

Policy Report

Fish processing, quality and safety in the state of Qatar

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The Social and Economic Survey Research Institute (SESRI), a social scientific survey research initiative of Qatar University, was established in October 2008 with enthusiastic support from the leadership of Qatar University. SESRI's mission is to provide sound and reliable data to guide policy formulation, priority-setting, and evidence-based planning in the social and economic sectors.

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LIST OF ABBREVIATIONS

SESRI: Social and Economic Survey Research Institute

QSAS: Qatar Semi-Annual Survey”

NDS: The second National Development Strategy

FQS: Food Quality and Safety

FAO: Food and Agriculture Organization

MME: Ministry of Municipality and Environment

GSO: GCC standardization organization

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1. EXECUTIVE SUMMARY

The second National Development Strategy (NDS) of the State of Qatar 2018–2022 aims to achieve 90% self-sufficiency in fish production by 2023 and balance food production with conservation of natural resources by promoting responsible consumption of food products. The high demand for fresh fish has shed light on the importance of managing the fishery sector in a sustainable way to avoid overfishing and stock extinction. One way to achieve this is to shift to processed fish consumption as a step toward supporting the growing economic diversification. The government actively works to encourage local investors and foreign companies to invest in food products in the country. This is done by the use of the latest technologies and modern methods to provide fresh and healthy food to citizens and residents in Qatar following the Standardization Organization for the Gulf Cooperation Council Countries.

The Social and Economic Survey Research Institute [SESRI] conducted its fifteenth in 2019 “Qatar Semi-Annual Survey” [QSAS] through telephone interviews of 1,354 participants (Qataris and residents) living in Qatar. The survey covered various topics and included a section dedicated to the fishery sector. This report presents consumers’ perceptions toward the consumption of processed fish as well as fish safety and quality standards in order to provide policy recommendations that may help both investors and the government in achieving sustainable development in the fishery sector in Qatar. The descriptive analysis from the survey data presented in this report resulted in the following main findings:

- Processed and packaged fish, such as fish snacks and fish sausages, are not profitable investments in Qatar.
- While 47% of Qataris prefer consuming fried fish, 51% of residents prefer consuming grilled fish.
- A significant number of Qataris (20%) and residents (22%) are unaware of the factors that cause fish spoilage.
- Both Qataris and residents attribute the main cause of fish spoilage during transport to markets in the State of Qatar, to high temperature.
- Around 83% of the community agreed that chilling the fish (cooled with ice) keeps them in good conditions.
- A total of 98% of consumers confirmed that the place they buy fish from complies with all quality and health regulations.
- A high and significant number of consumers (54%) buy fish from supermarkets.
- There is an urgent need to establish a strong national quality and safety system for more efficient use of fish products.

2. INTRODUCTION

In the post-oil era, Qatar has witnessed an increase in income, an economic boost, and a high influx of people from all over the world for work. As a result, some socioeconomic changes have emerged, such as the increasing demand for fish products, new fish preparation methods, and the importation of products that were previously unknown.

The second National Development Strategy (NDS) of the State of Qatar 2018–2022 paid great attention to the fisheries sector as a step toward supporting the growing economic diversification and called for a renaissance in the sector. Among the developments mentioned in the strategy are equipping fisheries and fishing ports with basic services and advanced technology, enforcing effective fish conservation laws, and increasing local production through advanced fish farms. In 2018, the Qatar Free Zone Authority was established to oversee and organize new free zones, providing opportunities and benefits for companies seeking to enter the market. The government actively works to encourage local investors and foreign companies to invest in food production in the country using the latest technologies and modern methods. These initiations aim to support the requirements of sustainable development to provide fresh, healthy, and quality food to Qatari citizens following the Standardization Organization for the Gulf Cooperation Council (GSO).

Currently, COVID-19 has a clear negative impact on food security, with concerns arising as to virus transference and the waste created from infected food. Therefore, food quality and safety has become one of the most important topics throughout the world, including Qatar. Food quality and safety (FQS) can be defined as a kind of consumer protection standard that provides safe and healthy food accepted by consumers and reflects their satisfaction. This could be achieved by following all food laws and regulations enforced by national authorities throughout the supply chain. Failure to apply these standards can lead to food spoilage, such as chilled fish¹ that may become unsuitable for human consumption.

There are many reasons that make FQS important, such as the opportunity for economic diversity through the introduction of new, high-quality fishery products for export that could become vital economic resources. In addition, FQS could reduce post-harvest losses. Moreover, it helps to improve consumer satisfaction and regulate markets by implementing all safety management systems throughout the supply chain. The most important driver of FQS is the avoidance of food-borne diseases that may result from environmental contamination or microbial bacteria that can negatively affect consumers and lead to food poisoning. Finally, implementing FQS could help in stock management by decreasing the amount of catch for illegal processing from the juvenile fish² species, and measuring the exact local demand. This may help countries to be self-sufficient, prevent overfishing, and hence rescue the fish stock. Therefore, it is essential for a country to have national food control systems to manage the safety and quality of food for consumption. In this regard, this report aims to provide some important information related to the consumption of processed fish and fish safety and quality standards, and to provide policy recommendations that may help both investors and the government in achieving the sustainable management of the fishery sector in Qatar.

¹ chilled fish are freshly caught fish that have not been subjected to any preserving treatment aside from chilling (GSO, 2000)

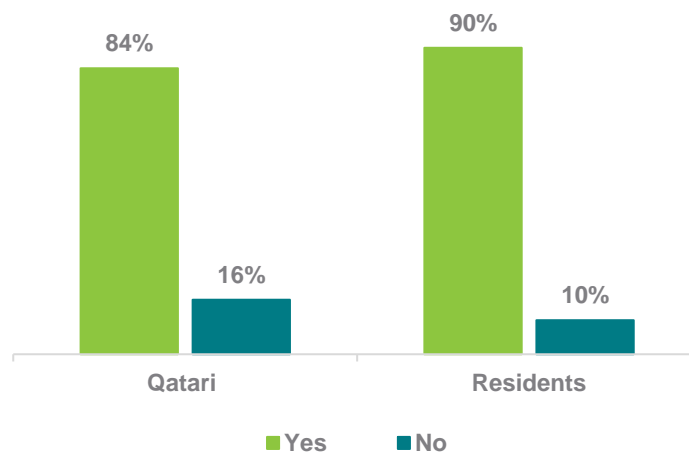
² Juvenile fish is fish that caught illegally because they are immature fish that could affect the sustainability

3. RESULTS AND DISCUSSION

3.1 Fish consumption status in Qatar

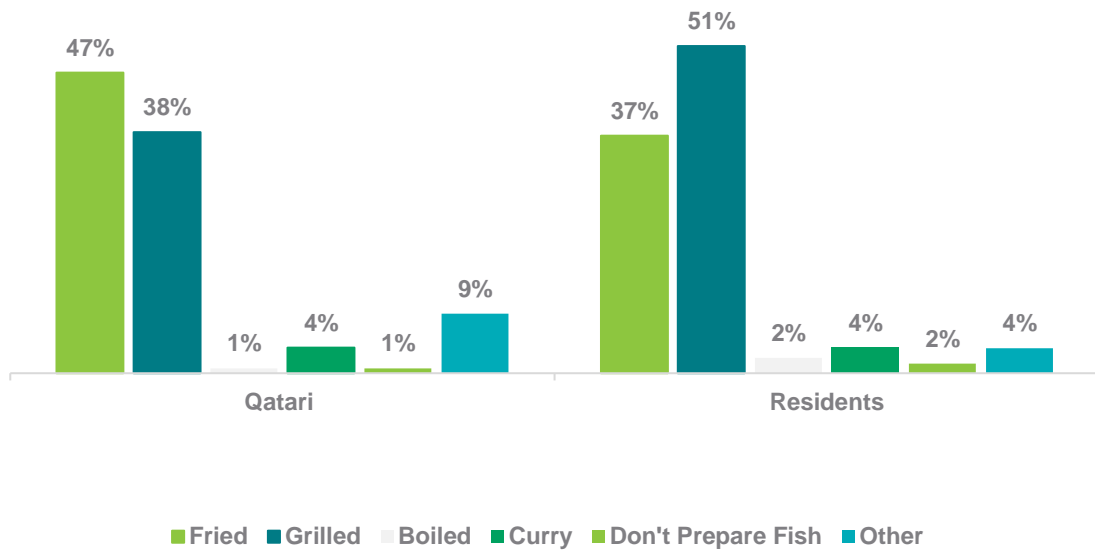
The growing population worldwide has led to an increase in the fish consumption. Interestingly, the global food fish consumption increased at average annual rate of (3.1%) at almost twice the annual growth of world population (1.6%) from 1961 to 2017 (Food and Agriculture Organization [FAO], 2020), leading to great pressure on the carrying capacity of the seas to produce more. Qatar, like the rest of the world, is also trying to address this problem by managing fish production. Understanding the fish consumption status would help the country to understand the socioeconomic characteristics of consumers, improve consumer satisfaction, manage fish production in the country, formulate, implement, and evaluate policies related to fishery sectors. Thus, the first section of this report presents some of the attitudinal behaviors of respondents toward processed fish products in Qatar.

Figure 3.1-1 Fish and fish product consumption by respondents



Consumption of fish in Qatar is very high. In 2020, fish consumption registered around 23.5 thousand tons (Badawi, 2020). The high fish consumption demand puts pressure on the fish stock. Therefore, understanding fish consumption attitudes and behavior is becoming vital for the sustainable management of the fishery sector. In this survey, participants were asked whether they eat fish or any other fishery products. The results showed that the majority of both Qataris (84%) and residents (90%) consumed fish, with residents having slightly higher percentages compared to Qataris. This result is consistent with another study by Al-Thani on food patterns and diet quality in Qatar (Al-Thani et al., 2017). Results from this survey, showed that over 90% of both Qataris and residents preferred fresh fish to other types of fish, such as canned, frozen, or salted fish. This indicates that Qatar has to balance having high-quality fresh fish to increase consumer satisfaction and at the same time sustaining the resource to avoid overfishing due to high demand of fresh fish consumption.

Figure 3.1-2: Methods of fish preparation for consumption by respondents

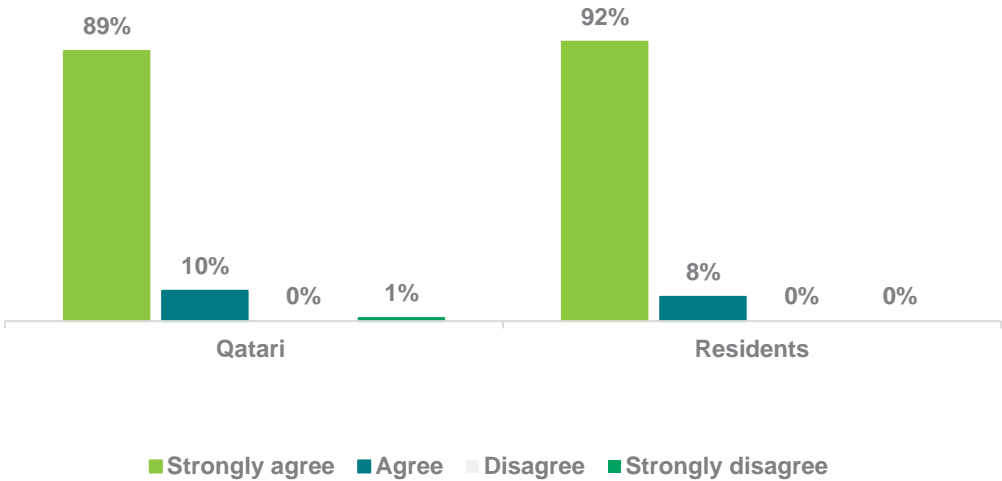


The way fish prepared could have an impact on human health. For example, a study on the effect of different cooking methods of fish showed that the grilling method is the healthiest (Marimuthu et al., 2012), while frying is usually perceived as a less healthy option (Mitterer-Daltoé et al., 2014). In this study, respondents were asked to choose their most preferred way to cook fish to determine their preferences as well as the level of their knowledge regarding which method is the healthiest. Figure 3.1-2 shows that frying and grilling were the most chosen methods in Qatar; however, more Qataris (47%) preferred fried fish compared to the residents (37%), while more than half of the residents chose grilled fish consumption compared to only 38% of Qataris. This gives a good indication of why it is important to focus on increasing health awareness regarding the healthiest fish preparation method.

3.2 Fish consumption safety and quality

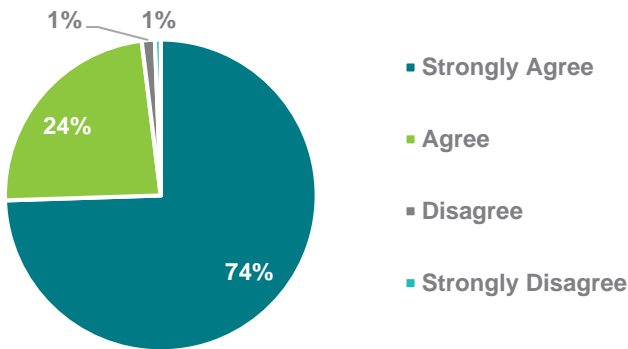
Fish is one of the most important healthy protein options for human consumption. However, fish are considered perishable food products, and they are highly vulnerable to spoilage. Thus, it is very important to consider FQS standards when buying fish. FQS is gaining attention worldwide because of its direct effect on consumers' livelihoods and wellbeing. Qatar is one of the countries that cares the most about food quality, and it is usually the Ministry of Public Health and Ministry of Municipality and Environment (MME), that are responsible for food safety and quality. Both authorities provide qualified expert staff to apply the Gulf Standards to food such as chilled fish. Section 2 of the report presents the fish consumption safety and quality results by measuring the level of awareness regarding the impact of fish consumption on human health, the reasons for fish spoilage, and some quality and safety standards required for fish consumption.

Figure 3.2-1 Respondents' health awareness of fish consumption



Qatar and other Arab countries are shifting toward providing guidelines that focus on encouraging healthier lifestyles (Coats et al., 2019). Consequently, to shed light on the level of health awareness in Qatar, the respondents in this study, were asked to choose whether they agreed with the following statement: “Eating fish is good for your health.” Almost all of the respondents, including both Qataris and residents, believed that fish was good for their health. This result is consistent with other studies conducted with consumers in other parts of the world, such as Pieniak et al.’s (2010) study, which showed that European consumers strongly believe that eating fish is healthy. Although almost all respondents were fully aware of the importance of fish consumption for health, there was still some concern about the healthiest method of fish preparation in the State of Qatar.

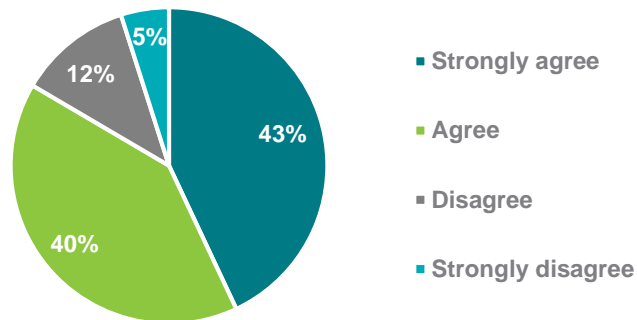
Figure 3.2-2: Perception of respondents toward the quality of the fish markets



One of the main standards of FQS is the cleanliness of the place where people buy fish. Thus, to avoid fish spoilage, the place where the fish are sold should be clean, and the shelf life for chilled fresh fish should not exceed seven days from the date of the catch (GSO, 2012). To measure peoples' views toward the quality of the market that they buy fish from, respondents were asked whether they agreed or disagreed with the following statement: “The place I usually buy fish from is clean, which makes me a persistent customer.” The results showed that the majority of respondents agreed that the place they

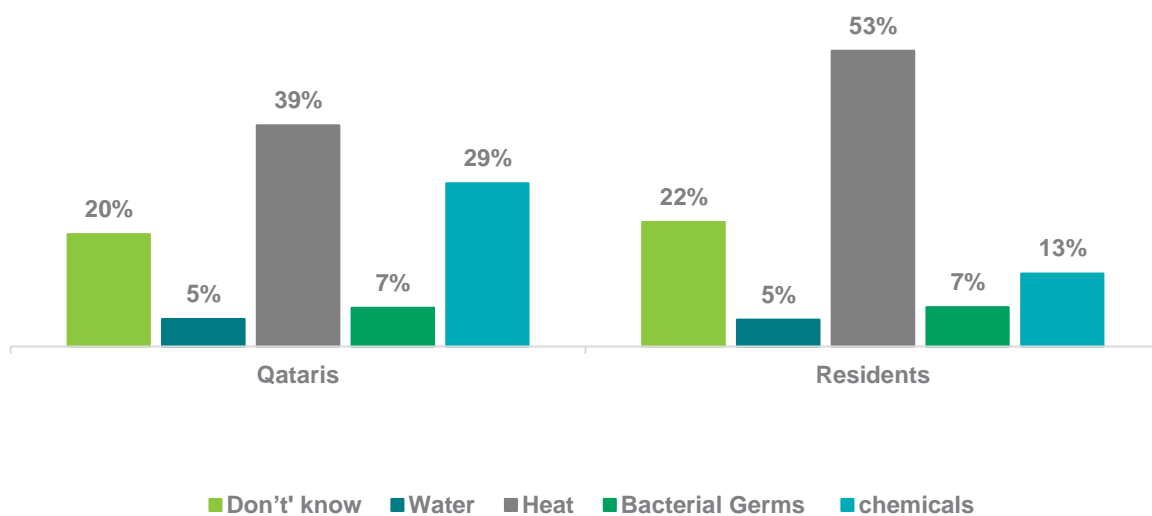
bought fish from was clean (98%). This indicates the high consumer satisfaction with the health and hygiene standards of markets in Qatar.

Figure 3.2-3: Chilling fresh fish keeps it in good condition



In order to help keep fresh fish in healthy and good conditions suitable for human consumption, they should be cleaned and cooled to ice melting temperature (0 C) as quickly as possible (GSO, 2012). The Standardization Organization for GCC (GSO) has established an update of Gulf Technical Regulation No. GSO 380/1994 within the program of work of the Technical Committee No. 5 “Food and Agricultural Products Specifications Sector.” According to the GSO, “chilled fish” are fresh fish that caught recently and chilled, as a whole or in part, and not been treated with any means of preservation other than cooling, and that are not specific to crustaceans and their products (GSO, 2012). Respondents in this study were aware of the importance of cooling to keep the fish safe for consumption (84%), and only 17% disagreed with the fact that cooling the fresh fish with ice would keep them in good conditions. This might reflect the possibility of having an incidence of fish contamination at the markets in the state of Qatar.

Figure 3.2-4: Factors causing fresh fish spoilage in Qatar, by respondent



The most common reasons for fish spoilage in the industry were cited in the literature to be the low temperature of storage conditions and chemical techniques for controlling water activities, microbial spoilage, and oxidative and enzymatic degradation (Ghaly et al., 2010). The same results were found in this study, since both Qataris and residents attributed the main cause of fish damage while transported to markets to high temperature. For example, in the summer of 2019, the Ministry of Municipality and Environment eliminated around 100 kg of spoiled fish because of their spoilage from high temperature, and it is worth noting that this is a common phenomenon during the summer (MME, 2019). Figure 3.2-4 shows that Qataris were more aware of the causes of fish damage compared to residents.

3.3 Respondents' interest in consuming processed fish

Fish processing involves several steps, such as stunning, grading, slime removal, meat bone separation, in addition to steaking, and filleting. Around 20 to 80% of fish waste could be generated from this process depending on the level of processing, which could then be utilized as fish silage, fishmeal, and fish sauce. Moreover, various preservation methods could be implemented to prevent fish spoilage and reduce post capture losses, such as frying, fermentation, drying, salting, and smoking (Adeyeye et al.; Lkutegbe & Sikoki, as cited in Anihouvi et al., 2019). Many countries are moving toward fish processing to reduce fish waste and produce valuable byproducts that are suitable for human consumption while also helping to fill the demand gap of fish consumption. This section reviews Qatar society's interest in purchasing and eating processed fish products such as fish balls, samosas, or fish sausages.

Figure 3.3-1: The frequency of purchasing processed fish products by respondents.

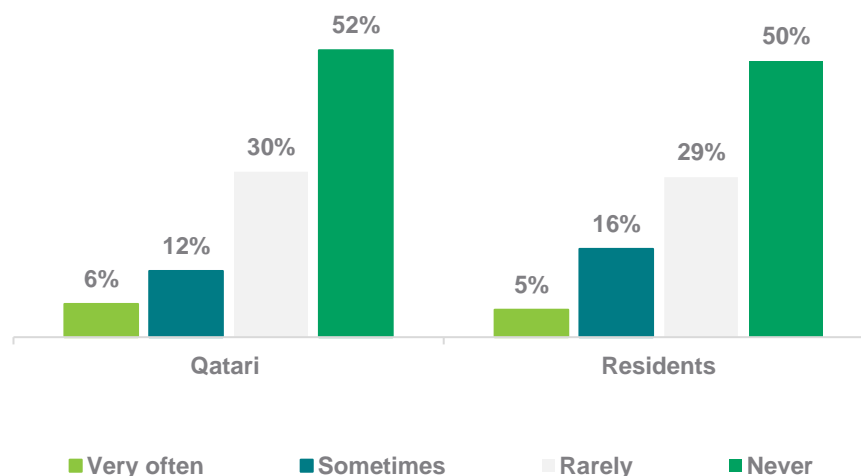
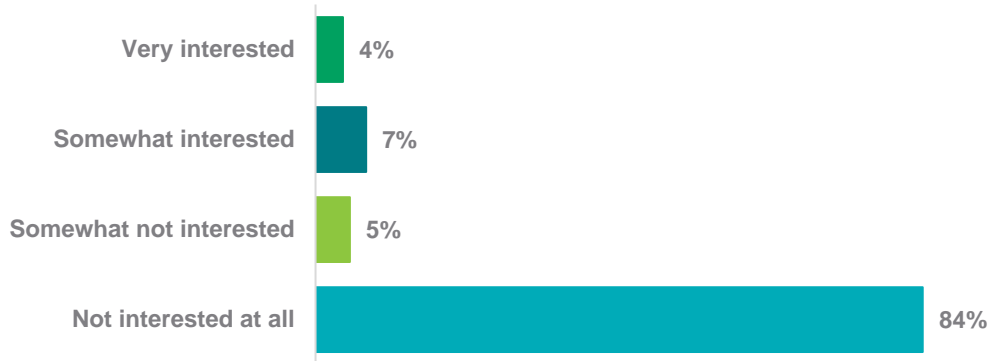


Figure 3.3-1 indicates that half of both Qataris (52%) and residents (50%) had never purchased snacks of processed fish products such as fish balls or samosas. Almost 30% of both groups had rarely bought processed fish snacks. This indicates that processed

fish products are not of interest to Qatar society and that the majority of Qataris and residents do not buy them.

Figure 3.3-2: Respondents' interest in eating fish sausage



Respondents were asked to rate their interest in consuming fish sausages. A total of 84% of the respondents (92% of Qataris and 78% of residents) were not interested in eating fish sausage. This shows that fish sausage would not be a good investment option for businesses in Qatar. Based on the results reported in this section, it is evident that the demand for fresh fish consumption highly outweighs that of processed fish among the Qatar community, and investing in processed fish products for human consumption would not be a source of profit in Qatar. Therefore, investment in fish byproducts and fishmeal might be a better option than investing in processed fish products in Qatar. A study by Martinez-Alvarez (2015) showed that animal processing industries could develop useful products with higher value, such as protein hydrolysates, that may reinforce the immunity of fish as well as newly weaned animals.

4. POLICY RECOMMENDATIONS

Based on the results of this report, some policy recommendations formulated to help sustaining the management of the fishery sector in Qatar:

1. Managing fish resources in a sustainable way and determining the total allowable catch per person per day could be a good management policy to prevent overfishing.
2. Investing in sustainable production techniques, such as fish farming and aquaponics, to meet the growing demand for fresh fish would reduce the increasing gap between supply and demand.
3. Modernization of artisanal fishing vessels in terms of their capacity and harvesting techniques will improve the quality and quantity of the fish catch. Development of the infrastructure for landing sites, coastal and internal markets, and transportation vehicles could ensure zero loss in the whole supply chain.
4. Responsible and sustainable consumption of fish is also an important issue that needs to be addressed, as well as balancing the consumption of different meat proteins.
5. An effective national food control system is essential to protect the wellbeing and safety of consumers and to ensure the safety and quality of their products.
6. The community should be educated and encouraged to consume healthy prepared fish and avoid the negative health effects of frying.
7. Recycling mechanisms and machines could be provided for fish markets to manage odors and reuse fish waste as poultry food.
8. The consumer must investigate the safety of the consumed fish, especially in the summer months, and be informed about the relevant safety measures.
9. Investing in fish processing (sausages, snacks, and samosas) is not profitable to investors because of its low demand in the State of Qatar.
10. Investing in the processing of fish into byproducts that can be used in fish farming or poultry food can preserve the natural resources of the State of Qatar.
11. Fish resources can contribute to the diversification of the economy if the sector is managed sustainably in modernized and commercialized ways. This could be done by opening investment opportunities in sustainable fish production.
12. There is a need to establish standardized and specialized fish markets to avoid contamination with other products, such as fruits or vegetables.
13. Some important investment opportunities in the sector could include modern infrastructure, waste recycling machines, or sustainable production systems to increase fish production.
14. Effective communication channels between officials, different stakeholders, and decision makers are vital to complying with legal requirements.

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6. APPENDICES

Methodology

SESRI at Qatar University conducted its fifteenth “Qatar Semi-Annual Survey” (QSAS) in May 2020. The semi-annual telephone survey is a research-based and unbiased polling approach to answer questions of national interest to Qatar. QSAS uses technically prepared sampling and interviewing methodology to deliver important information to academic scholars, policy makers, and students about the general conditions of the two main population groups of residents in Qatar (Qataris and residents). Aside from the demographic section, the survey includes a variety of topics, such as consumers’ attitudes toward fish processing and safety in Qatar. This version of the survey consisted of 1,354 completed telephone interviews conducted across the two sub-population groups: the Qataris (n=554) and residents (n=800).

Prior to its administration, the survey was programmed into the computer-assisted telephone interviewing (CATI) system using the software BLAISE. The survey instrument was reviewed by the researchers to ensure that all of the programming was correct. A pre-test on a small number of participants (n=51) was then conducted. Based on the information obtained, the final version of the questionnaire was developed and then programmed into CATI in preparation for the data collection. During the data collection, 1,354 interviews were completed.

The dataset was then cleaned, coded, and saved in STATA format for analysis. After weighting the final responses to adjust for the probability of selection and non-response, the data were analyzed using STATA, the statistical software package for socioeconomic data.

** The following table describes the demographic characteristics of the respondents in detail:

Variable	Frequency	Percentage
Respondent type		
Qataris	660	43%
Higher-income expats	889	57%
Gender		
Males	862	56%
Females	687	44%
Educational level		
Less than high school	159	10%
Vocational/sec/post sec	587	35%
Undergrad & postgrad	795	55%
Other	3	0%
Marital status		
Married	1048	71%
Never married	412	24%
Other	84	5%
Employment		
Employed	1064	69%
Unemployed	480	31%

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