Spatial Fish Consumption Paradigms and Perceptions Across Gujarat State

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Abstract

The paper attempts to analyze the pattern of fish consumption as well as the factors that leads the people to consume fish of Gujarat. The study location is Gir—Somnath district of Gujarat.360 people participated in the survey and the result reveals that the current the per capita fish consumption is 1.69 kg with cephalopods, hilsa and anchovies featuring as the preferred species. Conjoint analysis revealed that source of purchase, reasons for particular places of purchase as well as drivers of buying fish were the three determining factors that influenced fish consumption in Somnath-Gir. The fish consumers seemed to prefer retail markets as the preferred source of purchase due to freshness of the fish and the main driver for fish consumption has been the assured quality.

Keywords: Fish consumption Conjoint analysis; Garette ranking; Somnath Gir-Gujarat

Introduction

The production, consumption and export of fish in India has grown significantly in the last three decades Fisheries sector plays very important role in the growth of national economy. The fisheries sector concentrate on many things such as increasing the fish production, improving the welfare of fishermen, promoting export and providing food security. It provides livelihood to approximately 14.49 million people in the country. The import and export of fisheries products influence the trade structure of a country. Fishing is an important sector in India to provide livelihood support by giving employment to 14 million people (Das et al 2017). The fisheries sector grew at an impressive rate across the last two decades growth rate of fisheries sector increased when compared to the agricultural sector (Kumar et al (2010), Suresh and Shinoj (2018) The vibrancy of the sector could be identified from the fact that it has registered an eleven-fold increase in production over the past five decades. Fish contains healthy source of protein and taste with determined global market growth. India is a major producer of fish through aquaculture and ranks second in the world after China.

Gujarat state has the longest coastline and, the continental edge in this part of the Arabian Sea being farther from shore than in any other part of the country, has the widest shelf area. The coastline of about 1640 km consists of 217 landing centres. Local consumption of fish and fishery products is lowest in Gujarat, accounting for about 50% of state's fish landings (Badonia et al, 2003, Zynudheen et al 2004). Compared to most of the other states, the coastal villages of Gujarat are still backward in respect of both infrastructure facilities and marine fish landings Gujarat is at the top position in Fisheries as is at the west coast of India and it covers 1/5th part of India along the coast as well as it is exclusive economic zone. It contributes about 20% of total marine production. Fish consumption varies widely with economic position of the households, in terms of both per capita consumption and type of fish species. Per capita fish consumption increases with increase in income. The share of fish protein in total animal protein expenditure is higher for lower

income groups, demonstrating their dependence on fish as a source of animal protein. Poor people consume mostly low-price fish and rich people spend a significant portion of their fish budget on expensive fish. Per capita fish consumption is substantially higher in rural areas than in urban areas (Mohan et al. 2005).

Fish consumption may be associated with slower cognitive decline with age (Morris 2005). 50 percent of marine fish available for domestic consumption is consumed fresh in and around the landing centres, 43 percent is consumed in demand centres located up to a distance of 200 kilometres from the coast and only 5 percent goes to centres located beyond 200 kilometers (Sathiadhas et al 1995). Hence, with higher income, fish demand has been projected to increase substantially with change in the species mix. The own-price elasticities by species have been found negative and near to unitary (Kumar et al 2005).

The present study focusses on analyzing the trends of fish consumption pattern with more specific to the identifying the driving factors for fish consumption. Analyzing the different constraints incurred by the consumers in fish consumption is also one of the major objectives of the study.

Data and Methodology

Primary data for the study was collected from Gir-Somanath district of Gujarat state consisting of a total of 360 respondents. The study identifies the rate of average fish consumption, preferred fish species etc. Moreover the study gives more preference to find different constraints related with fish consumption and factors that drives people to consume fish. Different statistical and econometric tools such as percentage analysis, garratte ranking and conjoint analysis have employed to derive meaningful results.

Figure 1: Study.
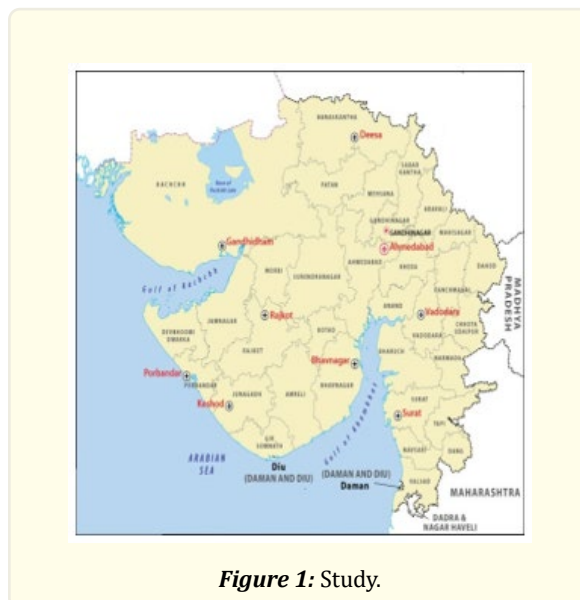
Conjoint analysis is a method in which is applied for the fields of food product choice, marketing, consumer preferences on market segments, consumers' willingness to pay for different product and quality attributes(Balan 1987, Vriens et al 1998, Writh, Halbrendt and Vaughn, 1991).

Conjoint analysis mainly consists of three fundamental processes. First of these is defining the ideal product features set, which provides the consumer with maximum utility. Second is determining the level of relationship between combinations of the product. Third is usage after the market margin simulation, profitability analyses and segmentation analysis. The starting point of conjoint analysis

relies on total utility theory, according to which it can be said that total utility is a function of the price utility and quality utility (Vriens et al 1998).

Two different calculation methods are used in the conjoint analysis in order to determine the significance levels of the product characteristics. First of them is the determination of the differences between partial utility values (part-worth values) of every feature. In partial utility model, every feature level of the product is free from each other and regarding feature level partial benefits constitute the total utility of the consumer. General consumer evaluation on the product or service and thus, contribution of every characteristic to his preference is determined by partial utility (part-worth). Part-worth contribution model (additive part-worth), which is used widespread in the conjoint analysis can be explained as follows (Vriens et al 1998).

$$Pref_{ijkl} = a_i + b_j + c_k + d_l$$

Where,

Pref$_{ijk}$ = Consumer preference or total utility.
a$_i$ = Product A feature part-worth in level i.
b$_j$ = Product B feature part-worth in level j.
c$_k$ = Product C feature part-worth in level k.
d$_l$ = Product D feature part-worth in level l is expressed so.

In this study, the full concept method was chosen for the collection of data that is evaluated in the conjoint analysis. Accordingly, question cards are prepared for every feature level and are provided to consumers, which include features that are determined regarding the product and level of every feature. Thus, the degree of participation of consumers to every alternative and the level of perception for each alternative are determined.

In order to evaluate the driving forces of the consumer preference for fish consumption a Composite Preference Assessment index (PAI) was used in the study. The composite index approach calculates preference indices using aggregate data for a set of indicators. An indicator represents a characteristic or a parameter of a system and it is a pragmatic, observable measure of a concept. Using the set of indicators described in Tables, we quantitatively assessed the preference index based on the systems using the combination of individual indicators. Since each indicator was measured on a different scale, they were normalized (rescaled from 0 to 1) by using the following equations.

$$x_{ij} = \frac{X_{ij} - \min_i\{X_{ij}\}}{\max_i\{X_{ij}\} - \min_i\{X_{ij}\}}; \text{If } x_{ij} \text{ increases with preference} \dots\dots\dots (1)$$

$$y_{ij} = \frac{\max_i\{X_{ij}\} - X_{ij}}{\max_i\{X_{ij}\} - \min_i\{X_{ij}\}}; \text{ If } y_{ij} \text{ decreases with preference} \dots\dots\dots (2)$$

Where, x$_{ij}$ and y$_{ij}$ are the variables representing effects on the preference indices. The values after normalisation were transformed into a four point Likert scale, categorised as 0-0.25, 0.26-.5, 0.6-0.75 and 0.76-1 which are assigned score values 1 (low), 2 (moderate), 3 (high) and 4 (very high) respectively. The mean values of the different species as well as the different parameters of preference were calculated and were combined to develop a composite preference index.

Results and discussions

The data was collected, analyzed and the results are discussed under the following heads.

Demographic profile

A total of 360 respondents were included in this study. Respondent socio-demographic information includes gender, age and educational qualification. Table 1 shows the gender details of the respondents. It indicate that most of the respondents were male (99.7 per cent) and only 0.3 per cent were female. When considering the age details of the respondents 90 per cent are in the middle age (30-60) followed by below 30 aged group (5.8 per cent and more than 60 group (4.2 per cent). The educational status of the respondents indicates a higher percent for higher secondary level of education (90.6 percent) followed by high school level (7.2 percent) and primary (1.4 percent) respectively.

Demographics	Category	Number of respondents (percentage)
Gender	Male	259(99.7)
	Female	1(0.3)
Age	<30	21(5.8)
	30-60	324(90.0)
	>60	15(4.2)
Education	Primary	5(1.4)
	High School	26(7.2)
	Higher Secondary	326(90.6)
	Collegiate	3(0.7)

Source: Sample survey.

Table 1: Demographic profile of respondents (Figures in brackets indicate percentages to total).

Income and expenditure pattern

The pattern of fish consumption is highly influenced by the income and expenditure of consumer. In one way the income and expenditure incurred for fish are very closely related. The present study identifies that the average monthly income of the respondents was found as Rs. 13,072 ranging from Rs. 4000 to Rs. 25000(figure 2). The monthly expenditure on food is Rs. 3703 (47.4 per cent) were it ranges from 1000 to 9000. The monthly expenditure on fish is Rs.1435 (10 per cent).
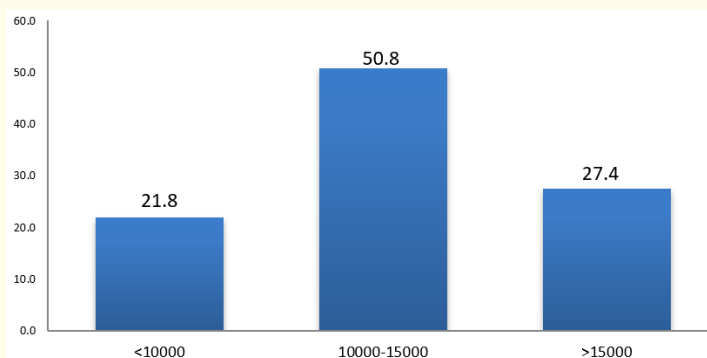

Source: Sample survey.
Figure 2: Annual income pattern.

The item wise expenditure pattern of the households have been analyzed and depicted in Figure: 3. the expenditure on food is in the highest position (45.6 per cent) followed by the expenditure on education (31.9 per cent).

Source: Sample survey.
Figure 3: Expenditure pattern.
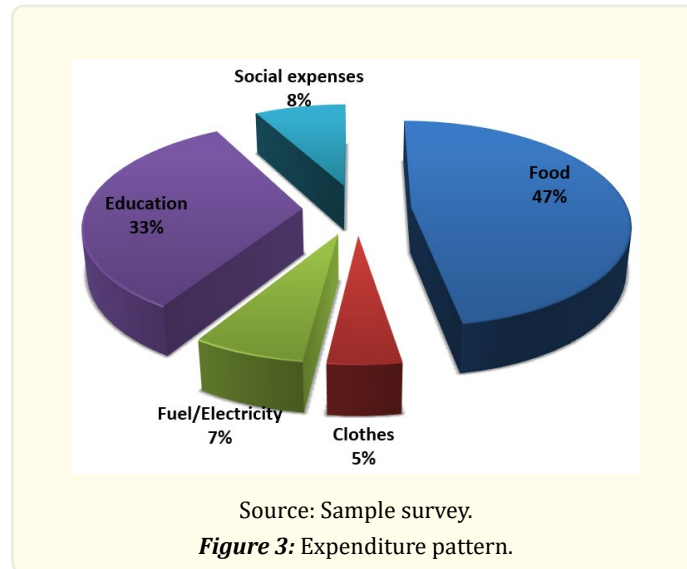
The expenditure on food is categorized in to 8 items which are Cereals, Pulses, Oil, Fruits and vegetables, Milk and dairy products and Fish and fish products. Among them the average expenditure is highest on oil (29 per cent) followed by fruits and vegetables (19 per cent). The expenditure on fish and fish product is 10 per cent. The fish consumption is increasing over the years. This leads to the decrease in the meat and meat product consumption. The average monthly expenditure on food is indicated in figure 4.


Source: Sample survey.
Figure 4: Average monthly expenditure on food.
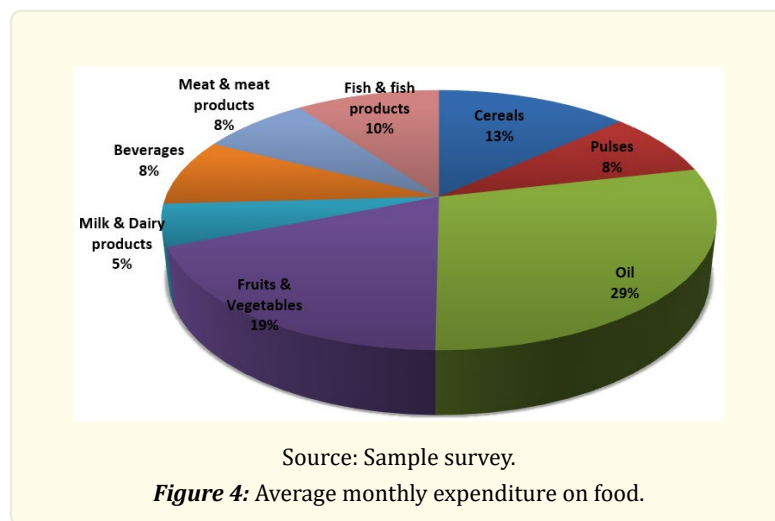
Fish consumption profile
Trend in fish consumption

When considering the trend in fish consumption, most of the respondents (75.8 per cent) consume fish and 24.2 per cent of the respondents are not consuming fish. The study shows that all of the respondents consume fish daily and fish has become an inevitable part of their daily food.

Quantity of fish consumption

The fish consumption across the households indicated that the average fish consumption was found to be 5.3 kg per household. Among them 55 per cent of the respondent consume 5-6 kilogram whereas 29 per cent consume less than 5 kilograms and 16 per cent consume more than 6 kilograms of fish. The quantity of fish consumption is indicated in the figure 5.

Source: Sample survey.
Figure 5: Quantity of fish consumption.
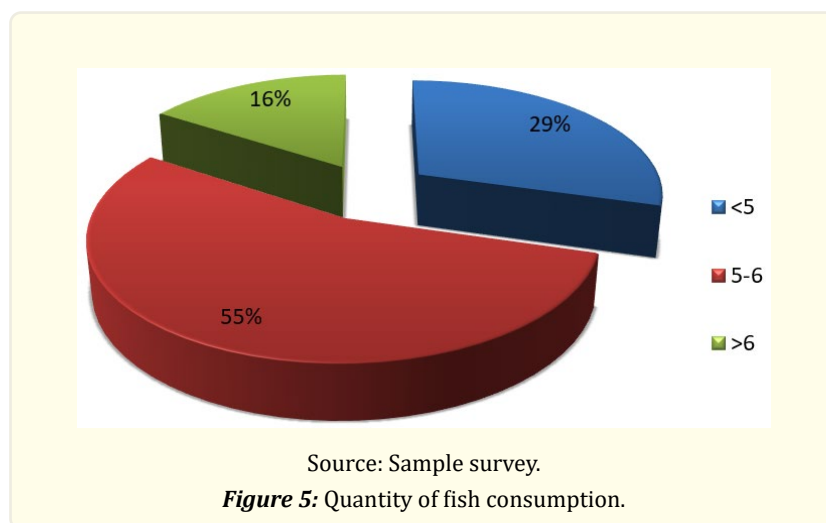
The per capita consumption of the fish is found to be 1.69 kg. Cephalopod (10.8 per cent) is the most consuming fish in Gujarat followed by Hilsa (10.6 per cent). The average fish consumption pattern is furnished in table 2.

Access to buying fish

The study identified the access to buying fish as an important criterion for fish consumption. The results point out that 53.9 percent of the respondents buy fish from a close access of 200-500 meters.33.1 per cent of the respondents buy fish from a source of less than 200 meters and 13.1 per cent buying source more than 500 meters.

Source of purchase

Table 4 shows the main source of purchases. 116 respondents (85.9 percent) were opted Retail market as the main source of purchase. 8 respondents (5.9 percent) purchase fish from fish vendors at door step. Only 3 percent of respondents were purchasing fish from wholesale market and supermarkets and 2.2 percent depend on landing centres.

Species	No of households consuming	%	Average Consumption (Kg)	%
Cephalopods	358	99.4	2.30	10.8
Hilsa	277	76.9	2.27	10.6
Anchovies	356	98.9	2.21	10.3
Shrimps	358	99.4	2.03	9.5
Bombay duck	357	99.2	2.01	9.4
Sardines	277	76.9	1.97	9.2
Seer fishes	358	99.4	1.87	8.8
Pomfrets	358	99.4	1.82	8.5
Mackerels	357	99.2	1.69	7.9
Ribbon fishes	358	99.4	1.59	7.4
Cat fish	358	99.4	1.55	7.3
Shark	357	99.2	1.32	6.2
Threadfin breams	358	99.4	0.34	1.6
Tuna	358	99.4	0.70	3.3

Source: Sample survey.

Table 2: Average fish consumption.

Distance travelled	Number of respondents
<200	119(33.1%)
200-500	194(53.9%)
>500	47(13.1%)

Source: Sample survey.

Table 3: Access to buy fish.

Source of purchase	Number of respondents
Landing centre	3(2.2)
Retail market	116(85.9)
Wholesale market	4(3)
Fish vendors at door step	8(5.9)
Super markets	4(3)

Source: Sample survey.

Table 4: Source of purchase.

Reason for choosing the buying source

Most people depend on retail markets as the best source of purchase. The main reason for choosing this buying source is distance is less. 89 respondents (66.9 percent) choose as the distance is comparatively less. 23 respondents (17.3 percent) prefer the source because there is verity of species available.

Reason for choosing the buying source	Number of respondents
Distance	89(66.9)
Freshness	3(2.3)
Cheap	9(6.8)
Variety of species	23(17.3)
Trust	1(.8)
Credit	1(.8)
Time	7(5.3)

Figures in brackets indicate percentages to total.

Source: Sample survey.

Table 5: Source of purchase.

Consumer preferences in fish consumption

   Conjoint analysis was carried out with 3 factors of 20 different factor levels giving 320 different combinations. Using the fractional factorial design the combinations were greatly reduced to 30 which appear to be manageable for further analysis. The fish quality set composed for the conjoint analysis is given in the table below.
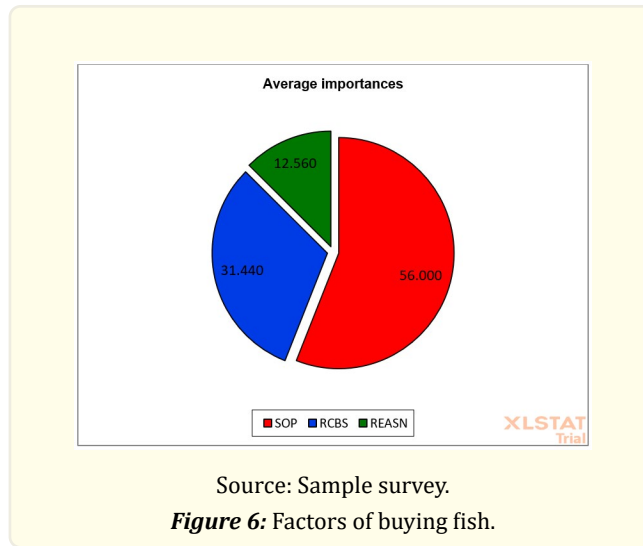
Factor	Factor Levels
Source of buying fish	Landing Centre Retail Market Wholesale Market Online Fish vendors at door step Supermarkets Wayside Market
Reasons for source of purchase	Distance Freshness Variety of species Credit Cheap Trust Time
Drivers for buying Fish (Marine / Inland)	Price and affordability Taste and preference Availability Accessibility Tradition Quality and nutrition

Source: Sample survey.

   The conformity of the model was estimated under the conjoint analysis with the actual consumer preferences were evaluated as 0.95 according to the Pearson R. The statistics show the relationship between the applied model and the observed outcomes.

When the outcomes of the analysis were interpreted, it was found out that the Source of purchase of fish is the most important factor in determination of the consumer choice in fish consumption. The impact of Source of purchase of fish on buying decision was about 56.00 %. Reasons for the buying source of purchase is the second most important factor (31.44 %) followed by the Drivers for buying fish of about 12.56 % significance. The results of the conjoint analysis are indicated in fig 6 and table 6.

Source: Sample survey.
Figure 6: Factors of buying fish.

Factors	Part worth value	Significance level (%)
Source of buying fish		
Landing Centre	0.101	56.00
Retail Market	0.553	
Wholesale Market	0.412	
Online	0.243	
Fish vendors at door step	0.516	
Supermarkets	0.322	
Wayside Market	0.434	
Reasons for source of purchase		
Distance	0.255	31.44
Freshness	0.565	
Variety of species	0.452	
Credit	0.253	
Cheap	0.320	
Trust	0.312	
Time	0.202	

Drivers for buying Fish (Marine / Inland)		
Price and affordability	0.410	12.56
Taste and preference	0.515	
Availability	0.456	
Accessibility	0.562	
Tradition	0.111	
Quality and nutrition	0.522	
Total worth constant	3.452	100.00
Total (%)	Significance = 0.0000	
Pearson's R = 0.95	Significance = 0.0098	

Source: Sample survey.

Table 6: Conjoint analysis.

Part-worth or marginal utility value of every factor level shows the effect of the concerning level on consumer preferences. The factor level, which has the highest part-worth, is the most preferable alternative by consumers.

The sources of buying fish, which is the first most important factor in consumption preference, have the highest part-worth score for the retail market (0.553) followed by the fish vendors at the door step (0.516).The consumers preferred to buy fish from the way side markets holds the third position in the source of buying fish (0.434) and have got prominence over the other sources , rather than travel to buy fish they buy fish while travelling creating a flexible pattern for buying as well as consumption of fish. Wholesale markets having a part worth score of 0.412 holds the next major source of buying fish followed by super markets (0.322), online purchase (0.243) and landing centre (0.101). The results indicates that majority of the consumers choose retail markets for buying fish regardless of other sources. The quality, good taste and cheap rate may the reasons can be acknowledged as the effective factors in the consumers decision in the preference of the buying place. The results also indicates that fish vendors at doorstep, whole sale markets etc. and even the online services have considerable importance in choosing the purchase place by the consumers for fish consumption.

The reasons for choosing the place of purchase has got the second most important factor in fish consumption. The freshness of the available fish in the purchase place has got the first place with highest part worth value about 0.565. The variety of species is the second most with part worth value 0.452. The cheap rate and trust for the fish vendors hold holds the next in consumer preference with part worth values of about 0.320 and 0.312 respectively. The distance for buying fish holds the next with a part worth value of 0.255 followed by credit with a score of 0.22. Among the reasons time has the lowest part worth score of about 0.202 which indicates that time has no relevance in the reasons of buying fish.

The drivers for buying fish which is the highest factor have the third highest part worth value for quality (0.522) followed by the accessibility of fish (0.512). The taste and preference have a part worth value of about 0.515 and availability of about 0.456 whereas the price and affordability for fish consumption records only 0.410 utility value. Moreover tradition in consuming fish holds the lowest impact in for buying fish with part worth values about 0.111. Hence most of the consumers buy fish in regards of the quality of fish and the accessibility in buying fish.

In conjoint analysis, the difference between factor levels as much as the part-worth of every factor level represents the impact of regarding factors on consumer preferences. When the results are interpreted, it is concluded that the largest difference between the part-worth values are in the reasons for buying fish and the preferences in the important parameters to buy fish. Accordingly, it can be concluded that consumers have tendency to buy fish variety providing the highest value to due to these reasons.

Average and total utility or worth values of the combinations, which were designed in the scope of the conjoint analysis and total worth value is composed of sum of factor level scores. The combination, which has the highest total worth is defined as the product

feature set providing the consumers with optimum utility. Feature set, which has the lowest total worth value, provides the consumers with minimum level of benefit. In other words, the factor and factor level having the highest total utility is preferred by consumers with priority. The combination, which has the lowest total utility value, is the product set that consumers prefer least. And from these the overall results interpret that the optimum fish quality set, which provides the consumers with optimum benefit is the variety of fish from the retail fish markets which are highly nutritious, good quality and taste. The optimum fish quality set is represented in the table.

Optimum fish quality set		
Source of purchase	*Retail Market*	*Total Worth Utility*
Reasons for the place of purchase	Freshness	1.1471
Drivers of buying fish	Quality	

Source: Sample survey.

Constraints in fish consumption

The Garette ranking results for the constraints in fish consumption is clearly furnished in the table 7. In Gujarat the main constraint in the consumption of fish was observed to be the lack of fresh fish, followed by consumption restricted due to irregular supply, wide fluctuations in price, and high price.

Constraints in increasing fish consumption	*Score*	*Rank*
Lack of fresh fish	64.09	I
Irregular supply	60.98	II
Wide fluctuations in price	57.63	III
High price	54.28	IV
Poor access to buying	49.45	V
Lack of hygiene in purchase sources	49.40	VI
Unavailability of preferred fishes	47.23	VII
Restricted to social function	42.66	VIII
Lack of awareness	42.60	IX
Tradition	41.34	X

Source: Sample survey.
Table 7: Constraints in fish consumption.

Conclusion

The present study disclosed that the fish consumption is Gujarat is continued to be increased compared to the earliest. People in the lowest income quintile consume about four times lesser amount of fish and fish products than those in highest quintile. Similarly, people in urban areas consume a higher quantity of fish and fish products than those in rural areas (FAO 2014, Dey 2007). Being a large producer unlike earlier times the per capita consumption is 1.69 kg. This is important that for the food security point of view fish need to be consumed more and fish being available, accessible and affordable within the state. Gujarat is the most fish producing state so the consumption behavior has to be changed and also more people will be available to the fisheries. When considering the frequency of consumption most people consume fish daily. The unavailability of the fish is the main problem faced by the consumers. This leads to the increase in the price of the fish. The value added fish products are not preferred by the respondents. When considering the quantity of fish consumption most people consume 5-6 kilograms of fish monthly. Majority of the respondents in were in close access

to fish buying source of less than a kilometer. The main constraint in the consumption of fish was observed to be the lack of fresh fish, irregular supply, and consumption restricted due to high price. The gradual increase in the fish consumption is due to the increase in income, education level, health and nutritioal benefits associated with it and other situational factors such as regular supply, fresh fish, availability of preferred fishes, accessibility and socio- demographic characteristics etc.

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