

FACTORS AFFECTING FISH CONSUMPTION IN FINNISH CATERING OUTLETS

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ABSTRACT

The Finnish food service outlets can be categorized as commercial foodservice operators, public kitchens or staff restaurants. The aim of this paper is describe how much fish consumption varies between different types of catering outlets and what is the importance of kitchen personnel's opinions to fish consumption. The data was collected in 2005 with telephone survey in interviewing persons, which were involved in managing or procuring operations in the outlets. The results showed that the fish consumption per served portion varies considerably between different outlet types. The consumption was two times higher in restaurants or hotels than in schools or hospitals. Moreover restaurants purchased most of fish as fresh whereas public kitchens preferred frozen products. Staff's opinions concerning fish price or origin had impact on the fish consumption. However opinions about healthy aspects or the risk of environmental pollutants did not have impact of fish consumption in catering outlets.

Keywords: Fish consumption, Catering, Restaurants, Institutional kitchens

INTRODUCTION

The catering sector is becoming a major player in the food market as a growing amount of money is spent on meals away from home. Catering service sector accounts for broadly one third of customer expenditure on food in many countries (Steward & Yen, 2004, Duquesne et al, 2004 and Defra 2007). The role of catering sector in the Finnish food market is considerable as every third Finn has his/her daily meal prepared by a catering kitchen (Nielsen 2005).

The changing customer habits have been converting the food consumption patterns in the catering sector in various ways. Customers with rising incomes are more demanding. They are looking for outlets which can provide varied menu items (Steward et al, 2005). Also convenience is important. Moreover the nutrition and health aspects are increasingly associated with the food service sector. As customers are more anxious about the health implications of imbalanced diets new opportunities for food service firms with a positive health reputation will be created (Defra 2006).

The food service sector has intensified the operational process as the developments in food technology have influenced changes through the subsystems. However the procurement has remained critical to the financial success of food service operations (Speers & Gregoire 2004). The most important demands of the caterers on the suppliers are complete delivery of orders, delivering on time, high product quality and high frequency of deliveries (Jansen et al, 2001).

Recommendations to eat fish and seafood are included in most national guidelines (WHO 2003). Seafood is considered important food due to its several health benefits; for example, reduction of the risk of coronary heart diseases (Kris-Etherton et al, 2002). Controversially seafood is potentially a major source of chemical contaminants. The contradictory circumstances also occur in Finland, where various local fish species contain high level of mercury or dioxin components (Isosaari et al, 2006). However the Finnish food authorities have given recommendations on fish consumption to the catering service sector for decades, because of its favorable nutritional qualities (Finnish Food Safety Authority 2006).

Fish is a challenge for the catering sector. The popularity, health image or gastronomic status of the outlet can be based on the quality of served fish meals. However in many occasions fish may cause more demands on the catering sector than many other foodstuffs. Fish itself can be an expensive item; moreover the procurement, storage and preparation can cause extra expenses compared to other foodstuffs. Earlier the uncertain or insufficient supply of fresh fish caused supplementary difficulties to the catering sector. However the market situation has changed considerably since Finland abolished trade barriers and the fish market became more market-oriented. For the catering sector the accessibility of fish products has improved as the supply is more stable and predictable than before.

The Finnish catering sector is diverse. In 2005 there were 18 000 meal preparing caterer kitchens, which served 700 million meals. The catering service outlets can be grouped in three categories: institutional kitchens, commercial catering service operators and staff canteens. Public sector has an important duty in catering trade as the majority of served meals are prepared in hospitals, schools, kindergartens or other institutional kitchens. The commercial operator is the biggest group consisting of a great variety of restaurants, cafeterias, fast food outlets and hotels. Staff canteens are the smallest group and they serve only 10% of all prepared meals (A. C. Nielsen 2005).

Table I: The number of outlets and prepared food proportions in Finnish catering service sector in 2005 (A. C. Nielsen 2005)

Field of activity	Number of outlets	Number of food proportions (million)
Commercial operators.	11 100	285,405
Restaurants	3 600	71,259
Hotels, accommodations	1 100	45,342
Cafeterias	4 800	70,249
Hamburger, kebab and pizza restaurants	1300	80,951
catering services	300	17,604
Staff canteens	1 500	59,981
Institutional kitchens	5 600	423,578
Hospitals	300	70,272
Children's homes and nursing homes	1 200	82,841
Kindergartens	1 200	32,34
Comprehensive and secondary schools	2 200	158,196
Universities and institutes	600	53,4
Others	100	26,53
Total	18 200	768,965

The vast variety of catering outlets is offering meals to various types of customers. The strategic principles may vary considerably among the canteens, bars or restaurants. Institutional kitchens are balancing between tight budget constraints and nutritional requirements; commercial restaurants or cafeterias are constantly searching out best practices for maximizing profits and staff canteens are focused on satisfying their particular customers' needs.

The field of the activity and the business idea determine the bases for daily operations as well as strategic development in the catering kitchens. The persons who are in charge of purchasing and menu planning are operating under complex circumstances. They have to connect various regulations and recommendations, customers' needs and requirements with economic constraints. Obviously the professional skills and experience are defining their decisions, but conclusions may also be partly dependent on decision makers' personal opinions. In this paper we evaluate if there are preferences or attitudes which may contribute to or prejudice the purchasing decisions. We intend to distinguish what opinions are most strongly associated with the consumption of different fish products. Moreover we evaluate how much the field of activity is inflecting to the fish consumption.

DATA AND METHODS

The collected data was based on a statistical sample and the target population included all catering kitchens which prepared meals served away from home in 2005. The frame population consisted of 14 740 outlets (A. C. Nielsen 2005). The stratified sample consisted of 2200 outlets. The stratification was based on daily served proportions, which was presumed to correlate with the amount of served fish. The consistency and validity of the questions was tested in advance in a survey laboratory. The data was collected by a telephone survey in January – March 2006 by interviewing persons who were involved in managing or procuring operations in the outlets.

The fish consumption volumes were collected as product weights. The volumes were asked in cumulative quantities and separately divided in imported and domestic fish quantities. Moreover fish consumption data was collected in two product types: fresh and frozen. In addition to quantitative data various opinions about of fish products were asked in the survey. The questions were concerning both buying decisions such as origin, price or reliability of fish delivery. Moreover different statements concerning eco-labeling, characteristics of fish as a food ingredient, the healthfulness or health risks of fish and the demand for fish were asked. The collected data also included background data concerning field of activity, size of outlet, geographical location and region. The overall response rate of the survey was nearly 80%, which can be considered high in national total surveys. No imputation was made in partly answered questionnaires.

For a descriptive analysis the estimations of the total fish consumption and the estimates of different product type proportions were calculated with the Surveymeans application of SAS software. For the statistical analyses the quantitative dependent variables of fish consumption were converted into dichotomous variables. The exogenous variables concerning different opinions were dichotomous and other exogenous variables were classified in three categories.

The existence or the strength of any association between the fish consumption variables and exogenous variables was examined by computing chi-square tests with cross tabulation tables. The logistic regression was applied in modeling the fish consumption. The models were created to cumulative unspecified fish consumption and the consumption of fresh, frozen and domestic fish supply.

In logistic regression the dependent variable can take the value 1 with a probability of success p , or the value 0 with probability of failure $1 - p$. The probabilities for considerable fish consumptions were modeled as a linear function of the X_i .

$$\text{logit}(p_i) = \ln \left(\frac{p_i}{1 - p_i} \right) = \beta_0 + \beta_1 x_{1,i} + \dots + \beta_k x_{k,i}.$$

The unknown parameters β_j were estimated by maximum likelihood. Since logistic regression calculates the probability or success over the probability of failure, the results of the analysis are in the form of an odds ratio. The odds ratio for a given independent variable represents the factor by which the odds(event) change for a one-unit change in the independent variable.

The forward stepwise logistic regression (with the significance level of 0,05) was applied in creating the models (SAS). No effect was added to the model, but the intercept was included.

RESULTS

Sample Characteristics

The data consisted of 1741 answers. All of them included estimate of total consumption of unspecified fish. But as some of the interviewee could not divide consumption in product type or in origin, the response rate was partly lower in those cases. Out of all 1741 interviewed persons 30% were cooks, 30% chefs of the restaurants, 30% entrepreneurs and rest of them were in other positions in the catering kitchens.

Table II: The data divided in two fish consumption levels

	Unspecified fish *	Fresh fish **	Domestic fish species **	Frozen fish**
Considerable consumption	514	469	890	1059
Not considerable consumption	1227	1006	733	408
n	1741	1475	1623	1467

*Considerable consumption of unspecified fish equals above the median in the sample

**Considerable consumption of fresh, frozen or domestic fish equals fish consumption with over 30% share of total fish consumption in the sample

Descriptive Analyses

The consumption of fish varied in different field of activity and was the biggest in staff canteens, where the consumption per served meal was double to the institutional kitchens. The type of consumed fish products was also dependent on the field of activity. The fresh fish products were preferred to frozen ones in the commercial kitchens, whereas the institutional kitchens consumed more frozen or pre-prepared products.

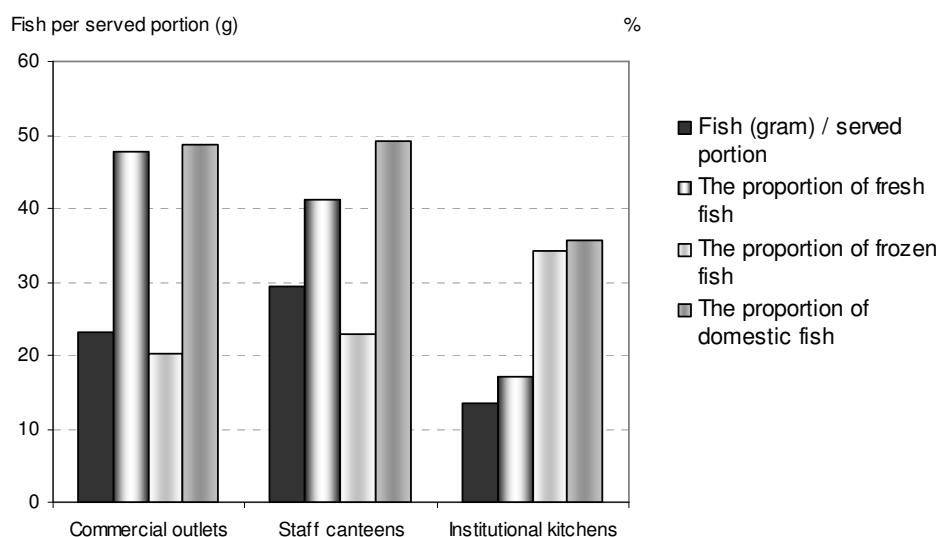


Figure 1. The consumption of fish per served meal in different fields of activity in the Finnish catering service sector and the proportions of different product type of the total fish consumption

The association between the fish consumption and the branch of the catering kitchen as well as the size of the outlet was evident. In the case of fish consumption of a different product type as well as unspecified fish consumption there was a clear connection with the field of activity. Likewise the size of the catering unit had an evident association with any kind of fish consumption. However there were no connections between fish consumption and regional factors such as the geographical region or the density of surrounding population. In the logistic regression model the province and location variables were excluded.

Table III: The association between fish consumption and variables concerning size, field, region and location. The results on Chi-square statistics (*) $p < .0001$; * $p < .05$)**

Exogenous variable	Unspecified fish	Fresh fish	Domestic fish species	Frozen fish
Size of the unit	***	***	*	***
Field of activity	***	***	***	***
Province	-	-	-	-
Location: rural- small town-city	-	-	-	-
n	1741	1475	1623	1467

The opinions concerning the origin of fish were strongly connected with the amount of fish consumption. Local supply was associated with any type of fish consumption. Moreover fish price, fish species as well as nutritional recommendations and demand of fish meals were connected with consumption. On the other hand many opinions did not have any association with fish consumption. Such opinions as eco-labeling, positive health impacts or health risks were not connected with fish consumption. Moreover the storage of fish or the price level of competing food ingredients weren't connected with the consumption.

Table IV: The association between fish consumption and variables concerning opinions. The results on Chi-square statistics and the variables selected to the models (*) $p < .0001$; ** $p < .001$; * $p < .05$)**

OPINION	Un-specified fish	Fresh fish	Domestic species	Frozen fish	Included in models
Fish is locally produced	***	***	***	*	x
Fish is difficult to handle	**	***	**	-	x
Fish dishes are not wanted	***	***	***	**	x
Fish is affordable	***	-	-	-	x
The importance of fish species	*	***	***	-	x
The importance of fish price	*	-	**	***	x
The reliability of fish delivery	-	*	***	-	x
Nutritional recommendations	**	*	*	***	x
Fish is produced by fishermen	*	***	***	-	-
Fish is difficult to store	-	-	**	-	-
Fish is healthy	-	-	-	-	-
Personnel dislike to use fish	-	-	-	-	-
The price level of other food ingredients	-	-	-	-	-
Environmental pollutants accumulating in fish limit the Finns' eating of fish	-	*	-	*	-
Demand for organic or eco-labeled fish will grow	-	-	-	-	-
n (min- max)	1407-1461	1346-1399	1346-1399	1346-1399	

Modeling Results

Eight most significant opinion variables and variables concerning field and size of catering outlet were selected for stepwise logistic regression modeling. The same variables were applied to modeling unspecified fish consumption as well as consumption by different product types.

More than any other factor, the field of activity was associated with the amount of fish consumed in the catering outlets. The probability of consuming a considerable amount of fish was much higher in staff canteens than in restaurants or other commercial outlets. In any type of fish products the higher levels were more probable in canteens. They had a positive association with a considerable consumption of unspecified fish (OR= 2,6), of domestic fish species (OR=1,6), of fresh fish (OR=1,1) and of frozen fish (2.3). However in the institutional kitchens the situation was partly the opposite. The probability of consuming a considerable amount of fish was much lower in institutional kitchens than in restaurants or other commercial outlets. Institutional kitchens had a negative association with a considerable consumption of unspecified fish (OR= 0,3), of domestic fish species (OR=0,6) and of fresh fish (OR=0,2), but not with frozen fish (OR=6,6).

Also the size of the outlet was a factor influencing the fish consumption. The probability of consuming a considerable amount of fish was higher in outlets serving lower amounts of daily meals than those of more meals. In the case of unspecified fish consumption (OR=4,1) as well as consumption of fresh fish (OR=2,4) the smaller unit size had a positive association with fish consumption.

Table V: The odds ratios for consuming considerable amounts of unspecified fish for different unit size, field of activity and opinions. Results form forward stepwise logistic regression (SAS)

Effect	Odds	95% Wald Confidence Limits
Size of unit		
Medium vs, large	4,1	2,4 - 6,9
Small vs, large	2,5	1,3 - 4,9
Field of activities		
Staff canteens vs, Commercial outlets	2,6	1,7- 4,1
Institutional kitchens vs, Commercial outlets	0,3	0,2 – 0,4
Opinions		
Customers do like vs, customers do not like	1,7	1,2 - 2,4
Not difficult to prepare vs difficult to prepare	1,5	1,0- 2,1
Not locally produced v, locally produced	0,6	0,4- 0,8
Not affordable vs, affordable	1,5	1,1- 2,0

Staff's opinions had a direct association with the consumption of fish. However the influence of different opinions was not equal to a different type of fish consumption. The personnel's conception that customers like having fish dishes had a positive association with consumption of unspecified fish (OR= 1,7), of domestic fish species (OR=1,6) and of fresh fish (OR=1,5), but not of frozen fish.

The opinion about the origin also had an influence on fish consumption. In the catering outlets where the personnel considered that locally produced fish is not an important factor, the consumption of fish remained lower than in those with staff having an opposite opinion. The staff's opinion that local

production is not important had a negative association with consumption of unspecified fish (OR= 0,6), of domestic fish species (OR=0,4) and of fresh fish (OR=0,5), but was positively associated with the consumption of frozen fish (OR=1,4). Also the opinion concerning fish species was a factor influencing fish consumption. The personnel's conception that fish species is not important had a negative association with the consumption of domestic fish species (OR= 0,6), but not of other fish product types or unspecified fish.

Table VI: The odds ratios for consuming considerable amounts of fresh fish, domestic fish species or frozen fish for different unit size, field of activity and opinions. Results form forward stepwise logistic regression

Effect	Fresh fish (n = 1048)		Domestic fish species (n = 1047)		Frozen fish (n = 1044)	
	odds	95% Wald Confidence limits	odds	95% Wald Confidence limits	odds	95% Wald Confidence limits
Size of the unit						
Medium vs, large	2,4	1,5- 3,7	-	-	-	-
Small vs, large	2,3	1,2- 4,3	-	-	-	-
Field of activities						
Staff canteens vs, Commercial outlets	1,1	0,6- 1,9	1,6	0,9- 2,7	2,3	1,4- 3,8
Institutional kitchens vs Commercial outlets	0,2	0,1- 0,2	0,7	0,5- 0,9	6,6	4,7- 9,2
Opinions						
Not difficult to prepare vs difficult to prepare	1,5	1,0- 2,1	-	-	-	-
Customers do like vs customers do not like	1,5	1,1- 2,1	1,6	1,2- 2,1	-	-
Not locally produced vs locally produced	0,4	0,3- 0,6	0,4	0,3- 0,5	1,4	1,0- 1,9
Price is not important vs price is important	-	-	2,0	1,2- 3,3	0,6	0,3- 0,9
The fish species is not important vs fish species is important	-	-	0,6	0,4 - 0,9	-	-

Personnel's professional attitude to fish as a food ingredient had an influence on fish consumption. In the catering outlets where the staff considered that fish is not difficult to handle and prepare dishes, the consumption of fish was higher than in those with personal having an opposite opinion. The personnel's conception that fish is not difficult to handle had a positive association with the consumption of unspecified and fresh fish (OR= 1,5), but not of frozen or domestic fish species.

As the association with price and consumption was a complex issue, it was evaluated with two questions with a different approach. The personnel's conception that fish is not affordable was positively associated with the consumption of unspecified fish (OR= 1,5), but not of fresh, frozen or domestic fish species. However the personnel's opinion on the importance of fish price had a direct influence on fish consumption of frozen fish and domestic species. If the price was not considered important issue, it had a positive association with the consumption of domestic fish species (OR= 2,0), but had a negative association with the consumption of frozen fish (OR=0,6).

CONCLUSIONS

The fish consumption varies considerably among different types of catering outlets. In the staff canteens the consumption of fish is higher than any other field of the catering sector. There are various reasons for that. The clients of Finnish staff canteens are often dedicated on health aspects as they are often well educated and have relatively high incomes (Raulio et al, 2004). Moreover having the daily lunch in staff canteens is more common among women than men. It is not surprising that different types of commercial restaurants or cafeterias are serving more fish than institutional kitchens. Restaurants are able to respond to the changes occurring in the markets. If customers are preferring fish meals and are willing to pay for them, the commercial outlets react and develop their menus. The situation is different in the Finnish institutional kitchens, which are balancing with tight budgets and demanding nutritional demands. With frozen, more affordable fish products catering outlets are able to meet the requirements of serving recommended amounts of seafood. In the institutional kitchens the consumption of frozen fish products is considerably higher than in restaurants.

Many personnel's opinions were directly influencing the fish consumption. Partly influential opinions reflected the demand or customers' needs; partly they delineated the personnel's professional attitudes or knowledge. If the personnel have good skills and a positive attitude to fish as a food ingredient the consumption of fish was higher. Especially if the handling of fresh fish didn't cause difficulties the consumption was higher. At present personnel may also regard fish more convenient food ingredient than before, because the catering sector can order and purchase fish fillets, steaks or other pre-processed fish products processed by industry.

Price is defiantly one of the key factors influencing purchasing decisions and consumption of fish. In spite of that there was no association with the price of fish and the consumption of fresh fish. However the price had a conflicting impact on consumption of domestic fish species and frozen fish products. In the catering outlets, where the personnel considered that price is an important factor in purchasing, the frozen products were preferred. In the opposite situation, where price was not considered important, the domestic species were consumed more. Obviously dishes prepared from domestic fish species were often served in catering outlets where price is not one of the most important factors.

Universally domestically produced food is preferred to imported supply. That is also the fact in Finnish fish consumption. However it is surprising that despite increasing imports of fish it is still considered a 'patriotic' food ingredient. In the catering sector locally produced fish was valued and was associated with high fish consumption.

Opinions concerning health aspects, eco-labelling, health risks and nutritional recommendations had no clear association with fish consumption. Result was partly as predicted. The Finns are not very concerned about health risks. The debate on the environmental pollutants has remained mild and the customers' opinions about the health aspects of fish have not changed (Ahvonen & Honkanen 2003). Also the eco-labeling of fish product is marginal in Finland. However it was surprising that nutritional recommendations had an insignificant role. The opinions on nutritional recommendations were associated with fish consumption, especially with the consumption of frozen products, but the influence was not notable.

The preconditions for increasing the fish consumption in growing catering sectors are good. The personnel's opinions on and attitudes to fish are mostly positive. Inevitably many former difficulties of supply, delivery or pricing have been defeated and fish has become a more desired and competitive food ingredient.

REFERENCES

- Ahvonen, A. & Honkanen, A. (2003). Fishery Barometer 2003: Outlook of enterprises and Consumers. *Kala- ja Riistaraportteja*. 280, Finnish Game and Fisheries Research institute, Helsinki. (in Finnish, Summary in English).
- Defra, Department for Environment, Food and rural Affairs. (2006). Food Industry, Sustainability Strategy. UK.
- Defra, Surveys, Statistics and Food Economics Division. (2007). Food service and eating out: an economic survey.
- Duquesne, B., Matendo, S. and P. Lebailly, (2004), Profiling food consumption: comparison between USA and EU. Food consumption Observatory, Department of Economics and rural development, Grignon Agricultural University.
- Finnish Food Safety Authority. (2006). Dietary advice on fish consumption, Helsinki.
- Isosaari, P., Hallikainen, A., Kiviranta, H., Vuorinen, P., Parmanne, R., Koistinen, J., & Vartiainen, T. (2006). Polychlorinated dibenzo-p-dioxins, dibenzofurans, biphenyls, naphthalenes and polybrominated diphenyl ethers in the edible fish caught from the Baltic Sea and lakes in Finland. *Environmental Pollution*, 141; 2006: 213-225.
- Jansen, D., van Weert, A., Beulens, J. And Huirne, R. (2001). Simulation model of multi-compartment distribution in the catering supply chain. *European Journal of Operational Research*, 133, 210-224.
- Kris-Etherton, P., Harris, W., and L. Appel (2002). Fish consumption, fish oil, omega 3-fatty acids, and cardiovascular diseases. *Circulation*, 106, 2747-2757.
- Raulio S., Mukala K., Ovaskainen M-L., Lahti-Koski M., Sirén M. and Prättälä R. (2004). Eating during the working day in Finland – collected results from national surveys. Publications of National Public Health Institute B3/2004, Helsinki. (in Finnish)
- Speers M. & Gregoire M (2004), Food service organizations – a Managerial and Systems Approach. Pearson Prentice Hall, New Jersey.
- Statistics Finland (2005). Household Budget Survey. www.stat.fi
- Stewart, H., Blisard, N., Jolliffe, D., & Bhuyan S. (2005). The demand for Food Away from Home: Do Other Preferences Compete with our desire to eat Healthfully? *Journal of Agricultural and Resource Economics*, 30(3);:520-536.
- Steward, J., & Yen, S. T. (2004). Changing household characteristics and the away-from-home food market: a censored equation system approach. *Food Policy*, 29,643-658.
- WHO (World Health Organization) (2003). Food based dietary guidelines in the WHO European Region. Nutrition and Food Security Programme, WHO Regional Office for Europe. Copenhagen.
- WHO (World Health Organization) (2003). Food based dietary guidelines in the WHO European Region. Nutrition and Food Security Programme, WHO Regional Office for Europe. Copenhagen.