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Title: Consumer knowledge and purchasing practices of fresh fish

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(i) Abstract

This study sought to prove that a relationship exists between consumer's awareness on the assessment of the quality of fresh fish and consumer purchasing behaviour. One hundred fresh fish consumers from the inland and coastal regions of Trinidad were surveyed by a questionnaire which had questions pertaining to purchasing behaviour, demographics, awareness on fresh fish quality characteristics, and fish- borne illnesses. Results showed that a majority of the consumers purchase from the local fish market and the main quality factor of most importance to the consumers was found to be freshness of fish. Also, results showed that the mean awareness of the characteristics of fresh fish quality is 29 ± 10.013 while the mean awareness of fish borne illnesses is 1.84 ± 2.852 . Additionally, correlations showed that at the 1% level of significance supermarket purchases is related to consumers' awareness of the characteristics of fresh fish; while at the 5% level of significance sea- side purchases and the frequency of purchases are related to consumers' awareness of the characteristics of fresh fish. Therefore, it was concluded that consumers are aware of the quality characteristics of fresh fish and this awareness relates to their purchasing behaviour.

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(1) Introduction

2.1. Background

Fish is an important source of protein and it is widely consumed for its health benefits and taste. It is believed to be a healthier choice of protein source than most other meats since it contains Omega 3 fatty acids which are claimed to aid in the treatment and prevention of Cardiovascular Diseases. However despite this major health benefit, fish, especially fresh fish, can be detrimental to health if not handled with care as it is a highly perishable commodity. 'Fresh fish' refers to fish which has never been frozen and has an acceptable shelf life of ten days (Wedemeyer 2003). Within these ten days, fresh fish is considered of good quality if handled correctly and kept under the correct storage conditions as outlined by the code of practice for fresh fish and seafood by the Food and Agriculture Organization and World Health Organization (FAO and WHO 2009). However, as fresh fish age and becomes deteriorated by bacteria, it becomes prone to scombrototoxin production (FAO and WHO 2009), leading to fish poisoning.

Scombroid poisoning is the second most popular fish borne toxicity that is highly prevalent throughout the Caribbean. It is associated with a high histamine build up in fresh fish due to poor handling practices (Brody n.d.). Such practices include storing fish on no ice or on an inadequate amount, or even having it exposed to ambient temperatures for long periods of time. Histamine formation may be inactivated by freezing but once formed, it cannot be eliminated by heat or freezing (Köse 2010); thus, such poor handling and storage practices put

consumers and their households at adverse health risks even if such fish is stored well after purchase.

In Trinidad, unhygienic practices are observed with fresh fish handling by some vendors. Fresh fish is mainly sold in fish markets and laws have been put in place to make sure wholesome fish is delivered to the consumer under the country market act, chapter 68:02. According to this act with respect to fresh fish, no fish should be stored after closing hours nor shall be removed from the market to any cold stores. In addition to this, fresh fish should not be sold or offered or be exposed for sale which was exposed on a previous day. Fish should also only be exposed or sold at the stall set aside for that purpose (Ministry of Legal Affairs 2009). Despite the fines and other consequences for a breach in the laws, these laws are still commonly broken which may be due to lack of supervision by Health Officers and Inspectors. As such, it is believed that market vendors sell fish from previous days and store fish at ambient temperatures.

Fresh fish is also sold by both street and mobile vendors and to a lesser extent by selective supermarkets. Fresh fish bought from these sources is convenient to consumers as a majority of the fish markets are located on the coastal areas of the island. Likewise, unhygienic practices are also observed. Street and mobile fish vendors tend to store fresh fish in inadequate ice, at the wrong temperature and/or in the wrong storage container, or even for more than the recommended storage time. Even though some measure of quality of fish is maintained in the supermarkets, it is believed that consumers are deceived into thinking they are purchasing 'fresh fish' when in reality the fish remains for a longer storage time than usual as it may have been previously frozen before being chilled until sale.

Therefore, the observed behaviour of many fresh fish outlets prompted this research on consumer's awareness and the assessment of the quality of fresh fish. This study aims to prove that a relationship exists between consumer's awareness on the assessment of the quality of fresh fish and consumer purchasing behaviour. Consumers who are able to effectively assess the quality of fresh fish may apply this knowledge when purchasing fresh fish and it may even influence their choice on the source outlet for fresh fish. However, the importance of quality factors of fresh fish may vary from consumer to consumer and this may also influence their overall purchasing behaviour. Thus, this study is not only limited to the intrinsic quality factors of fresh fish, such as its sensory characteristics, but it also takes into consideration extrinsic factors that may influence whether fresh fish is purchased. The factors include: convenience, price, and the length of time it was stored on ice.

1.2. Justification

The research is warranted as there are few studies done on the subject, particularly in Trinidad. Most reported studies focused on consumer purchasing behaviour of seafood done in Asia. In addition to this, few studies pertained to consumer knowledge, awareness or perception of quality of fish in general. Furthermore, there are limited recent studies in this area. The most recent studies conducted on consumer perceptions about seafood were done in 1995 in Europe and then in 2008 in the United States. Thus, this research is significant as it will be one out of the few to be conducted in Trinidad and to make a direct link between consumer purchasing behaviour and the awareness of the quality of fresh fish.

1.3. Research Question/ Problem Statement

The current sale of fresh fish under poor storage and handling practices by fresh fish outlets in Trinidad increases the risk of contracting a fish borne illness in consumers and their households which can result in fish poisoning and consequently death. This problem can be minimized or avoided through consumer awareness of the appropriate assessment of the quality characteristics of fresh fish, fish storage, and fish handling, before purchase.

1.4. Objectives

1.4.1. General Objectives

This research seeks to examine the awareness of consumers in a coastal rural region and an inland urban region of Trinidad on the safety procedure of handling, storing, and assessing fresh fish and to determine if their awareness coincides with their purchasing practices.

1.4.2. Specific Objectives

1. To determine where consumers mainly purchase fresh fish and their reasons for the choice.
2. To assess consumers' awareness on the characteristics of fresh fish, and the storage and holding conditions before purchasing, as well as some types of fish borne illnesses.
3. To compare the fresh fish purchasing habits and the awareness of consumers from a coastal region with an inland region in Trinidad.
4. To determine the demographics (age and sex) of the targeted population in relation to their awareness on fresh fish and their purchasing practices.

1.5. Hypothesis

Based on the previous research from similar studies, it is expected that the observations made in this study will share a common pattern. Thus, the predictions made in research arrived from previous studies are related to the specific objectives of this current study. As such, it is hypothesized that:

1. More respondents will be consumers of fresh fish from the local fish market than from the supermarket, and other sources.
2. A great number of respondents will be unaware of specific quality characteristics of fresh fish but those within the coastal region will be more aware than those in the inland region.
3. The majority of respondents who purchase fresh fish from the supermarket will be in the younger age range than the older age ranges.

1.6. Scope

Due to financial and time restraints, this study is limited to Claxton Bay as the coastal region of study and the East-West corridor of Trinidad from Tunapuna to Curepe as the inland area.

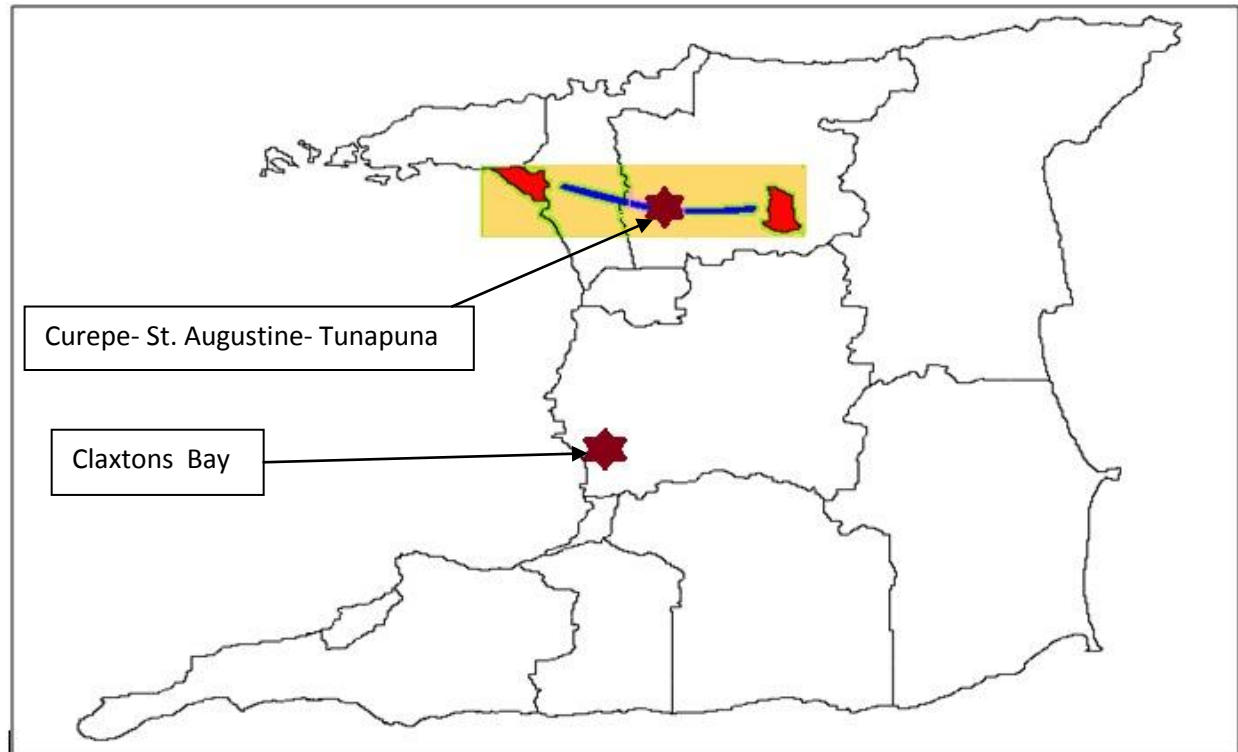


Figure 1 The Scope of Focus on the Map of Trinidad

1.7. Key Terms

Key terms that will be frequently used throughout this paper are defined as follows:

1. Awareness - The state or condition of having knowledge or understanding of a subject or issue or situation (Macmillan 2009).
2. Consumer - An individual who buys products or services for personal use and not for manufacture or resale, as well as makes the decision whether or not to purchase an item at a store (Investor Words 2012).

3. Customer Purchasing Behaviour – The process by which individuals search for, select, purchase, use, and dispose of goods and services in satisfaction of their needs and wants (Business Dictionary 2012).
4. Fresh Fish - Fish which have not been frozen from catch to market then to the consumer (Finest at sea 2005) and have an acceptable shelf life of ten days (Wedemeyer 2003).
5. Perception - This is the process by which people translate sensory impressions into a coherent and unified view (Business Dictionary 2012).
6. Quality - The totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs (ISO 8402: 1986, 3.7).

(2) Literature Review

Fresh fish quality is an important factor that must be considered when choosing from a particular outlet. Consumers should be aware about the quality of fresh fish so that the application of this knowledge can influence the choice of outlet and in essence, decrease the chances of a contracting food borne illness or toxin like scombroid poisoning. Literature pertaining to this current study on consumer purchasing practices of fresh fish has shown that consumers tend to mostly buy seafood from the fish market and their decisions are mainly based on subjective quality characteristics of the seafood. However, this literature also suggests that consumers are not able to detect the quality of seafood. Due to the limited research done on fresh fish, this review will include literature pertaining to seafood and will first seek to explain the quality of fresh fish.

Fish Quality

According to the Food and Drug Administration (FDA 2012), the quality of fish involves aspects related to gastronomic delights, purity, nutrition, safety, consistency, fairness, and value and product excellence. However, as highlighted by Fisheries and Aquaculture Department 1995, fish quality mainly includes the aesthetic appearance and freshness of fish as well as safety aspects. The freshness of fish deals with the degree of spoilage and can be subjectively determined by consumers using sensory assessments (FDA 2012). Literature indicates that sensory assessment can be done through the evaluation of the eyes, gills, and the general appearance of the fish. As subjective evaluations can be bias, a standard criterion is used for the assessment of fresh fish known as quality index method. Based on this method,

characteristics of high quality fresh fish includes gills which are red, clear eyes, and an overall general appearance of stiff, shiny, bright skin (Fisheries and Aquaculture Department 1995).

As fresh fish is highly perishable, certain practices must be put in place to decrease the rapid degradation of fresh fish. With reference to the Food and Agriculture Organization and World Health Organization (2009), fresh fish should be stored in a shallow layer surrounded by sufficient adequate ice and it should not be exposed to the sun as this can cause dehydration. Consumer tips by the Seafood Industry Development Company (2012) suggests that consumers follow the sensory guidelines when purchasing fresh fish and should pay close attention to overall cleanliness of the facility as well as the condition of the seafood which is supposed to be displayed on a thick bed of fresh ice and stored preferably in a case with some type of cover.

Literature also suggests that unhygienic conditions, improper handling and storage of fresh fish can all result in fish borne illnesses. According to the Fisheries and Aquaculture Department (1995), fish borne illnesses include bacterial, viral, parasitic and toxin-infections, as well as intoxications which can be divided into microbial, biotoxins, and chemicals. One example of a biotoxin is scombrototoxin. Articles from Seafood Industry Development Company (2012) and the Food and Agriculture Organization and World Health Organization (2009), highlighted that scombrototoxin or histamines can be present in fresh fish which is not stored on ice or exposed to the sun. Such species include bonito, jacks, king fish, and marlin. Even though this condition may be rare, other fish borne illnesses such as the infections are very common and are mainly caused by contamination from the environment, the handlers, or even the water (Fisheries and Aquaculture Department 1995). Thus, as stated by Fisheries and Aquaculture Department

(1995), fish borne illnesses can be controlled by protecting the fish from the exposure to the environment, water treatment, personal hygiene and education of the fish handlers.

Previous studies conducted pertaining to consumer awareness on fresh fish implied that consumers tend to purchase seafood which is perceived of a good quality but they are unaware of how to assess the quality of fish.

According to Brunso (2003), a study conducted in Denmark on 345 consumers of fresh fish showed that traditional fish eaters were unable to evaluate the quality of fish based on the odour and the appearance of the fish. However, consumers who were involved in fish, for example fishermen or fish handlers, were able to evaluate the odour and appearance of the fish.

This previous study coincides with another study done on consumer perceptions about seafood during 2006. In this study by Hicks, Pivarnik and McDermott (2008) it was found that most of the respondents perceived the judgement of the freshness of seafood as difficult. Also, only 29% of the respondents perceived themselves as knowledgeable about seafood quality while 36% of the respondents indicated that they were knowledgeable on both safe seafood handling practices and seafood storage. Interestingly it should be noted that this study revealed that the seafood quality determines the purchasing decisions of 75% of the respondents while 69% of the respondents based their purchasing decisions on safe seafood handling practices and 65% on seafood storage.

Hence, it is justified to say that consumers are unaware of the quality, storage and handling practices of fresh fish even though these factors may influence their purchasing decisions. Also, unawareness may be more prevalent in those consumers who do not take part in fish handling.

Consumer Purchasing Behaviour

Previous studies conducted on consumer purchasing behaviour of seafood have shown that the quality of fish influences the purchasing habits of consumers.

A study conducted in Oman during the year of 2003 on the purchasing behaviour of consumers for seafood products showed that the majority (76%) of the consumers purchase from on-shore fish markets while a lesser percent of consumers purchase from supermarkets, fish shops and retailers (Al-Mazrooei, Chomo and Omezzine 2003). This study was also the only one to show a negative relationship between the purchasing of seafood from on-shore fish markets and the perceived quality of the fish. Those consumers who value the texture of the fish as important tend to buy from on- shore markets less.

However, a similar study by Perishables Group (2010) conducted on 876 seafood consumers in Asia, 2010, showed that the majority (44%) of consumers also purchase seafood from the fish market but a positive relationship resides between the location and the perceived quality of the fish. It was found that food safety/cleanliness is the most important factor considered when choosing from that particular source. This was indicated by 36% of respondents, followed by freshness (29%), then family preferences and health and nutrition with 11%. Furthermore, in choosing the particular type of seafood, it was found that the freshness of seafood is the main factor that determines the type to purchase. This was indicated by 85% of the respondents followed by 63% of the respondents for the price factor, and then 52% who indicated the appearance or quality of the seafood.

In support of this previous study, a more recent study conducted in 2011 by Mugaonkar, et al. (2011), showed that quality is the most important factor in choosing a product for 96.4% of the

consumers as well as other factors such as the nutritional value and the price of the product. Ninety two percent of the respondents indicated that nutritional value of the product is most important while the price is the most important factor for 82.9% of the consumers when choosing a product.

Thus, based on these studies, it can be postulated that consumers mainly purchase their fresh fish from local fish markets and the quality aspects which primarily influence their purchasing behaviour are the freshness of the fish as well as food safety and cleanliness of the surroundings.

However, in addition to the quality of the fish, previous studies have also shown that the age of consumers may influence their place of purchase for seafood. A review of literature by Brunso (2003), showed that European consumers of unprocessed fish are mainly of the elderly group than younger people who mainly consume processed fish. Furthermore, consistent in findings, the same study conducted in India on consumer behaviour at organized fish retail outlets revealed that consumers who mainly consisted of young people. It was found that 65% of consumers between 25-30 years of age mainly purchase fish from retail outlets while as the age increase, the percentage of consumers decrease. Therefore, it can be deduced that younger people tend to purchase fish which is not fresh from supermarkets and retail outlets.

Theoretical Framework

The theoretical framework employed throughout the study will be the Total Food Quality Model. This model provides a common framework for the perception theories namely the means- end approach, the expectancy value approach, and the satisfaction/ dissatisfaction

approaches (Grunert 2005). The Total Food Quality Model seeks to explain how consumers gain awareness on the quality attributes of fish.

According to Brunso (2003), this model distinguishes quality perceptions before and after purchase evaluations. As demonstrated in figure 2, the quality perceptions made before are based on consumer's ability to assess the specifications or characteristics of the product. However, as some of the characteristics of a product cannot be assessed before purchase, it may be assessed after consumption. Even in some cases the characteristic may not be able to be assessed at all and as stated by Brunso (2003), it may depend to a high degree on consumer's trust in producers' claims about the characteristic.

Cues are used to aid in the assessment of the quality of the product and may also be motivators to consumers who consequently gather certain quality expectations of the product. If the expected purchase motive is fulfilled, this can influence consumer's intention to buy the product. As explained by Brunso (2003), the intrinsic quality cues deals with the physical characteristics of the product while the extrinsic quality cues focus on the external characteristics of the product. In terms of fish, intrinsic quality cues include the sensory characteristics of the fish such as the appearance and odour which the extrinsic quality cues would include factors such as convenience, safety and cleanliness of the surroundings, and the age of the fish.

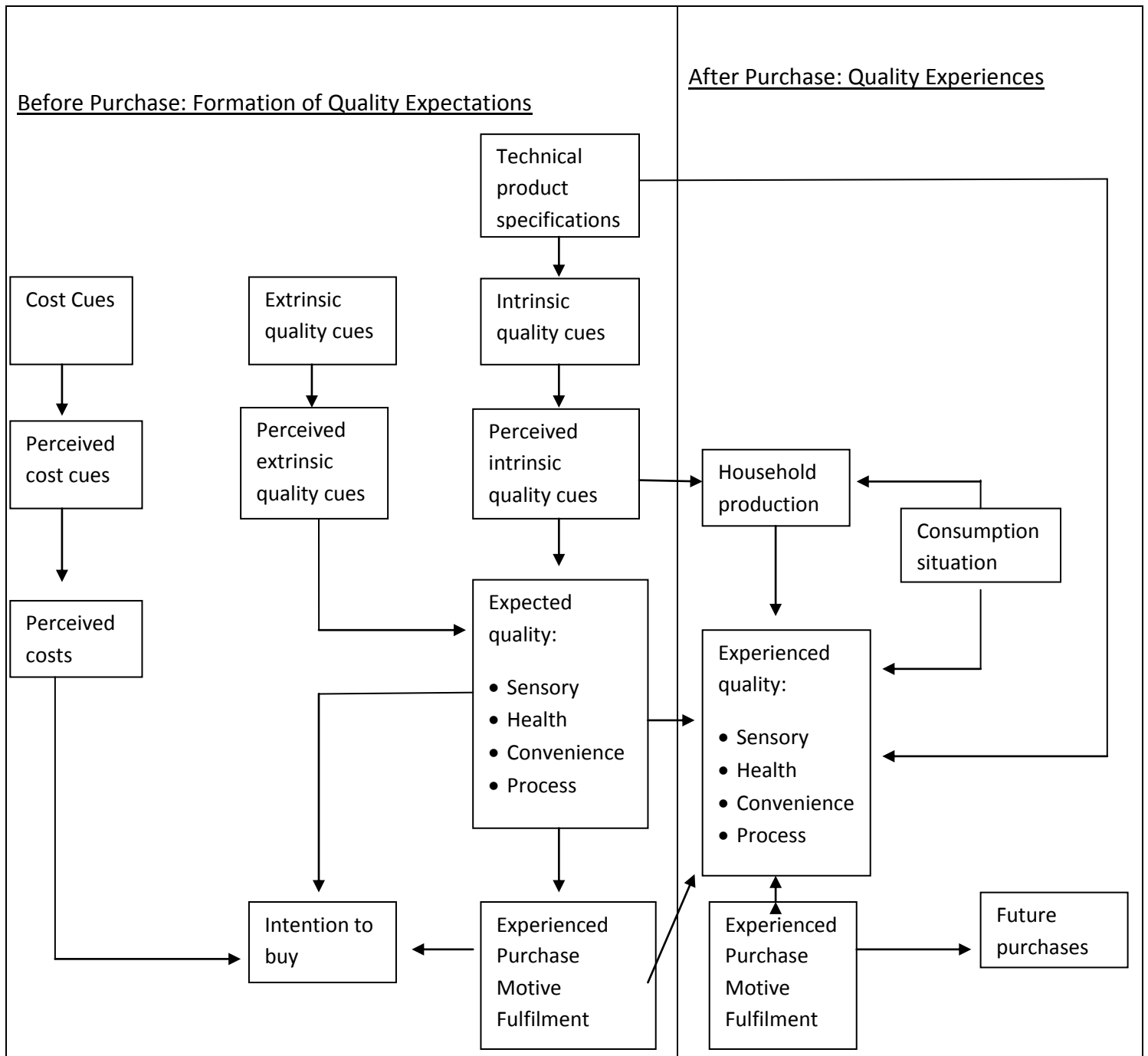


Figure 2 The Total Food Quality Model

Therefore, the quality cues of this model will be applied to this current study to explain the reasons and motives for the choice of place of purchase for fresh fish based on the importance of the quality cues. Also, based on the previous literature presented in this review, it is evident that the perception of the intrinsic quality cue freshness mainly influences the place chosen to purchase fish, which for most consumers is the local fish market. However, literature also supports that consumers are unaware to assess this intrinsic quality cues of seafood.

(3) Materials and Methodology

Sampling Design: A cross- sectional survey was conducted during the month of March 2012 on consumer awareness and purchasing practices of fresh fish. The research done through convenience sampling included a sample size of 100 fresh fish consumers from two communities (50 consumers from each community). This sample size was obtained using a criterion with a margin of error of 5% and an estimated probability of fresh fish consumers of 0.85 out of the total fish consumers.

Instrument: The research data was collected using a standard questionnaire. This questionnaire comprised of six close ended questions was pretested on a pilot sample involving 10 fresh fish consumers to ensure that the questions were clear, easy to answer and generated the responses the research desired. Modifications were then made to the wording of the questionnaire as some questions were not easily understood. The revised questionnaire is divided into three sections where each contains two questions. These sections include demographics, consumer purchasing behaviour assessment questions, and questions on consumer awareness of fresh fish characteristics. To distinguish between the locations as the questionnaire did not contained a location question, the questionnaires were numbered 1- 100 where questionnaires 1- 50 represented one community and questionnaires 51- 100 represented the other community.

Data Collection: The data was collected from two areas in Trinidad; that is, a coastal rural area and an inland urban area. The coastal rural area chosen was Claxton Bay while the inland urban area was taken from along the East- West Corridor of Trinidad. However, this study only

included the districts of Tunapuna, St. Augustine, and Curepe. This data was collected from fresh fish consumers in supermarkets, local markets, and by near-by street vendors of fresh fish on weekends. Questionnaires were distributed to some consumers by hand while in some needed cases the questionnaire was presented as a face to face interview. The face to face interview was used to generate the same information as the standard questionnaire and was mainly used as a means of convenience to consumers, and to aid those consumers who were either illiterate or unable to see the print.

Data Analysis: The data collected was analyzed using SPSS software (Statistical Package for the Social Sciences, version 12.0, SPSS Inc, Chicago, Ill USA) and charts were constructed in Microsoft Office Excel 2007. Frequencies were used to examine the demographics of the population. Pearson chi squares were used to analyse the consumer purchasing practices in relation to the demographics age, sex and location. Also, all scores were tabulated in Excel and then ANOVA was used to analyse consumer awareness of the assessment of fresh fish, certain fish borne illnesses, and perceived quality factors. In addition to this, the means of these scores were used to find the overall awareness. The statistical significance was set at p values of < 0.05.

(4) Results

The cross- sectional study included 100 customers of fresh fish. Table 1 shows the demographic characteristics of the population. Fifty percent (50%) of the respondents were from the inland part of Trinidad, that is, Curepe, St. Augustine, and Tunapuna, while the 50% were from the coastal region of Claxton Bay. Overall, the makeup of the population included more females (52%) to males (48%). The highest percentage (26%) of the population was between the 51-60 age group, followed by the 41-50 age group (24%), then the 31-40 (21%), and 21-30 (19%) age groups respectively. The 61-70 age group had the lowest percentage (10%) of the population study.

Table 1 Frequency results of demographic characteristics of the respondents in the study (n=100)

Demographic Categories	Frequency	Percent (%)
1. <u>AGE (years):</u>		
- 21-30	19	19
- 31-40	21	21
- 41-50	24	24
- 51-60	26	26
- 61-70	10	10
2. <u>SEX:</u>		
- Female	52	52
- Male	48	48
3. <u>LOCATION:</u>		
- Inland	50	50
- Coastal	50	50

Results on consumers purchasing behaviour have shown, based on figure 3, that consumers (35%) mainly purchase unprocessed fish from the local fish market. Figure 3 also highlights that 19% of consumers of unprocessed fish purchase from the sea- side and mobile/ van vendors, followed by 17% of consumers who purchase from supermarket and then 10% from street vendors.

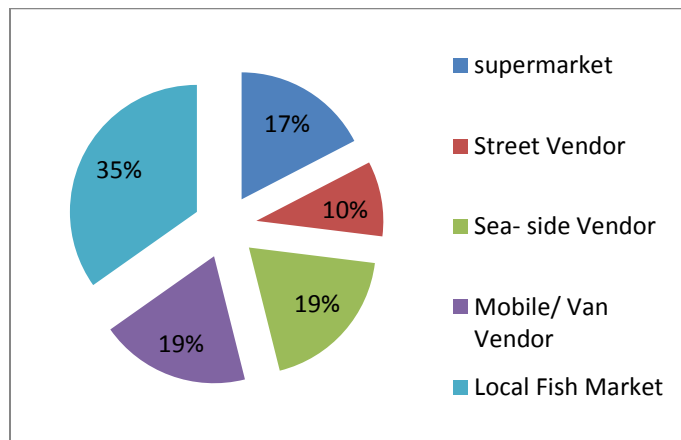


Figure 3 Place of purchase of unprocessed fish by consumers (n =100)

However, when the place of purchase of respondents was analysed with the demographic characteristics of the studied population, it was found that a relationship exists between some demographic characteristics and the place of purchase. Table 2 shows that age is related to purchases from the supermarket at the 1% level of association. Also at the 1% association level, sex is related to purchases from the street vendor as well as the mobile vendor, and at the 5% association level it is related to purchases from the local fish market. In terms of location, this is related to purchases from both the sea- side vendor and the mobile vendor at the 5% association level.

Table 2 Cross tabulation of the significance of demographic characteristics in relation to the place of purchase

Place of Purchase	Pearson Chi-Square Value of Association for		
	AGE	SEX	LOCATION
Supermarket	0.000	0.841	0.46
Street Vendor	0.232	0.002	0.338
Sea-Side Vendor	0.299	0.002	0.053
Mobile/ Van Vendor	0.072	0.216	0.053
Local Fish Market	0.278	0.034	0.221

Values in bold indicate statistical association $p < 0.05$

In an attempt to examine this relationship, figures 4-6 show the trends observed. In figure 4, it is observed that a majority (12 out of 20) of the consumers who purchase unprocessed fish from the supermarket belongs to the 21- 30 age group while only one of the consumers above 50 years purchase from this source. In figure 5, it is observed that a majority (9 out of 11 and 26 out of 40 respectively) of the purchases of unprocessed fish from street vendors and the local fish market are done by females. However, 17 out of 22 of purchases from the sea- side vendors are by males. Finally, figure 6 shows that a majority (15 out of 22 for both) of the purchases from the sea-side vendor and the mobile vendors are from consumers in the coastal area of Claxton Bay.

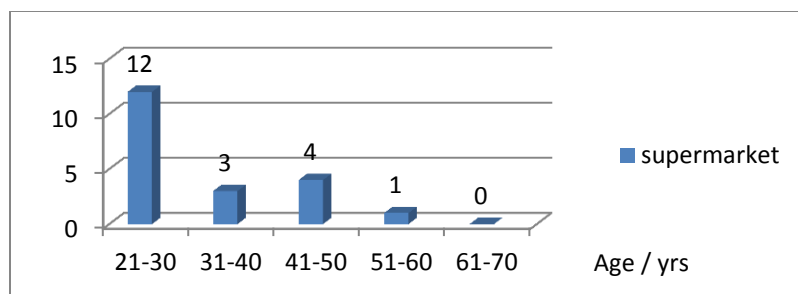


Figure 4 Consumers of unprocessed fish from the supermarket in relation to age (n= 20)

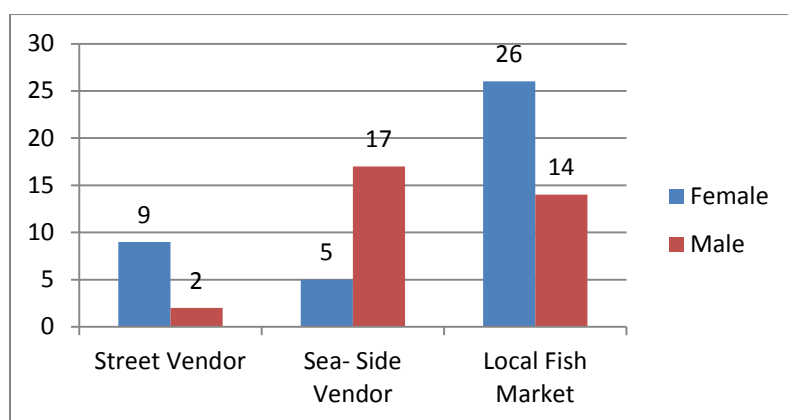


Figure 5 Consumers of unprocessed fish from street vendors, seaside vendors, and the local fish market in relation to sex

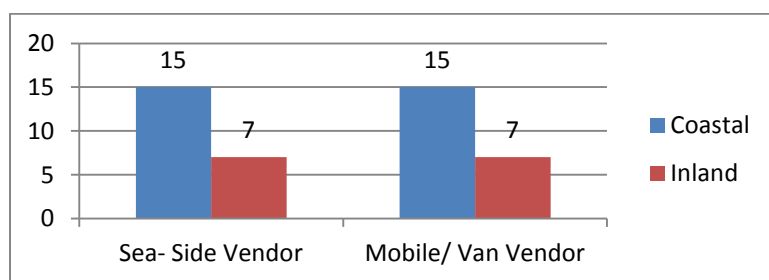


Figure 6 Consumers of unprocessed fish from sea- side vendors and mobile vendors in relation to location

The results of factors that influence customers' decision in the place of purchase for unprocessed fish is shown in Table 3. This table shows that the freshness of fish is the most important factor for 31 out of 40 local fish market consumers. This is then followed by the convenience and proximity of the outlet (n=20); the price of the fish (n=18); the safety and cleanliness of the surroundings (n=13), and the type of fish sold by outlet (n=12). In comparison, this table also shows that convenience and proximity of the outlet is of most importance for 13 out of 20 supermarket consumers. This is followed by the freshness of the fish (n=9); the safety and cleanliness of the surroundings (n=8); the price of the fish (n=6); and the type of fish sold by the outlet (n=2).

Table 3 Cross tabulation results of the importance of quality factors on local fish market and supermarket consumers

Quality factors	Local Fish Market			Supermarket		
	Very Important	Somewhat Important	Least Important	Very Important	Somewhat Important	Least Important
Freshness	31	7	0	9	12	0
Safety & Cleanliness of Surroundings	13	10	14	8	11	2
Convenience & Proximity	20	14	3	13	7	1
Type of Fish	12	2	23	2	4	15
Price of the Fish	18	14	5	6	9	6

Values are represented in the frequency of respondents from each location

In figure 7, 39 consumers purchase fresh fish 1-2 times per month, while 35 consumers purchase once or more per week, and 20 consumers 3-4 times per month. Only 6 consumers are seasonal purchasers of fresh fish. However, the frequency of purchase as it relates to the place of purchase shows that highest frequency (15 out of 40) of local fish market consumers and 13 out of 20 supermarket consumers, buy fresh fish 1-2 times per month. This figure also shows that the most frequent buyers of fresh fish buy from the local fish market (13 out of 40) and the seaside vendor (13 out of 22).

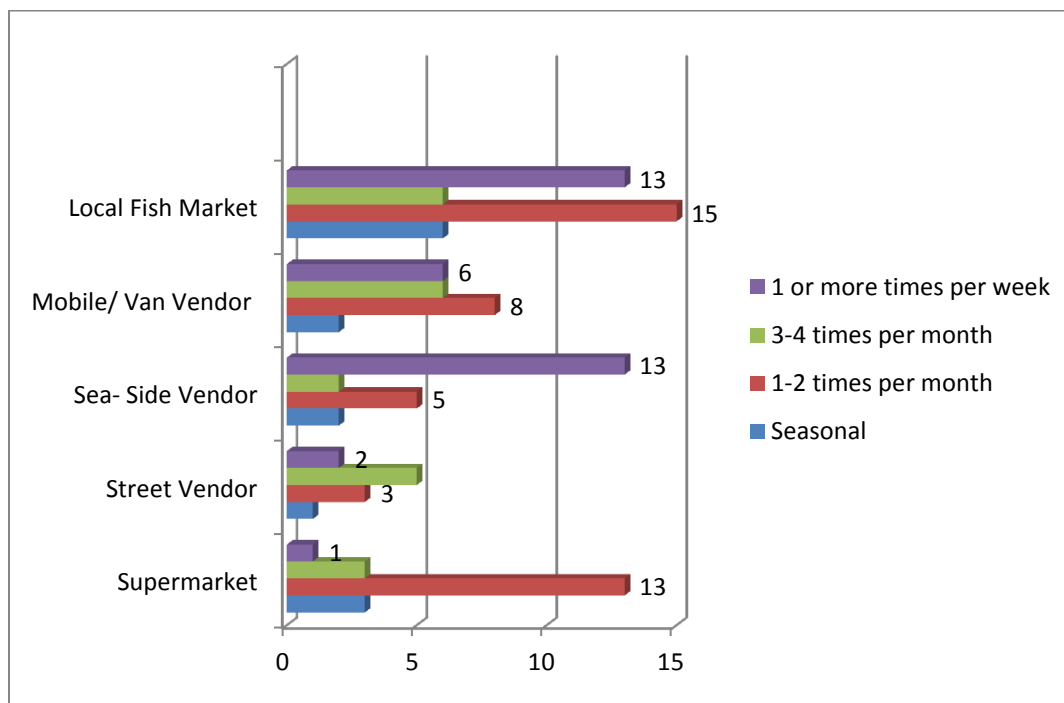


Figure 7 The frequency of fresh fish purchases by consumers in relation to the place of purchase.

The frequency of fresh fish purchases was analysed with the demographic characteristics of the studied population. Table 4 indicates that the age or the sex of the customers is not statistically related to the frequency of purchases at the 5% level of association but at the 10%, there was

an association between sex and the frequency of purchases. However, the table indicates that the location of the consumers is related to their frequency of fresh fish purchases at the 5% level of association.

Table 4 Cross tabulation results of the significance of demographic characteristics in relation to the frequency of fresh fish purchases

Demographics	Pearson Chi- Square Value of Association
AGE	0.508
SEX	0.109
LOCATION	0.043

Values in bold indicate statistical association $p < 0.05$

Figure 8 shows that consumers from the coastal region make up the majority (20 out of 39) who purchase fresh fish 1-2 times per month. Also, this figure shows that coastal region consumers are the most frequent buyers of fresh fish. This is indicated by the 19 out of 35 consumers from the coastal region who purchase fresh fish once or more times per week.

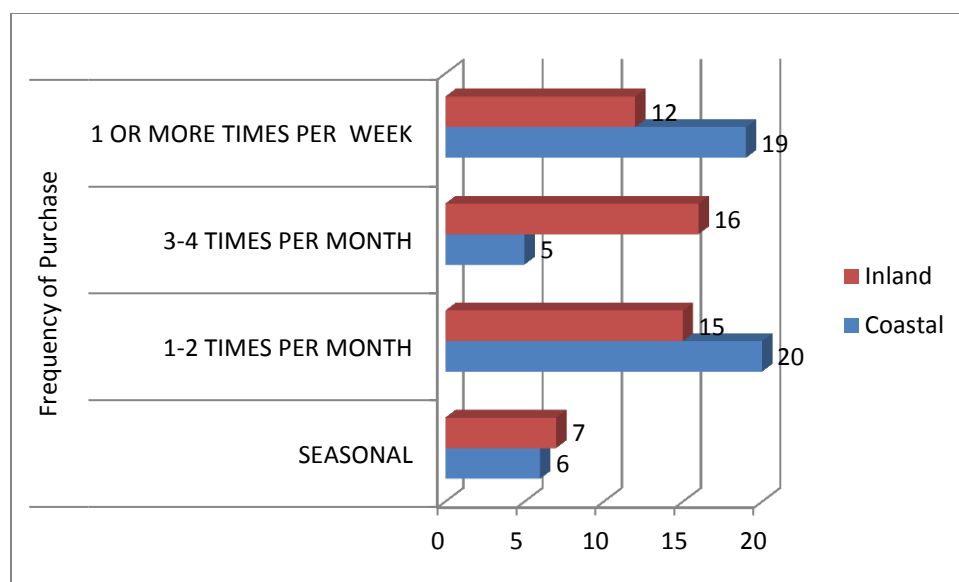


Figure 8 Frequency of fresh fish purchases by consumers in relation to the location

Table 5 shows the overall awareness of consumers on fresh fish quality and fish- borne illnesses which was scored out of 45 and 15 respectively. This table shows that there is high awareness of fresh fish quality where the mean awareness is 29.6 ± 10.013 . However, there is a low awareness of fish- borne illnesses as the mean awareness of fish- borne illnesses is 1.84 ± 2.852 .

Table 5 Means results of awareness of consumers on fresh fish quality and fish- borne illnesses

	N	Mean $\pm$ SD
Awareness of Fresh Fish Quality	100	29.6 $\pm$ 10.013
Awareness of Fish- borne Illnesses	100	1.84 $\pm$ 2.852

Awareness of Fresh Fish Quality scored out of 45 and Awareness of Fish borne Illnesses scored out of 15.

When the awareness of fresh fish quality was analysed with the demographic characteristics of the population, using ANOVA, table 6 shows that sex is not statistically significant to the awareness of the consumers but age and location are related with a weak significance at the 10% level. However, a significant relationship was observed when supermarket purchases, sea-side purchases, and the frequency of purchases were analysed with the awareness. Supermarket purchases was significantly associated with the awareness of fresh fish quality ($p < 0.01$); while association between awareness and both sea-side purchases and the frequency of purchases were significant at the 5% level.

Table 6 ANOVA results of correlation between independent variables and the awareness of consumers on fresh fish quality

Independent Variables	F- value	Significance
1. <u>DEMOGRAPHICS:</u>		
Age	1.879	0.120
Sex	1.120	0.292
Location	2.729	0.102
2. <u>PLACE OF PURCHASE:</u>		
Supermarket	13.618	0.000
Street Vendor	0.423	0.517
Sea- side Vendor	4.436	0.038
Mobile/ Van Vendor	0.68	0.795
Local Fish Market	2.542	0.114
3. FREQUENCY OF PURCHASE	3.738	0.014

Values in bold indicate statistical significance $p < 0.05$

Table 7 examines the means of each independent factor which was at the 10% and 5% levels. This table shows that the awareness of fresh fish quality increases with age as the highest mean of awareness was among the 61-70 age group. Also, the highest mean awareness is found among those consumers from the coastal region of Trinidad. In relation to the place of purchase, this table shows that consumers who purchase from the supermarket are less aware of characteristics of fresh fish quality compared to others who do not purchase from this source. This is given by a mean awareness of 23 ± 9.375 . However, based on this table, consumers who purchase from the sea- side vendors are more aware of the characteristics of fresh fish quality than those who do not purchase from this source. In addition, those consumers who purchase fresh fish the most (that is 1 or more times per week) are more aware than others who purchase less frequently.

Table 7 ANOVA results of the significant independent variables and awareness of consumers

Independent Variables	N	MEAN	Std. D
1. Age			
- 21-30	19	24.74	9.048
- 31-40	21	29.76	11.009
- 41-50	24	31.88	10.088
- 51-60	26	31.00	8.944
- 61-70	10	33.00	10.328
2. Location			
- Coastal	50	31.60	9.712
- Inland	50	28.32	10.137
3. <u>PLACE OF PURCHASE:</u>			
Supermarket			
- Purchase from source	20	23.00	9.375
- Do not purchase from source	80	31.70	9.443
Sea- side Vendor			
- Purchase from source	22	33.86	9.33
- Do not purchase from source	78	28.86	9.967
4. <u>FREQUENCY OF PURCHASE:</u>			
- Seasonal	13	29.62	10.096
- 1-2 times per month	35	26.25	11.590
- 3-4 times per month	21	30.00	7.416
- 1 or more times per week	31	34.23	8.160

(5) Discussion

The study's findings suggest that the awareness of fresh fish quality coincides to their purchasing practices even though it was unable to show a relationship between the main place of purchase for many and their awareness. The main place of purchase for fresh fish consumers which mainly consist of women is within the local fish markets and their reasons are mainly based on the quality attribute- freshness. This observation was consistent with pervious literature which indicated that a majority of the consumers purchase from the fish markets (Perishables Group 2010) and the most important factor is its quality (Mugaonkar, et al. 2011) which is characterized by the freshness of the fish.

Based on the theoretical framework employed, this observation shows that consumers who purchase from the local fish market, probably use their perception of the intrinsic quality cues of the fresh fish in their decided intention to buy. These intrinsic quality cues or sensory characteristics used to detect the actual freshness of fish may vary from one consumer to another as each specification may be valued differently. The value of each specification of fish may be based on the fulfilment of personal experiences with the fish to evoke the sense of satisfaction. Once this satisfaction is fulfilled, those factors that were of little value may be disregarded and may not be associated with the individual's assessment of the quality characteristics of fish. Additionally, some may not even know how to detect the sensory characteristics of fish but associate the freshness of the fish with a particular vendor. Thus, these factors could be the possible reasons as to why the awareness of the consumers on the characteristics of fresh fish is not related to purchases from local fish markets.

However, this study also showed that consumers from the younger age groups tend to mainly purchase fresh fish from supermarket and their main purchasing motivator is the convenience of the outlet. This behaviour observed can also be explained by the theoretical framework employed in the study. It is evident that consumers who purchase from this outlet value convenience as the main factor which influence their intentions to buy while the freshness is a secondary factor.

Unlike a study conducted by Hicks, Pivarnik and McDermott (2008), this study was able to prove that consumers overall are aware of the characteristics of fresh fish quality. That previous study was based on individuals' perceptions of their awareness to detect the seafood quality and the population included respondents who do not purchase seafood. Thus, it is quite possible that those who actually purchase fish may perceive themselves as being aware of seafood quality.

It was observed that overall, consumers are aware of the characteristics of fresh fish quality. This observation was not consistent with previous literature from Hicks, Pivarnik and McDermott (2008) who conducted an online survey and showed that respondents perceive themselves as unaware of seafood quality.

However, this current study showed that a relationship exists between the age of fresh fish consumers and their awareness of the characteristics of fresh fish quality. It was observed that as the consumers increase in age so does their awareness. This observation was duly noted in light of the fact that a majority of the younger fresh fish consumers purchase from the supermarket. This study suggest that consumers of younger age groups who tend to buy fresh fish from the supermarket are less aware of the characteristics of fresh fish than

others who do not purchase from this source. Thus, consumers of fresh fish from the supermarket may be widely deceived into thinking or may even perceive that they are buying 'fresh fish' because they seem to have limited knowledge about detecting the true attributes of fresh fish.

Also, younger consumers who purchase at the supermarket may have less awareness of quality characteristics of fresh fish due to the fact that they purchase fresh fish less frequently ~~to~~ compared to others with a greater awareness. This study shows that a majority of the younger individuals who purchase at the supermarket have a purchasing pattern of 1-2 times per month while a majority of those who purchase at sea-side vendors, purchase once or more times a week and have a greater awareness of the quality characteristics of fresh fish. This observation is contrary to that reported by Brunso (2003), in a study conducted in Denmark showing that traditional fish eaters were unaware of how to evaluate the characteristics of fresh fish. However, the current study focused on both frequent purchasing as well as frequent consumption and this might increase one's ability to assess the characteristics of fresh fish.

Like age, trends were also found between the awareness of consumers on the characteristics of fresh fish and their location. This research suggests that fresh fish consumers from the coastal region of Claxtons Bay are more aware than the consumers from inland region of the East- West Corridor. This variant in awareness may be prevalent due to the fact that the chosen coastal area of study is a well established fishing community that is made up of fishermen and families of fishermen. Thus, this major factor can influence their general knowledge of fish. This finding is supported by literature in Brunso (2003)

who showed in the same study in Denmark that consumers in who are involved with fish handling are more aware of the evaluation of fresh fish.

This study also suggest that those from the coastal region who are more aware of the quality characteristics of fresh fish, purchase more frequently than inland consumers and they mainly purchase from sea- side vendors. These consumers probably purchase fresh fish from the sea- side vendors as they perceive fish from this source to have the best quality of freshness since the fish is sold on the same day of capture. Interestingly, this study shows that a majority of the consumers who purchase from the sea-side vendors are males. This is probably because the fishing and “fisherman” environment and surroundings is more appealing to a gathering of men than to women.

In the comparison of locations, it is also found that consumers in the coastal region purchase more from the mobile vendors than consumers from the inland region. In the coastal region, there may be a higher amount of mobile vendors in this community as many mobile vendors may not want to travel such a far distance inland with fresh fish as it is considered a highly perishable food. Thus, this can be the possible reason for the observation made.

With respect to fish-borne illnesses, this study suggests that consumers are unaware of fish-borne illnesses such as mercury, histamine, and ciguatera poisoning. However, this may be a source of error by the research design as limited questions were used to examine consumer awareness of fish- borne illness since the survey contact time of the consumers was carefully considered.

Other limitations of the study included time constraints and the logistics of the study. These factors could have impacted on the observed results, as they caused the study to be limited to two locations that were easily accessible to the researcher.

(6) Conclusion

Based on this study, it is evident that the consumer awareness on the quality characteristics of fresh fish coincides with the purchasing practices. Consumers, who are highly aware, purchase from sea- side vendors and their purchasing pattern is more frequent than others. On the other hand, those consumers who are less aware purchase from the supermarket and their purchasing pattern is less frequent than highly aware consumers.

(7) Recommendations

As this research was able to show that some consumers are not fully aware of the quality attributes of fresh fish, it is recommended that government should educate the public of such through town hall meetings or workshops; flyers or other reading material; or even through media broadcast programmes. It is widely observed that government have offered their assistance in educating fish handlers such as fishermen and market vendors on the popular fish handling procedures. However, if this education is extended to the public, consumers will be able to apply this knowledge to their purchasing practices.

Furthermore, as this research paper was unable to truly detect the consumer awareness on fish-borne illnesses, it is suggested that studies be done in this area. Further studies can also focus on application of the knowledge of fish fresh by handlers as it was observed throughout this study that fishermen and fish market vendors are knowledgeable of the procedure of fresh fish handling but many do not always apply this knowledge.

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(9) Appendices

APPENDIX # 1: Draft Questionnaire

Questionnaire #:



The University of the West Indies

Student Final Year Research Project Questionnaire on
CONSUMER AWARENESS AND PURCHASING PRACTICES OF FRESH FISH

1) Sex:

☐

Male

☐

Female

2) Age:

☐

21-30

☐

31- 40

☐

41-50

☐

51- 60

☐

61-70

☐

71-80

3) For EACH of the listed vending locations, indicate on a scale of 1 to 3, the importance of each factor in determining your purchase of fresh, unprocessed fish from that place?

Key: ① Least important ② Somewhat important ③ Very important ○ I do not purchase fish from that place (N/A)

Please shade  the option of your choice in the space provided.

Place of Purchase		Freshness	Safety & Cleanliness	Convenience & Proximity	Type of Fish	Price of the Fish	N/A
i.	Supermarket	① ② ③	① ② ③	① ② ③	① ② ③	① ② ③	☐
ii.	Street Vendor	① ② ③	① ② ③	① ② ③	① ② ③	① ② ③	☐
iii.	Sea- side Vendor	① ② ③	① ② ③	① ② ③	① ② ③	① ② ③	☐
iv.	Mobile/ Van Vendor	① ② ③	① ② ③	① ② ③	① ② ③	① ② ③	☐
v.	Local Fish Market	① ② ③	① ② ③	① ② ③	① ② ③	① ② ③	☐
vi.	Other	① ② ③	① ② ③	① ② ③	① ② ③	① ② ③	☐

Please tick [V] the option of your choice in the box provided.

4) How often do you purchase FRESH fish?

- ☐ Seasonal
 ☐ 1-2 times per month
☐ 3-4 times per month
 ☐ 1 or more times per week

5) How can you decide if fish is fresh based on each of the following factors?

a. EYES:

- ☐ Clear
 ☐ Pale
 ☐ Not sure

b. SKIN:

- ☐ Bright or shiny
 ☐ Soft and dull
 ☐ Not sure

c. SMELL:

- ☐ Fishy
 ☐ Seaweed
 ☐ Not sure

d. GILLS:

- ☐ Red
 ☐ Brown
 ☐ Not sure

e. TEXTURE:

- ☐ Soft
 ☐ Stiff
 ☐ Not sure

f. EXPOSURE TO FRESH AIR FOR LENGTHY TIMES:

☐ Exposed ☐ Not exposed ☐ Not sure

g. STORAGE CONDITION:

☐ Unfrozen before sale ☐ Frozen before sale ☐ Not sure

h. STORAGE until sale:

☐ On clean and sufficient ice ☐ On salt ☐ Not sure

i. DATE OF CAPTURE TO PURCHASE DATE:

☐ Within 15 days ☐ Within 10 days ☐ Not sure

6) Rank your level of awareness for each of the following Fish-borne conditions:

	Fish borne Illnesses	Very Much Aware	Moderately Aware	Not Aware
a.	Ciguatera Poisoning			
b.	Histamine/ Scombroid Poisoning			
c.	Mercury Poisoning			