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Exploring Fish Consumption Patterns: A Comparative Study of Urban and Rural Households in Kawardha, (Kabirdham District) Chhattisgarh, India

B. Nightingale Devi [a*], Aishwarya Sahu [a], Doman Nirmalkar [a] Chandramukhi Paikra [a] and Roshmi Sahu [a]

[a] Late Shri Punaram Nishad College of Fisheries, Kawardha, Chhattisgaarh-491995, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This study examined regional differences in fish consumption patterns and their correlation with household characteristics in the Kawardha block of Chhattisgarh, India. The study explored various aspects of fish consumption, including occupation, monthly income and expenditure, consumption frequency, species preference, factors influencing fish consumption, and constraints faced by fish consumers. A survey was conducted with 100 respondents (50 households from each region), randomly selected. The collected data were analysed using frequency and percentage and the findings revealed that rural households consumed more fish compared to urban households, with

**Corresponding author: E-mail: devi.cof12@gmail.com;*

Rohu (*Labeo rohita*) emerging as the preferred fish species in both regions. The majority of consumers in both rural (45.25%) and urban areas (62.5%) preferred to consume fish once a week. The High Income group (HIG) urban households (82.75%) and low-income group (LIG) rural households (88.23%) were the primary fish consumers. The study also observed that households with a heavy occupational lifestyle consumed more fish (68%) in rural areas, whereas households with a sedentary occupational lifestyle consumed more fish in urban areas (44%). Factors influencing fish consumption were found to be the price and quality of fish. Constraints faced by fish consumers included concerns about hygiene and the availability of desired fish sizes. Various reasons were identified for the reluctance to consume fish, such as the presence of bones, religious beliefs, and sensory preferences. Understanding the regional disparities in fish consumption patterns and the associated household characteristics can guide targeted interventions for promoting sustainable and healthy fish consumption practices in both rural and urban areas. This knowledge can contribute to the development of strategies to address constraints and improve fish consumption habits, leading to better nutrition and overall well-being of inhabitants of both regions.

Keywords: Fish consumption patterns; income level; occupation; influencing factors; constraints.

1. INTRODUCTION

Fisheries and aquaculture play a crucial role in supporting various aspects of human life and society. They serve as essential sources of food, providing vital nutrition to billions of people worldwide [1]. Fish is known for being a highly nutritious food, offering a rich source of protein, essential vitamins, and minerals. Additionally, it is a valuable source of omega-3 fatty acids, which are beneficial for heart health and brain development. The affordability of fish makes it accessible to a wide range of populations, especially in regions where other animal proteins may be less available or expensive. This accessibility is particularly important for communities with limited resources, as it allows them to obtain necessary nutrients for their overall well-being. Because of its nutritional profile and availability, fish offers immense potential to combat hunger and malnutrition worldwide. The growth in fish consumption has outpaced the population increase, which has risen by 1.6 percent annually over the same period. The consumption of fish has grown faster than that of any other animal product and disparities in consumption pattern exists across the income groups [2]. As per the report of FAO [3] per capita consumption rose from 9.9 kg in the 1960s to a record 20.5 kg in 2019, dipping slightly to 20.2 kg in 2020. Factors like rising incomes, urbanization, post-harvest improvements, and dietary changes are expected to drive a 15 percent increase to 21.4 kg per capita by 2030 [3].

Moreover, India's promising fisheries sector provides livelihood, employment, and entrepreneurship opportunities to over 2.8 crores fishers and fish farmers at the primary level, with several lakhs more benefiting along the value chain [4]. India's fish production has witnessed a remarkable growth over the years [5]. Chhattisgarh is located in the central region of the country, offering significant potential for the growth of fisheries. The favorable climate and meteorological conditions further support the development of fisheries in the region [6]. Chhattisgarh stands as the most abundantly endowed state with water resources in central India. It possesses extensive aquatic reserves, including rural tanks, reservoirs, and ponds, alongside four major river basins and their associated tributaries [7]. The state of Chhattisgarh's per capita fish consumption is reported to be 19.7 kg [5]. The fisheries sector is playing a crucial role in generating self-employment opportunities through the establishment of Women Self Help Groups (SHGs) in rural areas [8]. This initiative has had a direct or indirect impact on addressing malnutrition concerns.

In light of the significant growth in fish production and its importance as a protein source, this study was initiated to assess the fish consumption patterns among urban and rural households within the study area. The objectives of the study were as follows:

1. To analyze fish consumption patterns in terms of the frequency and quantity consumed by the respondents in both rural and urban areas.
2. To explore the preferences of fish species among the respondents.

3. To determine the socio-economic, cultural, and dietary factors influencing fish consumption in the study area.
4. To identify the constraints faced by fish consumers in the region.

2. METHODOLOGY

The study was conducted in the Kawardha block (Kabirdham district) of Chhattisgarh, encompassing both urban and rural areas. The district is situated between 21.32' to 22.28' North latitude and 80.48' to 81.48' East longitude encompassing an area of 4,447.5 km² (1,717.2 sq mi). this region contributes significantly to the state's fish production and the state has been declared as best Inland fisheries state in India in the year 2022. The total fish production of Chhattisgarh state's stands at 6.16 lakh tonnes, with the Kabirdham district accounting for 3.7% of this overall production [5]. A total of 100 household samples were taken, with 50 samples collected from each urban and rural area. The sample selection process involved random sampling. Data collection was performed through face-to-face interviews using a structured questionnaire. The households were categorized into different income groups, namely low-income group (LIG), middle-income group (MIG), and high-income group (HIG), based on their income levels. Data analysis was conducted using frequency and percentage. To analyze the constraints faced by fish consumers, a Rank based Quotient (RBQ) approach was employed. RBQ quantifies the data collected through preferential ranking techniques by assigning ranks to the parameters and then calculating the RBQ value. The formula of RBQ given by Savarathanam [9].

$$\text{RBQ} = \sum_{i=1}^{n} \frac{(\text{fi})(\text{n}+1-\text{i})}{\text{N}*\text{n}} * 100$$

Where,

f_i = number of respondent reporting a particular problem
under i^{th} rank.
N = Total number of respondents
n = number of problems identified

3. RESULTS AND DISCUSSION

(i) Fish consumption pattern: Out of the 50 samples taken from rural areas, 42 households were found to be fish consumers, indicating that 84% of rural households consume fish. On the other hand, in urban areas, out of the 50 samples, 40 households were fish consumers, accounting for 80% of urban households. The remaining households in both rural and urban areas (16% and 20%, respectively) were non-fish consumers [10].

(ii) Frequency of fish consumption: The analysis of the present study reveals that in urban households, 15% prefer fish consumption once a month, 15% twice a month, 7.5% twice a week, and the majority, 62.5%, consume fish on a weekly basis. Similarly, in rural households, the study found that 14.2% consume fish once a month, 26.1% consume fish twice a month, 14.3% consume fish twice a week, and the majority, 45.25%, consume fish on a weekly basis.

These findings suggest that the frequency of fish consumption varies among different regions and can be influenced by factors such as cultural practices, availability of fish, and dietary preferences of the population.

(iii) Fish Species preference: In rural area, the commonly consumed fish species were Rohu (32.78%), Pangasius (18%), Catla (9.8%), Tilapia (8.2%), Common carp (8.2%), Silver carp (8.2%), Puntius (8.2%), Eel (3.27%), Magur (1.64%), and Singhi (1.64%). In urban area, the preferred fish species were Rohu (35.38%), Catla (23%), Silver carp (9.23%), Pangasius (7.3%), Common carp (4.62%), Mrigal (4.62%), Grass carp (3%), Tilapia (3%), Prawn (3%), Eel (3%), Magur (1.53%), and Puntius (1.53%).

Table 1 highlights the variations in species preference among the consumers reflecting the availability and popularity of specific fish species in those areas. Factors such as local taste preferences, cultural practices, and availability of different fish species influence the choices made by consumers.

(iv) Fish consumption compared with monthly income: The data analysedregarding the monthly income of households and fish consumption patterns reveals interesting findings. Among urban households, a higher percentage (82.75%) of high-income group (HIG) households consume fish compared to low-income group (LIG) households (76.9%) and middle-income group (MIG) households (75%). The non-consumer percentage ranges from 17.25% to 23.1% across all three income groups.

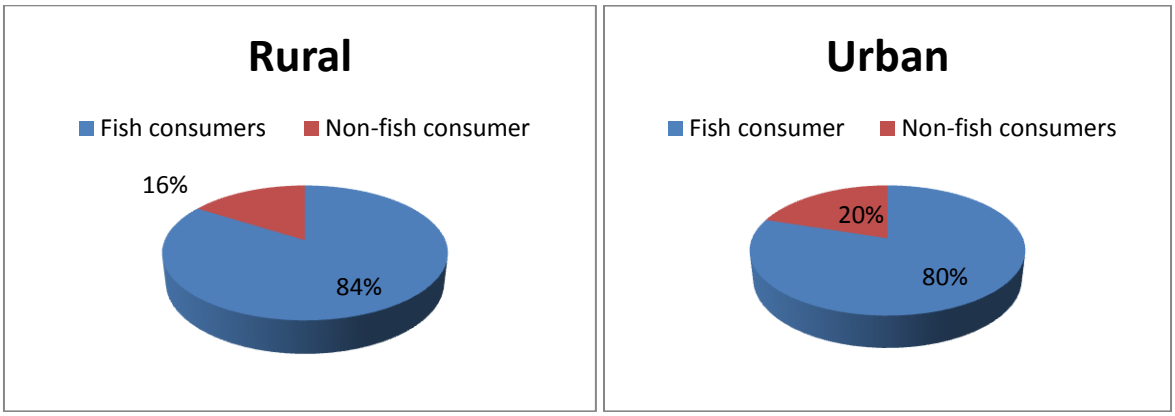

Fig. 1. Pie chart of fish consumption pattern in rural and urban areas

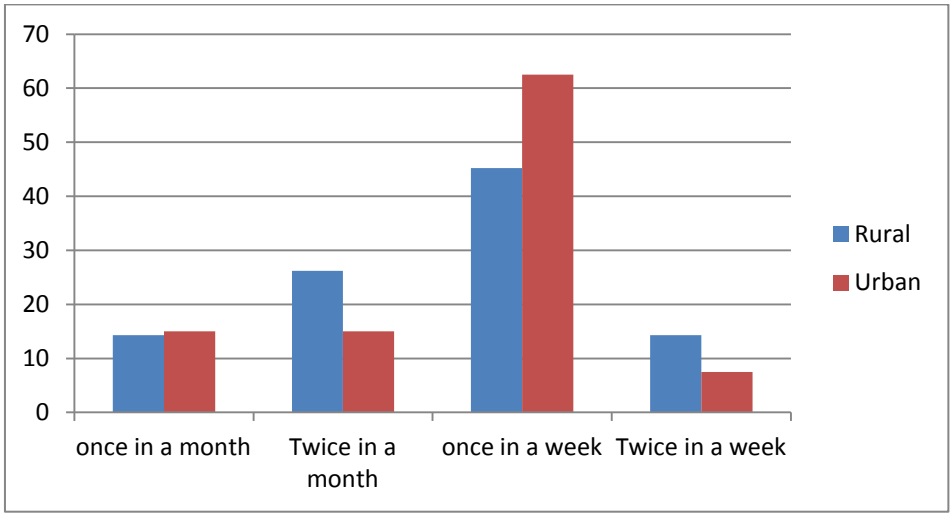

Fig. 2. Graphical representation of Frequency of fish consumption in different time periods by rural and urban people

Table 1. Comparison of fish species preference in the study area

S. No.	Fish species	Common name	Percent of consumption	
			Rural (%)	Urban (%)
1	*Labeo rohita*	Rohu	32.78	35.38
2	*Catla catla*	Catla	9.8	23
3	*Cirrhinus mrigala*	Mrigal	-	4.62
4	*Hypophthalamichthys molitrix*	Silver carp	8.2	9.23
5	*Ctenopharyngodon idella*	Grass carp	-	03
6	*Cyprinus carpio*	Common carp	8.2	4.62
7	*Macrobrachium rosenbergii*	Prawn	-	03
8	*Pangasidon hypopthalamus*	Pangasius	18	7.6
9	*Clarias batrachus*	Magur	1.64	1.53
10	*Heteropneustes fossilis*	Singhi	1.64	-
11	*Oreochromis mossambicus*	Tilapia	8.2	03
12	*Puntius spp*	Puntius	8.2	1.53
13	*Anguilla anguilla*	Eel	3.27	03

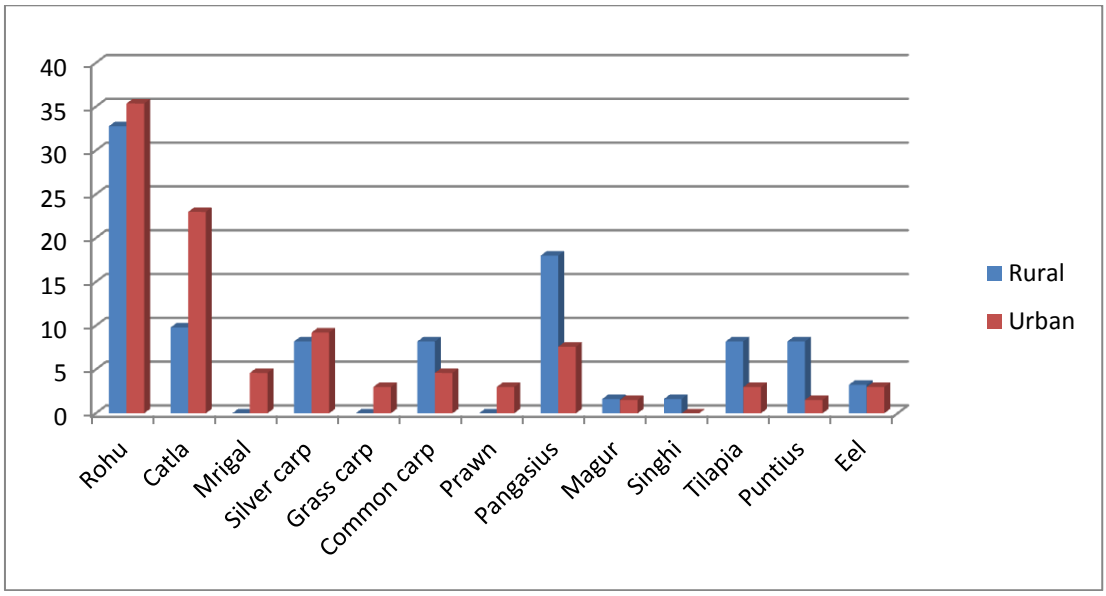

Fig. 3. Graphical representation of fish species preference between rural and urban areas

Table 2. Fish consumption compared with monthly income of rural and urban consumers

Monthly income	Urban			Rural		
	Total HH	Fish consumer	Non fish consumer	Total HH	Fish consumer	Non fish consumer
Low income group(LIG)	13 (26%)	10 (76.9%)	3 (23.1%)	34 (68%)	30 (88.23%)	4 (11.76%)
Middle income group(MIG)	8 (16%)	6 (75%)	2 (25%)	13 (26%)	10 (76.9%)	3 (23.1%)
High income group(HIG)	29 (58%)	24 (82.75%)	5 (17.25%)	3 (6%)	2 (66.6%)	1 (33.3%)

In rural households, a higher percentage (88.23%) of LIG households consume fish compared to MIG households (76.9%) and HIG households (33.3%).

These findings suggest that fish consumption patterns can be influenced by income of households. Higher-income households tend to consume higher fishing the urban area consumers, while lower-income households also show significant fish consumption rate in rural area.

(v) Monthly expenditure compared with expenditure on fish: The present study reveals the total average expenditure and expenditure specifically on fish in different income groups. In rural households, the total average expenditure for the low-income group (LIG) is Rs. 4,645.2, for the middle-income group (MIG) is Rs. 9,300, and for the high-income group (HIG) is Rs. 11,000. The expenditure on fish for LIG is 14.44 %, for MIG is 14.51%, and for HIG is 5.15%. In urban areas, the total expenditure for LIG is Rs. 7,555, for MIG is Rs. 10,000, and for HIG is Rs. 11,625. The expenditure on fish for LIG is 7.01%, for MIG is 9.80%, and for HIG is 0.70%.

These findings indicate variations in the monthly expenditure on fish among different income groups and between rural and urban areas. Generally, middle income groups tend to have higher expenditure on fish compared to lower-income groups and higher income groups. The expenditure on fish can be influenced by factors such as fisheries activities as primary occupation, availability of fish, and personal preferences.

(vi) Occupational lifestyle compared with fish consumption: The lifestyle of head of the Hhs was assessed from occupation and respective physical activity ratio (PAR). In the present study, the analysis of fish consumption patterns in relation to occupational lifestyle revealed the following trends. In rural area, households with a

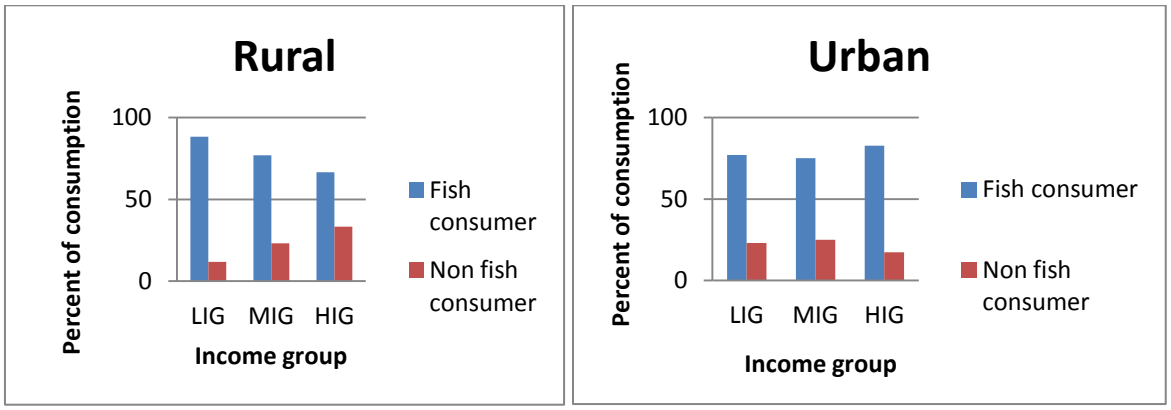

Fig. 4. Graphically Distribution of Fish consumption compared with monthly incomes in rural and urban areas

Table 3. Monthly expenditure compared with expenditure on fish

Income group (Rs.)	Rural		Urban	
	Total expenditure (Rs)	Expenditure on fish (Rs.)	Total expenditure (Rs)	Expenditure on fish (Rs)
< 8000 (LIG)	4645.2	670.9 (14.44%)	7555	530 (7.01%)
8000 – 20,000 (MIG)	9300	1350 (14.51%)	10000	980 (9.80%)
>20,000 (HIG)	11000	566.6 (5.15%)	11625	812.5 (0.70%)

moderate occupational lifestyle (100%) were the dominant fish consumers, followed by households with a heavy occupational lifestyle (84.61%) and a sedentary lifestyle (71.42%). Similarly, in urban areas, households with a heavy occupational lifestyle (84.61%) were the dominant fish consumers, followed by households with a sedentary lifestyle (81.4%) and moderate occupational lifestyle (70%).

These results suggest that there is a correlation between occupational lifestyle and fish consumption patterns. In rural areas, households with moderate occupational lifestyles tend to have higher fish consumption, while in urban areas, households with heavy occupational lifestyles show higher fish consumption rates. Sedentary lifestyles are also associated with significant fish consumption, particularly in urban areas.

(vii) Factors affecting fish consumption: The study revealed the major factors affecting fish consumption in both rural and urban areas. In rural areas, the price of fish (38.0%), quality of fish (19.8%), and convenience of visiting the market (9.52%) were identified as the primary factors influencing fish consumption. In urban areas, the taste of fish (27.5%), convenience of visiting the market (18.75%), and variety of fish (13.34%) were the major factors affecting fish consumption.

The results indicate that factors such as price, quality, taste, variety, and convenience of access to fish markets play crucial roles in shaping the consumption patterns of fish. These factors influence consumers' decision-making processes and their preferences for fish consumption in both rural and urban settings.

Constraints faced by fish consumers: The study identified the major constraints faced by fish consumers in both rural and urban areas. In rural areas, the constraints reported were a limited variety of fish (23.80%), inadequacy of the desired size (18.36%), and poor hygiene. On the other hand, in urban areas, the major constraints faced were poor hygiene (21.95%), higher price fluctuations (17.14%), and inadequate sanitation.

These results indicate that constraints related to variety, size availability, hygiene, price fluctuations, and sanitation constitute significant challenges faced by fish consumers. Addressing these constraints is crucial for improving the overall fish consumption experience and ensuring consumer satisfaction in both rural and urban areas.

Table 4. Occupational lifestyle compared with fish consumption in rural area and urban area

Occupational Lifestyle	Rural			Urban		
	Total households	Fish consumers	Non fish consumers	Total households	Fish consumers	Non fish consumers
Sedentary	7 (14%)	5 (10.00 %)	2 (2.00%)	27 (54%)	22 (44.00%)	5 (10.00%)
Moderate	3 (6%)	3 (6.00%)	0 (0%)	10 (20%)	7 (14.00%)	3 (6.00%)
Heavy	40 (80%)	34 (68.00%)	6 (12%)	13 (26%)	11 (22.00%)	2 (4.00%)
Total	50 (100%)	42 (84%)	8 (16%)	50 (100%)	40 (80%)	10 (20%)

Table 5. Factors affecting fish consumption in rural area and urban area

Attributes	Rural		Urban	
	RBQ score	Rank	RBQ score	Rank
Quality of fish	19.8	II	7.5	VI
Variety of fish	0.79	VI	13.34	III
Price of fish	38.0	I	3.34	IV
Taste of fish	3.58	IV	27.5	I
Hygiene of fish market	3.96	V	0.83	VI
Convenience to visit market	9.52	III	18.75	II

Table 6. Constraints faced by fish consumers in rural area and urban area

Constraints	Rural		Urban	
	RBQ score	Rank	RBQ score	Rank
Inadequate sanitation facilities	8.16	IV	12.5	III
Lack of hygiene (cleanliness)	13.60	III	25.0	I
Less number of fish variety	23.80	I	4.28	V
Higher price fluctuation	0.34	VII	17.14	II
Lack of freshness of fish	2.0	VI	2.14	VI
Distantly located market	5.10	V	0.7	VII
Unavailability of the desired size	18.36	II	8.57	IV

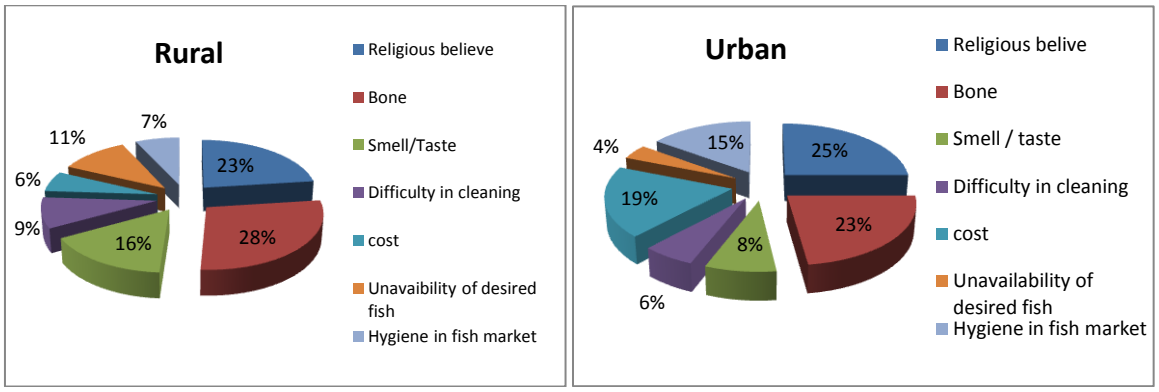

Fig. 5. Graphical distribution of reasons for not consuming fish in both areas

Reasons for not consuming fish: The study identified the reasons behind not consuming fish in both rural and urban areas. In rural areas, the major reasons reported were bones (28%), religious beliefs (23%), smell and taste (16%), unavailability of desired fish (11%), difficulty in cleaning (9%), poor hygiene in fish markets (7%), and cost (6%). In urban areas, the reasons included religious beliefs (25%), bones (23%), cost of fish (19%), poor hygiene in fish markets (15%), smell and taste (8%), difficulty in cleaning (6%), and unavailability of desired fish (4%).

These findings highlight the diverse reasons why individuals choose not to consume fish, including concerns related to bones, religious beliefs, taste, cost, hygiene, and cleaning difficulties. Understanding these reasons can help in addressing misconceptions, improving accessibility to desired fish varieties, and promoting the benefits of fish consumption to overcome barriers and increase fish consumption rates.

4. CONCLUSIONS

The importance of this study lies in its contribution to understanding the regional differences in fish consumption patterns and the factors influencing them. By exploring the fish consumption patterns in both rural and urban areas of the Kawardha block, Chhattisgarh, the study provides valuable insights that can inform policy decisions and interventions to promote sustainable and healthy fish consumption practices. The findings of this study shed light on various factors influencing fish consumption patterns in both rural and urban areas of the Kawardha block, Chhattisgarh. Understanding these factors and their implications can inform targeted interventions and policies aimed at promoting sustainable and healthy fish consumption practices. Efforts should be directed towards addressing constraints and improving factors such as availability, quality, hygiene, and affordability. Creating awareness about the nutritional benefits of fish, dispelling misconceptions, and enhancing access to a variety of fish species can encourage higher fish consumption rates among different communities. Overall, this study provides valuable insights into the regional differences in fish consumption patterns, influencing factors, and constraints faced by fish consumers. It emphasizes the need for comprehensive strategies to support and promote the sustainable growth of the fisheries sector while ensuring the availability of safe and nutritious fish for all segments of society.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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