

An Online Survey Study of Consumer Preferences on Aquatic Products in China: Current Seafood Consumption Patterns and Trends

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Abstract

The domestic demand for aquatic products in China has increased greatly, from consumption of 4.5 kg per person in 1970 to 31 kg per person in 2009. Little attention has been paid to Chinese consumer preferences on aquatic products. This study seeks to address this question through an online survey targeting university students to investigate the family and personal consumption preferences on aquatic products. This online survey involved 1038 students who are studying in 10 universities located in coastal and inland cities on mainland China. The results showed that 49.9% of respondents' families bought fish once a week. Fish markets (47.2%) and supermarkets (21.8%) were the main sources of purchase due to good freshness (48.6%) and shopping convenience (45.8%). More than half of all respondents (55.8%) preferred fish over meat. Among them, 60.4% of respondents like freshwater fish with a good awareness of freshness and taste. Regarding the selection of cooking methods, respondents showed a clear favor for braising, steaming and stewing over frying and grilling. About two thirds of respondents had no experience on eating raw fish. However, many of them showed interest in raw fish such as salmon and tuna. This study provided preliminary information of Chinese consumption patterns on aquatic products for understanding current and future consumption trends of China's aquatic market, and may be used as a reference for aquatic product processing industry.

Highlights: China ranks first in the world for fish production and exportation. Income growth and transitional economic environment have dramatically changed the food consumption patterns in China. As China has the largest population (1.34 billion) in 2011, Chinese seafood consumption preference and consumption trends might have great effects on the global fishery market.

Keywords: Aquatic products; Consumer preferences; Consumption patterns; Food culture

Introduction

Income growth, urbanization, improved distribution and transportation and changes in consumer preferences have led to expanded trade and globalized market for food products [1]. The globalized food market offers expanded sale opportunities and supply for both exporting and importing countries. Not only is there more trade in total, but the composition of agricultural world trade has been shifting away from bulk commodities towards expanded trade in fresh product and, especially, processed goods [2]. International trade in fish and fishery products continues to grow significantly. In 2009, total international exports recorded 55.67 million tons, accounting for 38.5% of total aquatic production [3]. The growth of global fishery trade also reflects the changes of seafood consumption, rising consumption not only due to the EU and the United States but also to other regions, including Asia with the notable exception of Japan [4].

China, the largest developing country, has been accelerating its industrialization and urbanization pace. Gross domestic product (GDP) growth has been exerting significant influence on the food consumption pattern [5]. Because of the accelerated urbanization and industrialization, the urban population increased dramatically in the last three decades. The net urban population increment was 499.4 million from 1980 to 2011, similar to the total population of 502.5 million in 27 European Union countries as of January 1, 2011 [6,7]. Urban and middle class Chinese consumers have become increasingly

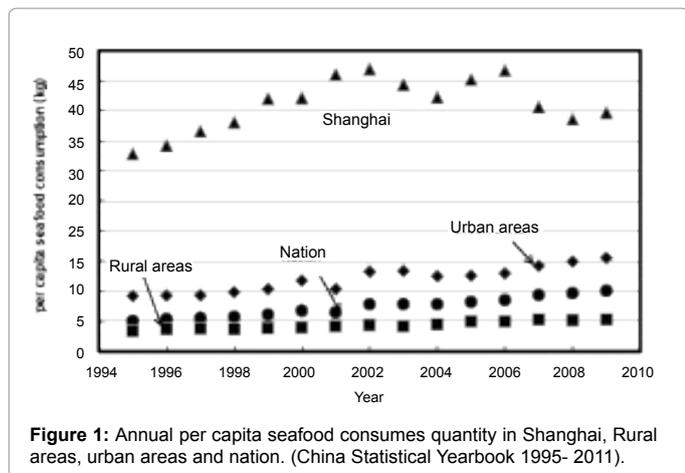
aware of product origin and opt for aquatic products because of its nutrition, safety, and variety. With the wide spread of western style cuisine and the ongoing evolution of Chinese cuisine, more families are using seafood products [8]. On the other hand, fish is very important in Chinese food culture, because it has been considered as a symbol of abundance and prosperity. Fish and fishery products are popular food throughout the coastal areas as well as the inland parts of China [9]. Therefore, sustained high GDP and disposable income growth will continue to boost domestic consumption of aquatic products in the future. Actually, the domestic demand for aquatic products in China has increased significantly, from the consumption of 4.5 kg per person in 1970 to 31 kg per person in 2009 [3]. However, data from the National Statistics Bureau of China (NSB) showed that per capita consumption was 15.5 kg for urban dwellers in 2009, while that of rural residents was 5.3 kg, slightly up from 5.2 kg in 2008. Exceptionally, per capita consumption was at a very high level for coastal cities such as Shanghai, increasing from 32.8 kg in 1995 to 39.7 kg in 2009 (Figure 1). This inconsistency might be due to the different terminologies used between Chinese statistics and product categories. In the absence of reliable statistics, collection and analysis of market data for fishery products might provide useful information of the actual fishery market and also have the advantage of providing insights into

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the behavior of fish industry insiders and consumers [8]. There are many studies analyzing the influencing factors of aquatic products consumption markets or demand predictions of the Chinese fishery market [10-12]. However, little research attention has been paid to consumer preferences on aquatic products. As China has the largest population (1.34 billion) in 2011, it should not therefore be surprising that China might play a pivotal role in the global seafood industry. The present study seeks to address this question through an online survey targeting university students to investigate their family and personal consumption preferences on aquatic products. We used national statistical sources and our own consumer survey data combined with the perception of Chinese food culture to analyze food consumption and preference, and to understand the consumption status and trends of China's aquatic market.

Methodology

Consumer Survey

The questionnaire was administered online from December 2011 to February 2012 with a total of 1038 respondents involved. These respondents were restricted to university students (undergraduates or post graduates) who were studying in 10 universities from six coastal cities (Dalian, Qingdao, Lianyungang, Shanghai, Xiamen and Haikou) and four representative inland cities (Beijing, Hangzhou, Nanchang and Wuhan) (Figure 2).

The questionnaire was taken under the guidance of professors in each university. As the period is winter vacation for university students in China, all the students can take time to their hometown for Chinese New Year and stay with their family and take the questionnaire. After careful evaluation of all the responses, 18 respondents were excluded due to inconsistent responses or missing observations in one or more variables of interest. A total number of 1020 respondents were included in this study. Respondent socio-demographic information is summarized in Table 1. Among these respondents, 53.5% were female and 46.5% were male, ranging in age from 19 to 30 years. According to their hometown distribution, 71.6% of the respondents were from urban areas, and 28.3% were from rural areas. A four-level household income standard was developed based on average wage of Shanghai: low (< 50 k Chinese Yuan (CNY), medium (50-100k CNY), high (100-200k CNY), and very high (>200k CNY). Accordingly, 50.2% of the respondents were in the low income level, 35.2% were in the medium

income level, 10.7% were in the high income level, and 3.9% were in the very high income level.

Questionnaire

The questionnaire had 23 questions, which were divided into two parts as family and individual consumption patterns on aquatic products. Most of the questions were multiple choices related to purchasing frequency, purchasing source, reasons for purchasing, consumer spending, cooking methods, as well as consumer perception and choice on fish versus meat, freshwater fish versus saltwater fish, and raw fish, surimi-based products or dried products. The questionnaire also included several questions which were designed to ask students to fill in the information about their favorite seafood, cuisine, and their advice on processing and development of fishery products.

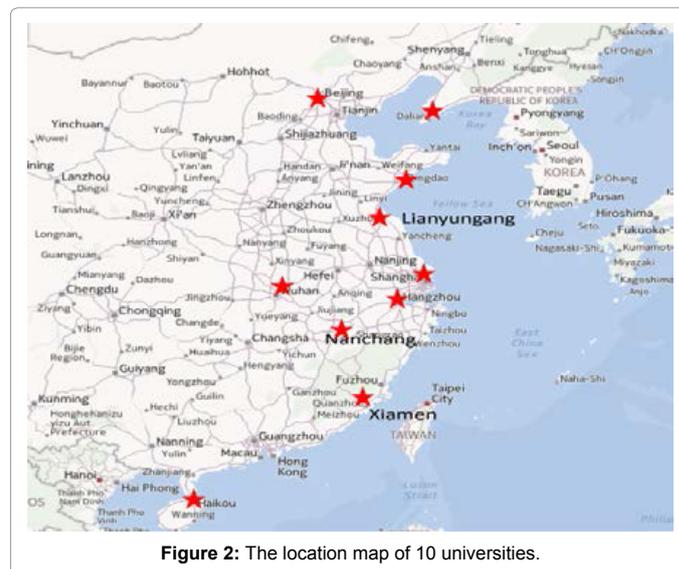
Statistical methods

All statistical analyses were conducted using SASS software provided by online survey company (Sojump.com, China). Percentages of responses in each category were calculated. Cross tabulation was used to examine relationships among and between the variables.

Results and Discussion

Family consumption patterns

Results of family consumption patterns relating to purchasing frequency, purchasing place, consumer expenditure and cooking methods of favorite dishes were listed in table 2. Regarding the



Demographics	Category	Percentage
Gender	Male	46.50%
	Female	53.50%
Age	19-30	100%
Home place	Urban	71.60%
	Rural	28.30%
Annual household income, omit(1000 CNY) (1000CNY=158USD)	Low <50	50.20%
	Medium 50-100	35.20%
	High 100-200	10.70%
	Very high >200	3.90%

Table 1: Demographics of respondents.

Questions	Answer	Percentage
Seafood purchase frequency	Less than once a week	30.40%
	Once a week	49.90%
	2-3 times a week	15.40%
	Almost everyday	4.30%
Purchase place	Super market	21.80%
	Wholesale market	16.70%
	Fish Market	47.20%
	grocery store	5.40%
	Others	5.10%
The reason for choosing purchase place	Close to home	45.80%
	Good freshness	48.60%
	Cheap	23.70%
	Good service	24.40%
	Easy to cook	2.80%
	variety	3.70%
Average expenditure for seafood in a week (CNY) 1000CNY=158USD	<10	19.40%
	30-Oct	23.10%
	30-80	29.20%
	>80	8.30%
Favorite cooking method	braising	77.20%
	Steaming	68.40%
	Stir-frying	39.20%
	Soup	41.70%
	Grill	20.90%
	Others	12.50%

Table 2: Family consumes patterns (purchase frequency, purchasing place, consume expenditure and cooking method).

purchasing frequency, 49.9% of the family usually bought fishery products once a week, and 30.4% did less than once a week. More frequently, 15.4% of the families made the purchase 2-3 times a week, and 4.3% even did almost every day. From the above results, we knew nearly 70% families consume fish products at least once a week, which indicated that fish is one of the important foods for everyday life. In China, there has been a long history of fish-eating culture. Especially during festivals or celebrations, fish has been considered an essential dish due to its meaning of prosperity when served whole [13]. In addition, the Chinese word for fish, 'yu' is pronounced the same as the word for rich/abundance. People like to use the symbol of fish to indicate the fulfillment of wishes in the New Year.

For the purchasing place, 21.8% of families bought fishery products from supermarkets, 16.7% bought from wholesale markets. Nearly half of the families (47.2%) reported buying fishery products from fish markets. Only 5.4% chose grocery stores, and 5.1% bought from other places. Moreover, we found that the families (30%) from urban areas prefer to buy in the supermarket or fish market, while only 2% families from rural areas buy fishery products from supermarkets. The regional differences might be due to the different distribution system, because there are many facilities such as large supermarkets and large wholesale fish market with developed cold-chain distribution system, but in rural areas there are less facilities such as these, only with some grocery stores or regular markets.

The reason to choose different purchasing places (multiple selection) were summarized as: convenience for shopping (45.8% of families), freshness (48.6%), good service (24.4%), cheapness (23.7%), variety (3.7%) and easy to cook (2.8%).

The average expenditure for buying fishery products in a week was less than 10 CNY for 19.4% of families, 10-30 CNY for 23.1% of the

families, 30-80 CNY for 29.2% of the families, and more than 80 CNY for 8.3% of the families. If we assume the average household income to be 3,000 CNY per month and 40% of the income to be spent on food consumption, then the cost of fishery product consumption at 60-120 CNY (one tenth of the total food expenditure) would be reasonable.

When considering cooking methods for fishery products, 77.2% of the families showed a clear favor for braising, which uses a combination of moist and dry heat. Typically the food is first seared at high temperature, and then finished in a covered pot with a variable amount of liquid to result in a particular flavor. Followed braising, 68.4% preferred steaming, 41.7% soup, 39.2% stir frying, 20.9% grilling, and 12.5% other methods. For braising and steaming, people like to use whole fish or fillets. This also reflects Chinese seafood culture tradition, because fish served in whole is to signify the freshness and represent the wholeness of having a beginning (head) and end (tail).

At the end, respondents were asked to list three favorite home-cooked dishes (including fish species and cooking methods). Braised and steamed bass (one species of freshwater fish), hairtail, common carp and crucian carp, stewed grass carp, stir-fried squid, broiled fish steak (salmon), and stewed bean curd with fish head (black carp) were among the favorite ones.

Personal consumption patterns

University students in China usually live in dormitories, and they can take 3 meals cheaply and conveniently at campus cafeterias. The personal consumption patterns can be known from the purchase behavior in cafeterias. The results of personal consumption patterns were shown in table 3. More than half of the respondents (55.8%) preferred fish over meat. Among them, 60.4% liked freshwater fish with a good awareness of freshness and taste.

Regarding the preference of fish, 48.7% of the respondents indicated nutritional and healthy concerns, 44.1% mentioned good taste, 3.3% of respondents chose price since fish is cheaper than meat, and 4.33% had other reasons.

Questions	Answers	Percentage
Which do you prefer	Meat	44.2%
	Fish	55.8%
Which do you prefer	Freshwater fish	60.4%
	Marine fish	39.6%
The reason for preferring fish	Cheaper than meat	3.3%
	Nutrition and healthy	48.7%
	Good taste	44.1%
	Others	4.33%
How many times do you eat fish a week in university	Less than once	25.9%
	Once	40.7%
	2-3 times	31%
	Almost everyday	2.3%
Favorite cuisine	Braising	55.1%
	Steaming	22.1%
	Deep frying	12.%
	Stir frying	4.6%
	others	7.4%
Have you ever eaten sashimi (raw fish)	yes	37.5%
	no	62.5%
Favorite raw fish	Salmon	70.6%
	Tuna	56.7%
	Arctic surf clams	18.3%
Have you ever eaten surimi based foods	yes	64.8%
	no	35.2%

Table 3: Personal consume patterns (preference on fish and other Japanese style seafood).

The respondents were also asked for the frequency of fish consumption in campus cafeteria. Of the respondents, 40.7% ate fish once a week, 31% did 2-3 times a week, 25.9% did less than once a week, and 2.3% did almost every day.

As for the favorite meals in cafeteria, 55.1% of the respondents selected braised fish, then followed by steamed fish (21%), deep fried fish (12.1%), stir fried fish (4.6%) and 7.4% for other fish. These results were similar to those for family consumer patterns except for deep frying. The reason might be because deep frying cannot be conveniently done at home, and most young people like to eat deep fried food, such as fried chicken.

The respondents were also asked their opinion about Japanese style fish products such as sashimi (raw fish) and surimi-based products. About two thirds of the respondents had no experience on eating raw fish. However, many of them showed interest in sashimi with 70.6% who liked to try salmon, 56.7% tuna and 18.3% arctic surf clams. The fact of increasing salmon consumption also can be reflected from the trade data of China's seafood imports and exports. China imported 204,000 MT of wild salmon and exported 90,400 MT in 2010 (NBSC, 2012). The increase of salmon import also indicated that salmon is popularly consumed in China.

For surimi-based products, 64.8% of respondents claimed they have eaten fish balls, a popular kind of surimi-based products to Chinese and east-southern Asian people, but not to Japanese. Moreover, respondents reported that they liked to eat imitated crab meat and grilled chikuwa (tube-shaped fish paste). However, different from the market in developed countries, the surimi-based products are sold in frozen status due to prolonging food shelf life and deficient cold chains, which cannot be eaten directly. Therefore, it is progressing to develop those surimi-based products as those of ready to eat products.

The relationship between consumption pattern and socio-economic variables

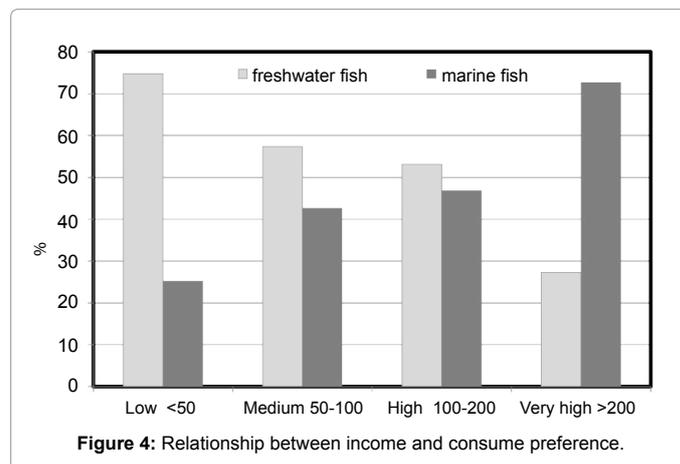
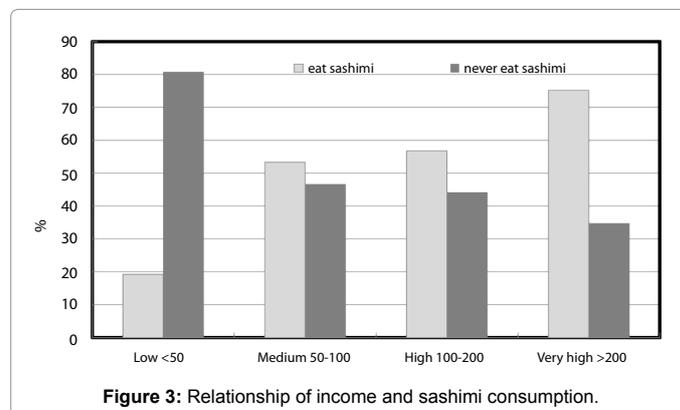
Effects of consumer gender: The results showed that 56.2% of the female respondents and 55.3% of males preferred fish over meat, which was similar to the results of 55.8% for all respondents. There is no link between the gender and consumption pattern. Both male and female respondents like to eat fish because of its healthy value and good taste. This is consistent with the result reported by Myrland et al. [14], which indicated that there is no difference between the sexes regarding seafood consumption levels in Norwegian households.

Effects of income and region: With the development of international market, more and more imported aquatic products show up on Chinese consumers' dining tables. Salmon, snow crab legs and cod are common products available in supermarkets. Sashimi has been considered as high-quality and healthy foods. When income and experience of eating sashimi were made into cross tabulation, it is interesting to find that 80.8% of respondents, whose household income are less than 50k CNY, had no experience of eating sashimi; whereas 75.2% of the respondents with household income higher than 200k CNY had experience of eating sashimi (Figure 3). This result implied that sashimi, a kind of high quality seafood, can be affordable for the high income level families. This result is consistent with the study as the income elasticity is close to one in China, which implies that every 1% increase in income would result in a similar extent increase in domestic demand for seafood [15,16].

The relationship between income and consumer preference on

freshwater fish over marine fish was shown in Figure 4. We found that 74.7% of the respondents with a household income less than 50k CNY preferred freshwater fish; whereas 72.7% of the respondents with a household income higher than 200k CNY preferred marine fish. From the survey, we also found that household income in urban areas were higher than those in rural areas. Especially, respondents from coastal cities in eastern and southern China, such as Qingdao, Dalian, Shanghai, had high incomes, ease to access marine fish, and experience of eating sashimi.

With the widespread of Japanese restaurants and Sushi bars all over the world, more people recognize Japanese food as one of the world's healthiest cuisines with impressive low cholesterol, fat and calories, and high fiber. In Shanghai, Beijing, and Dalian, there are more than 1000 Japanese restaurants in each city. When considering the regional effect on the experience of eating sashimi, we found that 64.8% of the respondents from Shanghai had the experience of eating sashimi, whereas only 23.4% of the respondents from inland city, such as Wuhan, had such experience. This regional difference might be partially due to the availability of many Japanese restaurants in Shanghai. And also the urban resident has increased the share household food expenditures spent on food away from home [17]. Different from developed countries, the respondents preferred freshwater fish, while they also showed high interest in marine fish, such as tuna and salmon. This result reflects that the respondents have a traditional food culture on freshwater fish, but the consumption patterns are changed with the life style changes and economic growth. For educated young people, they perceive marine fish high quality and healthy as containing more



omega-3 fatty acid. In China, freshwater fish output accounts for 47.9% of total aquatic production. Due to the backward distribution system, marine fish products are limited to be consumed in coastal areas. Even if marine fish can be found in markets of inland cities, the quality of frozen fish is not so competitive. Most Chinese prefer to purchase fish to be alive, showing its freshness, even when they order in restaurants. These facts are also one of the reasons the respondents like freshwater fish, but also show interest in high quality salmon and tuna.

Concern of Food safety

In this survey, 68% of respondents are concerned about food safety. In fact, food safety has attracted much attention throughout the world with increasing incidence of food-borne diseases, and newly-recognized hazards in foods. Food safety problems mainly include contamination with pathogenic bacteria, viruses, toxins, chemical and other environmental hazards [18]. Fish is highly perishable and often shipped in fresh form, thus careful handling and strict quality control are required throughout food processing and distribution systems. Increased income and access to information have led to increased demands of high-level food with safety and quality. Food safety concerns might be another reason why most respondents prefer salmon and tuna, not only due to good taste, but also healthy and safety image.

Current situation and prospects of aquatic product processing

In this survey, respondents were asked to give their comments on processed fish products. Nearly half of respondents (44%) considered convenience as the critical factor for seafood selection and consumption, 38% claimed taste, 18% recommended good texture, and only 6% indicated the healthy aspect. Since the living standard of Chinese has significantly improved, the demand for quality foods, especially high quality aquatic products arose accordingly [19]. As Gofton [20], mentioned in his research, a general lack of time, knowledge, skills and abilities to prepare home meals has influenced our global food attitudes and choices in the direction of more convenient food. Brunner also pointed that the demand for convenience food products is steadily increasing and convenience is one of the big trends in the food business. Our survey results are also consistent with these opinions [21].

On the other hand, respondents also claimed the processed fishery food should be tasty. Despite increasing importance of health-related, convenience-related and process-related dimensions on consumer acceptance of food, taste was reported to continuously be the primary consideration in food selection [22]. This is consistent with the quickest growing demand for surimi products, which is considered as convenient and tasty food. The production of surimi products increased from less than 100k tons in 2000 to 964k tons in 2009, nearly 10-fold increase [3]. The quick development might be due to the orientation of surimi products as a kind of convenient and tasty foods. It is still promising for the development of surimi industry as the merit of variable and convenient products, good for long distance distribution, and mass production.

Food consumption patterns depend on several factors, such as personal preference, habit, availability, economy, convenience, social relationship, ethnic heritage, religion, tradition, culture and nutritional requirement [23].

According to the survey results, there is a clear need to develop more convenient and high value-added products. It could be predicted that there would have a remarkable increase in the consumption of fish and fish products in China, especially high quality marine fish.

As marine fish resources are limited, it would be a great challenge for freshwater fish processing to develop taste and healthy products.

Conclusion

The consumption characteristics of aquatic products in China were concluded as follows.

Both urban and rural aquatic product markets were growing. Aquatic product consumption per capita increased year by year. With economy growth and urbanization, consumption per capita increased to some extent, but might be limited by fish resources. Coastal areas, relatively developed districts, consumed more aquatic products than western or central areas. Consumers preferred non-polluted aquatic products and had concerns on food safety. Consumers favored braising, steaming and stewing over stir-frying and grilling. About two thirds of respondents had no experience of eating raw fish. However, many of them showed interest in raw fish such as high-quality salmon and tuna. At present, due to deficient cold chains, most people preferred fresh and live freshwater fish over deteriorated marine fish. This is a good opportunity for marine fish processing development but also a challenge for freshwater fish. Future study on processed fishery products will be focused on product specific factors such as easiness to eat, taste, and health.

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