Journal of Culinary Research, Volume 20, Number 5, pp.43-51, 2014

http://www.culinary.re.kr

The Sanitation Level and Culinary Environment of Using Fishery Products for the Housewives in the Seoul Metropolitan Area

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ABSTRACT: The purpose of this study is to assess the sanitation level and purchase behavior of fishery products, and to identify management conditions of bad smell from cooking fish at home as perceived by housewives in a metropolitan area. Frequency analysis, descriptive analysis, and cross-tabulation analysis were employed as statistical techniques for current study. Total 270 were collected from housewives. The statistical variables included the kinds of cooking oil and the age of housewives, the types of hoods for fish roasting, the types of covers for fish grills, the number of family, the ventilation methods, and the maintenance of kitchen utensils based on family incomes, and they showed statistically significant differences(p<.05). Furthermore, the housewives whose sanitary cognition level for fishery products was high, the housewives whose level of purchase attitude was relatively high, and the housewives who utilized specialized kitchen utensils demonstrated statistically significant differences(p<.05). It resulted from the assessment of such actual conditions as difference of culinary environment according to the sanitation level of fishery products, the level of purchase attitude, and whether the housewives utilized special kitchen utensils or not. The more efforts were proved from those who had the intentions for improvement of an amenable culinary environment at homes, according to the higher income obtainers, the smaller nuclear family, the younger generation, whether the housewives utilized special kitchen utensils or not, and those who had the higher sanitary cognition level of fishery products. The above results were derived from an individual lifestyle or a dietary lifestyle, but eventually this seems to be related with the propensity and values hierarchy of individuals.

Keywords: Sanitation Level of Fishery Products, Purchase Cognition Attitude, Kitchen Utensils, Culinary Environment

INTRODUCTION & LITERATURE REVIEW

Even though the mandatory controls over terrible air pollution and repeatedly used air in the room have been reinforced at the government level, people have less interest in the quality of air in a house. Housewives usually spend most of day at home, and they cannot realize the quality of air which is one of the essential factors for indoor environment. Namely, the fragrance of food when cooking fish can affect indoor air quality (Choi *et al*., 2011). Cooking fishery products releases various kinds of VOCs (volatile organic compounds) (Salmon *et al*., 2005; Choi *et al*., 2011). When breathing in such harmful substances for a long time, human bodies can get poisoned chronically it causes serious illnesses (Schwela, 1997). In fact, harmful substances can increase risk of lung cancer among non-smoking housewives when people cook. Therefore, condition of air can influence on people's health directly, so that the environment of kitchen is very important (Ko *et al*., 2000).

Various changing in modern society such as increased national income, nuclearization of family, single-person households, and women's socioeconomic participation have made differences in the quality of dining-out culture and menu along with food purchasing patterns. The changes of food consumption trends resulted in lower consumption of carbohydrates, increasing purchase of fruit, fresh food, and processed food at big-box stores and specialty shops(Park & Kim, 2008). In particular, recent outbreaks of BSE(bovine spongiform encephalopathy) and food additives have fuelled anxiety about food, effecting changes in consumption of well-being foods. Hence, it is expected to increase people's awareness of food hygiene when buying fishery products and clean culinary environment.

Fishery products are popular as a health food among housewives, especially external blue colored fish like Spanish mackerel, mackerel, sardine, and saury are becoming more and more consumed (Jeong *et al*., 1998; Kim *et al*., 2001; Moon *et al*., 2011; Park & Kim, 2008; Park *et al*., 2010; Shim *et al*., 1994; Yoon *et al*., 2010). In addition, housewives are interested in different kinds of cooking utensils for safe health food because kitchen utensils are as much important as freshness, quality and origin of food during cook.

Demographic characteristics including the level of national income have been brought up as important causal variables in

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Received: 8 August, 2014, Revised: 20 October, 2014, Accepted: 20 October, 2014.

both quantity and quality of food consumption. For example, Park and Kim(2008) demonstrated that increased national income, the change of the family system, expanded social participation of women, anxiety about food are all related to the changes in dining-out culture and the quality of food consumption patterns, and those changings derived from consumers' preference for health food, fresh food, and functional food, cutting down their carbohydrate intake. In addition, demographic characteristics have been considered as a significant element to better understand consumers' menu selection behavior among different variables of dining-out culture (Verbeke & Lopez, 2005). Previous scholars identified that demographic characteristics influence eating habits, preference and acceptance (Na, 2009) and it could be useful factor to understand fast food consumption behavior (Bearden, Teel, & Durand, 1978; Ninemeier, 1984). Furthermore, variables related to eating behaviors (e.g., acceptance and preference of food, consumers' daily habits, attitude and inherent traits, cooking and selecting menu) and individual lifestyle (e.g., grocery shopping) have been considered as a critical demographic factor to better comprehend consumers' behaviors (Divine & Lepisto, 2005). In particular, those with a higher level of education and income, nuclear families, single-person households, and career women noticeably prefer health food like well-being food or fishery products (Hong, 2011; Park, 2012; Ryu & Lee, 2013; Seung, 2005; Sul, 2007). Therefore, changes in dining-out culture, food quality, and well-being food are closely related to lifestyles and demographic characteristics.

Although gained from an individual culture, a reference group of social strata and family, lifestyle is a derivative of inherent personal value systems and personality (Markin, 1974). Besides, consumers tend to buy healthier products such as fruit, fresh food and processed food rather than carbohydrates (Divine & Lepisto, 2005; Park, 2012; Park & Kim, 2008; Roert, 1980; Yoo *et al*., 2008). Hence, the importance of health food and the change of dining-out culture have been actively studied, but there are only a few studies on hygienic management on fishery products and harmful substances from cooking. Based on the previous studies, in this respect, this study aims to provide basic data for the improvement of indoor air by analyzing the sanitation level of managing fishery products and the maintenance of kitchen utensils to prevent harmful substances made by cooking fish. Consequently, current study deduces that housewives who buy fishery products consider health and safety in the course of purchasing fish and kitchen utensils and cooking. Therefore, a theoretical model can be drawn based on demographic variables Fig. 1.

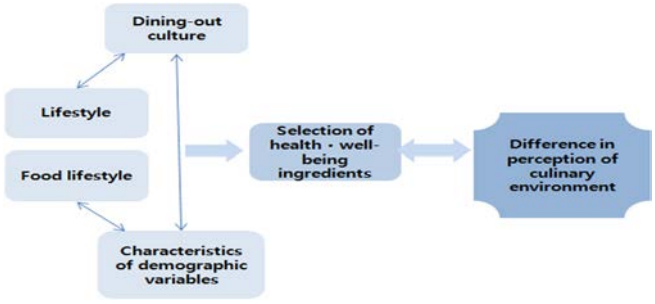

Fig. 1. Relationships among dining-out culture, lifestyle, culinary environment and demographic variables.

METHODOLOGY

Research Hypothesis

This study aims to analyze the awareness on sanitation when the housewives in cities buy fishery products and their odor management when people cook fish. The dependent variables include sanitation of fishery products and odor management when cooking fish. As for the independent variables, income, the number of family members, levels of sanitary control on fish, and the purchase of kitchen utensils are selected.

Demographic characteristics such as income, the number of family members and their education levels decide menu and are very important when choosing dining-out menu. Also, the sanitation level of fishery products is related to a clean culinary environment (Na, 2009; Ninemeier, 1984; Saba, 2001; Verbeke, 2001). The selected menu and eating habits have to do with lifestyles, social identities and personalities, revealed by social status, propensities and values (Lee, 2008). Based on literature and empirical studies, therefore, the present study assumes that the status of culinary environment will be different according to the demographic characteristics. It therefore proposes following hypothesis.

H1. The different demographic characteristics will influence on the status of culinary environment.

In addition, Park (2008) reported that people who have higher income more consider about quality of food and culinary culture, food safety, convenience, and cleanliness of food when they purchase food products. Hence, the changing of quality of life can effect on people's food consumption pattern toward healthier food choice, high quality food, and diversity of foods. Based on these change, this study assumes that the changing of level of social economic, life style, pattern of food consumption will influence on fishery cooking behavior such as decision of cooking utensils, level of sanitation, and so on. It therefore proposes following hypothesis.

H2. The different level of sanitary supervision and awareness of purchasing for fishery products will be influenced on the status of culinary environment.

Previous researcher reported that increasing of national income and changing of family group unit like unclear family contribute the changing of food purchasing behaviors. Specifically, the high carbohydrate food products are keep decreasing in numbers every year, but the purchasing level of fruits, fresh foods, high quality processed foods are keep increasing. Additionally, some issues relate to food products such as mad cow disease, food additives problem create consumers' anxiety and it brings well-being trend as well as changing perception of various food products including fishery products. These results identify food pattern change from quantitative food consumption to qualitative food consumption such as healthy foods, functional foods, and fresh foods (Kim & Kim, 2005; Park, 2008). Hence, this study assumes that state of culinary environment will be affected by sanitation level of fishery food products, specific cooking utensils. It therefore proposes following hypothesis.

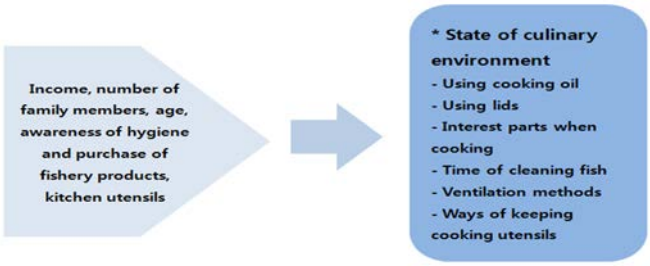

Fig. 2. Culinary environment according to income, number of family members, sanitation levels, purchase of fishery products and kitchen utensils.

Table 1. Demographic characteristics of housewives surveyed (N=270)

Characteristics		Frequency (n)	Percentage (%)
Age	≤29	96	35.6
	30~39	11	4.1
	40~49	104	38.5
	50≤	59	21.9
Number of family	≤2	10	3.7
	3~4	210	77.8
	5≤	50	18.5
Income of the whole household	≤₩400 million	135	50.0
	₩401~600 million	85	31.5
	≥₩601 million	50	18.5

H3. The state of culinary environment will be affected by professional cooking utensils.

Based on these previous supporting, the culinary environment of housewives in large cities is related to hygienic management of fishery products. The changes in the quality of life result in health-oriented, gentrified, and verified consumption patterns of food. It is expected that consumers' socioeconomic levels and sanitation levels in purchasing fishery products influence their removing harmful substances as shown in Fig. 2. Hence, these studies show that the more income, the more values on food quality and food culture and the more consideration for sanitation such as safety, convenience and cleanliness of ingredients and groceries.

Research Sample

Research sample for current study were selected from general housewives who are living in the capital city in South Korea. Total 300 samples were collected from the mother of children whose are majoring in culinary arts six universities that are located in capital city in South Korea, and all of selected participants were housewives. All of students were educated about the survey process and research purpose from researcher, and the students fully explained the purpose of current study to their mothers before distributing the survey. Survey distribution was performed for one month from April 20th to May 20th, 2014 to 400 participants. Out of 400, total 270 questionnaires were collected (72.9%) after excluding 30 participants because of missing data, multivariate and univariate outliers found 50 outliers, and 50 disqualifications since faithless responses. The demographic result was shown in Table 1.

Survey Development

The analysis tools were improved based on demographically elaborated three phases to increase the awareness of hygienic management of fishery products and the reliability and validity of tools for analyzing clean kitchen environment. First, based on previous studies and sanitary control for mass feeding (An, 2012), detailed analysis tools were reorganized (Hong, 2011; Lee, 2009). Second, such errors as typos and ambiguity of the questions were corrected by 10 graduate students majoring in foodservice. Last, there was an additional complement targeting 20 consumers, modifying unfit items. The final questionnaire is as shown in Table 2.

Data Interpretation

Current study investigates culinary environment by considering the age, income, use of cooking utensils, and hygienic management of housewives living in a capital area. A survey was conducted, and the valid data from it was analyzed with SPSS 18.0 program. Statistical significance level was $P< .05$ in present study.

To better understand the whole research, a descriptive statistical analysis (percentage, average, deviation) was carried out for the sanitation levels of fishery products according to de-

Table 2. Variables and scales of the questionnaire

Variables	Items	Scales	Questionnaires
Independent variable	Income, number of family members, age, cleanliness of kitchen utensils, sanitation level of fishery products, awareness of purchase	Nominal scale	11. Kitchen utensil for cooking fish (Yes, No) 12. Kitchen utensil for grilling fish (Yes, No)
		Interval scale	1. Organic, 2. Origin, 3. Producer, 4. Date of shipment, 5. Quality information(GAP), 6. Additives, 7. Freshness
			8. Fish specialty shop, department store, large mart 9. Fast food fish 10. Separate wrapper for fish
Dependent variable	Culinary environment	Nominal scale	13. Use of cooking oil, 14. Use of lids, 15. Cleaning fish, 16. Ventilation, 17. Ways of keeping kitchen utensils

mographic variables. These levels were classified as 'high' and 'low' above and below 3.92 on average. Cross-tabulation and χ^2 method were employed to analyze the demographic variables, purchase of specialized cooking tools, awareness of hygienic management, and culinary environment when cooking fish.

RESULTS

Sanitation levels of fishery products among housewives in a capital area South Korea. The average and standard deviation were calculated to analyze the sanitation levels of fishery products among housewives as shown in Table 3.

The result of analyzing the sanitation levels of fishery products among housewives shows 3.92 out of 5 points on average, which means they usually consider the sanitation levels of fishery products. In particular, consideration of hygienic management was shown in order of indication of the origin (M=4.23), indication of the producer (M=4.01), freshness of products (M=3.95), date of consignment (M=3.93), organic fishery products (M=3.90), information of quality (M=3.76), and information of additives (M=3.66).

The results of analysis of culinary environment based on demographic characteristics among the housewives (income, number of family members, age) are as shown in Table 4.

The cooking oil the housewives use is preferred in order of olive oil(51.9%), soybean oil(19.6%), none(12.6%), corn oil(9.3%), and others(6.7%), showing a significant difference in age(χ^2 =20.17, p<.05). The younger housewives prefer to use olive oil when they cook fish.

The lids they use are preferred in order of metal lids(25.6%), thick paper(25.6%), aluminum foil(22.2%), none(16.3%), others -(10.4%), showing a significant difference in the number of family members(χ^2=19.16, p<.05) and age(χ^2=28.41, p<.05). Those who have fewer family members or who are younger prefer to use aluminum foil on a pan.

As for cleaning fish, they tend to purchase partially cleaned fish(45.9%), purchase fully cleaned fish(44.1%), or clean fish in person(10.0%), showing a significant difference in the number of family members(χ^2=12.22, p<.05). As they have fewer family members, they tend to buy partially cleaned fish.

For the ventilation method, they prefer to use ventilators (67.0%) or open windows(33.0%), showing a significant difference in income(χ^2=6.14, p<.05). As they have more income, they prefer ventilators. In addition, for the ways of keeping cooking utensils after cooking fish, they wash and keep(74.8%), just wipe off and keep(20.7%), or just put a lid on(4.5%), showing a significant difference in income(χ^2=9.04, p<.05). As they get higher income, they wash their cooking utensils cleanly.

Table 3. Sanitation levels of fishery products among housewives in large cities

Sanitation level	*M*	*SD*
Organic fishery products	3.90	.43
Indication of the origin	4.23	.41
Indication of the producer	4.01	.39
Date of consignment	3.93	.52
Information of quality(GAP)	3.76	.67
Information of additives(Product background)	3.66	.72
Freshness of products	3.95	.53
Total	3.92	.52

The result of analyzing housewives' hygienic management and awareness of purchasing fishery products is as shown in Table 5.

The result shown as above → in Table 5 reveals that the housewives prefer olive oil for cooking fish with higher levels of hygienic management(χ^2=13.12, p<.05) and awareness of purchase(χ^2=13.59, p<.01). As they have higher levels of hygiene(χ^2=35.17, p<.001) and awareness of purchase(χ^2=32.20, p<.001), they prefer to use aluminum foil for a cover. Also, those with higher levels of hygiene(χ^2=55.49, p<.001) and awareness of purchase(χ^2=57.98, p<.001) tend to buy fully cleaned fish. As they have higher levels of hygiene(χ^2=41.36, p<.001) and awareness of purchase(χ^2=44.91, p<.001), they prefer ventilators when cooking fish. Those with higher levels of hygiene(χ^2=35.17, p<.001) and awareness of purchase(χ^2=37.64, p<.001) prefer to keep their utensils after washing.

The result of analyzing culinary environment based on using specialized cooking utensils is as shown in Table 6. As for cooking oil when cooking fish, the housewives who use specialized kitchen utensils prefer olive oil(χ^2=10.02, p<.05). Those who use specialized kitchen utensils for fish(χ^2=30.64, p<.001) and those who use specialized kitchen utensils for grill(χ^2=25.85, p<.001) prefer aluminum foil for a cover.

The housewives who use specialized tools for cooking fish prefer to purchase fully cleaned fish(60.9%), while those who don't use prefer to purchase partially cleaned fish(64.0%), showing a significant difference among the groups at p<.001 (χ^2=42.58). The housewives who use specialized tools for grill prefer to purchase fully cleaned fish(63.5%), while those who don't use prefer to purchase partially cleaned fish(64.9%), showing a significant difference among the groups at p<.001 (χ^2=62.91).

The housewives who use specialized kitchen utensils for cooking fish prefer to use fans(82.7%) and open windows(17.3%), while those who don't prefer to open windows(60.5%) and use fans(39.5%), showing a significant difference among the groups at p<.001(χ^2=53.69). The housewives who use specialized tools for grill prefer to use fans(77.4%) and open windows(22.6%), while those who don't prefer to open windows(54.1%) and use fans(45.9%), showing a significant difference among the groups at p<.001(χ^2=28.15). The housewives who use specialized tools for cooking fish prefer to keep utensils after washing(90.4%) and keep after wiping utensils off(9.6%), while those who don't prefer to keep utensils after washing(53.5%), keep after wiping off(36.0%), and keep utensils with lids on(10.5%), showing a significant difference among the groups at p<.001(χ^2=50.44). The housewives who use tools for grill prefer to keep utensils after washing(88.7%) and keep after wiping off (11.3%), while those who don't prefer to keep utensils after washing(55.0%),

Table 4. Analysis of culinary environment based on the demographic characteristics unit : capita(%)

Classification		Income(₩ million)			Number of family members			Age				Sum
		≤400	400~600	≥600	< 2	3-4	> 5	20s	30s	40s	>50s	
Cooking oil	Soybean oil	33 (24.4)	11 (12.9)	9 (18.0)	2 (20.0)	44 (21.0)	7 (14.0)	10 (33.3)	10 (16.1)	23 (20.0)	10 (15.9)	53 (19.6)
	Corn oil	11 (8.1)	8 (9.4)	6 (12.0)	1 (10.0)	19 (9.0)	5 (10.0)	1 (3.3)	5 (8.1)	8 (7.0)	16 (25.4)	25 (9.3)
	Olive oil	66 (48.9)	45 (52.9)	29 (58.0)	6 (60.0)	104 (49.5)	30 (60.0)	17 (56.7)	35 (56.5)	56 (48.7)	30 (47.6)	140 (51.9)
	None	17 (12.6)	13 (15.3)	4 (8.0)	1 (10.0)	26 (12.4)	7 (14.0)	2 (6.7)	9 (14.5)	17 (14.8)	4 (6.3)	34 (12.6)
	Etc.	8 (5.9)	8 (9.4)	2 (4.0)	0 (0.0)	17 (8.1)	1 (2.0)	0 (0.0)	3 (4.8)	11 (9.6)	3 (4.8)	18 (6.7)
		χ^2=7.74, p=.460			χ^2=5.11, p=.746			χ^2=20.17*, p=.032				
Lids	Metal lid	34 (25.2)	19 (22.4)	16 (32.0)	0 (0.0)	49 (23.3)	20 (40.0)	5 (16.7)	17 (27.4)	27 (23.5)	20 (31.7)	69 (25.6)
	Thick paper	34 (25.2)	22 (25.9)	13 (26.0)	1 (10.0)	53 (25.2)	15 (30.0)	6 (20.0)	11 (17.7)	35 (30.4)	17 (27.0)	69 (25.6)
	Aluminum foil	27 (20.0)	24 (28.2)	9 (18.0)	5 (50.0)	51 (24.3)	4 (8.0)	10 (33.3)	19 (30.6)	30 (26.1)	1 (1.6)	60 (22.2)
	None	26 (19.3)	12 (14.1)	6 (12.0)	3 (30.0)	33 (15.7)	8 (16.0)	6 (20.0)	8 (12.9)	15 (13.0)	15 (23.8)	44 (16.3)
	Etc.	14 (10.4)	8 (9.4)	6 (12.0)	1 (10.0)	24 (11.4)	3 (6.0)	3 (10.0)	7 (11.3)	8 (7.0)	10 (15.9)	28 (10.4)
		χ^2=5.00, p=.757			χ^2=19.16*, p=.014			χ^2=28.41**, p=.005				
Cleaning fish	Purchasing fully cleaned fish	59 (43.7)	42 (49.4)	18 (36.0)	5 (50.0)	102 (48.6)	12 (24.0)	11 (36.7)	28 (45.2)	57 (49.6)	23 (36.5)	119 (44.1)
	Purchasing partially cleaned fish	64 (47.4)	32 (37.6)	28 (56.0)	5 (50.0)	86 (41.0)	33 (66.0)	14 (46.7)	27 (43.5)	51 (44.3)	32 (50.8)	124 (45.9)
	Cleaning in person	12 (8.9)	11 (12.9)	4 (8.0)	0 (0.0)	22 (10.5)	5 (10.0)	5 (16.7)	7 (11.3)	7 (6.1)	8 (12.7)	27 (10.0)
		χ^2=4.83, p=.305			χ^2=12.22*, p=.016			χ^2=6.12, p=.410				
Ventilation	Fan	78 (57.8)	63 (74.1)	40 (80.0)	5 (50.0)	136 (64.8)	33 (66.0)	83 (72.2)	39 (61.9)	83 (72.2)	39 (61.9)	181 (67.0)
	Window open	57 (42.2)	22 (25.9)	10 (20.0)	5 (50.0)	74 (35.`2)	17 (34.0)	32 (27.8)	24 (38.1)	32 (27.8)	24 (38.1)	89 (33.0)
		χ^2=6.14*, p=.046			χ^2=.97, p=.615			χ^2=6.52, p=.089				
Keeping cooking utensils	Keeping after washing	94 (69.6)	66 (77.6)	42 (84.0)	7 (70.0)	152 (72.4)	43 (86.0)	18 (60.0)	41 (66.1)	91 (79.1)	52 (82.5)	202 (74.8)
	Keeping after not washing	35 (25.9)	16 (18.8)	5 (10.0)	2 (20.0)	47 (22.4)	7 (14.0)	10 (33.3)	17 (27.4)	20 (17.4)	9 (14.3)	56 (20.7)
	Keeping with a lid on	6 (4.4)	3 (3.5)	3 (6.0)	1 (10.0)	11 (5.2)	0 (0.0)	2 (6.7)	4 (6.5)	4 (3.5)	2 (3.2)	12 (4.5)
		χ^2=9.04*, p=.031			χ^2=5.62, p=.230			χ^2=9.17, p=.164				
Total		135 (100.0)	85 (100.0)	50 (100.0)	10 (100.0)	210 (100.0)	50 (100.0)	30 (100.0)	62 (100.0)	115 (100.0)	63 (100.0)	270 (100.0)

*p<.05, **p<.01.

Table 5. Analysis of culinary environment based on hygienic management and awareness of purchasing fishery products

unit: capita(%)

Classification		Level of hygienic management		Level of awareness of purchase		Total
		High	Low	High	Low	
Cooking oil	Soybean oil	19(14.3)	34(24.8)	20(14.7)	33(24.6)	53(19.6)
	Corn oil	11(8.3)	14(10.2)	11(8.1)	14(10.4)	25(9.3)
	Olive oil	82(61.7)	58(42.3)	84(61.8)	56(41.8)	140(51.9)
	None	11(8.3)	23(16.8)	11(8.1)	23(17.2)	34(12.6)
	Etc.	10(7.5)	8(7.5)	10(7.4)	8(6.0)	18(6.7)
		χ^2=13.12*, p=.011		χ^2=13.59**, p=.009		
Lids	Metal lid	31(23.3)	38(27.7)	32(23.5)	37(27.6)	69(25.6)
	Thick paper	22(16.5)	47(34.3)	24(17.6)	45(33.6)	69(25.6)
	Aluminum foil	49(36.8)	11(8.0)	49(36.0)	11(8.2)	60(22.2)
	None	19(14.3)	25(18.2)	19(14.0)	25(18.7)	44(16.3)
	Etc.	12(9.0)	16(11.7)	12(8.8)	16(11.9)	28(10.4)
		χ^2=35.17***, p=.000		χ^2=32.20***, p=.000		
Cleaning fish	Purchasing fully cleaned fish	89(66.9)	30(21.9)	91(66.9)	28(20.9)	119(44.1)
	Purchasing partially cleaned fish	36(27.1)	88(64.2)	37(27.2)	87(64.9)	124(45.9)
	Cleaning in person	8(6.0)	19(13.9)	8(5.9)	19(14.2)	27(10.0)
		χ^2=55.49***, p=.000		χ^2=57.98***, p=.000		
Ventilation	Fan	118(88.7)	63(46.0)	121(89.0)	60(44.8)	181(67.0)
	Window open	15(11.3)	74(54.0)	15(11.0)	74(55.2)	89(33.0)
		χ^2=41.36***, p=.000		χ^2=44.91***, p=.000		
Keeping kitchen utensils	Keeping after washing	120(90.2)	82(59.9)	123(90.4)	79(59.0)	202(74.8)
	Keeping after not washing	13(9.8)	43(31.4)	13(9.6)	43(32.1)	56(20.7)
	Keeping with a lid on	0(0.0)	12(8.8)	0(0.0)	12(9.0)	12(4.5)
		χ^2=35.17***, p=.000		χ^2=37.64***, p=.000		
Total		133(100.0)	137(100.0)	136(100.0)	134(100.0)	270(100.0)

*p<.05, **p<.01, ***p<.001.

keep after wiping off(34.2%), and keep them with lids on(10.8%), showing a significant difference at p<.001(χ^2=43.67).

CONCLUSIONS

This study analyzed the sanitation levels of fishery products and management of bad smell when cooking fish targeting 270 housewives who have children majoring in foodservice in the metropolitan area. The data gathered from the survey used for frequency analysis, descriptive statistical analysis, and cross analysis, and the results are as follows.

First, the housewives usually use cooking oil when cooking oil, especially olive oil(51.9%). In particular, younger ones prefer olive oil. They use lids for covering pans such as metal lids(25.6%), thick paper(25.6%), aluminum foil(22.2%), and those who have fewer family members and are younger prefer aluminum foil for covering a pan.

When they cook fish at home, they usually purchase cleaned fish, which is especially shown in those with fewer family members. As for ventilation, fans are most preferred(67.0%), followed by opening windows(33.0%). Notably, those with higher income prefer to use fans rather than to open windows when they cook fish. Most of them keep their utensils after washing (74.8%), especially those with higher income do(p<.05). However, there aren't any significant differences in ventilation and the ways of keeping kitchen utensils after using in terms of the number of family members and age(p.<05).

Second, this study examined the culinary environment based

Table 6. Analysis of culinary environment based on using specialized kitchen utensils unit: capita(%)

Classification		Kitchen utensil for cooking fish		Kitchen utensil for grill		Total
		Yes	No	Yes	No	
Cooking oil	Soybean oil	25(16.0)	28(24.6)	30(18.9)	23(20.7)	53(19.6)
	Corn oil	14(9.0)	11(9.6)	10(6.3)	15(13.5)	25(9.3)
	Olive oil	92(59.0)	48(42.1)	91(57.2)	49(44.1)	140(51.9)
	None	14(9.0)	20(17.5)	19(11.9)	15(13.5)	34(12.6)
	Etc	11(7.1)	7(6.1)	9(5.7)	9(8.1)	18(6.7)
		χ^2=10.02*, p=.040		χ^2=6.67, p=.154		
Lids	Metal lid	40(25.6)	29(25.4)	37(23.3)	32(28.8)	69(25.6)
	Thick paper	29(18.6)	40(35.1)	32(20.1)	37(33.3)	69(25.6)
	Aluminum foil	52(33.3)	8(7.0)	52(32.7)	8(7.2)	60(22.2)
	None	23(14.7)	21(18.4)	22(13.8)	22(19.8)	44(16.3)
	Etc	12(7.7)	16(14.0)	16(10.1)	12(10.8)	28(10.4)
		χ^2=30.64***, p=.000		χ^2=25.85***, p=.000		
Cleaning fish	Purchasing fully cleaned fish	95(60.9)	24(21.1)	101(63.5)	18(16.2)	119(44.1)
	Purchasing partially cleaned fish	51(32.7)	73(64.0)	52(32.7)	72(64.9)	124(45.9)
	Cleaning in person	10(6.4)	17(14.9)	6(3.8)	21(18.9)	27(10.0)
		χ^2=42.58***, p=.000		χ^2=62.91***, p=.000		
Ventilation	Fan	129(82.7)	45(39.5)	130(81.8)	51(45.9)	181(67.0)
	Window open	27(17.3)	69(60.5)	29(18.2)	60(54.1)	89(33.0)
		χ^2=53.69***, p=.000		χ^2=28.15***, p=.000		
Keeping kitchen utensil	Keeping after washing	141(90.4)	61(53.5)	141(88.7)	61(55.0)	202(74.8)
	Keeping after not washing	15(9.6)	41(36.0)	18(11.3)	38(34.2)	56(20.7)
	Keeping with a lid on	0(0.0)	12(10.5)	0(0.0)	12(10.8)	12(4.5)
		χ^2=50.44***, p=.000		χ^2=43.67***, p=.000		
Total		156(100.0)	114(100.0)	159(100.0)	111(100.0)	270(100.0)

*p<.05, **p<.01, ***p<.001.

on hygienic management and the awareness of purchasing fishery products. The housewives with higher levels of sanitation and awareness of purchase prefer olive oil when cooking fish and aluminum foil for a cover. They also prefer to buy fully cleaned fish and use fans when they cook. Moreover, they prefer to keep kitchen utensils after washing(p<.05).

Next, the housewives who use specialized kitchen utensils prefer to use aluminum foil for a cover, purchase fully cleaned fish, and use fans when they cook. They also prefer to keep the utensils after washing them(p<.05).

When all the results are combined, those who get higher income, who have fewer family members, who are younger, and who use specialized cooking utensils tend to help improve the sanitation of fishery products before buying them. The housewives also prefer wrapped products of specialty stores or major supermarkets. The results show that housewives' preferences are derived from personal dietary lifestyle that is closely related to their own internal tendency. In addition, the hygienic management, purchase patterns, and using specialized tools for health and sanitation are all related to personal lifestyle or demographic characteristics. Particularly, house wives who are higher income, higher education levels, and younger should make effort to improve a pleasant environment. These also contribute to demonstrate the relations among personalities, lifestyles, or social identity according to the previous studies.

Last, previous studies identified that the level of harmful are significantly different based on species of fish and shellfish, and cooking methods, but there is few studies have been conducted

to find relationships among perception of sanitation environment and cooking utensils as perceived by housewives. Although some experimental studies only performed in context of environment, food and nutrition, any practical studies to provide meaningful implication for cooking behaviors are not fully conducted in culinary sector. Therefore, future research should analyze the effects of demographic characteristics on culinary environment based on dietary lifestyle or personal lifestyle. These results will contribute to develop research area for demonstrating the impact of identification about specific culinary sector and perception about fishery products on people's eating behavior and culinary environment.

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