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RESEARCH ARTICLE

Spatial fish consumption paradigms across Kerala

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ABSTRACT

The present paper attempts to assess the spatial pattern of fish consumption and its attributes in Kerala. The study was conducted across different district locales in Kerala *viz*., urban coastal (Trivandrum), rural coastal (Alappuzha), noncoastal urban (Kottayam) and noncoastal rural (Palakkad) districts. A total of 1440 consumption households were covered for the study. The consumer profiles revealed that 57% of respondents were of middle age group (35-55 years) with collegiate education (27%). More than 40% consume fish on a daily basis. The result revealed that the fish consumption increased over the years on account of better fish availability (62%) accessibility (52%) and affordability (48%). The fish accessibility was less than one km as opined by 52% of consumers. The consumption attributes indicated that sardine was the most preferred species of fish followed by mackerel and anchovies. The constraints in fish consumption as perceived by the consumers induced that from lack of fresh fish, to high price, wide fluctuations in price, irregular supply and lack of hygiene in purchase sources were limiting factors in augmenting fish consumption. Different statistical and econometric tools such as conjoint analysis, preference assessment index and discriminant analysis have been deployed for analyzing the data.

Key words: Fish consumption, Conjoint Analysis, Preference Assessment Index Discriminant Analysis

INTRODUCTION

Fisheries sector plays a very important role in the growth of national economy and continues to show an impressive growth rate when compared to other food producing sectors in the country. The Indian fisheries sector focuses on the economic paradigms such as improving fish production efficiency, improving the welfare of fishermen, ensuring equity, augmenting export and trade, generating employment and ensuring food security. Fish assumes to be a major constituent of the diet of people. On one side fish continues to be a poor man's protein ensuring food security and on other side it offers a delicacy of huge prices. It has been identified that about 60 per cent of the Indian populace consume fish and consumption patterns varies spatio temporally across different social fabrics (Shyam et.al, 2013). The consumption assessment indicated that the marine fish is more preferred than others and the urban area fish consumption is more than the rural populace (Shyam, 2020).

Kerala, is one of the major fish producing and consuming states in the country where the per capita fish consumption is four times than the national average (Shyam, 2016). The demand and supply relations are on par over the years. The supply side is catered by varied fishery resources including marine and inland resources. The demand continues to surge due to varied fish consumption preference, income and demand (Shyam, 2013). However, over the years it has been noticed that there is a mismatch between the fish supply and demand. The fish consumption demand is met by fish arrivals from different neighbouring states and sometimes through imports. The study indicated that on an average, 40 percent of the domestic demand is met from outside fish arrivals .These outside arrivals ensure that the fish is available, accessible and affordable throughout all seasons (Shyam *et al*., 2017). Notwithstanding the fact that Kerala's net deficit in ensuring adequate fish supply, there are alarming issues over the quality of fish and the health concerns facing by fish consumers.

The fish demand and supply relationship are often bolstered by the doctrines of fish availability, accessibility and affordability. The availability necessitates that the fish quality isn't hampered by long distance travel and additives. The accessibility doctrine assumes significance that the consumers needn't to travel long to purchase fish and it is available next door. The affordability factor assesses the realisation of price across species, size, period, product form, method of fish catch and season. It's of significance to ascertain whether the fish

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consumption in Kerala is impacted by these doctrines of fish availability, accessibility and affordability. In this context, the present study delves into assess the trends and pattern of fish consumption across the four district locales in Kerala, attributes of fish consumption, thereby to determine the major constraints facing by consumers towards fish consumption. The overall objectives of the proposed study is to analyse the fish consumption paradigms across four selected study areas, with special focus on (1) Analysing the trends and pattern of fish consumption, (2) Identifying major factors that drive people in fish consumption, and (3) Assessing major constraints of consumption.

METERIALS AND METHODS

The study was based on the primary data collected from four districts in Kerala covering coastal – non-coastal and urban - rural locale. Accordingly, 1440 consumer household urban coastal (Trivandrum), rural coastal (Alappuzha), non-coastal urban (Kottayam) and non-coastal rural (Palakkad) districts were studied using a well-structured questionnaire post reconnaissance studies. Purposive random sampling method was implied for selecting the study locales (Fig. 1).

The schedule elicited the information on the personal profile, income, expenditure, fish consumption pattern, major preferred species, major buying source, the factors which drive people to consume fish and the factors affecting the fish consumption. In order to analyse the data, the primary statistical tool of percentage analysis, conjoint analysis, garrette ranking etc. have been employed. Conjoint analysis, discriminant analysis and preference assessment index methods have been carried out to find out the consumer preferences and the pattern of fish consumption among the respondents.

Fig. 1. Study area

Analytical tools

The tools of analysis used for the study are indicated below:

Conjoint analysis

Conjoint analysis is defined as the method in which a consumer or a decision-maker evaluates and estimates confined number of alternatives systematically (Akpinar et al 2009).The analysis 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. Conjoint analysis mainly consists of three fundamental processes (Boughanmi et al 2007). 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 the total utility is a function of the price utility and quality utility (Padilla et al,2007).

Two different calculation methods are used in the conjoint analysis in order to determine the significance level of product characteristics. First one is the determination of 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 this 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:

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

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.

Preference assessment index (PAI)

A composite preference assessment index (PAI) approach was also used in this study to evaluate driving forces that are influencing consumer preference which lead to an increase in the demand for various types of fishes.(Shyam *et al* ,2019) 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

$$x_{ij} = \frac{X_{ij} - \min_i \{X_{ij}\}}{\max_i \{X_{ij}\} - \min_i \{X_{ij}\}}$$; if x_{ij} increases with preference ……..……..……(1)

$$y_{ij} = \frac{\max_i \{X_{ij}\} - X_{ij}}{\max_i \{X_{ij}\} - \min_i \{X_{ij}\}}$$; if y_{ij} decreases with preference ……..……..……(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.

Discriminant analysis

Discriminant analysis (DA) involves the determination of a linear equation like regression that will predict which group the case belongs to (Ramayah et al, 2009, Sohail et al, 2009). It is shown as follows:

$D = v_1x_1 + v_2x_2 + v_3x_3 + \ldots\ldots\ldots v_ix_i + a$

D= discriminate function, V= the discriminant coefficient of weight for that variable, X= respondent's score for that variable, a = constant, i= the number of predictor variables.

Garrette ranking method

The Garette Ranking Technique was employed to rank the constraints. The order of merit given by the consumers was transmitted into scores. (Garrette, and Woodworth, 1969). For converting the scores assigned by the exporter towards the particular problem, per cent position was worked out using the formula:

Percent position = $100 \times (R_{ij} - 0.5)$

N_j

Where,

R_{ij} = rank given for the ith problem by the jth consumer in State

N_j = number of attributes

RESULTS AND DISCUSSION

Demographic Profile

Respondent socio-demographic information includes gender, age and educational qualification (Table 1). A total of 1440 respondents were included in this study. The results indicates that majority of the respondents are male (71.3%) than female (28.7%). Trivandrum has more of female respondents (54%) than male (46%) (Table 1). In Palakkad district, only male respondents were available for the study.

Table 1. Gender, age and educational qualification details of the respondents

Particular	Coastal Rural	Non Coastal Urban	Non Coastal Rural	Coastal Urban	Total
Gender					
Male	199 (55)	304 (84)	360 (100)	164 (46)	1027 (71.3)
Female	161 (45)	56 (16)	0 (0)	196 (54)	413 (28.7)
Total	360	180	360	360	1440
Age (years)					
<35	122	22	2	45	191 (13.26)
35-55	158	252	212	228	850 (59.02)
>55	80	86	146	87	399 (27.74)
Total	360	360	360	360	1440 (100.00)
Educational qualification					
Illiterate	10 (3)	0 (0)	40 (11)	3 (0.83)	53 (3.68)
Primary	57 (16)	4 (1)	120 (33)	30 (8.33)	211 (14.65)
High School	86 (24)	14 (4)	130 (36)	109 (30.28)	339 (23.54)
Higher Secondary	39 (11)	38 (11)	50 (14)	124 (34.44)	251 (17.43)
Collegiate	116 (32)	168 (47)	20 (6)	81 (22.50)	385 (26.74)
Professional	52 (14)	136 (38)	0 (0)	13 (3.61)	201 (13.96)
Total	360 (100)	360 (100)	360 (100)	360 (100)	1440 (100)

(Figure in parenthesis indicate percentage to total)

Age Profile

The age profile of the respondents point out that 59.02% of the respondents came under the age group frequency of 35-55, followed by 27.74% of the respondents in greater than 55 age group and 13.26% of them come under the less than 35 age group category (Table 1).

Educational Status

The educational status of the respondents shows that most of them are collegiate (26.74%). 23.54% of the respondents having high school level education and 17.43% having higher secondary level education. Among the respondents only 14.65% possessed primary education and 13.96% are professionals. The level of education of the respondents was high as indicated by a low level of illiterates (3.68%) in the sample (Table 1).

Household Expenditure Pattern

The average monthly expenditure of the respondents were studied (Fig. 2) and the results shows that Coastal urban (₹ 16452) has the highest average monthly house hold expenditure followed by non-coastal urban (₹ 14150), non-coastal rural (₹ 12205) and coastal rural (₹ 11629).

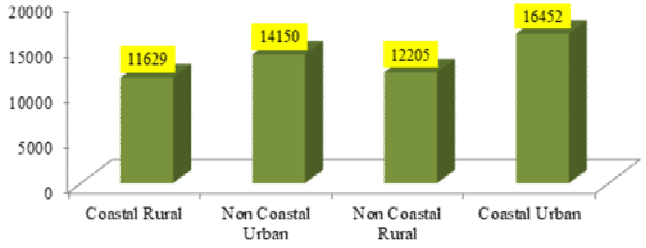

Fig. 2. Average monthly expenditure

In coastal rural households the monthly mean expenditure on food is ₹ 5,636 were it ranges from 12,000. The monthly mean expenditure on fish is ₹ 2,149 were it ranges from 5,700 to a minimum of 300. Whereas in Non-coastal rural the respondents spend central part of their income towards the category of education. In Noncoastal urban the respondents spend more on food on an average of ₹ 7761.42 (63.88%), followed by Fuel/Electricity (13.60%), Health Care (8.11%), Education (7.19%) and Clothes (7.23%) and in coastal urban the expenditure is high on food (33%), followed by shelter (16%), education (12%), clothes (10%) and others (10%) (Fig. 2).

Fish Consumption Profile

1. Frequency of consumption

The results show that 36.88% of the respondents consume fish daily, followed by 21.32% consume fish weekly, 20.76% consume fish twice in a week and 15.76% consume fish alternatively (Table 2). Comparing the area wise fish consumption Coastal rural (54.17%) and coastal urban (36.88%), non-coastal urban consume weekly (34.44) and noncoastal rural consume twice in a week (39.17%).

2. Quantity of fish consumption

The average annual per capita fish consumption across the study locales was found to be 27.84 kg ranging from 20.63 in the case or rural non-coastal to 34.83 kg in the case of urban coastal. The annual per capita consumption in the coastal rural and non-coastal urban was found to be 31.94 and 23.96 kg, respectively. The results of the quantity of fish consumption and average species composition were clearly indicated in Table 3 and 4.

Table 2. Frequency of fish consumption

Coastal Rural	Non Coastal Urban	Non Coastal Rural	Coastal Urban	Total
195 (54.17)	28 (8.89)	56 (15.56)	248 (68.89)	531 (36.88)
75 (20.83)	52 (14.44)	12 (3.61)	86 (23.89)	226 (15.69)
33 (9.17)	122 (33.89)	141 (39.17)	3 (0.83)	299 (20.76)
50 (13.89)	124 (34.44)	110 (30.56)	23 (6.39)	307 (21.32)
5 (1.39)	4 (1.11)	4 (1.11)	0 (0)	13 (0.90)
2 (0.56)	16 (4.44)	8 (2.22)	0 (0)	26 (1.81)
0 (0)	10 (2.78)	28 (7.78)	0 (0)	38 (2.64)
360 (100)	360 (100)	360 (100)	360 (100)	1440 (100)

(Figure in parenthesis indicate percentage to total)

Table 3. Average fish consumption

Monthly	Coastal Rural	Non Coastal Urban	Non Coastal Rural	Coastal Urban	Total
Less than one	28	68	105	21	222 (15.42)
One-Two	68	78	68	56	270 (18.75)
2-3 kg	138	141	121	149	549 (38.13)
3-5 kg	84	57	51	87	279 (19.38)
More than five	42	16	15	47	120 (8.33)
Total	360	360	360	360	1440 (100.0)

The average species composition in the monthly per capita fish consumption basket was analyzed and the results indicate that among the species, sardine (0.53%) is the most consumed fish in the selected areas of study. Comparing the different study locations, in coastal rural, sardine consumption was the highest (0.61%) than other areas (Table 4). Being the coastal area, the availability and the low price of sardine was the major reason for the highest consumption rate.

3. Access to buying fish

The results of access to buying fish (Table 5) indicates that majority of consumers of fish that is 33.82% of the respondents travel 1 km to 2 km and 33.78% travel less than 1 km to buy fish. Comparing the different selected areas of study, Coastal rural (47.22%) and coastal urban (46.67%) travel less than 1km to buy fish whereas Non Coastal rural (39.44%) travel 2 to 5 km to buy fish and noncoastal urban (39.17%) travel 1 to 2 km. The results reveals that majority of the respondents were in close access to fish buying source.

4. Source of purchase

Source of purchase is found to be multiple across different consumers. Among the respondents the main source of purchase is the retail market (32.29%), followed by fish vendors at door step (30.82%) (Table 6). When comparing the study locations, the major sources of purchase is different. In Coastal rural (45.28%) and coastal urban (31.39%) area the main source of purchase is fish vendors at the door step. Non-coastal urban (34.44%) and noncoastal urban (43.61%) has retail markets as the major source of purchase (Table 6).

Table 4. Average species composition in the monthly per capita fish consumption basket

Species	Coastal Rural	Non Coastal Urban	Non Coastal Rural	Coastal Urban	Total
Anchovies	0.24	0.15	0.14	0.33	0.22
Carps	0.03	0.08	0.02	0.005	0.03
Crab	0.02	0.04	0.01	0.03	0.03
Cephalopods	0.12	0.06	0.03	0.16	0.09
Mackerel	0.3	0.18	0.22	0.42	0.28
Seabass/ Milk fish/ Mullet	0.02	0.08	0.03	0.005	0.03
Clam/ Mussel/ Oyster	0.05	0.05	0.02	0.02	0.04
Pearl spot	0.12	0.12	0.05	0.005	0.07
Pomfret	0.12	0.05	0.02	0.16	0.09
Prawns/ Shrimp	0.22	0.15	0.12	0.18	0.17
Ribbon fishes	0.11	0.05	0.03	0.14	0.08
Sardine	0.61	0.48	0.39	0.63	0.53
Seer fish	0.08	0.05	0.05	0.15	0.08
Sharks	0.01	0.02	0.02	0.005	0.01
Sole fish	0.05	0.02	0.03	0.02	0.03
Thread fin breams	0.16	0.09	0.11	0.22	0.15
Tuna	0.12	0.08	0.11	0.23	0.14
Tilapia	0.12	0.12	0.13	0.03	0.10
Others	0.16	0.12	0.18	0.16	0.16
Total	2.66	1.99	1.71	2.9	2.32

Table 5. Distance travelled to buy fish

Distance (km)	Coastal Rural	Non Coastal Urban	Non Coastal Rural	Coastal Urban	Total
Less than 1	170 (47.22)	81 (22.50)	68 (18.89)	168 (46.67)	487 (33.82)
1 to 2	151 (41.94)	141 (39.17)	118 (32.78)	134 (37.22)	544 (33.78)
2 to 5	30 (8.33)	120 (33.33)	142 (39.44)	42 (11.67)	334 (23.19)
More than 5	9 (2.50)	18 (5.00)	32 (8.89)	16 (4.44)	75 (5.21)
Total	360 (100)	360 (100)	360 (100)	360 (100)	1440 (100)

(Figure in parenthesis indicate percentage to total)

Table 6. Source of purchase

Source of purchase	Number of respondents				
	Coastal Rural	Non Coastal Urban	Non Coastal Rural	Coastal Urban	Total
Landing centre	19 (5.28)	20(5.56)	6(1.67)	47(13.06)	86(5.97)
Retail market	86(23.89)	124(34.44)	157(43.61)	98(27.22)	465(32.29)
Fish vendors at door step	163 (45.28)	54(15)	108(30.00)	113 (31.39)	444(30.82)
Wholesale market	34 (9.44)	14(3.89)	14(3.89)	30(8.33)	92(6.39)
Online	11(3.06)	15(4.17)	5(1.89)	22(6.11)	53(3.68)
Super market	15(4.17)	120(33.33)	6(1.67)	22(6.11)	163(11.32)
Way side market	32(8.89)	13(3.61)	64(17.78)	28(7.78)	137(9.51)
Total	360(100)	360(100)	360(100)	360(100)	1440(100)

(Figure in parenthesis indicate percentage to total)

Major Drivers in Buying Fish –Conjoint Analysis

Conjoint analysis was attempted to assess the consumer preference with three factors of 20 factor levels generating 320 combinations. In the iterative process using the fractional factorial design, the combinations were reduced to 50 (making amenable for further analysis and deducing meaningful conclusions). The three factors chosen, included source of buying fish, reasons there in for the source and the drivers for buying fish. The fish quality set composed for the conjoint analysis is given in the Table 7 below.

Table 7. Drivers of buying fish

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	Price and affordability Taste and preference Availability Accessibility Tradition Quality and nutrition

In the study, 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 that the source of purchase of fish is the most important factor in determination of the consumer choice in the fish consumption. The impact of source of purchase of fish (SOP) on buying decision was about 56.00 %. Reasons for the buying source of purchase (RCBS) are the second most important factor (31.44 %), followed by the drivers for buying fish registering 12.56% significance. The results of the conjoint analysis are indicated in Fig. 3 and Table 8.

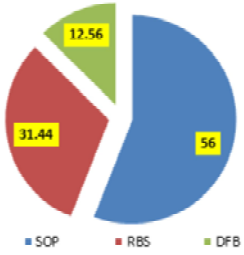

Fig. 3. The results of conjoint analysis

Table 8. Conjoint analysis results

Factors	Part worth value	Significance level (%)
Source of buying fish		
Landing Centre Retail Market Wholesale Market Online Fish vendors at door step Supermarkets Wayside Market	0.101 0.553 0.412 0.243 0.516 0.322 0.434	56.00
Reasons for source of purchase		
Distance Freshness Variety of species Credit Cheap Trust Time	0.255 0.565 0.452 0.253 0.320 0.312 0.202	31.44
Drivers for buying Fish (Marine / Inland)		
Price and affordability Taste and preference Availability Accessibility Tradition Quality and nutrition	0.410 0.515 0.456 0.562 0.111 0.522	12.56
Total worth constant Total (%) Pearson's R = 0.95	3.452 Significance = 0.0000 Significance = 0.0098	100.00

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 values. 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 with regard to 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 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. (Boughanmi et al , 2007, Vriens et al ,1998, Wirth et al ,1991 and and Akpinar et al , 2009

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 9.

Table 9. Optimum fish quality set

Optimum fish quality set		
Source of purchase	Retail Market	Total Worth Utility
Reasons for the place of purchase	Freshness	
Drivers of buying fish	Quality	1.1571

Preferred Species and Major Drivers in Fish Consumption

Preference index is the composite index which takes into account numerous parameters which determine fish consumption like availability, accessibility, quality, nutrition, tradition etc. The preference index for the different species of fish by the respondents is furnished in Table 10.

Table 10. Preference index of major species

Species	Parameters									Preference Index
	Availability	Accessibility	Quality	Nutrition	Taste & Preference	Tradition	Meat Substitute	Persuasion	Price	
Sardine	0.66	0.71	0.48	0.96	0.66	0.85	0.33	0.19	0.65	0.61
Mackerel	0.77	0.55	0.48	0.84	0.79	0.76	0.41	0.2	0.42	0.58
Prawn	0.56	0.68	0.54	0.54	0.69	0.66	0.65	0.29	0.43	0.56
Tuna	0.63	0.75	0.65	0.66	0.46	0.48	0.67	0.17	0.40	0.54
Thread fin breams	0.56	0.85	0.75	0.76	0.51	0.32	0.33	0.45	0.32	0.54
Stolephorous	0.72	0.63	0.55	0.62	0.67	0.74	0.33	0.04	0.5	0.53
Pearl spot	0.7	0.79	0.64	0.57	0.38	0.40	0.35	0.12	0.64	0.51
Pomfret	0.42	0.45	0.75	0.56	0.82	0.46	0.66	0.25	0.18	0.51
Seer fish	0.55	0.56	0.80	0.60	0.72	0.30	0.60	0.14	0.12	0.49
Soles	0.35	0.4	0.42	0.52	0.6	0.45	0.35	0.32	0.65	0.45
Squid	0.48	0.55	0.50	0.52	0.45	0.30	0.38	0.15	0.68	0.45
Clam/ Mussel/ Oyster	0.35	0.25	0.60	0.58	0.52	0.32	0.31	0.20	0.70	0.43
Crab	0.52	0.48	0.75	0.31	0.45	0.30	0.52	0.15	0.17	0.41
Carps	0.32	0.31	0.58	0.45	0.45	0.25	0.35	0.25	0.65	0.40
Tilapia	0.52	0.45	0.42	0.32	0.31	0.21	0.35	0.2	0.72	0.39

The results indicates that among the different species Sardine remains the most preferred fish with a high score of 0.61, followed by mackerel (0.56), tuna (0.59), prawn (0.54), Stolephorous (0.53), pomfret (0.51), sole fish (0.51), seer fish (0.49), threadfin breams (0.489 and crab (0.41). Despite any income group, there exists a high uniformity between the respondents in buying mackerel as well as sardine. The most preferred species in fish consumption is indicated in the Fig. 4.

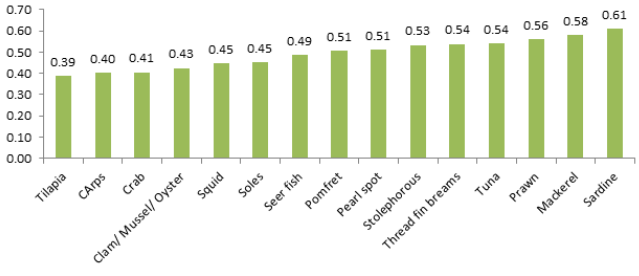

Fig. 4. Preferred species in fish consumption

Driving Forces of Fish Consumption- Discriminant Analysis

Driving forces that influence consumer preference which lead to an increase in the demand for various types of fish can be determined by analyzing the consumer satisfaction and preferences. The consumers are diverse in their consumption preferences. The discriminant analysis approach used for assessing the choices of the respondents for consumption

and the study identifies the different drivers of fish consumption (Table 11).

Table 11. Discriminant analysis results

Parameters	Wilk's lambda	Significance
Availability	0.863	0.001
Accessibility	0.742	0.000
Quality	0.998	0.033
Nutrition	0.977	0.025
Taste and preference	0.620	0.000
Tradition	0.325	0.000
Meat substitute	0.281	0.000
Persuasion	0.424	0.000
Price	0.519	0.000
Others	0.203	0.000
	Structural Matrix (Canonical loadings)	Unstandardized canonical discriminant function coefficient
Availability	0.532	2.31
Accessibility	0.458	1.30
Quality	0.795	0.79
Nutrition	0.556	0.43
Taste and preference	0.433	0.20
Tradition	-0.210	0.38
Meat substitute	-0.189	0.18
Persuasion	0.245	0.79
Price	0.350	1.00
Others	-0.126	-0.10
Constant		-3.22
Canonical correlation 0.85 , Wilks lambda (□) 0.147 Chi square (9 df) 18.307 p <0.000		

The Wilks's Lambda statistic was used to test the significance of the function. The value of Wilks's lambda 0.147 which transforms to a chi-square of 18.307 with 9 degrees of freedom, ($p < 0.001$) points out that the model is significant and explains the consumer preference for the consumption of fish.

The DA table indicates that quality is the most significant discriminant factor with highest Wilks' Lambda of 0.998 and highest canonical loading (0.795 or 79.5%) describing the major driver of fish consumption preferences of the consumer followed by nutrition (0.556 or 55.6%), availability (0.532 or 53.2%), accessibility (0.458 or 45.8%), taste and preference (0.433 or 43.3%), price (0.35 or 35%), persuasion (0.245 or 24.5%), others (-0.126 or 12.6%), meat substitute (-0.189 or 18.9%) and tradition (-0.21 or 21%). The factors price and persuasion accounts only low impact among the respondents in fish consumption. Also the least preference is given for

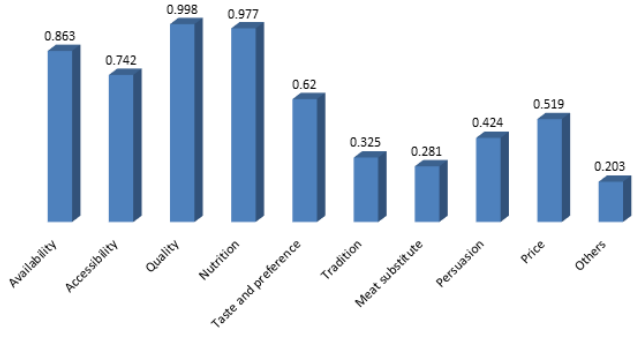

Fig. 5. Driving forces of fish consumption

persuasion and moreover the study analyzed that most of the respondents do not consume fish as a substitute to meat. The different reasons for the fish consumption are clearly indicated as discriminant factors in the Fig. 5.

However, the respondents have also mentioned that availability of most of the fishes became rare at present which indirectly indicating the loss of fish diversity and abundance in water bodies nearby, loss of fishes in natural waters due to degradation of natural habitats, excess exploitation, use of illegal fishing gears, expansion of aquaculture into natural waters etc.

Constraints in Fish Consumption

The Garrette ranking results shows the constraints in fish consumption which is clearly furnished in Table 12. The major constraint in fish consumption was observed to be the irregular supply of fish in all the areas of study. Lack of fresh fish is the second main constraint in the coastal urban and non-coastal urban area whereas high price is marked as the second major constraint in the coastal rural and non-coastal rural areas. The respondents opined that purchase and demand of the fish have not been reduced yet due to these reasons and their fish consumption has only increased fairly despite the high prices. But the irregular supply as well as poor access and other reasons have a good role in consumption pattern of the consumers. This makes them to depend on fish products and other sources for the consumption of fish. The study could easily come to the conclusion that fish has become one of the inevitable food item among the people.

Table 12. Factors constraining the increased fish consumption

Attributes	Coastal Rural		Non Coastal Urban		Non Coastal Rural		Coastal Urban		Total	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Irregular supply	54	I	68	I	76	I	61	I	64.75	I
Lack of fresh fish	48	IV	65	II	56	V	59	II	57.00	IV
Wide fluctuations in price	49	III	64	III	58	IV	58	IV	57.25	III
High price	50	II	66	IV	70	II	68	III	63.50	II
Poor access to buying	42	V	55	V	50	VI	51	VI	49.50	VI
Lack of hygiene in purchase sources	39	VI	41	VII	42	VII	50	VII	43.00	VII
Unavailability of preferred fishes	38	VII	48	VI	63	III	53	V	50.50	V
Restricted to social function	29	VIII	38	VIII	37	VIII	32	IX	34.00	VIII
Tradition	26	IX	29	IX	30	IX	23	X	27.00	IX
Lack of awareness	23	X	26	X	18	X	39	VIII	26.50	X

CONCLUSION

The study clearly point outs that the fish consumption in Kerala is steadily increasing. The consumption analysis indicates that the average annual per capita fish consumption across the study locales was found to be 27.84 kg ranging from 20.63 in the case or rural non-coastal to 34.83 kg in the case of urban coastal. The annual per capita consumption in the coastal rural and non-coastal urban was found to be 31.94 and 23.96 kg,

respectively. The study identified that irrespective of the increased price of fish, the fish consumption rate reached its peak as majority of the consumers consume fish on a daily basis. The study also point out that main source of purchase is the retail market followed by fish vendors at door step. The main constraint in the consumption of fish was observed to be the lack of fresh fish, followed by consumption restricted due to high price, wide fluctuations in price, irregular supply and lack of hygiene in purchase sources. As the demand-supply gap is widening up the study also identified imports from neighboring states could be done with proper quality assurance check for the imports along with developing appropriate regulatory measure for exports. Amidst of these there exists some structural problems in the fishing industry. The non-availability of fish in the domestic fish market will lead to a situation where in the domestic consumers are devoid of fish in the market at affordable prices. Ensuring the availability and affordability of fish is thus highly important and could be augmented without any fail. The local fishermen of the area should have awareness about good handling practices in order to fetch quality standard and price for the fish. Moreover proper guidelines and practices could be adopted for increasing consumption and improving hygiene standards in the fish supply chain.

REFERENCES

Akpinar MG, Dagistan E, Mazlum Y, Gul M, Koc B and Yilmaz Y, 2009. Determining household preferences for fish consumption with conjoint analysis in Turkey. Journal of Animal and Veterinary Advances 8(11): 2215-2222.

Boughanmi H, Al-Musalami J, Al-Oufi H and Zaibet L, 2007. Estimating consumer preferences for value-added fish products in Oman: A conjoint analysis. Journal of Food Products Marketing 13(2): 47-68.

Garrette HE and Woodworth RS, 1969. Statistics in psychology and education. Vakils, Fifer and Simons Pvt. Ltd., Mumbai, India, 329 pp.

Padilla CP, Villalobos A, Spiller and Henry, 2007. Consumer preference and willingness to pay for an officially certified quality label: Implications for traditional food producers. Agric. Tec. (chile) 67: 300-308.

Ramayah T, Rouibah K, Gopi M and Rangel GJ, 2009. A decomposed theory of reasoned action to explain Intention to use Internet stock trading among Malaysian investors. Comput. Hum. Behav 25(2): 1222-1230.

Shyam S Salim, 2013. *Demand and Supply Paradigms for Fish Food Security in India*. Seafood Export Journal 43(5): 34-40.

Shyam S Salim, 2013. *Demand pattern and willingness to pay for high value fishes in India*. Journal of the Marine Biological Association of India 55 (2): 48-54.

Shyam S Salim, 2016. *Fish consumption pattern in India: Paradigm shifts and Paradox of export trade (Fish consumption pattern in India, exports - Overview)*. Food and Beverage News, pp. 25-28.

Shyam S Salim, 2020. Demand pattern and willingness to pay for high value fish consumption: Case study from selected coastal cities in Kerala, South India. Indian Journal of Fisheries 67(3): 135-143.

Shyam S Salim, Monolisha S and Sunil PV, 2020. Fish Consumption: Gauging the determinants of consumption and buying patterns across Kerala markets. Journal of the Marine Biological Association of India 62(1): 21-28.

Shyam S Salim, Athira NR, Athira PR, Safeena PK, Rahman M Ramees, Fernandez Reeja, Remya R and Rosey Xavier Smitha, 2019. Assessing demand drivers in augmenting fish consumption in Ernakulum. Indian Journal of Economics and Development 7(5): 1-8.

Sohail MS, Daud S (2009). Knowledge sharing in higher education institutions: Perspectives from Malaysia. VINE: Journal of Information Knowledge Management System 39(2): 125-142.

Vriens M, Looschilder GH, Rosbergen E and Wittink D, 1998. Verbal vs. realistic pictorial representations for including design-attributes in conjoint analysis. Journal of Product Innovation Management 15: 445-467.

Wirth FF, Halbrendt CK and Vaughn GF, 1991. Conjoint analysis of the mid-Atlantic food fish market for farm raised hybrid striped bass. Southern Journal of Agricultural Economics 23: 155-164.

Wright KB, 2005. Researching Internet-based populations: Advantages and disadvantages of online survey research, online questionnaire authoring software packages, and web survey services. Journal of Computer-Mediated Communication 10(3) article 11.