preference is one of the factors that should be considered in group feeding, especially for growing children to reduce leftovers in economical aspect and to increase children's intake of various essential nutrients in nutritional aspect(Lee et al. 1998).

There are various seafood categories, of which the shapes and cooking methods differ from item to item,

possibly resulting in a wide range of preference scores. However, there has not been any study reported regarding the preference for extensive items in various seafood categories. Therefore, the purpose of this study was to determine elementary school children's preference for an extensive number of seafood dishes and how these preferences/children are affected by several factors such as gender, cooking methods, the distance from the sea, mother's seafood preference and the frequencies that they are served each category of seafood by their mother, as one of the approaches to find strategies to promote these children's acceptance of seafoods.

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## Subjects and Methods

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### 1. Subjects

Subjects for this study were 146(76 boys and 70 girls) and 91(49 boys and 42 girls) children from the fifth grade of a public elementary school located each in Boryeong-city, Chungcheongnam-do(coastal area) and Cheolwon-gun, Gangwon-do(land-locked area), respectively. A self-report survey was conducted during November, 2000.

### 2. Measurement

A survey questionnaire was administered to the children in order to examine their preference for the 22, 11, 10, 11 and 9 dishes made of fish, shellfish, cephalocoda, dried seafoods and processed seafoods and the reasons why they dislike fish. Preferences were determined by a 5-point likert analysis with marks of 'like a lot', 'like', 'average', 'dislike' and 'dislike a lot' as 5 through 1, respectively. In the event that a seafood dish items which had 'never been served' to subjects they were asked to mark a 0. Seafood dish items were selected to be questioned according to the literature (Gu & Park 1998) and the menu for one year of two schools participated in this study. Six items were deleted from data analysis because one-third of the children of either school answered 'never been served'.

The questions in the questionnaire for mothers consisted of the general characteristics of the family and the mothers' preference for fish, shellfish, cephalocoda, dried seafoods and processed seafoods. Also the frequencies that the mothers use fish, shellfish, cephalocoda,

dried seafoods and processed seafoods for family meals including eating out and food delivery were questioned to mothers, in order to examine the children's eating frequencies of these various seafoods at home. The frequencies determined by a 5-point likert analysis with marks of 'more than once a day', '4-6 times per week', '1-3 times per week', '1-3 times per month' and 'rarely' as 5 through 1, respectively and these values were assessed as continuous variables for the analysis according to general characteristics and the correlation to seafood preferences.

### 3. Statistical analysis

Data were analyzed using the SPSS/PC program. Chi-square test was employed for the analysis of categorical variables. Means of seafood preference and frequency were compared by Student's t-test between areas and by Duncan's Multiple Range Test After Analysis of Variance (ANOVA) between levels of mother's education and household income. Correlation between seafood preferences and serving frequencies were examined by Pearson's coefficients.

## Results and Discussion

### 1. General characteristics of subjects

Table 1 shows that the type of family and the proportion of children who had a working mother were similar in two areas for the children who participated in this study. The mothers of the elementary school children in Cheolwon tended to have had less education than those in Boryeong but the difference did not reach to the level of statistical significance. Mothers of Cheolwon answered to have significantly less household income than those of Boryeong (Table 1).

### 2. Children's preference for seafoods

The seafood category that was most preferred by the total children was the "processed seafoods" and the least one was "dried seafoods". Compared to children with a full-time housekeeper, children of working mothers tended to have a lower preference for all five seafood categories, especially for dried seafoods, which were significantly more preferred by the children with a full-time housekeeper (Table 2). The children whose mother had finished middle school only had a signifi-

**Table 1.** General characteristics of the elementary school children

	Boryeong (146)	Cheolwon (91)	Total (237)	Number(%)	p < 0.05
Mother's education					
Middle school graduation	17( 11.8)	12( 13.7)	27( 12.5)		
High school graduation	84( 58.3)	62( 71.3)	146( 63.2)	NS	
College graduation	44( 29.9)	13( 14.9)	56( 24.2)		
Total	144(100.0)	87(100.0)	231(100.0)		
Mother's employmental status					
Yes	62( 42.8)	40( 45.5)	102( 43.8)		
No	83( 57.2)	48( 54.5)	131( 52.2)	NS	
Total	145(100.0)	88(100.0)	233(100.0)		
Household income(1,000won/month)					
<1,000	26( 18.3)	20( 23.5)	46( 20.2)		
1,000 - 2,000	50( 49.3)	52( 60.2)	122( 53.8)		
>2,000	46( 32.3)	13( 15.3)	59( 26.0)		
Total	142(100.0)	85(100.0)	227(100.0)		
Type of family					
Nuclear	124( 86.1)	70( 79.5)	194( 83.6)		
Extended	17( 11.8)	16( 18.2)	33( 14.2)		
Other	3( 2.1)	2( 2.3)	5( 2.2)	NS	
Total	144(100.0)	88(100.0)	232(100.0)		

cantly higher preference for shellfish than subjects whose mother had more than a college education (Table 2). Household income and type of family did not affect children's seafood preference.

Table 3 shows a much lower preference for the various fish dishes of total children in Cheolwon area, especially for soup and deep frying. Children in Cheolwon significantly less preferred gulbigui, galchigui, fish crocket, galchitwigim, godeungutwigim, galchijorim, dongtaemaentang, agutang and dongtaeguk. The other fish dishes except gajamitwigim also tended to be less preferred by the children in Cheolwon than those in Boryeong. The children in two areas had a similar low preference for gajamitwigim, which was consistent with the study of Lee & Kim (2001).

The lower fish preference of total children in Cheolwon than in Boryeong may be attributed to the lowest fish preference of girls in Cheolwon. Among four area-gender groups, girls in Cheolwon had the lowest preference for most seafood items except dongtaemaentang, dongtaeguk and fish crocket, for which the preference of boys in Cheolwon was the lowest. Among

**Table 2.** Elementary school children's seafood preferences according to general characteristics

	Fish	Shellfish	Cephalocoda	Dried seafoods	Processed seafoods
Mother's education					
Middle school graduation	3.25 ± 0.43 <sup>(4)</sup>	3.76 ± 0.69 <sup>(1)</sup> (13)	3.38 ± 0.65(13)	3.41 ± 0.60(13)	3.75 ± 0.61(15)
High school graduation	3.60 ± 0.78(42)	3.51 ± 0.64 <sup>(6)</sup> (65)	3.55 ± 0.77(60)	3.36 ± 0.72(70)	3.91 ± 0.74(91)
College graduation	3.65 ± 0.77(14)	3.20 ± 0.83 <sup>(2)</sup> (25)	3.39 ± 0.99(22)	3.26 ± 0.68(25)	3.82 ± 0.73(39)
Total	3.59 ± 0.76(60)	3.46 ± 0.71(103)	3.49 ± 0.80(95)	3.34 ± 0.70(108)	3.89 ± 0.72(145)
Mother's employmental status					
Yes	3.42 ± 0.84(28)	3.43 ± 0.78(51)	3.35 ± 0.94(38)	3.19 ± 0.78(46)	3.84 ± 0.85(67)
No	3.77 ± 0.65(35)	3.54 ± 0.66(55)	3.61 ± 0.69(60)	3.49 ± 0.63(64)	3.93 ± 0.62(80)
Total	3.61 ± 0.75(63)	3.49 ± 0.72(106)	3.51 ± 0.80(98)	3.36 ± 0.71 <sup>(*)</sup> (110)	3.89 ± 0.73(147)
Household income(1,000won/month)					
< 1,000	3.49 ± 0.80(19)	3.25 ± 0.61(24)	3.33 ± 0.90(25)	3.20 ± 0.72(24)	3.82 ± 0.77(33)
1,000 - 2,000	3.66 ± 0.74(31)	3.59 ± 0.73(55)	3.60 ± 0.73(46)	3.45 ± 0.72(62)	3.96 ± 0.67(74)
> 2,000	3.60 ± 0.77(11)	3.47 ± 0.77(25)	3.52 ± 0.88(23)	3.29 ± 0.70(22)	3.85 ± 0.81(38)
Total	3.60 ± 0.76(61)	3.48 ± 0.72(104)	3.51 ± 0.82(94)	3.36 ± 0.72(108)	3.90 ± 0.73(145)
Type of family					
Nuclear	3.59 ± 0.76(57)	3.50 ± 0.75(91)	3.52 ± 0.82(82)	3.39 ± 0.73(95)	3.88 ± 0.74(124)
Extended	3.66 ± 0.59(5)	3.54 ± 0.61(13)	3.38 ± 0.71(12)	3.30 ± 0.62(11)	3.94 ± 0.65(22)
Others	3.5(1)	3.11(1)	3.50 ± 0.80(2)	2.9 ± 0.00(2)	3.75 ± 0.35(2)
Total	3.60 ± 0.74(63)	3.50 ± 0.73(105)	3.50 ± 0.80(96)	3.37 ± 0.70(108)	3.88 ± 0.72(148)

1) Mean ± standard deviation(number)

2) Values sharing the same superscript within a column are not significantly different at  $p < 0.05$ .

3) Significantly different between children with a full-time housekeeper and those of working mothers.

a few studies on gender difference in food preference, males generally tended to have a higher preference for most food groups not only in elementary school children(Lee 1998) but also in middle school students (Han et al. 1997) and adults(Sin & Han 1997).

It was interesting to find that the tendency of lower preference in girls throughout most fish items determined in this study than in boys was not shown in Boryeong. In fact, girls showed the significantly higher preference for godeungugui, daegumacutang and godeungujorim than boys while the preference for most fish prepared by deep frying were higher in boys. Boryeong. Lee & Kim(2001) also found that elementary schoolgirls prefer Alaska pollack(daegu) significantly more than elementary schoolboys, although their study examined children's preference for seafood itself, not seafood dishes. The results of this study suggested that nutrition education to emphasize the nutritional importance of fish should be focused on the specific area-gender group after preference assessment.

Making soup was the least preferred method of cooking fish regardless of gender and area, while grilling was the most preferred in each gender-area group, ex-

cept in boys in Boryeong who preferred deep frying to grilling. Girls in Boryeong preferred boiling/steaming to deep frying, while the other gender-area groups liked deep frying better. Making soup was the only method to cook fish for which preference was higher in girls than in boys in Cheolwon.

Children in Cheolwon as a land-locked area seemed to have fewer opportunities to served a variety of fish compared to the other areas, which may contribute to a low preference for fish. Cheongcogui, agutang, urugmacutang, byungeojorim and gajamitwigim had never been served to 30%, 20%, 30%, 28%, and 30% of the children, respectively and these fish are the least or second least preferred by the children in each cooking category. A study on the food preference of elementary school children in Masan city, Cheong(1995) also reported that the elementary school children had a lower preference for the foods that they had never been served. By means of transportation and freezing techniques which have been developing rapidly these days, meal servers in school lunch programs should be encouraged to use a wider variety of fish as should mothers at home.

**Table 3.** Fish preference of elementary school children according gender and distance from the sea

	Boryeong(146)			Cheolwon(91)			Total(237)		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
<b>Grilled</b>									
Galchigui	4.32(76) <sup>1)</sup>	4.22(67)	4.27(143)	3.96(47)	3.93(40)	3.94(87)	4.18(123)	4.11(107)	4.15(230) <sup>2)</sup>
Culbigui	4.04(73)	4.09(66)	4.06(139)	3.89(47)	3.43(37)	3.69(84)	3.98(120)	3.85(103)	3.92(223)*
Ggongchigui	3.86(71)	3.94(66)	3.90(137)	3.67(48)	3.53(38)	3.60(86)	3.78(119)	3.79(104)	3.90(223)
Godeungeogui	3.62(74)	4.00(70) <sup>1)</sup>	3.93(144)	3.65(48)	3.45(38)	3.56(86)	3.63(122)	3.80(108)	3.70(230)
Cheongeogui	3.24(51)	3.18(45)	3.21( 96)	3.30(33)	2.70(27)	3.03(60)	3.26( 84)	3.00( 72)	3.14(156)
Total	3.88(48)	3.93(42)	3.87(175)	3.86(30)	3.26(30)	3.61(52)	3.87( 78)	3.70( 64)	3.79(142)*
<b>Deep fried</b>									
Galchitwigim	4.33(73)	4.00(66) <sup>1)</sup>	4.16(139)	3.73(45)	3.49(39)	3.62(84)	4.10(118)	3.80(105) <sup>1)</sup>	3.95(223)***
Fish cutlet	4.05(75)	3.72(67)	3.89(142)	3.78(49)	3.50(40)	3.65(89)	3.94(124)	3.64(107) <sup>1)</sup>	3.80(231)
Fish crocket	4.02(62)	3.52(48) <sup>1)</sup>	3.80(109)	3.41(46)	3.42(38)	3.42(84)	3.76(107)	3.48( 86)	3.63(193)*
Godeungeotwigim	3.76(72)	3.77(66)	3.71(228)	3.36(45)	3.22(36)	3.30(81)	3.61(117)	3.58(102)	3.59(219)***
Gajamitwigim	3.35(55)	3.16(44)	3.26( 99)	3.49(35)	2.96(26)	3.26(61)	3.40( 90)	3.09( 70) <sup>1)</sup>	3.26(160)
Total	3.95(43)	3.63(35)	3.81( 78)	3.61(31)	3.19(21)	3.44(52)	3.81( 74)	3.46( 56) <sup>1)</sup>	3.66(130)***
<b>Boiled/steamed</b>									
Galchijorim	3.99(76)	4.03(69)	4.01(145)	3.84(44)	3.56(39)	3.9 ( 83)	3.93(120)	3.86(108)	3.90(228)*
Godeungeojorim	3.52(75)	3.94(70) <sup>1)</sup>	3.72(145)	3.50(46)	3.42(38)	3.46(84)	3.51(121)	3.76(108) <sup>1)</sup>	3.63(229)
Ggongchijorim	3.51(72)	3.80(65)	3.65(137)	3.71(48)	3.28(39)	3.52(87)	3.59(120)	3.61(104)	3.60(224)
Jogiyangnyumjijim	3.73(71)	3.63(59)	3.68(130)	3.44(45)	3.25(36)	3.36(81)	3.62(116)	3.48( 95)	3.56(211)
Byungeojorim	2.83(60)	2.90(49)	2.86(109)	2.76(34)	2.31(29)	2.56(63)	2.81( 94)	2.68( 78)	2.75(172)
Total	3.55(59)	3.75(44)	3.63(103)	3.49(30)	3.11(21)	3.33(51)	3.53( 89)	3.54( 65)	3.53(154)*
<b>Soup</b>									
Urugmaeutang	3.54(70)	3.43(60)	3.49(130)	2.89(35)	2.85(26)	2.87(61)	3.32(105)	3.26(86)	3.29(191)****
Dongtaemaentan	3.41(71)	3.45(64)	3.43(135)	2.85(48)	3.13(40)	2.98(88)	3.18(119)	3.33(104)	3.25(223)**
Dongtaeguk	3.41(71)	3.24(68)	3.32(138)	2.83(47)	3.20(40)	3.00(87)	3.17(117)	3.22(108)	3.20(225)*
Agutang	3.33(66)	3.20(61)	3.27(127)	2.85(39)	2.69(32)	2.77(71)	3.15(105)	3.02( 93)	3.09(198)***
Daegumaeutang	2.91(57)	3.56(45) <sup>1)</sup>	3.20(102)	2.90(40)	2.75(28)	2.84(68)	2.91( 97)	3.25( 73) <sup>1)</sup>	3.06(170)
Total	3.35(50)	3.42(35)	3.38( 85)	2.78(28)	2.93(16)	2.83(44)	3.15( 78)	3.27( 51)	3.19(129)***
Total	3.67(23)	3.73(18)	3.73( 41)	3.50(16)	3.39( 7)	3.47(23)	3.60( 39)	3.64( 25)	3.61( 64)

1) Mean(number of subjects) 2) \* : Significantly different between genders at  $p < 0.05$  and  $p < 0.01$ , respectively.3) \* \* \* \* : Significantly different between areas at  $p < 0.05$ ,  $p < 0.01$ ,  $p < 0.005$  and  $p < 0.001$ , respectively.

There was no significant difference in the reasons why the children dislike fish between gender and areas. The most frequently answered reason was 'troublesome fish bones'(51.6%) and followed by 'unpleasant fish taste'(19.4%) and 'unpleasant fish smell'(17.2), suggesting that new recipes other than deep frying should be developed to cook fish without giving the children trouble in removing fish bones.

Although the preference for fish cutlet and fish crocket of boys and girls in both areas were high, high fat content of deep frying makes this type of cooking less desirable, considering an increasing obesity rate of elementary school children these days. It is noteworthy that the higher preference for deep fried foods to

boiled, steamed and braised foods or soup was not found in elderly people according to the study of Yim et al.(1998), although they examined the preference for general menu type, not only for seafoods. Fried foods were less preferred by the elderly subjects among the side dishes. It may be due to physiological characteristics of the elderly or the dietary patterns of young generation, which is rapidly westernizing these days.

Among shellfish, sacutwigim, ggoggetang, sacutang, guljeon and raw oysters were significantly less preferred by children in Cheolwon than those in Boryeong (Table 4). There was no gender difference found in the preference for shellfish except guljeon, for which preference of boys was significantly higher than that

of girls. Significantly higher preference of elementary schoolboys for oysters than girls was also found in the study of Lee & Kim(2001). The results of their study is consistent to ours regarding a higher preference for crab and shrimp than clams, and much lower preference for oysters.

It is not possible to compare the preference scores for each items of respective categories in this study to those in others, since there has been no research on the preference for more than a few kind of seafoods. According to the study of Kim et al.(1998) who examined elementary school children's preference for 4 kinds of seafoods, namely, fish, shellfish, cuttlefish and fish paste, the elementary school children of Dangjin, another coastal area in Chungcheongnam-Do seemed to prefer shellfish quite less(2.88 and 2.64 for non-

obese and obese children, respectively) than those in Boryeong area in this study.

Even though elementary school children highly preferred common squid(4.25 and 4.19 for boys and girls in the Busan area, respectively) in the study of Lee & Kim(2001), the results of this study showed that children's preference for squid could differ dramatically according to cooking methods. The mean preferences for bokkeum, jjigae, jorim, guk, sukhoi and muchim with doraji were 4.17, 3.99, 3.79, 3.82, 3.43, and 3.02, respectively in the case of the elementary school children in Boryeong, another coastal area.

Ojineobokkeum, ojineojigae, ojineoguk, ojineosukhoi, jjukumiyachabokkeum and haeparinaengchae in the cephalocoda category were significantly less preferred by total children in Cheolwon than those in

**Table 4.** Shellfish preference of elementary school children according to gender and distance from the sea

	Boryeong(146)			Cheolwon(91)			Total(237)		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
Saetwigim	4.49(74) <sup>1</sup>	4.51(69)	4.50(143)	4.11(47)	4.43(42)	4.26(89)	4.34(121)	4.48(111)	4.41(232) <sup>1*</sup>
Ggotgetang	4.56(75)	4.39(69)	4.48(144)	4.10(48)	4.29(42)	4.19(90)	4.38(123)	4.35(111)	4.37(234) <sup>1</sup>
Saesusajeon	3.90(67)	3.86(58)	3.88(125)	4.02(42)	4.06(33)	4.04(75)	3.95(109)	3.93(91)	3.94(200)
Saeutang	3.81(73)	3.77(64)	3.79(137)	3.54(46)	3.37(38)	3.46(84)	3.70(119)	3.62(102)	3.67(221) <sup>1*</sup>
Ggomakmuchim	3.09(56)	3.35(46)	3.21(102)	3.33(43)	3.68(40)	3.49(83)	3.20(99)	3.50(86)	3.34(185)
Jogaemaeutang	3.43(68)	3.10(46)	3.27(128)	3.29(45)	3.32(37)	3.30(82)	3.32(113)	3.19(97)	3.29(210)
Raw oysters	3.17(71)	3.00(64)	3.09(135)	2.98(45)	2.26(35)	2.66(80)	3.09(116)	2.74(99)	2.93(215) <sup>1*</sup>
Guljeon	3.01(67)	2.72(55)	2.89(122)	2.79(39)	1.97(30)	2.43(69)	2.93(106)	2.46(85) <sup>1*</sup>	2.72(191) <sup>1*</sup>
Midudukjijim	2.68(53)	2.64(50)	2.57(103)	2.72(43)	2.13(38)	2.44(81)	2.70(96)	2.32(88)	2.52(184)
Total	3.61(38)	3.52(22)	3.59(60)	3.40(28)	3.33(19)	3.37(47)	3.52(66)	3.45(41)	3.50(107)

1) Mean (number of subjects)      2) <sup>1</sup> : Significantly different between genders at  $p < 0.05$ .

3) \* : Significantly different between areas at  $p < 0.05$ .

**Table 5.** Cephalocoda preference of elementary school children according to gender and distance from the sea

	Boryeong(146)			Cheolwon(91)			Total(237)		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
Ojineobokkeum	4.15(73) <sup>1</sup>	4.19(70)	4.17(143)	3.73(48)	3.80(41)	3.76(89)	3.98(121)	4.05(111)	4.01(232) <sup>1*</sup>
Ojineojigae	3.93(71)	4.05(66)	3.99(137)	3.58(45)	3.83(40)	3.69(85)	3.79(116)	3.96(106)	3.89(415) <sup>1*</sup>
Ojineojorim	3.82(71)	3.75(64)	3.79(135)	3.70(46)	3.67(39)	3.68(85)	3.77(117)	3.72(103)	3.75(220)
Nakjijachabokkeum	3.85(66)	3.72(65)	3.79(131)	3.45(42)	3.64(36)	3.54(78)	3.69(108)	3.69(101)	3.69(209)
Ojineoguk	3.70(73)	3.94(68)	3.82(141)	3.27(44)	3.30(37)	3.28(81)	3.54(117)	3.71(105)	3.62(222) <sup>1***</sup>
Jjukumiyachabokkeum	3.59(64)	3.51(62)	3.56(126)	2.80(35)	2.59(32)	2.70(67)	3.31(99)	3.20(94)	3.56(193) <sup>1****</sup>
Mulojingujeon	3.48(66)	3.59(63)	3.53(129)	3.38(45)	3.50(38)	3.43(83)	3.44(111)	3.55(101)	3.50(212)
Ojineosukhoi	3.30(53)	3.56(48)	3.43(101)	2.78(37)	3.28(25)	2.98(62)	3.09(90)	3.47(73)	3.26(163) <sup>1</sup>
Ojineodorajimuchim	2.84(62)	3.12(58)	3.02(189)	2.56(43)	2.75(36)	2.65(79)	2.72(105)	2.98(94)	2.84(199)
Haeparinaengchae	2.30(53)	2.77(43)	2.51(96)	1.97(36)	2.19(32)	2.07(68)	2.17(89)	2.52(75)	2.33(164) <sup>1*</sup>
Total	3.47(33)	3.81(30) <sup>1</sup>	3.63(63)	3.25(21)	3.36(14)	3.29(35)	3.38(54)	3.67(44)	3.51(98) <sup>1</sup>

1) Mean(number of subjects)      2) <sup>1</sup> : Significantly different between genders at  $p < 0.05$ .

3) \* \* \* \* \* : Significantly different between areas at  $p < 0.05$ ,  $p < 0.01$ ,  $p < 0.005$  and  $p < 0.001$ , respectively.

Boryeong(Table 5). The significantly lower preference for most cephalocoda in Cheolwon than in Boryeong resulted majorly from the lowest preference of boys in Cheolwon for most cephalocoda items except ojingeorim and jukkumiyachabokkeum, for which the preference of boys in the same area was the lowest. The girls' mean preference for cephalocoda dishes were higher than boys' in both areas and difference was significant in the Boryeong area. On the other hand, significantly higher cephalocoda preference by the girls than boys was not found in Busan city, another coastal area(Lee & Kim 2001).

Much lower preference for squid compared to fish such as mackerel, hair tail and yellow croaker has been reported in the case of the long-lived elderly(Kim et al. 1999), which was not observed in the elementary school children of this study.

Table 6 shows that children prefer squid to ancho-

vies and bukeo in the dried seafood categories regardless area and gender. Among dried seafoods, ojingeochaebokkeum, bukeoguk, myulchibokkeum(large), bukeochaemuchim were significantly less preferred by children in Cheolwon than those in Boryeong(Table 6). Gender difference in dried seafood preference was not found. Table 6 also showed that children's preference for some seafoods can differ according to the size of materials. Large anchovies were significantly less preferred by the children in Cheolwon than in Boryeong when served as bokkeum(3.20 vs 2.78 for Boryeong and Cheolwon, respectively), while children's preference for myulchibokkeum made of small fish are similar in the two areas(3.64 vs 3.55 for Boryeong and Cheolwon, respectively).

In Table 7, children in both areas seemed to prefer particular processed seafoods to others, regardless of cooking methods(tuna > imitation crab meat > fish

**Table 6.** Dried seafood preference of elementary school children according to gender and distance from the sea

	Boryeong(146)			Cheolwon(91)			Total(237)		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
Ojingeotwigim	4.19(48) <sup>1)</sup>	4.21(42)	4.29(142)	4.19(48)	4.21(42)	4.20(90)	4.26(121)	4.24(111)	4.25(232)
Ojingeochaebokkeum	4.32(73)	4.26(69)	4.09(140)	3.68(47)	3.73(40)	3.70(87)	3.92(119)	3.96(108)	3.94(227) <sup>2)</sup>
Myuchibokkeum(small)	3.71(68)	3.58(66)	3.64(134)	3.56(45)	3.55(40)	3.55(85)	3.65(113)	3.57(106)	3.61(219)
Juichipobokkeum	3.65(66)	3.82(55)	3.73(121)	3.38(39)	3.34(38)	3.36(77)	3.55(105)	3.62(93)	3.59(198)
Mareunsaubokkeum	3.69(68)	3.52(66)	3.60(134)	3.77(44)	3.29(41)	3.54(85)	3.72(112)	3.43(107)	3.58(219)
Bukeoguk	3.34(68)	3.20(64)	3.27(132)	2.91(45)	2.74(42)	2.83(87)	3.17(113)	3.02(106)	3.10(219)**
Myuchibokkeum(large)	3.30(70)	3.08(63)	3.20(133)	2.87(46)	2.67(39)	2.78(85)	3.13(116)	2.92(102)	3.03(218)**
Baengeopogui	2.85(53)	3.21(47)	3.02(100)	3.13(38)	2.82(28)	3.00(66)	2.97(91)	3.07(75)	3.01(166)
Bukeorim	2.92(61)	2.71(45)	2.83(106)	2.74(42)	2.48(40)	2.61(82)	2.84(103)	2.60(85)	2.73(188)
Bukeochaemuchim	2.98(57)	2.68(47)	2.85(104)	2.59(41)	2.38(40)	2.48(81)	2.82(98)	2.54(87)	2.68(185)*
Total	3.43(36)	3.47(30)	3.45(66)	3.34(25)	3.08(20)	3.22(45)	3.39(61)	3.31(50)	3.36(111)

1) Mean(number of subjects)

2) \* \*\*: Significantly different between areas at  $p < 0.05$  and  $p < 0.01$ , respectively.

**Table 7.** The preference of elementary school children for processed seafoods according to gender and distance from the sea

	Boryeong(146)			Cheolwon(91)			Total(237)		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
Chamchijigae	4.20(74) <sup>1)</sup>	4.40(68)	4.27(229)	4.40(48)	4.65(40)	4.51(88)	4.28(122)	4.49(108)	4.39(431)
Chamchibokkeum	4.08(64)	4.18(60)	4.04(200)	4.07(45)	4.00(35)	4.04(80)	4.07(109)	4.12(95)	4.11(382)
Gematsaltwigim	4.18(65)	3.68(56) <sup>1)</sup>	3.95(121)	4.05(42)	3.84(38)	3.95(80)	4.13(107)	3.74(94) <sup>1)</sup>	3.95(201)
Gematsaljeon	4.03(67)	3.71(59)	3.88(126)	4.00(41)	3.54(37)	3.78(78)	4.02(108)	3.65(96) <sup>1)</sup>	3.84(204)
Eomukguk	3.80(74)	3.96(68)	3.87(142)	3.81(47)	3.48(42)	3.65(89)	3.77(119)	3.76(104)	3.79(231)
Eomukbokkeum	3.79(72)	3.88(65)	3.83(137)	3.74(47)	3.56(39)	3.66(86)	3.77(119)	3.76(104)	3.76(223)
Eomukjorim	3.75(71)	3.73(66)	3.74(137)	3.66(44)	3.34(41)	3.51(85)	3.71(115)	3.58(107)	3.65(222)
Ggonchitonjorimijigae	3.33(64)	3.31(58)	3.32(122)	3.57(44)	3.14(36)	3.38(80)	3.34(108)	3.24(94)	3.34(202)
Total	3.97(49)	3.93(39)	3.95(88)	3.94(34)	3.60(28) <sup>1)</sup>	3.79(62)	3.96(83)	3.79(67)	3.89(150)

1) Mean(number of subjects)

2) <sup>1)</sup> : Significantly different between genders at  $p < 0.05$ .

paste > canned mackerel pike) except for girls in Boryeong, who prefer fish paste to imitation crab meat. It is noticeable that among seafood categories, processed seafood was the only one for which children's preference did not differ significantly between areas (Table 7). In fact, processed seafood was the most preferred category regardless of area and gender. Boys showed a significantly higher preference for gematsaltwigm and gematsajeon than girls. Therefore, serving processed seafoods more frequently to the children in land-locked areas like Cheolwon are suggested to increase the intake of total seafoods by those children.

Boys' preference for deep frying as a cooking method for various seafoods was significantly higher or tended to be higher than girls' in both areas, except for godeungeo in Boryeong, fish croquet in Cheolwon (Table 2) and ojingeotwigm in both areas (Table 6). Considering that the obesity rate has been increasing especially in elementary schoolboys in urban areas (Kang et al. 1997), warning about high fat foods should be included in the nutrition education for those boys.

### 3. Mother's preference for seafoods

Mothers' preference in Cheolwon was significantly lower for cephalocoda and tended to be lower for fish than that in Boryeong, while there was no significant difference between areas in mothers' preference for shellfish, processed seafoods and dried seafoods (Table 8).

The seafood preferences of elementary school children were similar to those of their mothers except those for processed seafoods, for which the preferences of children were much higher than that of their mothers ( $3.89 \pm 0.73$  and  $2.76 \pm 0.96$ , respectively).

There was no consistent correlation found in preferences for seafoods between the elementary school children (Table 8) or boys and their mothers. A positive correlation was found between preferences of elementary schoolgirls and their mothers only in those of cephalocoda.

### 4. The frequencies of seafoods being served by mothers

Table 10 shows the frequencies that mothers of elementary school children serve the animal protein sources including five seafood categories for their family's meal by cooking, eating out and having foods delivered. Mothers with a middle school education and less answered to serve fish for their family's meal significantly less frequently than those who had more education. And mothers with a household income of 1,000,000 - 2,000,000 won per month answered to use dried seafoods significantly more frequently than the other income groups. The effect of household income on eating frequencies of seafood was not observed in the study of Lee & Kim (2001). The discrepancy may be due to the fact that the eating frequency of seafood

**Table 8.** Seafood preference of the mothers of elementary school children

	Boryeong	Cheolwon	Total	Significance <sup>b</sup>
Fish				
Mother	3.66 ± 0.89(145) <sup>1)</sup>	3.45 ± 0.88(86)	3.58 ± 0.89(443)	NS
Child	3.70 ± 0.77( 41)	3.47 ± 0.70(23)	3.61 ± 0.75( 64)	
Shellfish				
Mother	3.43 ± 0.89(145)	3.39 ± 0.87(83)	3.41 ± 0.88(226)	NS
Child	3.60 ± 0.69( 60)	3.37 ± 0.75(47)	3.52 ± 0.72(107)	
Cephalocoda				
Mother	3.73 ± 0.91(145)	3.49 ± 0.80(85) <sup>2)</sup>	3.64 ± 0.88(230)	NS
Child	3.63 ± 0.76( 63)	3.29 ± 0.84(35) <sup>3)</sup>	3.51 ± 0.80( 98)	
Dried seafood				
Mother	3.41 ± 0.86(146)	3.43 ± 0.81(88)	3.42 ± 0.84(234)	NS
Child	3.45 ± 0.71( 66)	3.22 ± 0.69(45)	3.36 ± 0.71(111)	
Processed seafood				
Mother	2.70 ± 0.98(146)	2.87 ± 0.91(85)	2.76 ± 0.96(231)	p < 0.001
Child	3.95 ± 0.75( 88)	3.79 ± 0.68(62)	3.89 ± 0.73(150)	

1) Mean ± standard deviation(number of subjects)

2) \* \*\* : Significantly different between areas at p < 0.05 and p < 0.01, respectively.

3) Significantly different in the between elementary school children and mother.



was not asked according to various categories in their study.

Mother's employment status and type of family did not affect the frequencies that mothers used the five categories of seafoods for their family's meal in this study. The results of the present study are consistent

to those reported by Lec & Kim(2001) in that the education level of the mother, but not the family type, affect the eating frequencies of seafood. The elementary school children of mothers with a highschool education or more responded to eating seafood more frequently than their counterparts with less education.

**Table 9.** Pearson's correlation coefficients in seafood preferences between elementary school children and their mothers

Mother's preference	Fish	Shellfish	Cephalopoda	Dried seafoods	Processed seafoods
Fish	-0.005	0.208*	0.076	-0.219*	0.039
Shellfish	0.105	0.138	0.010	0.103	0.130
Cephalopoda	0.248	0.028	0.152	0.018	0.158
Dried seafoods	0.104	-0.073	0.112	0.068	0.117
Processed seafoods	-0.026	-0.049	0.010	0.230*	0.098

\* : Significant at  $p < 0.05$ .

**Table 10.** The frequencies of elementary school students' being served various seafoods at home according to general characteristics

	Fish	Shellfish	Cephalocoda	Dried seafoods	Processed seafoods	Meats & poultry	Eggs	Beans & products	
Mother's education	Middle	2.45 ± 0.74 <sup>(29)</sup>	1.93 ± 0.92 (29)	2.03 ± 0.91 (29)	1.66 ± 0.77 (29)	2.38 ± 0.86 (29)	2.52 ± 0.91 (29)	3.07 ± 1.13 (29)	3.10 ± 1.15 (29)
	High school	2.90 ± 0.77 <sup>(143)</sup>	2.10 ± 0.79 (144)	1.98 ± 0.79 (145)	1.94 ± 0.79 (144)	2.49 ± 1.04 (146)	2.75 ± 0.78 (146)	3.39 ± 0.95 (145)	3.11 ± 0.93 (146)
	College	2.98 ± 0.75 <sup>(56)</sup>	2.21 ± 0.71 (56)	1.96 ± 0.54 (56)	1.88 ± 0.74 (56)	2.36 ± 0.94 (56)	2.87 ± 0.76 (56)	3.48 ± 0.85 (56)	3.13 ± 0.76 (56)
	Total	2.86 ± 0.77 (228)	2.10 ± 0.79 (229)	1.98 ± 0.75 (23)	1.89 ± 0.78 (229)	2.44 ± 0.99 (231)	2.75 ± 0.79 (231)	3.37 ± 0.96 (230)	3.12 ± 0.91 (231)
Mother's employment status	Yes	2.86 ± 0.76 (100)	2.07 ± 0.82 (100)	1.97 ± 0.72 (121)	1.82 ± 0.73 (121)	2.40 ± 0.96 (102)	2.72 ± 0.80 (102)	3.36 ± 0.95 (101)	3.05 ± 0.95 (102)
	No	2.91 ± 0.80 (129)	2.15 ± 0.80 (131)	2.02 ± 0.77 (131)	1.94 ± 0.80 (130)	2.49 ± 1.05 (131)	2.80 ± 0.81 (131)	3.39 ± 0.97 (131)	3.14 ± 0.89 (131)
	Total	2.87 ± 0.78 (229)	2.11 ± 0.81 (231)	2.00 ± 0.75 (232)	1.88 ± 0.77 (231)	2.45 ± 1.01 (233)	2.76 ± 0.80 (233)	3.38 ± 0.96 (232)	3.10 ± 0.92 (233)
Family income (1,000won/month)	< 1,000	2.89 ± 0.80 (45)	1.98 ± 0.94 (45)	2.00 ± 0.98 (45)	1.98 ± 0.88 (46)	2.09 ± 0.94 <sup>(46)</sup>	2.63 ± 0.97 (46)	3.28 ± 1.11 (46)	3.04 ± 0.97 (46)
	1,000-2,000	2.82 ± 0.71 (120)	2.11 ± 0.78 (121)	1.99 ± 0.67 (122)	1.87 ± 0.72 (120)	2.67 ± 1.03 <sup>(122)</sup>	2.75 ± 0.76 (122)	3.46 ± 0.90 (121)	3.12 ± 0.91 (122)
	> 2,500	2.95 ± 0.88 (59)	2.24 ± 0.75 (59)	2.01 ± 0.75 (59)	1.86 ± 0.79 (59)	2.24 ± 0.86 <sup>(59)</sup>	2.90 ± 0.74 (59)	3.36 ± 0.92 (59)	3.08 ± 0.90 (59)
	Total	2.87 ± 0.78 (224)	2.12 ± 0.81 (225)	2.00 ± 0.76 (226)	1.89 ± 0.77 (225)	2.44 ± 1.00 (227)	2.77 ± 0.81 (227)	3.40 ± 0.95 (226)	3.10 ± 0.91 (227)
Type of family	Nuclear	2.87 ± 0.80 (188)	2.15 ± 0.81 (191)	2.03 ± 0.78 (191)	1.88 ± 0.76 (196)	2.46 ± 1.01 (192)	2.81 ± 0.81 (192)	3.34 ± 0.96 (191)	3.08 ± 0.89 (192)
	Extended	2.94 ± 0.72 (32)	1.94 ± 0.79 (33)	1.82 ± 0.58 (33)	1.79 ± 0.74 (33)	2.39 ± 1.00 (33)	2.55 ± 0.79 (33)	3.48 ± 1.03 (33)	3.27 ± 1.10 (33)
	Others	2.80 ± 0.45 (5)	2.25 ± 0.50 (4)	1.80 ± 0.84 (5)	2.50 ± 1.00 (4)	2.80 ± 1.30 (5)	2.80 ± 0.84 (5)	13.6 ± 0.55 (5)	3.0 ± 0.70 (5)
	Total	2.88 ± 0.78 (226)	2.12 ± 0.81 (228)	2.0 ± 0.76 (229)	1.88 ± 0.76 (228)	2.46 ± 1.01 (230)	2.77 ± 0.81 (230)	3.37 ± 0.96 (229)	3.10 ± 0.92 (230)

1) Mean ± standard deviation(number of subjects)

2) Values with the some superscripts in a column are not significantly different of  $p < 0.05$ .

**Table 11.** Cooking frequency of protein sources by mothers of elementary school children according to distance from the sea

		Daechon (146)	Cheolwon (91)	Total (237)	Sig- nificance <sup>b)</sup>
Fish	Rarely	4( 2.7%)	2( 2.4)	6( 2.6)	NS
	1-3/month	32(21.9)	29(34.1)	61(26.4)	
	1-3/week	86(58.9)	45(52.9)	131(56.7)	
	4-6/week	16(11.0)	8( 9.4)	24(10.4)	
	>7/week	8( 5.5)	1( 1.2)	9( 3.9)	
	Total	146	85	231	
Shellfish	Rarely	15(10.3)	33(37.9)	48(20.6)	p < 0.001
	1-3/month	78(53.4)	46(52.9)	124(53.2)	
	1-3/week	44(30.1)	7( 8.0)	51(21.9)	
	4-6/week	6( 4.1)	1( 1.0)	7( 3.0)	
	>7/week	3( 2.1)	0( 0.0)	0( 0.0)	
	Total	146	87	233	
Cephalocoda	Rarely	35(24.1)	20(22.5)	55(23.5)	NS
	1-3/month	80(55.2)	59(66.3)	139(59.4)	
	1-3/week	24(16.6)	5( 5.6)	29(12.4)	
	4-6/week	5( 3.4)	5( 5.6)	10( 4.3)	
	>7/week	1( 0.7)	0( 0.0)	1( 0.4)	
	Total	145	89	234	
Processed seafoods	Rarely	57(39.3)	24(27.3)	81(34.8)	NS
	1-3/month	60(41.4)	41(46.6)	101(43.3)	
	1-3/week	25(17.2)	23(26.1)	48(20.6)	
	4-6/week	3( 2.1)	0( 0.0)	3( 1.3)	
	>7/week	0( 0.0)	0( 0.0)	0( 0.0)	
	Total	145	88	233	
Dried seafoods	Rarely	24(16.4)	13(14.6)	37(15.7)	NS
	1-3/month	64(43.8)	34(38.2)	98(41.7)	
	1-3/week	40(27.4)	28(31.5)	68(28.9)	
	4-6/week	12( 8.2)	10(11.2)	22( 9.4)	
	>7/week	6( 4.1)	4( 4.5)	10( 4.3)	
	Total	146	89	235	
Meat/chicken	Rarely	5( 3.4)	3( 3.4)	8( 3.4)	NS
	1-3/month	49(33.6)	32(36.0)	81(34.5)	
	1-3/week	67(45.9)	43(48.3)	110(46.8)	
	4-6/week	24(16.4)	7( 7.9)	31(13.2)	
	>7/week	1( 0.7)	4( 4.5)	5( 2.1)	
	Total	146	89	235	
Eggs	Rarely	6( 4.1)	5( 5.7)	11( 4.7)	NS
	1-3/month	14( 9.6)	3( 3.4)	45( 7.3)	
	1-3/week	67(45.9)	42(47.7)	109(46.6)	
	4-6/week	38(26.0)	30(34.1)	68(29.1)	
	>7/week	21(14.4)	8( 9.1)	29(12.4)	
	Total	146	88	234	
Bean/bean products	Rarely	8( 5.5)	2( 2.2)	10( 4.3)	NS
	1-3/month	25(17.1)	17(19.1)	42(17.9)	
	1-3/week	79(54.1)	36(40.4)	115(48.9)	
	4-6/week	27(18.5)	25(28.1)	52(22.1)	
	>7/week	7( 4.8)	9(10.1)	16( 6.8)	
	Total	146	89	235	

1) Number(%) 2) Significantly different between areas

According to Lee & Kim(2001), the recommendation by mothers may also increase elementary school children's eating frequency of seafood.

Mothers of elementary school children in Cheolwon answered to serve shellfish for their family's meal significantly less frequently than those in Boryeong (Table 11). Families that served shellfish less than once a week are 10.3% and 37.9% in Boryeong and Cheolwon, respectively. Mothers in Cheolwon tended to serve fish and cephalocoda less frequently and bean/bean products more frequently than those in Boryeong, although the difference did not reach a statistically significant. Level therefore, children in Cheolwon may have less opportunity to consume animal protein than those in Boryeong although this study did not determine the actual intake of those food groups.

The frequency that five seafood categories were served to the elementary school children by their mothers showed a positive correlation to mothers' preference for those seafoods except for shellfish(Table 12).

However, the significant correlation between the serving frequency of the seafoods by the mothers and children's seafood preference was found only in dried seafoods, contrary to other studies which reported the effect of both parents(Moon et al. 1979) and mothers (Cheong 1995) on children's preference. Instead, the results of this study suggested that other factors such as gender and distance from the sea affect children's preferences for seafoods. Lack of positive correlation between seafood preference and the frequency of being served seafoods throughout seafood categories in the children might partly be attributed to the fact that the frequencies for these children to be served seafoods

**Table 12.** Pearson's correlation coefficients between mothers' serving frequencies of seafoods and elementary school children's seafood preferences

Serving frequencies	Fish	Shellfish	Cephalocoda	Dried seafoods	Processed seafoods
Fish	0.167	0.118	0.013	-0.017	-0.007
Shellfish	0.172	0.128	0.084	0.181	0.105
Cephalocoda	0.036	0.023	0.002	0.069	0.114
Dried seafoods	0.103	0.078	0.066	0.346**	0.119
Processed seafoods	-0.113	-0.119	0.012	0.016	0.153

\*\* : Significant at p &lt; 0.01.

**Table 13.** Pearson's correlation coefficients between mothers' serving frequencies of seafoods and mothers' seafood preferences

Mother's preference	Fish	Shellfish	Cephalocoda	Dried seafoods	Processed seafoods
Fish	0.237***	0.196**	0.102	0.167*	0.035
Shellfish	0.002	0.032	0.264*	0.133*	0.083
Cephalocoda	0.197**	0.243	0.205**	0.162*	0.030
Dried seafoods	0.02	0.112	0.107	0.309**	-0.004
Processed seafoods	-0.062	0.041	-0.058	0.159*	0.355**

\* \*\* : Significant at  $p < 0.05$  and  $p < 0.01$ , respectively.

at school lunch five meals per week were not included in this study.

### Summary and Conclusion

This study was undertaken with 237 fifth grade children to investigate the preferences of elementary school children for the various seafoods according to gender, the distance from the sea and methods of cooking fish. And by assessing the frequency that the seafoods were served for family's meal and the seafood preferences of their mothers, the effect of those factors on children's seafood preferences were examined. Subjects for this study were from a public elementary school under meal service located each in Boryeong-city, Chungcheongnam-do(coastal area) and Cheolwon-gun, Gangwon-do(land-locked area). Data was obtained by using a questionnaire in November, 2000. Questions for the children consisted of their seafood preference and those for mothers consisted of mothers' seafood preferences and the frequencies of the five seafood categories being served for their family's meal. The results of this study are summarized as follows.

1) The children's mean preference was the highest for processed seafoods and the lowest for dried seafoods. The preferences for most fish, shellfish, cephalocoda and dried seafoods of total children in the Cheolwon were lower than those in Boryeong and differences in many items were significant. The processed seafood was the only category for which children in Cheolwon did not have significantly lower preference than those in Boryeong.

2) Among the four area-gender groups, girls in Cheolwon had the lowest preference for most seafood items except cephalocoda, for which the preference of boys in Cheolwon was the lowest. The tendency of lower

preference throughout all seafood items in girls than in boys was not shown in Boryeong. The girls' mean preference for cephalocoda category was higher than boys' in both areas and the difference was significant in the Boryeong area.

3) Making soup was the least preferred method to cook fish regardless of gender and area, while grilling was the most preferred in each gender-area group, except in boys in Boryeong who preferred deep frying to grilling. Boys had a higher preference for deep frying as a cooking method for many seafood items than girls in both areas. Making soup was the only cooking method for fish for which the preference was higher in girls than in boys in Cheolwon.

4) The seafood preferences of mothers in both areas were similar to those of their children except for processed seafoods, which were even more preferred by children than their mothers. The preferences for cephalocoda of mothers in Cheolwon were significantly lower than their counterparts in Boryeong. There was no consistent correlation found in preferences for the five seafood categories between the children and their mothers.

5) The mothers in Cheolwon answered to serving shellfish significantly less frequently than those in Boryeong. The serving frequency of five seafood categories for the elementary school children by the mothers were consistently correlated with mothers' preference for those seafoods except for shellfish. However, the significant correlation between the serving frequency of the seafood by the mothers and children's seafood preference was found only in dried seafoods.

Compared to their mothers' preference and frequency of being served each categories, children's seafood preference appeared to be affected more consistently by gender, distance from the sea, and the method of

cooking, of which effects were different upon each seafood categories according to the results of this study. Therefore, it was suggested that the importance of different focuses to each subgroup according to gender and area should be emphasized in the development of effective strategies and nutrition education to promote children's seafood preference.

Developing new recipes to serve fish without troublesome fish bones and providing children the opportunity to try a wide variety of fish were suggested to promote seafood preference of the children, especially girls in land-locked areas. In order to increase children's intake of seafood, more frequent use of processed seafoods will be effective. There were some limitations regarding the generalization of the results of this study, pertaining to the subject sample size in different areas of the nation and the fact that the frequencies of being served seafoods did not include meals at school lunch. Therefore, further research is needed to better understand the factors affecting seafood preference of elementary school children.

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