



Exploring fish consumption patterns and preference factors among consumers in the Siraha district of Nepal

Balmiki Chaudhary^{1,a}, Shubh Pravat Singh Yadav^{1,b,*}, Bishnu Yadav^{1,c}, Swastika Chaudhary^{1,d}, Keshab Kumar Budha Magar^{1,e}, Sumit Kumar Sah^{1,f}

¹Girija Prasad Koirala College of Agriculture and Research Center (GPCAR), Purbanchal University, Gothgaun, Morang, Nepal

*Corresponding author

ARTICLE INFO

Research Article

Received : 24-11-2022

Accepted : 13-04-2023

Keywords:

Fish
Consumption
Preferences
Consumer
Economics

ABSTRACT

Fish consumption choices are impacted by the socioeconomic aspects of customers. A field survey was done in 2022 with the purpose of (i) measuring the frequency of fish consumption, (ii) studying the socioeconomic characteristics of customers and their preferences; and (iii) researching the variables impacting the consumption of fish by consumers in the Siraha district. A sample size of 102 individuals was selected randomly from the Siraha district, including the Lahan Municipality, Dhangadhimai Municipality, and Golbazar Municipality, to ensure representation across diverse socio-economic backgrounds. Data was collected using a questionnaire administered to the participants. Respondents (58.8%) overwhelmingly prefer to eat fish more than twice a week, throughout the year or particularly in winter. Rohu (*Labeo rohita*) and carp (*Cyprinus carpio*) are the most often eaten fish species. The frequency of fish-consumption shows a strong connection with income level and education level. The stepwise multiple regression model explained 58.1% of the overall variation in fish consumption. The market structure is not sanitary, the price of fresh fish is expensive, and the consumption frequency of customers is impacted, particularly for poor socio-economic groups. boosted by a variety of various legislation, marketing, and advertising methods. In addition, consumers should be dispersed throughout the year rather than exclusively in particular seasons.

^a balmikichaudhary14re@gmail.com

^b <https://orcid.org/0000-0003-4591-8790>

^b sushantpy8500@gmail.com

^b <https://orcid.org/0000-0003-3987-5616>

^c bishmuyadav2073@gmail.com

^c <https://orcid.org/0000-0003-2249-3056>

^d chaudharyswastika@gmail.com

^d <https://orcid.org/0009-0008-1271-8294>

^e magarkeshab75@gmail.com

^e <https://orcid.org/0000-0001-6881-0809>

^f sumitsah9807753@gmail.com

^f <https://orcid.org/0000-0002-8898-7027>



This work is licensed under Creative Commons Attribution 4.0 International License

Introduction

According to Wenaty et al. (2018), fish is a great source of high-quality animal protein. It also contains more essential fatty acids, such as long-chain polyunsaturated fatty acids (omega-3 fatty acids), and micronutrients than other diets including animals (Yilma et al., 2020). Fish has been regarded as a nutritionally advantageous food item since it offers vitamin A, vitamin D, and iodine, and it may also be a source of phosphorus, fluoride, and calcium if bones are ingested (Diana et al., 2016). These considerations, therefore, have driven fish to become an essential element of a healthy diet (Dal et al., 2019). It is believed to be low in fat and simple to digest since it lacks connective tissues (Wenaty et al., 2018). The aquaculture industry in Nepal is a robust agricultural subsector that plays a significant role in the country's economy. By the year 2075/76, this sector is projected to contribute 1.13% to the country's Gross Domestic Product (GDP) and 4.18% to the Gross Domestic Product (GDP) of the agricultural

sector (Bhandari et al., 2021; Koirala et al., 2021). There are numerous water sources, accounting for around 5.5% of the total land area and just 2% of the estimated 826.818 hectares of water surface exploited for farming and fishing (Husen, 2019). The nation has a total output of 91.832 million tons, of which aquaculture contributes 70,831 million tons and fisheries 2.100 million tons (Table 1) (Bhandari et al., 2021; Koirala et al., 2021). Nepal imported 9.344 tons of fish to fulfill local demand in 2018/19 (Bhandari et al., 2021). However, fish output in Nepal is expanding steadily at a rate of 8-9% each year (Aryal et al., 2020).

It is widely accepted that the annual global output of fish and seafood is around 174.6 million tons, and that annual global per capita consumption is 20.5 Kg (Kilogram). However, owing to a variety of causes, the growth in per capita fish intake is not the same throughout the world (Wenaty et al., 2018). Additionally, the

government of Nepal has recommended that every man, woman, teenage girl, and boy consume at least 30g (grams) of fish daily (Gurung, 2016). However, a recent situation suggests that per capita fish intake in Nepal was just 2.10 kg in 2013 (Sapkota et al., 2020), followed by 3.11 kg at present (Bhandari et al., 2021), which is far less compared to other Asian countries, for instances, Vietnam (20 Kg), Cambodia (25 Kg), India (5 Kg), Bangladesh (12 Kg), and Thailand (30 Kg) (Paudel et al., 2021). Similarly, in South Asia, per capita fish intake climbed dramatically to 39.2 kg in 2013, whereas in Kenya, per capita yearly fish consumption dropped (Wenaty et al., 2018).

Fish intake frequency and their preferences are impacted by factors of religion, price, convenience, accessibility, availability, and choice of dietary qualities (Li et al, 2000; Sajeev et al. 2021; Wenaty et al., 2018). The price of fish relies on the market structure, species quality, demand, size, and weight of the fish species (Husen, 2019), and customers have taken into consideration the freshness and shelf life of the fish when buying (Bhandari et al., 2021). Fish preferences are also influenced by a variety of elements, including perceptual (freshness, taste, and odor) and non-sensory (personal behavior, views, perceived danger, and many more) (Rahman & Reza, 2020).

Household pond owners consumed fish more frequently, particularly Small Indigenous Species (SIS) (97% more frequently in households with ponds) (Diana et al., 2016). In Türkiye, Can et al. (2015) indicated fish is mostly consumed fresh, while in other countries, it is generally consumed processed. According to a survey conducted in Tanzania, a majority of consumers reported frequently or occasionally promoting fishing and consuming fish as a means of promoting a healthy diet and increasing the willingness of family members to incorporate fish into their meals. The study also found that children exhibited a strong desire to purchase and consume fish, highlighting the appeal of fish as a nutritious food option (Wenaty et al., 2018).

This study will find out the socio-economic characteristics of consumers on the diversity of fish, consumption frequency, and factors that effects consumption level. Results of this study help the fish farmers to increase their production accordingly to preferred by the public, sales policy, and other management practices. On the other hand, it gives knowledge on the value of fish nutrition to the general public.

Table 1. Status of aquaculture and fisheries

Particulars	Pond (no.)	Total Area (ha)	Fish production (mt)	Productivity (mt/ha)
Fish production from aquaculture	-	-	55,500	-
Pond fish culture	40,336	9,934	48,543	4.89
Other areas (swamps)	-	-	5,680	1.72
Paddy cum fish culture	-	-	557	0.36
Cage fish culture (m3)	-	-	420	6 kg/cm ³
Trout fish culture in raceway	-	-	300	10kg/m ²
Fish production from capture fisheries	-	-	21,500	-
Rivers	-	-	7,110	18 kg/ha
Lakes	-	-	850	170 kg/ha
Reservoirs	-	-	385	257 kg/ha
Swamps	-	-	5,990	540 kg/ha
Irrigated low land Paddy Fields	-	-	7,165	18 kg/ha
Total fish production (mt)	-	-	77,000	-

Source: (Kunwar and Adhikari, 2016)

Method and Methodology

Selection of the Study Site

The study was conducted in the Siraha district of Nepal (Figure 1). The government of Nepal has announced Siraha as a fish zone since 2021/22 and fish has been prioritized as an important commodity for commercialization and national development. Data were collected from Lahan Municipality, Dhangadhimai Municipality, and Golbazar Municipality. The Municipalities were purposively selected because the major fish markets lie in the area.

Sampling Technique and Sampling Size

The sampling method applied was the probability sampling method. Data from 102 randomly chosen households of Lahan Municipality, Dhangadhimai Municipality, and Golbazar Municipality were taken and households that do not consume fish were not taken into consideration. A questionnaire was developed to collect data from respondents who came from various socio-

economic backgrounds. Data collection started in March 2022 and continued until April 2022. Before the initiation of the field survey, the questionnaire was pre-tested on consumers to detect any necessary adjustments.

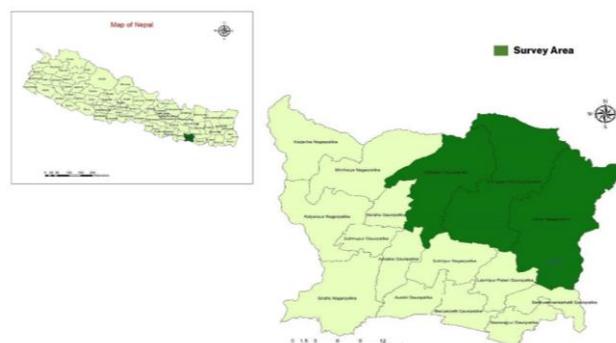


Figure 1. Map of Siraha district

Sources of Data

This research is based on primary and secondary data sources. Primary data was acquired through a household survey utilizing semi-structured questionnaires, informal interviews, and focus group discussions. Secondary data is acquired from numerous books, journals, papers, reports, online pages, and other publications, particularly those released by Prime Minister Agriculture Modernization Project (PMAMP), Ministry of Agriculture and Livestock Development (MOALD), and other associated organizations.

Data Evaluation

A pre-tested questionnaire was utilized to evaluate the frequency of fish consumption among respondents, with a focus on the 10 most commonly consumed fish species in the region. These species included Rohu, Naini, Bhakur, Common Carp, Silver Carp, Bighead Carp, Grass Carp, Pangasius, Mungri, and Tilapia. The study aimed to identify the extent of intake of these fish species by the respondents. The fish consumption frequency questionnaire was created and the replies were classified on a five-point scale in the following order: (I) once a week, (II) more than once a week, and (III) once a week twice a month, (IV) more than once a month (two or three times), and (V) more than once a year. And the frequencies were acquired according to their age, gender, education, employment, and income.

Data Processing and Analysis

Descriptive statistics such as frequency, bar graphs, and pie charts were produced using Microsoft Excel. Statistical tools pertinent to the social sciences are provided by SPSS/Windows version 26.0, which was used to perform the study's other statistical analyses (correlation coefficients and regression multiples). The description below provides the information about the software and tools used for various sorts of data analysis.

Pearson's Chi-square Test

The chi-squared test is used to detect if a sample of data originates from a population with a certain distribution. that is, to identify the link between two categorical variables. The Chi-square technique was used to examine (1) the independence of the two characteristics (2) the homogeneity of the variance (3) the degree of fit. The chi-square test for independent measures the extent to which knowledge of the frequency of one variable aids in the prediction of the value of a second variable.

The test's formula is as follows;

$$x^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

Where;

O_i = an observed frequency.

E_i = an expected (theoretical) frequency, asserted by the null hypothesis.

Correlation and Regression Analysis

An estimate of the strength of the linear link between two continuous variables is the correlation coefficient. Another name for the coefficient of correlation is the Pearson correlation coefficient. It is a measurement of how well the original data was fit by the least squares. The correlation coefficient abbreviated "r" is the fundamental outcome of a correlation (or "r"). It varies between -1.0 and

+1.0. The two variables are more strongly correlated the closer R is to +1 or -1. The correlation coefficients were employed to explore the link between customers' frequency of fish-eating and socioeconomic variables.

Finding the linear relationship between independent variables, which is often used to forecast dependent variables, is done using regression analysis. Regression analysis was performed to assess the linear connection between independent factors (age, sex, education, income) that were utilized collectively to predict dependent variables (frequency of consumption)

The following are possible formulations for the multiple linear regression model:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_nX_n + \varepsilon$$

Where:

Y = Dependent variable (consumption frequency)

B₀ = Constant

B_n = Regression coefficients

X_n = Independent variables (income level, age, education level, and profession)

ε = Error term

Ranking of Fish Consumption Value and Associated Problems.

Qualitative data were taken into consideration to produce the index. Based on household input, indicators are produced to examine fish consumption value and associated concerns.

The index of importance was computed by using the formula:

$$I = \frac{\sum (S_i \times F_i)}{AN}$$

Where,

I = Index Value

∑ = Summation

S_i = ith scale value

F_i = frequency of ith importance given by the respondents

N = total number of respondents

A = highest scale value

Results and Discussion

Findings from the study are presented in the thematic arrangement as per the study objectives. This section deals with the results and discussion of the research, based on the primary and secondary data. It discusses the questionnaire response rate, socio-economic characteristics, commonly consumed fish species and their frequencies, preferences, and habits of consumers, the relation between socio-economic variables with consumer preferences, correlation, and regression between fish consumption frequency and characteristics of the consumer.

Socio-economic Characteristics of the Respondent Households

The data collected in this study regarding socio-economic characteristics of respondents were age, gender, family size, caste, ethnicity, education level, income level, and profession. These characteristics are described below:

Age group and Gender Profile of Respondent

The bulk of respondents' age group was over 45 years old and accounted for around 47% of the total respondents, while the middle-aged and younger age groups accounted for just 38% and 17% of the total respondents, respectively. This suggests that the senior age group ingested more fish than the medium and younger age group. Concerning gender, 64.7% of the respondents were male and 35.3% were female (Table 2). This showed the fish consumption rate of the male respondent is higher than females. This could be because generally, male prefers to consume at both places (home and hotels) while female only at home.

Ethnicity and Religious Profile of Respondent

The ethnic groups found in the study area were Brahmin, Chhetri, Janajati, Madhesi, and Dalit. The majority of the respondents were Janajati (51%) followed by Madhesi (36.3%), Chhetri (5.9%), Dalit (4.9%), and Brahmin (2%). The ethnicity and religious composition of the sampled household is presented in the table below (Table 2). For religion, the majority of the respondent were Hindu (68.6%), and the remaining was Buddhist (31.4%). No other religious groups were found in the sampled household.

Education Profile of Respondent

The study findings on formal education level attained by respondents drawn that the highest number of respondents had a primary level of education (30.39%). Most of them were literate up to high school (28.43%) followed by a university degree (11.76%). Out of the total respondents, (29.41%) of the respondents were illiterate (Table 2).

Profession Profile of Respondent

The occupation of the respondents is indicated in Figure 2. Of the total number of responses, 8.58% of respondents are students. The majority of respondents (38.98%) are self-employed, 36.02% work in the private sector, and 16.42% work in the public sector.

Income Profile of Respondent

About 39.22% of the respondents earned monthly income ranging from 25.000-30.000, 23.53% of them

earned 35.000-50.000, 15.69% earned 15.000-25.000. Similarly, 14.71% of the respondent had an income which was less than 15.000 and only 6.86% of them earned more than 50.000. The income level of the respondent is illustrated in Figure 3.

Consumers' Habits and Preferences

This section deals with the consumers' habits and preferences concerning the commonly consumed fish species in the Siraha district.

Common Consumed Fish Species Preferred by Respondent

The major fish species Rohu, Naini, Bhakur, and Common Carp are consumed by respondents, which is shown in Table 3. According to the number and fish species, the most consumed fish species was Rohu with a percentage of 33.3%. After Rohu, carp was regarded as the most eaten and favored fish species and accounted for 28.4% of the total respondents, followed by tilapia accounting for 7.8% of the respondents. Similarly, Naini, Bhakur, and Pangasius all made up 5.9% of the total responders, whereas Silver Carp made up only 1%. Among the 10 most preferred fish species Rohu and Common Carp are responsible for 61.7% of whole fish consumption, the main causes behind respondents' preference for purchasing Rohu are its taste and Common Carp comparatively for less bone and larger size than other species. The result indicates a sign of homogeneity of the participants regarding fish species.

Consumers' Fish Consumption Frequency

In our survey, almost 58.8% of participants said they eat fish more frequently than once a week, while 21.6% reported they only do so once a week. Only 25% of consumers in Belgium, Denmark, and the Netherlands consume fish more than three times a week, according to Rahman & Reza (2020), which is relatively high. Similarly, 10.8% of respondents ate fish once a month, followed by 7.8% of participants eating fish more than once a week and 1% more than once a year (Figure 4).

Table 2. Age, ethnicity, religion and educational level of respondents

Socio-economic characteristics	Frequency	Percent
Age of respondents		
Young (20-30)	17	16.7
Middle age (30-40)	38	37.3
Elderly (above 45)	47	46.1
Total	102	100.0
Ethnicity of respondents		
Brahmin	2	2.0
Chhetri	6	5.9
Janajati	52	51.0
Madhesi	37	36.3
Dalit	5	4.9
Total	102	100.0
Religion of respondents		
Hindu	70	68.6
Buddhists	32	31.4
Total	102	100.0
Education level of respondents		
Illiterate	30	29.4
Primary school	31	30.4
High school	29	28.4
University degree	12	11.8
Total	102	100.0

Source: Field Survey, 2022

Table 3. Commonly consumed fish species in Siraha district

Species	Frequency	Percent
Rohu (<i>Labeo rohita</i>)	34	33.3
Naini (<i>Cirrhinus mrigala</i>)	6	5.9
Bhakur (<i>Labeo catla</i>)	5	4.9
Common Carp (<i>Cyprinus carpio</i>)	29	28.4
Silver Carp (<i>Hypophthalmichthys molitrix</i>)	1	1.0
Bighead Carp (<i>Hypophthalmichthys nobilis</i>)	6	5.9
Grass Carp (<i>Ctenopharyngodon Idella</i>)	2	2.0
Pangasius (<i>Pangasianodon hypophthalmus</i>)	6	5.9
Mungri (<i>Clarias batrachus</i>)	5	4.9
Tilapia (<i>Oreochromis niloticus</i>)	8	7.8
Total	102	100.0

Source: Field Survey, 2022

Table 4. Preferences and habits of Consumer's fish consumption in Siraha district

Questions	Preferences	%	Preferences	%	Preferences	%
Primary reason for fish consumption	Tasty	53.9	Healthy	34.3	Family likes it	11.8
Preferred season for fish consumption	Winter	27.5	Summer	3.9	Throughout the year	68.6
Preferred fish market	Direct from producer	14.7	Street market	78.4	Fishery neighborhood	6.9
Preferred fish type	Cultivated	74.5	Wild	25.5	-	-
Preparation method of Fish	Curry	52.9	Fry	47.1	-	-

Source: Field Survey, 2022

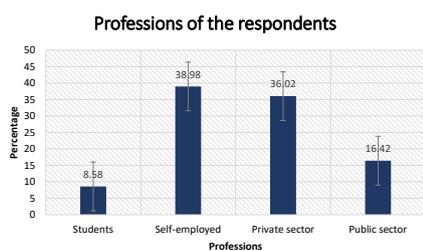


Figure 2. Profession of respondent

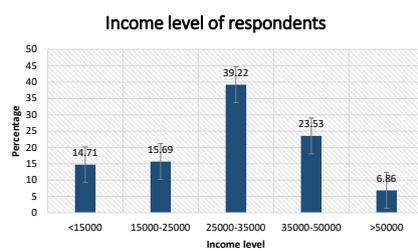


Figure 3. Income level of respondent

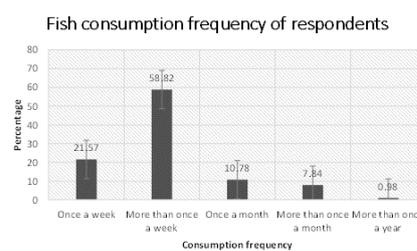


Figure 4. Consumers' fish consumption frequency

Preferences and Habits of Consumer's Fish Consumption

Table 4 demonstrates the tastes and behaviors of consumers in fish eating. Based on the findings, it was determined that the flavor of fish (53.9%) played a vital role, followed by health problems (34.3%) in selecting fish intake. Seasonal behavior plays a significant part in fish intake, with 68.8% of the total respondents having no seasonal influence on fish consumption, while 27.5% tended to consume more fish in winter and 3.9% in summer.

The majority of the fish buyers (78.4%), bought fish from street markets, about 14.7% directly bought from producers' ponds, and 6.9% of the total respondents from fishery neighborhoods. The major fish preferred type was mainly cultivated fish and wild fish and occupied about 74.5% and 25.5% of the total respondents respectively. The local fish market was used for maximum consumers' fish product accession where they conveniently found live fish. The study also mentioned that about 52.9% of the total respondents like to eat curry while 47.1% like fry fish.

Socio-economic Relationship and Fish Consumption Preferences

On the influence of socio-economic factors on fish consumption preferences, chi-square statistics was used. This was to determine the significant relationship between the consumer's socioeconomic variables and consumer preferences (Table 5). Significant relationships were identified between "main reasons for fish consumption" and education level, "fish preparation processes" and age group as well as gender, "preferred fish" and income level. ($P < 0.01$). There was no association between "main reasons for fish consumption", "preferred fish" and "fish processing" and other consumer preferences.

Influence of Consumer Characteristics and their Consumption Frequencies

On the influence of consumer characteristics on fish consumption frequency, inferential statistics were used. This was done to establish whether there was a significant relationship between the consumer characteristics (income level of consumer, age of consumer, education level of consumer, and profession of the consumer) with fish consumption frequency. The result was presented showing their level of significance.

Correlation between Fish Consumption Level and Characteristics of Consumer

To measure the strength of the linear relationship between two continuous variables, reference statistics are utilized (customer attributes and consumption frequency). The correlation coefficient refers to the correlation's main effect. Correlation coefficients were used to investigate the relationship between socioeconomic characteristics and the frequency of fish consumption by consumers. The data was analyzed using SPSS version 26 and is tabulated below (Table 6):

Pearson's correlation coefficient between consumption variables and consuming frequency is provided in Table 6. There is a significant link between consumption frequency and consumer income level at the 5% significance level (0.05). Since the P-value is lower than 0.01, there is a highly significant association between consumption frequency and the education level of the consumer. The age of the consumer and the profession of the consumer was not significant because the p-value is greater than 0.05. The result implies income level of consumers and the education level of consumers had a significant influence on fish consumption frequency while the age of consumers and profession of consumers had no significant influence.

Multiple Linear Regression Model for Fish Consumption Frequency

An inferential statistic was used to determine the level of influence of each respondent variable (socioeconomic

factors) on the consumption frequency of fish. The multiple linear regression model was used in the analysis and the result was identified for each. It was essential for the researcher to establish which of the socio-economic factors had a significant influence on consumers' fish consumption frequency.

The multiple linear regression model was used because it represents the influence of each independent variable (age of the respondent, education level of the respondent, profession of respondent, income of the respondent) on the dependent variable (consumption frequency) thus determining the relationship between two.

The regression model is as follows:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \epsilon$$

Where:

Y = consumption frequency

β_0 = intercept term

$\beta_1, \beta_2, \beta_3, \beta_4$ = coefficients to the independent variables

X1 = age of the respondent

X2 = education level of the respondent

X3 = profession of the respondent

X4 = income of the respondent

ϵ = error term

Table 5. Relationship between factors of socio-economic variables and fish consumption preferences

	Number	%	Number	%	Number	%	Number	%
Education level	It tastes good		It's healthy		My family likes it		Total	
Illiterate	14	46.7	4	13.3	12	40	30	100
Primary school	20	64.5	5	16.1	6	19.4	31	100
High school	13	44.8	15	51.7	1	3.5	29	100
University degree	0	0	12	100	0	0	12	100
Pearson Chi-Square: $\chi^2 = 44.8$; $p < 0.01$								
Age group	Fried		Curry		Total			
Young (20-30)	4	23.5	13	76.5			17	100
Middle age (30-45)	15	39.5	23	60.5			38	100
Elderly (Above 45)	35	76.5	12	25.5			47	100
Pearson Chi-Square: $\chi^2 = 17.4$; $p < 0.01$								
Gender	Fried		Curry		Total			
Male	45	68.2	21	31.8			66	100
Female	9	25	27	27			36	100
Pearson Chi-Square: $\chi^2 = 17.4$; $p < 0.01$								
Income level	Cultivated		Wild		Total			
<15000	8	53.3	7	46.7			15	100
15000-25000	13	81.3	3	18.7			16	100
25000-35000	35	87.5	5	12.5			40	100
35000-50000	13	54.2	11	45.8			24	100
>50000	7	100	0	0			7	100
Pearson Chi-Square: $\chi^2 = 15.1$; $p < 0.01$								

Source: Field Survey, 2022

Table 6. Correlation between fish consumption level and characteristics of consumer

Characteristics	Coefficient	P-value
Income level of consumer	0.202*	0.041
Age of consumer	0.101	0.312
Education level of consumer	0.265**	0.007
Profession of consumer	0.163	0.102

Source: Field Survey, 2022 [*Significant (P<0.05), **Highly significant (P<0.01)]

Table 7. Multiple regression model for the fish consumption value

Model	Unstandardized Coefficients B	Std. Error	t	Sig.
Constant	2.124**	0.268	7.924	0.000
Age of the respondent	-0.623**	0.106	-5.871	0.000
Education level of respondent	0.108	0.087	1.246	0.216
Profession of respondent	0.095	0.077	1.233	0.221
Income level of respondent	0.291**	0.081	3.579	0.001

Source: Field Survey, 2022 [*Significant (P<0.05), **Highly significant (P<0.01)]

Table 8. Ranking of consumers' opinions on fish consumption value using indexing techniques

Particulates	Index	Rank
Very good	0.56	III
Good	0.67	II
Average	0.86	I
Bad	0.13	IV
Very bad	0.00	V

Source: Field Survey, 2022

Table 9. Ranking of major problems in the fish market using indexing techniques

Problems	Index	Rank
Fish hygiene	0.81	I
Storage and conservation	0.51	II
Consumer information	0.33	III
Nothing	0.17	IV

Source: Field Survey, 2022

Table 10. Ranking of factors affecting fish consumption level using indexing techniques

Particulates	Index	Rank
Price	80.44	I
Fish bone	57.07	II
Fish size	41.77	III
Fish smell	15.85	IV
Texture	7.08	V

Source: Field Survey, 2022

Table 11. Ranking of steps needed to uplift fish consumption level using indexing technique

Particulates	Index	Rank
Lower price	0.86	I
Supply of live and fresh fish	0.75	II
Organic fish	0.53	IV
Market management	0.63	III
Nothing	0.31	V

Source: Field Survey, 2022

The final regression equation is given below:

$$Y = 2.124 + 0.623X_1 + 0.108X_2 + 0.095X_3 + 0.291X_4 + \varepsilon$$

The model has the following results: $\beta_0 = 2.124$, $\beta_1 = -0.623$, $\beta_2 = 0.108$, $\beta_3 = 0.095$, $\beta_4 = 0.291$ as shown in Table 7. At a 1% (0.01) level of significance, the age of the respondent and the income level of the respondent were statically significant since the p-value is less than (0.01). The education level of the respondent and the profession of the respondent was not significant with the p-value being higher than 0.05. These results imply that the age of the respondent and income level of the respondent had a significant influence on consumer consumption frequency while the education level and profession of the respondent had no significant influence. The findings of the resultant regression model (R = 58.1) imply that 58.1% of the variance is explained by the regression approach.

Respondent's age and economic level were revealed to be significant determinants of fish consumption frequency.

Consumers' Response to Fish Consumption Value and Associated Problems

The regularity with which customers eat fish is impacted by many different circumstances, and they may confront several hurdles while buying. Specific consumer attitudes on fish consumption, variables impacting their consumption, important difficulties discovered in the market, and methods to increase fish consumption are highlighted and depicted below.

Based on consumers' perspectives on fish eating, most respondents stated that their opinion on consumption was just average, rating I, followed by good, very good, and terrible with index values of 0.86, 0.67, 0.56, 0.13, and 0.00 correspondingly. Overall, Table 8 reveals that consumers' perceptions of fish-eating are favorable.

There exist various problems in the fish market. The majority of the respondents faced fish hygiene issues as a major problem in the fish market followed by storage and conservation problem and lack of information with index values of 0.81, 0.51, and 0.33 respectively (Table 9). While some of the respondents had no issue at all in the fish market.

The study illustrated that fish price was the major problem that affect consumers' fish consumption level with an index value of 80.44 and was ranked as I. Similarly, fish bone, fish size, fish smell, and texture also seemed to be problematic to fish consumers and they rated these issues 57.07, 41.77, 15.85, and 7.08, respectively (Table 10). Therefore, uplifting these issues contribute to more fish consumption among the respondents.

The findings observed that respondents had demand for lowering the market fish price of live and healthy fish. Again, the respondent had an issue regarding the unmanaged market system. Lowering fish prices will necessarily increase consumption frequency and the respondents also ranked this issue as I with an index value of 0.86. Similarly, they ranked II for the supply of live and fresh fish having an index value of 0.75 which also implies one of the major problems. Market management and supply of organic fish were also needed to uplift their consumption and they ranked these issues III and IV, respectively (Table 11).

Conclusion

Based on the results of the research done on the frequency of fish intake by consumers and the contributing variables in the Siraha district, the following conclusions were obtained. We identified over ten different fish species being commonly consumed in the selected community out of which, the majority preferred Rohu and Common Carp. Though fish consumption was being common in some areas poorer socio-economic classes found to consume less fish on average. For a healthy and balanced diet, eating fish should be sustained throughout the year. Several restrictions, such as prevalent eating practices, expensive fish, sensory (fresh, test, and smell), non-sensory (personal behavior, risk perception, views, and so on), inadequate understanding of nutrient-rich fish, as well as structural problems with the fisheries sector has a big impact on fish consumption. Also, we noticed that if the production of cultured fish will rise, which could result in decreased fisheries prices, which could soon increase fish consumption. Hygienic and price have a direct impact on the fish market and its production however, demand for live and healthy fish is thriving. Despite being small in size, locally produced fish are of high quality and the concept of organic and tastier has led to a surge in demand. Our regression model also explained that an increasing trend in education and income level have a significant association with consumers' eating levels. However, the influence of socio-cultural, economic, and demographic determinants on fish consumption requires additional investigation. Overall, given the commitment of different civil society groups to boost consumption rates and enhance cleanliness standards in fish markets, the focus should be made on tanning programs and frequent mobilization. To boost fish production and fish consumption habits and preferences in

the Siraha district of Nepal, this research will give important information on fish consumption preferences and the variables affecting them.

Author Declaration

No incompatible conditions are stated by the authors. In every stage of the writing of this work, all individuals contributed equally. The final draft of the article was also accepted by all scholars.

Acknowledgment

We would like to express our heartfelt thanks and genuine gratitude to our Lead Advisor Asst. Lecturer Ms. Dreesti Wasti (Faculty of Economics, GPACR, PU), for her continual counsel, support, advice encouragement, and helpful recommendations throughout her studies. We gratefully acknowledge my site supervisor Mr. Rabindra Kumar Mahatha, Senior Agriculture Officer, PMAMP, Siraha for his suggestions and positive energy during our time in Prime Minister Agriculture Modernization Project (PMAMP), Project Implementation Unit (PIU), Siraha.

References

- Aryal E, Neupane MP, Sapkota S, Shrestha S. 2020. Study on breeding performance, survival and growth performance of common carp (*Cyprinus carpio* L.) in fish farm of Dhanusha district, Nepal. *bioRxiv*, 2020-12. <https://doi.org/10.1101/2020.12.29.424661>
- Bhandari S, Jha DK, Dhungana P, Sapkota B, Acharya S, Bhattarai C, Pokhrel S. 2021. Analysis of carp value chain in Bara district, Nepal. *Food & agribusiness management (FABM)*, 2(2): 67-72. <https://doi.org/10.26480/fabm.02.2021.67.72>
- Can MF, Günlü A, Can HY. 2015. Fish consumption preferences and factors influencing it. *Food Science and Technology*, 35(2): 339-346. <https://doi.org/10.1590/1678-457X.6624>
- Dal B, Kızılaslan H, Dal T. 2019. Fish consumption preferences of consumers and determination of criteria affecting fish consumption by analytical hierarchical process (AHS) method (Tokat Province of Almus District). *Turkish Journal of Agriculture-Food Science and Technology*, 7(10): 1526-1532. <https://doi.org/10.24925/turjaf.v7i10.1526-1532.2479>
- Diana J, Pandit NP, Shrestha M. 2016. Household Fish Ponds in Nepal: Their Impact on Fish Consumption and Health of Women and Children. *Aquafish innovation lab technical reports: investigations 2013-2015*, volume 2, pp. 170-179.
- Gurung TB. 2016. Role of inland fishery and aquaculture for food and nutrition security in Nepal. *Agriculture & Food Security*, 1-9. <https://doi.org/10.1186/s40066-016-0063-7>
- Husen A. 2019. Fish Marketing System in Nepal : Present Status and Future Prospects. *International Journal of Applied Sciences and Biotechnology*, 7: 1-5. <https://doi.org/10.3126/ijasbt.v7i11.xxxxx>
- Koirala S, Jha DK, Lamsal A, Adhikari A. 2021. Production and marketing system of fish in Dhanusha, Nepal. *Food and agri economics review (FAER)*, 1(1): 28-35. <https://doi.org/10.26480/faer.01.2021.28.35>
- Kunwar PS, Adhikari B. 2016. Status and development trend of aquaculture and fisheries in Nepal. *Nepalese Journal of Aquaculture and Fisheries*, 3: 1-11.
- Li H, Houston JE, Wang S, Lee H. 2000. Factors affecting consumer preferences for fish in Taiwan. In *IIFET 2000 Proceedings*. International Institute of Fisheries Economics & Trade. pp. 1-7.

- Paudel A, Paudel A, Gurung B, Shrestha S. 2021. Value chain analysis of fish in Karaiyamai Rural Municipality, Bara. *Malaysian Animal Husbandry Journal*, 1(1): 1-13. <https://doi.org/10.26480/mahj.01.2021.01.13>
- Rahman N, Reza A. 2020. Consumer fish consumption preferences and contributing factors: empirical evidence from Rangpur city corporation, Bangladesh. *Heliyon*, 6: 1–7. <https://doi.org/10.1016/j.heliyon.2020.e05864>
- Sajeev MV, Radhakrishnan A, Mohanty AK, Joshy CG, Akber Ali VP, Gopika R, Ravishankar CN. 2021. Factors influencing the fish consumption preferences: Understandings from the tribes of Wayanad, Kerala. *Indian Journal of Extension Education*, 57(4): 23-27. <http://doi.org/10.48165/IJEE.2021.57405>
- Sapkota S, Laudari S, Sapkota SD. 2020. Meeting the Nutritional Needs for the Children: The Role of Fish Products from the Emerging Aquaculture of Nepal. *International Journal of Social Sciences and Management*, 7(4): 198–201. <https://doi.org/10.3126/ijssm.v7i4.32469>
- Wenaty A, Mabiki F, Chove B, Mdegela R. 2018. Fish consumers preferences, quantities of fish consumed and factors affecting fish eating habits: A case of lake Victoria in Tanzania. *International Journal of Fisheries and Aquatic Studies*, 6(6): 247–252.
- Yilma S, Busse H, Desta DT, Alemayehu FR. 2020. Fish Consumption, Dietary Diversity and Nutritional Status of Reproductive Age Women of Fishing and Non-Fishing Households in Hawassa , Ethiopia: Comparative Cross Sectional Study. *Frontiers in Science*, 10(1): 7–13. <https://doi.org/10.5923/j.fs.20201001.02>