Article

Factors Influencing the Knowledge Level of Fish Consumers: An Explanatory Analysis

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Abstract: Despite scientific proof of the benefits and effects of fish consumption on human health, most Indians consume less than the recommended dietary amounts. The current study attempted to assess the knowledge gap of fish eaters regarding the health and nutritional benefits, along with identifying the factors that directly and indirectly influence the knowledge level of fish consumers. The fish eaters were surveyed during the F.Y. 2021–2022 with representative samples of 934 fish consumers from across ten districts of the Gujarat state in western India. Fish consumers were found to have insufficient knowledge about health and nutritional benefits, which stalled the growth of fish consumption in the region. The significant factors influencing the knowledge level of fish consumers were education qualification, fish quality evaluation criteria, number of children in a family, years of fish consumption and family size. The consumers were found to place greater emphasis on the fish quality evaluation parameters such as smell, appearance, nutritional value, product price and freshness. The study's outcomes suggested that mass awareness programs should be planned to achieve higher levels of fish consumption in the region and the country.

Keywords: knowledge level; socio-psychological factors; health and nutritional benefits; fish quality evaluation

1. Introduction

Fish is one of the widely recommended components of human diets due to its high nutritional quality, potentially contributing to the population's nutritional and food security [1]. In general, fish is a decent source of superior quality digestible protein, minimal saturated fat, and is high in micronutrients [2,3]. They are also a reliable source of polyunsaturated omega-3, specifically docosahexaenoic (DHA) fatty acids and eicosapentaenoic [4]. In addition to that, fish is also regarded as one of the most available and affordable sources relative to supplementary animal protein [5]. Due to the multiple nutritional and health benefits offered by fish, fish consumption as food has grown globally at an average yearly rate of 3.1%, outpacing the growth in consumption of all the other animal protein sources [6].

However, a stark difference has been recorded in the fish consumption pattern in developed (24.40 kg/year) and least developed countries (12.60 kg/year). In contrast, the world average per capita fish consumption has been recorded as 20.20 kg/year [7]. The yearly per capita fish intake in India was found to be between 5 and 6 kg for the overall population and between 8 and 9 kg for the fish-eating population, which are poor values, representing 50% of those of the global rates [8]. Fish consumption in a country depends on many factors, such as regional tastes and preferences, quality, nutritional value and prices, and availability and affordability of high-value fish [8,9]. With other issues also to be considered, fish consumption also depends upon the consumer's knowledge concerning the nutritional benefits of fish. Past studies have also identified the nutritional value of

fish as a favourable factor influencing fish consumption [10–12]. According to the authors of [13], subjective knowledge was found to be a stronger predictor of fish consumption than objective fish-related nutritional knowledge. The study suggested that knowledge about health risks and benefits is important for making informed food consumption decisions [14]. At the same time, the authors of [15,16] discovered that consumer knowledge about the health effects of fish consumption is, however, rather poor. The study also explains that knowledge about seafood increases the consumer's ability to manage seafood consumption from selection to serving [17]. A study by ref. [18] suggested that attitude regarding and knowledge about fish directly increase fish consumption frequency, while knowledge has almost twice the effect on consideration set size than attitude. Studies on consumer awareness of fish have shown that socioeconomic considerations undoubtedly influenced such knowledge [19]. Knowledge and dietary health prevention behaviour have been shown to be positively co-related [20], and have positive beliefs and knowledge of health-related behaviour [21]. Hence, the present study is an attempt to understand the factors influencing the knowledge level of fish consumers regarding health and nutritive benefits of fish consumption. The study also attempted to understand the consumer's selection criteria for fish. Individual consumers have their own preferences when it comes to eating. The study results will enable domestic and international markets to more effectively target consumers with their fish and fish products. The effects of demographic factors (gender, age, education, occupation, income, family size, the total number of fish eaters in the family, and years of consumption) on consumer awareness and those that might have a substantial impact on the regional fish consumption will be discussed. While the literature generally supports the significance of product knowledge in influencing consumers' purchase decisions, very few studies have been conducted to explain the impact of subjective knowledge, particularly in developing nations such as India [19,21]. The current study pondered on the western state of India, particularly the state of Gujarat. The state is considered the highest fish production centre in India because of its large coastal line of 1600 km and massive inland fisheries resources. However, the state reported the lowest fish intake in India, with only 0.05 kg monthly per capita consumption [22]. Given that factors influencing fish consumption may vary depending on regional taste, preferences, tradition, and habit [23], the study attempted to measure the knowledge gap among fish consumers concerning the health and nutritional benefits through their selection criteria. Further, it analyses the relationship between various socioeconomic variables on the knowledge level of fish consumers and their fish selection criteria, followed by identifying the factors that directly and indirectly influence the behaviour of fish consumers in the state.

2. Materials and Methods

2.1. Sampling Procedure

The respondent fish consumer was selected through a multi-stage sampling method. In the initial stage, the number of districts from each zone was determined in proportion to the share of that respective zone to the state's total fish production. In the second stage, the number of respondents from each district was worked out based on the percentage contribution of each district to the total fish production keeping a base sample size of 934 fish consumers across the state. Table 1 shows the sample size distribution, which depicts a total of 10 districts representing both urban and rural areas of four sub-zones of the state of Gujarat. The 934 respondents were retained after data cleaning and editing due to missing responses.

Table 1. Sample respondent's distribution.

S. No.	Subzone	District	Production (M.T.)	Percentage (%)	Number of Respondents
1	North Zone	Banaskantha	1853	00.280	3
2	Middle Gujarat	Anand	8825	01.333	12
3		Vadodara	8226	01.243	12
4	South Gujarat	Surat	41,405	06.255	58
5		Navsari	29,681	04.484	42
6		Valsad	109,875	16.599	155
7	Saurashtra and Kutch	Porbander	92,162	13.923	130
8		Girsomnath	240,031	36.261	339
9		Dwarka	61,760	09.330	87
10		Kutch	68,129	10.292	96
	Total		661,947	100.00	934

2.2. Data Source

The study's methodology was designed so that the key predictive (socio-psychological) factors would be laid out. The primary data for various socio-psychological factors were collected from fish consumers using structured interview schedules through online Google forms and personal interviews with fish consumers. The survey was conducted from November 2021 to April 2022.

2.3. Tools of Analysis

Statistical Packages for Social Sciences (SPSS) and Microsoft Excel were used to analyse the data gathered. All the essential socio-psychological variables such as gender, age, income, occupation, education, family structure, and years of fish consumption have been expressed in frequency and percentage. A total of 10 questions covering various facets of the nutritional and health benefits of fish were asked to the respondents to gauge their level of knowledge (The subject matter experts chose these ten questions based on the judge's rating scale), and each correct response received a score of 1. The respondents were categorised into five categories based on their total score. The respondents were also analysed based on the number of correct answers for the nutritional and health-related aspects of fish consumption.

There are several possibilities from which people can choose their goods and services. The sum of these choices will influence their choice regarding their eating behaviour. Forecasting consumer preferences is one of the main objectives of marketing research, along with influencing consumer behaviour; thus, it is essential to understand how product qualities (purchasing parameters) affect consumer preferences. Hence, the prevalent criteria for assessing the quality of fish while purchasing were measured on a three continuum Likert rating scale. They were later arranged in the ascending order of their mean values. Correlation coefficients were used to analyse the association between socio-psychological traits and customer knowledge. Additionally, multiple linear regression analysis was used to investigate how these socio-psychological factors affected fish consumption. To measure the direct and indirect interaction between variables and to determine the degree to which individual causes determine specific variability in the knowledge level of fish consumers, the analysis of structural equations (also called path analysis) was carried out in this study.

3. Results

3.1. The Socio-Demographics and Psychographics of Fish Eaters

Socioeconomic factors such as age, education, income, education level, consumer preferences and fish prices impact fish consumption [24]. The knowledge about fish

species among Spanish consumers is related with demographic and consumer's habits variables [25]. The findings on personal and household socioeconomic variables of selected fish consumers presented in Tables 2 and 3 revealed that male consumers (83.90%) were dominant over female counterparts (16.10%) in their respective fish procurement. From the study results, it was clear that fish was preferred by adolescents across Gujarat, as nearly half (45.20%) of the respondents were within the 18- to 35-year-old age group. The findings by [9] were in consonance with the present findings. However, according to the findings of [26], the factors to be considered by respondents when purchasing fish products do not vary with age. Concerning the education status of the respondents, nearly one-third (30.20%) of them have attained education to a higher secondary level, followed by graduate (29.60%), primary (18.20%), illiterate (13.70%) and postgraduate (8.40%). The increased fish consumption of educated people is rooted in the belief that food is important for health [27]. Refs. [13,23] highlighted that education has a significant influence on fish consumption. It was discovered that consumers who knew more about fish ate it more frequently. According to [16] the main individual socio-demographic characteristics that contribute to the explanation of fish consumption decisions were gender, age, region and presence of children. About 48% of the households had a family size of 3–4 persons, followed by 5 or more family members (38.40%) and 1–2 members (12.70%). Concerning the number of children in the family, the maximum number of respondents had no children (54.50%), followed by 1–3 children (44.80%), 4–6 children (0.70%) and more than 6 children (0.40%). Only 0.70% of respondents reported that their whole family consumed fish, followed by 44.80% of the respondents reporting fish consumption by more than one member and 54.50% of the respondents reporting single fish consumers in the family. The number of fish eaters positively influences the quantity of fish purchased per visit (kg) [28]. The respondents reported a maximum fish consumption of more than 15 years (43.60%), and a meagre percentage of respondents reported consumption of fewer than five years. The occupation of the primary earner in a family showed that around 38.10% of the respondents belonged to salaried employees, followed by business owners (9.40%) and agriculture (3.60%). At the same time, about 48.80% of them were simultaneously involved in various activities. Over 26.70% of the respondents were in the income group of INR 5000 to INR 10,000 per month, followed by INR 1000 to INR 2000 per month (26.60%), and only 12.50% were in the lower income group or less than INR 5000 per month. According to a study [28] on fish consumption in Kolkata, fish was consumed in sufficient quantities by all socioeconomic categories. Any change in the respondents' monthly income did not significantly affect the amount of fish they bought each time. Few studies also reported that income is an important determinant of the level and types of foods and services purchased. It is found that when income rises, people purchase more food [29–31].

Table 2. Personal characteristics of the selected fish consumers in Gujarat (n = 934).

Gender		Age Group		Occupation		Education		Income (INR)	
Category	%	Category	%	Category	%	Category	%	Category	%
Male	83.90	18–35 years	45.20	Salaried Employee	38.20	Illiterate	13.70	Less than 5000	12.50
Female	16.10	36–50 years	29.50	Business	9.40	Primary	18.20	5000–10,000	26.70
-	-	>50 years	25.30	Agriculture	3.60	Higher secondary	30.20	10,001–20,000	26.60
-	-	-	-	Others	48.80	Graduate	29.50	20,001–30,000	17.50
-	-	-	-	-	-	Post graduate and more	8.40	More than 30,000	16.70

Table 3. Household characteristics of the selected fish consumers in Gujarat (n = 934).

Family Size		No. of Fish Eaters in the Family		No. of Children		Years of Consumption	
Category	%	Category	%	Category	%	Category	%
1 or 2 persons	12.70	Single member	54.50	No Children	54.10	Less than 5 years	13.10
3 or 4 persons	48.80	More than one member	44.80	1–3 Children	44.80	5–10 years	23.00
5 or more persons	38.50	Whole Family	0.70	4–6 Children	0.70	11–15 years	20.30
-	-	-	-	More than 6 children	0.40	More than 15 years	43.60

3.2. Knowledge Level Regarding Nutritional and Health Benefits of Fish Consumption

The respondents were categorised into five categories based on their total score (Table 4) and a total of 10 questions covering different aspects of the nutritional and health benefits of fish were asked to the respondents and a score of 1 was given for each correct answer (Table 5). The findings in Table 4 showed that most fish eaters (46.20%) had a limited understanding of the dietary and health advantages of fish eating. A little over 36.4% of fish eaters had very little information. Comparatively, only 1.1% and 0.2% of consumers fell into high and very high expertise groups. Ref. [9] reported that consumers greatly lack understanding of the availability of a wide range and variety of fish and fishery goods. Ref. [32] indicated that many fish-eating households are unaware of the benefits of fish nutrition. Because there is a dearth of information regarding fish's precise nutritional and health benefits, future health awareness programmes in Gujarat's government and development initiatives should emphasise the scientific evidence for these benefits. People can benefit from scientific nutritional information, with increased awareness and accessibility to certain information through public systems of health extension in the current environment of ever-increasing lifestyle diseases. Therefore, there is room to consider how consumers currently perceive the nutritional advantages of fish to raise awareness [33–35].

Table 4. Knowledge level of fish consumers.

Knowledge Score	Frequency	Percentage
Very low (0–2)	340	36.40
Low (>2–4)	432	46.20
Medium (>4–6)	150	16.10
High (>6–8)	10	01.10
Very High (>8–10)	2	00.20
Total	934	100.0

Table 5. Knowledge score of fish consumers in Gujarat (n = 934).

S. No.	Question	Correct Response	Percentage	Rank
1	Fish is a good source of (a) Protein (b) Vitamins and Minerals (c) Both a and b * (d) None of these	500	54	1

Table 5. *Cont.*

S. No.	Question	Correct Response	Percentage	Rank
2	Consumption of fish is beneficial for (a) Heart disease (b) Skin disease (c) Liver problems (d) All of these *	472	51	2
3	Fish is a rich source of (a) Omega-3 fatty acid * (b) Omega-6 fatty acid (c) Both a & b (d) None of these	404	43	3
4	Fish is the best source of (a) Vitamin A (b) Vitamin C (c) Vitamin D * (d) Vitamin E	418	45	4
5	Fish contains (a) High Cholesterol (b) Low Cholesterol * (c) High Fat (d) None of these	368	39	5
6	Which fish species contains more omega-3 fatty acids? (a) Salmon (b) Sardine (c) Mackerel * (d) All of these	164	18	6
7	An omega-3 fatty acid is important for (a) Body and brain (b) Heart (c) Blood pressure (d) All of these *	158	17	7
8	Which form of fish has more shelf life? (a) Fresh fish (b) Frozen fish (c) Canned fish * (d) None	88	9	8
9	Which fish species contains less fat? (a) Tilapia * (b) Rohu and catla (c) Prawns (d) Both a and b	64	7	9
10	Which fish species contain more minerals and vitamins? (a) Tuna (b) Mackerel (c) Salmon * (d) None of these	54	6	10

* Correct Response.

3.3. Association of Personal, Socio-Psychological Factors with the Knowledge Level of Fish Consumers

The relationship between the socioeconomic factors of respondents with essential factors [36], i.e., knowledge level, is presented in Table 6. The results presented in the table revealed that certain factors, viz., gender, education qualification, family size, number of children in the family, consumption years, and evaluation criteria for fish quality, were

positively co-related with the knowledge level of fish consumers. In contrast, factors such as marital status and income were found to be negatively co-related with the knowledge level of fish consumers. The negative correlation between income and knowledge level regarding the nutritional health benefits of fish may be due to the shifting consumer focus towards taste and value-added products with the rise in income levels of households [36,37].

Table 6. Correlation (r) between the socioeconomic profile of the fish consumers with their knowledge level (n = 934).

Variables	Knowledge Level
Gender	0.094 **
Age	0.050
Occupation	0.056
Education qualification	0.249 **
Marital status	−0.096 **
Family size	0.218 **
Income	−0.043
No. of children in family	0.337 **
No. of fish eaters in family	−0.036
Total years of consumption	0.427 **
Psychological factors	0.058
Evaluation of fish quality	0.441 **

** *p*-value is less than 0.01.

3.4. Relative Importance of Socioeconomic Factors in Explaining the Knowledge Level of Consumers

A linear regression analysis was specified to determine the socioeconomic factors affecting fish consumers' knowledge level (Table 7). The results from the regression model revealed that the knowledge level of fish consumers was significantly determined by the evaluation of fish quality, total years of consumption, number of children in the family, education qualification, family size, income, gender and number of fish eaters in the family. The coefficient of determination, the R^2 value of 0.409, indicated that various significant socioeconomic factors explained 40% of the variation in consumer knowledge. The performance of the analysis of variance showed that the F ratio was significant at 0.01 alpha levels. This provided the evidence that a combination of sanctioned socioeconomic variables had a collective and considerable impact on the knowledge level of fish consumers. Certain factors, viz., income and number of fish eaters in the family, have significantly negative effects. The degree to which the knowledge level of fish consumers responds to changes in socioeconomic variables revealed that a unit change in the fish quality evaluation, total years of consumption, number of children in the family, education level, family size, and gender would cause 13%, 48%, 33%, 31%, 33%, and 30% of change in knowledge level, respectively. In contrast, a unit increase in the income and number of fish consumption years caused a 13% and 15% decrease in the knowledge level of fish consumers. The results of the study are in line with the studies of [38–40].

Table 7. Regression analysis showing the relative importance of socioeconomic profile factors in explaining the knowledge level of fish consumers (n = 934).

Sr. No.	Factors	Unstandardised Coefficients		Standardised Coefficients	't' Value	Sig.
		B	Std. Error	Beta		
1.	Evaluation of fish quality	0.139	0.013	0.296	10.825	0.000
2.	Total years of consumption	0.481	0.047	0.280	10.200	0.000

Table 7. *Cont.*

Sr. No.	Factors	Unstandardised Coefficients		Standardised Coefficients	't' Value	Sig.
		B	Std. Error	Beta		
3.	No. of children in a family	0.334	0.041	0.215	8.089	0.000
4.	Education qualification	0.317	0.046	0.198	6.927	0.000
5.	Family size	0.339	0.074	0.121	4.604	0.000
6.	Income	−0.138	0.040	−0.094	3.450	0.001
7.	Gender	0.304	0.131	0.060	2.318	0.021
8.	No. of fish eaters in family	−0.153	0.075	−0.053	2.030	0.043

$R^2 = 0.409$, R^2 adj $= 0.404$, F $= 80.130$ **. ** p-value is less than 0.01.

3.5. Fish Quality Evaluation Parameters

Consumers place a high value on seafood product quality and are even willing to pay a higher price for high-quality, safe food [41]. In this regard, caution should be used when handling fish to ensure consumer pleasure and to enable farmers and marketing intermediaries to command fair pricing. Previous studies of seafood consumption have revealed the unsurprising fact that many consumers, particularly less regular, less experienced and less knowledgeable seafood consumers, experience difficulty evaluating, selecting, and preparing seafood [42–44]. Hence, it is of great significance to dig into the essential criteria adopted by the consumers while assessing the quality of fish. Smell, appearance, nutritional value, price, freshness, size, days since fish harvest, quality label, fish bone, weight, and brand were selected as the first, second, third, fourth, fifth, sixth, seventh, eighth, ninth, and eleventh fish quality factors favoured by consumers, respectively (Table 8). These fish quality factors were considered for fish quality evaluation after interaction with the consumers and the previous studies. It was observed that among the different criteria selected to evaluate the fish quality, smell, appearance and nutritional value of the fish were the most important criteria to evaluate the fish quality for more than 50% of the individuals, followed by the price of the product and labelling. This indicated that people were giving more importance to smell, appearance and nutritional value for fish consumption. According to the authors of [45], taste and smell of fish were significant obstacles to a higher consumption frequency. Ref. [40] mentioned that appreciation of the attribute taste emerges as the most important driver for eating fish, followed closely by health. Many previous researchers identified the freshness of fish and quality as significant factors in fish purchase [9,24,25,41]. Earlier research shows that fresh fish is the preferred choice, and about 60% of consumers have emphasised freshness over the price of fish as the order of preference [35]. It was found that individuals may be averse to consuming fish because of the unpleasant physical properties of some varieties of fish, such as the bones and the smell [46]. A fish survey revealed that most respondents judged the fish quality by close observation of the eyes, gills colour and the smell of the fish. At the same time, some trusted the fishermen or fish sellers as far as the quality of fish was concerned. It was found that labelling ingredients to show the nutritional value and content of fish sausages could enhance consumption [47].

Table 8. Criteria for evaluation of fish quality (n = 934).

Criteria	Most Important	Important	Least Important	Mean	Rank
Smell	534 (57.17)	260 (27.84)	140 (14.99)	1.42	1
Appearance	516 (55.25)	284 (30.41)	134 (14.35)	1.41	2

Table 8. *Cont.*

Criteria	Most Important	Important	Least Important	Mean	Rank
Nutritional value	534 (57.17)	180 (19.27)	220 (23.55)	1.34	3
Price of product	408 (43.68)	370 (39.61)	156 (16.70)	1.27	4
Freshness	362 (38.76)	370 (39.61)	202 (21.63)	1.17	5
Size	348 (37.26	374 (40.04)	212 (22.70)	1.15	6
Days since harvest of fish	360 (38.54)	350 (37.47)	224 (23.98)	1.15	7
Quality labelling	378 (40.47)	304 (32.55)	252 (26.98)	1.13	8
Fish bone	298 (31.91)	398 (42.61)	238 (25.48)	1.06	9
Weight	228 (24.41)	314 (33.62)	392 (41.97)	0.82	10
Brand	77 (8.24)	177 (18.95)	680 (72.81)	0.35	11

Note: The figure in the parenthesis indicates the percentage.

3.6. Effects of Personal and Socio-Psychological Factors on the Knowledge Level of Fish Consumers

Successful predictions of consequences/effects depend on recognising the causes/factors contributing to the system being predicted. Path analysis was utilised to assess the influence of demographic factors on fish consumers' knowledge. Hence, Table 9 examines the direct and indirect effects channelled through 12 factors on fish customers' level of knowledge about nutrition and health benefits. Out of the 12 parameters taken into account for the study, 10 had a direct positive influence. In contrast, the other two variables negatively impacted fish consumers' understanding of nutrition and health benefits. Ranking variables according to their overall direct effect on the nutritional and health-related knowledge level of fish consumers revealed that evaluation of fish quality (0.295), total years of consumption (0.278), number of children (0.337), educational qualification (0.204), family size (0.218), gender (0.04), occupied the major six ranks. In that order, psychological factors, income (−0.089), number of fish eaters in the family (−0.056), marital status (−0.042), occupation (0.033) and age (0.028) occupied the last six ranks. However, each independent variable's total indirect effect through other determinants was also quite important. The location of these results showed that total years of consumption (0.149), evaluation of fish quality (0.146), number of children (0.132), family size (0.100), income (0.046), educational qualification (0.045) were the first six principal factors which had a profound indirect impact on how people felt about fish consumption, while gender (0.045), occupation (0.023), age (0.022), number of fish eaters in the family (0.020), psychological factors (0.018) and marital status (−0.054) occupied the last six ranks. The first most significant indirect effect was channelled through educational qualification (X_4) in the case of nine factors. The next-biggest indirect impact was the number of children (X_8) in six factors. However, the third-largest indirect effect is directed through the evaluation of fish quality (X_{12}) in the case of five factors. The findings of a past study mentioned that age and education contributed, both directly and indirectly through knowledge, to explain fish consumption behaviour [13]. The results stated that factors such as the evaluation of fish quality, number of children, educational qualification and family size were the leading factors through which the nutritional and health-related knowledge level of the fish consumer can be manipulated.

Table 9. Direct, indirect and largest indirect effect of personal and socio-psychological factors on the knowledge level of fish consumers.

Factor No.	Factors	Correlation Coefficient	Direct Effect	Rank	Total Indirect Effect	Rank	Three Largest Indirect Effects through
1	2	3	4	5	6	7	8
X_1	Gender	0.094	0.049	6	0.045	7	$-0.019\ X_4$ $0.023\ X_{10}$ $0.016\ X_{12}$
X_2	Age	0.050	0.028	9	0.022	9	$-0.042\ X_4$ $0.036\ X_8$ $0.050\ X_{10}$
X_3	Occupation	0.056	0.033	8	0.023	8	$-0.066\ X_4$ $0.022\ X_7$ $0.031\ X_{10}$
X_4	Educational qualification	0.249	0.204	4	0.045	6	$0.013\ X_5$ $-0.022\ X_7$ $0.031\ X_{12}$
X_5	Marital status	-0.096	-0.042	10	-0.054	12	$-0.063\ X_4$ $-0.042\ X_5$ $0.032\ X_{10}$
X_6	Family size	0.218	0.118	5	0.100	4	$-0.010\ X_4$ $0.039\ X_8$ $0.063\ X_{10}$
X_7	Income category	-0.043	-0.089	12	0.046	5	$0.065\ X_4$ $0.015\ X_8$ $0.028\ X_{12}$
X_8	No. of children	0.337	0.205	3	0.132	3	$0.022\ X_6$ $0.072\ X_{10}$ $0.025\ X_{12}$
X_9	No. of fish eaters in the family	-0.037	-0.056	11	0.020	10	$0.041\ X_4$ $0.034\ X_{10}$ $0.009\ X_{11}$
X_{10}	Total years of consumption	0.427	0.278	2	0.149	1	$0.027\ X_6$ $0.053\ X_8$ $0.065\ X_{12}$
X_{11}	Psychological factors	0.058	0.040	7	0.018	11	$0.026\ X_4$ $0.015\ X_8$ $0.017\ X_{10}$
X_{12}	Evaluation of fish quality	0.441	0.295	1	0.146	2	$0.050\ X_4$ $0.017\ X_8$ $0.061\ X_{10}$

3.7. Path Analysis Model Fit Statistics

From Table 10, we can see that the Comparative Fit Index (CFI), indicating the amount of variance accounted for in the covariance matrix, is 0.96, which is close to 1, indicating the suitability of the model. The Tucker–Lewis Index (TLI), a non-normed fit index (NNFI) that partly overcome the disadvantage of NNFI and its value of 0.94 shows that it provides a better indication of how well a model fits the data. For both AIC and BIC, the relative measures of a fitted model with respect to the base model were 798.01 and 809.62, respectively. Moreover, the root mean square error of approximation (RMSEA) of the fitted model, which is an indicator of the badness of model fit, and as shown in Table 10, it is 0.21, which is fairly close to zero. Furthermore, the standardized root mean square residual (SRMR) is less than 0.09, implying that the model adequately fits the data.

Table 10. Fit statistics of the model.

User Model versus Baseline Model:	
Comparative Fit Index (CFI)	0.96
Tucker–Lewis Index (TLI)	0.94
Loglikelihood and Information Criteria:	
Loglikelihood user model (H_0)	−314.05
Loglikelihood unrestricted model (H_1)	−298.04
Akaike (AIC)	798.01
Bayesian (BIC)	809.62
Sample-size-adjusted Bayesian (BIC)	781.55
Root Mean Square Error of Approximation:	
RMSEA	0.21
90% confidence interval—lower	0.00
90% confidence interval—upper	0.38
p-value RMSEA ≤ 0.05	0.15
Standardized Root Mean Square Residual:	
SRMR	0.04

4. Discussion

This study is the first of its kind to examine the causes and factors influencing fish intake in the Gujarat region of India. This study evaluated the socio-demographic traits of fish consumers in comparison to existing studies [48,49] and aimed to comprehend consumer knowledge of fish and its health advantages as well as the influence of related factors on fish consumption behaviour across the region.

Fish intake is influenced by socioeconomic characteristics such as gender, age, education, occupation, income, family size, the total number of fish eaters in the family, and years of consumption. The purpose of including these variables in the study was to comprehend the variations in consumption patterns. The findings also indicate that there are notable differences in fish intake among these socio-demographic characteristics [24–26,50–53]. Young individuals with higher income and more education had higher consumption rates than older groups with lower incomes and educational levels. These results contradict [54,55]; males consume more fish than females [56,57].

Other consumer demographics, such as age and education, are commonly mentioned as important determinants of food preferences in general and fish consumption in particular. However, associations between these demographics and awareness of dietary practices or health conditions are more likely to be evident [58,59]. According to a previous study, age plays a crucial role in how people behave when it comes to eating fish [60,61]. As people age, they become more aware of their health and the connections between diet and disease [62]. However, in the present study, people of a young age consume more fish than the old age group. Nevertheless, in the present study, there was no significant association between the age and knowledge level of the fish consumer. The other study indicates that education level may predict health-related behaviour patterns and diet quality better than any other socioeconomic characteristic [63]. Further comprehensive studies are needed to estimate the influence of personal, social, economic, communication, psychological and situational determinants of fish consumption.

Correlations are used to summarise the knowledge of consumers and their characteristics (Table 6). Consumer knowledge was significantly and positively correlated with gender, education, family size, the number of children living in the home, years of consumption, and fish quality evaluation factors. The correlation matrix of the important variables, the regression model, and the results are shown in Table 7. Regression analysis

showed that the model explained 40.09% ($p < 0.01$) of the total variance. The quality of the fish, the total number of years consumed, and the number of children in the family were found to strongly influence consumer awareness of fish and its nutritional value [64–66]. It is interesting to note that having more people in the house encourages conversation and knowledge sharing. Additionally, children are naturally inquisitive and ask a lot of questions to their parents, who also teach them about nutrition and good eating habits. Therefore, there is a high correlation between the number of children and their knowledge of fish and its nutritional benefits. However, the findings can be more thoroughly explained by including additional demographic factors that were not considered in the current study. In addition, a logistic regression model might offer more insightful information on why people favour fish. More detailed research is needed to determine how socioeconomic and demographic factors affect fish intake.

The consumer decision-making process is significantly influenced by their food and habits knowledge. It has an impact on how consumers organise their information and, ultimately, the goods they decide to purchase [65–67]. It was noted that knowledge was a key factor influencing fish consumption [13,23]. Consumers who were more knowledgeable about fish were found to consume it more frequently. That was supported by both objective knowledge (perceived information) and subjective knowledge (accurate information) [65]. This highlights the significance of evaluating consumer knowledge of fish consumption. However, the current study found that a majority of consumers had a very-low-to-low level of awareness about fish and its nutritional value. As a result, it is advised that educating the population about the advantages of eating fish, particularly the younger generation, might enhance their subjective knowledge. According to studies in the literature, people have a better sense of subjective knowledge when the information comes from a subject-matter expert in the product category [68]. Therefore, citing trustworthy sources of information in communication is imperative, including professionals and scientists. Even school educators may greatly impact the public's understanding of fish and its nutritional benefits. Moreover, emotional appeals should be used in advertising to appeal to consumers' positive emotions and convince them to buy fishery products since they may help preserve favourable attitudes about fish foods [64]. Additionally, a range of channels, including both conventional and modern media can be used to communicate marketing messages to consumers.

This way, knowledge dissemination will be made possible to a large audience. Additionally, knowledge can come from one's own usage experiences [64,65,69]. Giving clients the option to try products made from fish is crucial. This can be accomplished by setting up samplings at shops, eateries, educational sites, events, etc. Since the study's findings show that consumer knowledge promotes fish intake, either directly or indirectly, it is imperative to look at the characteristics linked with consumer knowledge. Companies that sell fish and marketing experts may employ these characteristics in their marketing strategies.

It is known that education and income levels might have an effect on fish consumption [24,25,70]. The present study found a meaningful relationship between education and knowledge level and knowledge influences consumption (Table 5). It was also stated that university graduates consume more fish compared to others [45]. A study in France revealed that individuals with a bachelor's degree are more interested in fish-based diets [71]. A study conducted in the United States revealed, however, that there is an inverse relation between fish consumption and education and income levels, which does not correspond to the general literature reviews [72]. It was stated that there is no association between education level and fish consumption and frequency. Nevertheless, unlike the outcome of the present study, there is a meaningful relationship between income level and knowledge level [73]. People with lower income and in the younger age groups tend to consume less fish, but there is no meaningful relationship between education and fish consumption frequency [50]. There is no significant difference between men and women or among different age groups [74]; however, ref. [75] claimed that women consume more fish than men. We found a significant difference in consumption between people of different genders and age groups. It was found that our model explained only a small proportion of

variance. Hence, the findings can be more thoroughly explained by including additional demographic factors that were not considered in the current study. In addition, a logistic regression model might offer more insightful information on why people favour fish. More detailed research is needed to determine how socioeconomic and demographic factors affect fish intake.

5. Conclusions

The study discovered that most fish eaters had low knowledge of fish consumption's nutritional and health benefits, given the significant correlation between fish intake and consumer understanding. There is a strong need to enhance the subjective knowledge level of fish consumers through mass awareness-building programmes designed especially for a traditional fish-eating educated population with a significant focus on scientific fish quality evaluation criteria.

In addition, the knowledge-building programmes centred more on the health benefits of fish to children can potentially enhance fish consumption in the study area. To increase the awareness, systematic nutrition education must be offered in all preschool centres, and it must be included as a compulsory course in academic curricula. Programs on social media should be planned to include nutrition training and there is a need to organize frequent scientific guest lectures on balanced nutrition.

Further, as the consumers place greater emphasis on the fish quality evaluation parameters (smell, appearance, nutritional value, product price and freshness), specialised fish marketing arrangements (cold chain infrastructure) and promoting consumption of locally produced fish should be intensely promoted. The results of this study will aid researchers in identifying the key components of fish consumption in a nutritious diet.

Therefore, extensive research is still needed to determine the effects of social, economic, communication, psychological and situational factors of fish consumption and their influence on consumer knowledge. Training and promotion programmes must be organized more frequently to enhance consumption rates and their knowledge, especially with the involvement of NGOs and other social institutions. Additionally, the value addition of fish must be promoted in order to meet consumer demands, boost revenue, and still provide the health benefits of fish for a balanced diet.

References

1. Mehar, M.; Mekkawy, W.; McDougall, C.; Benzie, J.A.H. Preferences for rohu fish (*L. rohita*) traits of women and men from farming households in Bangladesh and India. *Aquaculture* **2022**, *547*, 737480. [CrossRef]
2. Beveridge, M.C.M.; Thilsted, S.H.; Phillips, M.J.; Metian, M.; Troell, M.; Hall, S.J. Meeting the food and nutrition needs of the poor: The role of fish and the opportunities and challenges emerging from the rise of aquaculture. *J. Fish Biol.* **2013**, *83*, 1067–1084. [CrossRef] [PubMed]
3. Thilsted, S.H. Fish diversity and fish consumption in Bangladesh—Case 4. In *Diversifying Food and Diets Using Agricultural Biodiversity to Improve Nutrition and Health—Issues in Agricultural Biodiversity*; Fanzo, J., Hunter, D., Borelli, T., Mattei, F., Eds.; Biodiversity International and Routledge: London, UK, 2013.
4. Nunes, M.L.; Bandarra, N.; Oliveira, L.; Batista, I.; Calhau, M.A. Composition and Nutritional Value of Fishery Products Consumed in Portugal. In *Seafood Research from Fish to Dish, Quality, Safety and Processing of Wild and Farmed Fish*; Luten, J.B., Jacobsen, C., Bekaert, K., Saeb, A., Oehlenschläger, J., Eds.; Wageningen Academic Publishers: Wageningen, The Netherlands, 2006; pp. 477–487.
5. Mohanty, B.P.; Sankar, T.V.; Ganguly, S.; Mahanty, A.; Anandan, R.; Chakraborty, K.; Paul, B.N.; Sarma, D.; Dayal, J.S.; Mathew, S.; et al. Database on nutritional composition of food fishes from India. *Curr. Sci.* **2015**, *109*, 1915–1916.
6. Rejula, K.; Sajeev, M.V.; Mohanty, A.K. Health benefits, quality and safety of fish in Kerala: Consumer perception and implications for extension system. *Indian J. Ext. Educ.* **2021**, *57*, 8–11.
7. FAO. *The State of World Fisheries and Aquaculture, 2020*; Sustainability in Action; FAO: Rome, Italy, 2020. [CrossRef]
8. Salim, S.S. Fish consumption pattern in India, exports-overview. *Food Beverage News* **2016**, *1*, 25–28.
9. Mugaonkar, P.H.; Ananthan, P.S.; Samal, S.S.; Debnath, B. A study on consumer behaviour at organised fish retail outlet. *Agric. Econ. Res. Rev.* **2011**, *24*, 133–140.
10. Birch, D.; Lawley, M.; Hamblin, D. Drivers and barriers to seafood consumption in Australia. *J. Consum. Mark.* **2012**, *29*, 64–73. [CrossRef]
11. Prasad, D.U.; Madhavi, S. Fish consumption behaviour in west Godavari district, AP, India. *Res. J. Manag. Sci.* **2014**, *3*, 1–5.
12. Bhuyan, P.C.; Goswami, C.; Kakati, B.K. Study of fish consumption patterns in Assam for development of market driven strategies. *Res. J. Chem. Environ. Sci.* **2017**, *5*, 42–52.
13. Pieniak, Z.; Verbeke, W.; Scholderer, J. Health-related beliefs and consume knowledge as determinants of fish consumption. *J. Hum. Nutr. Diet* **2010**, *23*, 480–488. [CrossRef]
14. Van Dijk, H.; Fischer, A.R.; Frewer, L.J. Consumer responses to integrated risk-benefit information associated with the consumption of food. *Risk Anal.* **2011**, *31*, 429–439. [CrossRef] [PubMed]
15. Burger, J.; Gochfeld, M. Perceptions of the risks and benefits of fish consumption. Individual choices to reduce risk and increase health benefits. *Environ. Res.* **2009**, *109*, 343–349. [CrossRef] [PubMed]
16. Verbeke, W. Agriculture and the food industry in the information age. *Eur. Rev. Agric. Econ.* **2005**, *32*, 347–368. [CrossRef]
17. Olsen, S.O. Understanding the relationship between age and seafood consumption: The mediating role of attitude, health involvement and convenience. *Food Qual. Prefer.* **2003**, *14*, 199–209. [CrossRef]
18. Rørtveit, A.W.; Olsen, S.O. The role of consideration set size in explaining fish consumption. *Appetite* **2007**, *49*, 214–222. [CrossRef]
19. Hoque, M.Z.; Sultana, N.; Haque, A.; Foisal, T.M.M. Personal and socioeconomic factors affecting perceived knowledge of farmed fish. *J. Agric. Food Res.* **2022**, *8*, 100–310. [CrossRef]
20. Petrovici, D.A.; Ritson, C. Factors influencing consumer dietary health preventative behaviours. *BMC Public Health* **2006**, *6*, 222. [CrossRef]
21. Swanson, V.; Power, K.; Kaur, B.; Carter, H.; Shepherd, K. The impact of knowledge and social influences on adolescents' breast-feeding beliefs and intentions. *Public Health Nutr.* **2006**, *9*, 297–305. [CrossRef]
22. NSSO. Report on Household Consumption of Various Goods and Services in India (20ll-12). *Govt. India* **2014**. Available online: https://mospi.gov.in/sites/default/files/publication_reports/Report_no558_rou68_30june14.pdf (accessed on 12 December 2022).
23. Pieniak, Z.; Verbeke, W.; Olsen, S.O.; Birch Hansen, K.; Brunsø, K. Health related attitudes as a basis for segmenting European food consumers. *Food Policy* **2010**, *35*, 448–455. [CrossRef]
24. Rahman, M.N.; Islam, A.R.M.T. Consumer fish consumption preferences and contributing factors: Empirical evidence from Rangpur city corporation, Bangladesh. *Heliyon* **2020**, *6*, e05864. [CrossRef]
25. Polanco, J.F.; Luna, L.; Llorente, I. Consumer's knowledge and preferences about fish farmed species. In Proceedings of the IIFET 2010, Montpellier, France, 13–16 July 2010.
26. Thiyagaraj, V.; Umamaheswari, M. A study of consumer preference with special reference to carp fish varieties in Coimbatore city. *Int. J. Manag.* **2018**, *8*, 1–8.
27. Trondsen, T.; Braaten, T.; Lund, E.; Eggen, A.E. Eggen Health and seafood consumption patterns among women aged 45–69 years. A Norwegian seafood consumption study. *Food Qual. Prefer.* **2004**, *15*, 117–128. [CrossRef]
28. Bhutia, T.P.; Qureshi, N.W.; Yadav, V.K. Factors affecting fish consumption in traditional fish markets of Kolkata city, West Bengal. *Int. J. Pure Appl. Biosci.* **2019**, *7*, 39–43. [CrossRef]
29. Jensen, H.H. Changes in seafood consumer preference patterns and associated changes in risk exposure. *Mar. Pollut. Bull.* **2006**, *53*, 591–598. [CrossRef] [PubMed]

30. Yen, S.T.; Lin, B.H.; Davis, C.G. Consumer knowledge and meat consumption at home and away from home. *Food Policy* **2008**, *33*, 631–639. [CrossRef]
31. French, S.A.; Tangney, C.C.; Crane, M.; Wang, Y.; Appelhans, B.M. Nutrition quality of food purchases varies by household income: The SHoPPER study. *BMC Public Health* **2019**, *19*, 231. [CrossRef] [PubMed]
32. Upadhyay, A.D.; Pandey, D.K. Analysis of urban consumer behaviour for fish in Tripura. *Fish. Technol.* **2009**, *46*, 193–196.
33. Kruk, M.E.; Gage, A.D.; Arsenault, C.; Jordan, K.; Leslie, H.H.; Roder-DeWan, S.; Adeyi, O.; Barker, P.; Daelmans, B.; Doubova, S.V.; et al. High-quality health systems in the Sustainable Development Goals era: Time for a revolution. *Lancet Glob. Health* **2018**, *6*, e1196–e1252. [CrossRef]
34. FAO; IFAD; UNICEF; WFP; WHO. Transforming food systems for food security, improved nutrition and affordable healthy diets for all. In *The State of Food Security and Nutrition in the World 2021*; FAO: Rome, Italy, 2021. [CrossRef]
35. Gundersen, C.; Ziliak, J.P. Food Insecurity And Health Outcomes. *Health Aff.* **2015**, *34*, 1830–1839. [CrossRef]
36. Rozin, P. *The Integration of Biological, Social, Cultural and Psychological Influences on Food Choice*; Shepherd, R., Raats, M., Eds.; The Psychology of Food Choice; CABI: Oxfordshire, UK, 2006; pp. 19–40. [CrossRef]
37. Janssen, M.; Chang, B.P.I.; Hristov, H.; Pravst, I.; Profeta, A.; Millard, J. Changes in Food Consumption During the COVID-19 Pandemic: Analysis of Consumer Survey Data From the First Lockdown Period in Denmark, Germany, and Slovenia. *Front. Nutr.* **2021**, *8*, 635859. [CrossRef]
38. Jin, S.; Zhou, L. Consumer interest in information provided by food traceability systems in Japan. *Food Qual. Prefer.* **2014**, *36*, 144–152. [CrossRef]
39. Shinichi, K.; Naotoshi, Y. The role of consumer knowledge, experience, and heterogeneity in fish consumption: Policy lessons from Japan. *J. Retail. Consum. Ser.* **2020**, *56*, 102151. [CrossRef]
40. Verbeke, W.; Vermeir, I.; Brunsø, K. Consumer evaluation of fish quality as basis for fish market segmentation. *Food Qual. Prefer.* **2007**, *18*, 651–661. [CrossRef]
41. Geethalakshmi, V.; Ashaletha, S.; Raj, D.; Nasser, M. Consumer preference and willingness to pay for value added fish products in Palakkad, Kerala. *Indian J. Fish* **2013**, *60*, 67–71.
42. Brunsø, K.; Verbeke, W.; Olsen, S.O.; Jeppesen, L.F. Motives, barriers and quality evaluation in fish consumption situations: Exploring and comparing heavy and light users in Spain and Belgium. *Br. Food J.* **2009**, *111*, 699–716. [CrossRef]
43. Sogn-Grundvåg, G.; Østli, J. Consumer evaluation of unbranded and unlabelled food products: The case of Bacalhau. *Eur. J. Mark.* **2009**, *43*, 213–228. [CrossRef]
44. Sveinsdóttir, K.; Martinsdóttir, E.; Green-Petersen, D.; Hyldig, G.; Schelvis, R.; Delahunty, C. Sensory characteristics of different cod products related to consumer preferences and attitudes. *Food Qual. Prefer.* **2009**, *20*, 120–132. [CrossRef]
45. Myrland, Ø.; Trondsen, T.; Johnston, R.S.; Lund, E. Determinants of seafood consumption in Norway: Lifestyle, revealed preferences, and barriers to consumption. *Food Qual. Prefer.* **2000**, *11*, 169–188. [CrossRef]
46. Leek, S.; Maddock, S.; Foxall, G. Situational determinants of fish consumption. *Br. Food J.* **2000**, *102*, 18–39. [CrossRef]
47. FAO. *The State of the World Fisheries and Aquaculture—Meeting the Sustainable Development Goals*; FAO: Rome, Italy, 2018; ISBN 978-92-5-130562-1.
48. Tomic, M.; Kovac, T.; Matulic, D. Attitudes as basis for segmenting Croatian fresh fish consumers. *New Medit.* **2016**, *4*, 63–71.
49. Forleo, M.B.; Romagnoli, L.; Palmieri, N. Are Italian consumers of canned tuna fish sensitive to environmentally sustainable product attributes? *Br. Food J.* **2023**, *125*, 608–625. [CrossRef]
50. Verbeke, W.; Vackier, I. Individual determinants of Fish Consumption: Application of the Theory of Planned Behavior. *Appetite* **2005**, *44*, 67–82. [CrossRef] [PubMed]
51. Kaimakoudi, E.; Polymeros, K.; Schinaraki, M.G.; Batzios, C. Consumers' Attitudes Towards Fisheries Products. *Proc. Technol.* **2013**, *8*, 90–96. [CrossRef]
52. Altintzoglou, T.; Vanhonacker, F.; Verbeke, W.; Luten, J. Association of health involvement and attitudes towards eating fish on farmed and wild fish consumption in Belgium, Norway and Spain. *Aquacult Int.* **2011**, *19*, 475–488. [CrossRef]
53. Köster, E.P. Diversity in the determinants of food choice: A psychological perspective. *Food Qual. Prefer.* **2009**, *20*, 70–82. [CrossRef]
54. Pieniak, Z.; Verbeke, W.; Brunsø, K.; Olsen, S.O. Consumer knowledge and interest in information about fish. In *Seafood Research from Fish to Dish: Quality, Safety and Processing of Wild and Farmed Fish*; Luten, J., Jacobsen, C., Bekaert, K., Sæøbo, A., Oehlenschlager, J., Eds.; Wageningen Academic Publisher: Wageningen, The Netherlands, 2006; pp. 229–241.
55. Olsen, S.O. Consumer involvement in seafood as family meals in Norway: An application of the expectancy-value approach. *Appetite* **2001**, *36*, 173–186. [CrossRef]
56. Wennberg, M.; Tornevi, A.; Johansson, I.; Hörnell, A.; Norberg, M.; A Bergdahl, I. Diet and lifestyle factors associated with fish consumption in men and women: A study of whether gender differences can result in gender-specific confounding. *Nutr. J.* **2012**, *11*, 101. [CrossRef]
57. Winkvist, A.; Hornell, A.; Hallmans, G.; Lindahl, B.; Weinehall, L.; Johansson, I. More distinct food intake patterns among women than men in northern Sweden: A population-based survey. *Nutr. J.* **2009**, *8*, 12. [CrossRef]
58. Grunert, K.; Wills, J. A review of European research on consumer response to nutrition information on food labels. *J. Public Health* **2007**, *15*, 385–399. [CrossRef]

59. Pieniak, Z.; Verbeke, W.; Perez-Cueto, F.; Brunsø, K.; De Henauw, S. Fish consumption and its motives in households with versus without self-reported medical history of CVD: A consumer survey from five European countries. *BMC Public Health* **2008**, *8*, 306. [CrossRef]

60. Can, M.F.; Günlü, A.; Can, H.Y. Fish consumption preferences and factors influencing it. *Food Sci. Technol.* **2015**, *35*, 339–346. [CrossRef]

61. Cardoso, C.; Lourenço, H.; Costa, S.; Gonçalves, S.; Nunes, M.L. Survey into the seafood consumption preferences and patterns in the portuguese population. Gender and regional variability. *Appetite* **2013**, *64*, 20–31. [CrossRef] [PubMed]

62. Senauer, B.; Asp, E.; Kivey, J. *Food Trends and the Changing Consumer*; Eagen Press: St Paul, MN, USA, 1991.

63. Mckay, D.L.; Houser, R.F.; Blumberg, J.B.; Goldberg, J.P. Nutrition information sources vary with education level in a population of older adults. *J. Am. Diet. Assoc.* **2006**, *106*, 1108–1111. [CrossRef]

64. Pieniak, Z.; Aertsens, J.; Verbeke, W. Subjective and objective knowledge as determinants of organic vegetables consumption. *Food Qual. Prefer.* **2010**, *21*, 581–588. [CrossRef]

65. Lawley, M.; Craig, J.F.; Dean, D.L.; Birch, D. The role of seafood sustainability knowledge in seafood purchase decisions. *Br. Food J.* **2019**, *121*, 2337–2350. [CrossRef]

66. Altintzoglou, T.; Heide, M. Fish Quality and Consumers: How Do Consumers' Knowledge About and Involvement in Fish Quality Define Factors That Influence Fish Buying Behavior? *J. Aquatic Food Product Technol.* **2016**, *25*, 885–894. [CrossRef]

67. Alba, J.W.; Hutchinson, J.W. Knowledge calibration: What consumers know and what they think they know. *J. Consum. Res.* **2000**, *27*, 123–156. [CrossRef]

68. Carlson, J.P.; Vincent, L.H.; Hardesty, D.M.; Bearden, W.O. Objective and Subjective Knowledge Relationships: A Quantitative Analysis of Consumer Research Findings. *J. Consum. Res.* **2009**, *35*, 864–876. [CrossRef]

69. Raju, P.S.; Lonial, S.C.; Mangold, W.G. Differential Effects of Subjective Knowledge, Objective Knowledge, and Usage Experience on Decision Making: An Exploratory Investigation. *J. Consum. Psychol.* **1995**, *4*, 153–180. [CrossRef]

70. Burger, J.; Waishwell, L. Are we reaching the target audience? Evaluation of a fish fact sheet. *Sci. Total Environ.* **2001**, *277*, 77–86. [CrossRef]

71. Barberger-Gateau, P.; Letenneur, L.; Deschamps, V.; Pérès, K.; Dartigues, J.F.; Renaud, S. Fish, meat, and risk of dementia: Cohort study. *BMJ* **2002**, *325*, 932–933. [CrossRef] [PubMed]

72. Burger, J.; Stephens, W.L.; Jr Boring, C.S.; Kuklinski, M.; Gibbons, J.W.; Gochfeld, M. Factors in exposure assessment: Ethnic and socioeconomic differences in fishing and consumption of fish caught along the Savannah River. *Risk Anal.* **1999**, *19*, 427–438. [CrossRef] [PubMed]

73. Çolakoğlu, F.A.; İşmen, A.; Özen, Ö.; Çakır, F.; Yığın, Ç.; Ormancı, H. The evaluation of fish consumption in Çanakkale, E.U. *J. Fish. Aquat. Sci.* **2006**, *23*, 387–392.

74. Sechena, R.; Liao, S.; Lorenzana, R.; Nakano, C.; Polissar, N.; Fenske, R. Asian American and Pacific Islander seafood consumption—A community-based study in King County, Washington. *J. Expo. Anal. Environ. Epidemiol.* **2003**, *13*, 256–266. [CrossRef] [PubMed]

75. Sarıözkan, S.; Cevger, Y.; Demir, P.; Aral, Y. The consumption situation and habits of livestock products among the students of Erciyes University Veterinary Faculty. *J. Health Sci.* **2007**, *16*, 171–179.