



Exploring Perceptions and Health Awareness in Fish Consumption Across Coastal and Inland Kerala

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ABSTRACT

The study investigated fish consumption patterns and consumer perceptions in Kerala, focusing on coastal and inland districts during 2020. Using a sample of 396 households from four districts and employing suitable tests, the study reveals significant disparities in monthly and per capita fish consumption, with coastal areas displaying higher rates. The majority of consumers hold a moderate perception of nutritional and health benefits, indicating a need for targeted health awareness programs. Coastal and inland consumers differ significantly in their perceptions, with coastal residents demonstrating greater awareness of dietary advantages, while inland consumers express resignation to lower quality due to supply chain limitations. Urban consumers exhibit an optimistic health perception, contrasting with rural concerns about certification systems and government inefficiencies in ensuring safe fish. The study emphasizes the necessity for customized information dissemination and awareness programs to address the diverse concerns of fish consumers in Kerala.

INTRODUCTION

Aquatic foods provide a notably healthier dietary option compared to terrestrial meat products, as highlighted by Bogard et al., (2015). They constitute a significant and globally embraced cuisine (Burger et al., 1999; Turan et al., 2006), contributing to the sustainability, safety, and nutritional balance of various diets. Fish, recognized as the third major source of dietary protein on a global scale after cereals and milk (FAO, 2020), plays an important role in addressing global hunger, ensuring food security, and enhancing nutrition (Bennet et al., 2021). Numerous studies underscore the perception of fish as a healthier choice among consumers in comparison to other non-vegetarian foods (Brunso, 2003; Gross, 2003). Over the years, per capita food fish consumption has risen significantly, climbing from a modest 9.0 kg in 1961 to 20.2 kg in 2022. This increase has led to fish meeting 20 per cent of the total animal protein intake for 3.1 billion

humans all over the world (FAO, 2022). India has yet to attain the recommended fish consumption level of 12 kg per year, as advised by the ICMR, with a projected per capita fish consumption of only 6.6 kg in 2030 (Msangi et al., 2013). Despite the Government of India setting a target of achieving 20 MT fish production by 2022-23 through the “Blue Revolution” scheme (Shasani et al., 2020), this goal remains unmet. In 2020-21, the annual per capita fish consumption in India stood at 6.31 kg, although Kerala reported a significantly higher consumption rate of 17.93 kg per year (DoF, 2022). The understanding of consumption behavior and consumer perception plays a vital role in aiding the government in formulating programs to address hunger and malnutrition (Sajeev et al., 2021).

Despite the rising trend in fish consumption in Kerala, the increasing incidents of adulteration (FSSAI, 2018) have raised substantial concerns among consumers regarding the quality and safety of fish available in local markets. Consumers grapple with

the challenge of making food choices that balance the conflicting forces of nutritional-health benefits versus quality-safety risks (Verbeke et al., 2004). The purchasing behavior of consumers regarding fish is influenced by factors such as quality, nutritional value (Mugaonkar et al., 2011), safety (Grunert, 2005), price, availability (Sajeev et al., 2021), convenience, and sensory perception (Sajeev et al., 2022). Early perceptions and learning play a significant role in shaping fundamental and enduring food choices (Koster & Mojet, 2007), while perceptions about conflicting information regarding health risks and benefits are also crucial (Dijk et al., 2011).

Consumer perceptions about food evolve over time and are currently intertwined with considerations of nutrition, well-being, and health. Existing literature reveals a gap in knowledge regarding consumer perceptions on the benefits of consuming fish on one's health, fish quality, and safety of fish available for consumption (Troy & Kerry, 2010) in our markets. Governments are tasked with the duty of responding to consumer apprehensions and anticipations through their food safety and health departments.

METHODOLOGY

To analyze variations in consumption and perception between coastal and inland consumers, the survey focused on two coastal districts in Kerala, namely Kozhikode and Ernakulam, as well as two inland districts, Palakkad and Kottayam. A total of 400 fish-consuming households were randomly selected from these districts, encompassing rural, semi-urban, and urban areas, with each district contributing 100 households. The survey aimed to provide a comprehensive understanding of fish consumption practices. To collect primary data, a structured interview schedule was developed based on a literature review, field interactions, and expert opinions. The schedule included questions covering socio-personal characteristics of consumers, fish consumption behavior, and items related to consumer perception. The perception statements were crafted to align with conceptual dimensions, focusing on the nutritional-health benefits of fish and concerns related to the quality and safety of fish consumption. Each selected household was visited, and a personal interview was conducted with one adult respondent who played a significant role in fish purchase and cooking activities. The interviews took place between January 2020 and March 2020, covering a total of 396 households. Various statistical analyses, including frequency analysis, t-test, non-parametric tests for two independent samples (Mann-Whitney U), and Kruskal-Wallis test, were employed to analyze the gathered data, providing a robust evaluation of the survey findings. SPSS 20.0 was used for the analysis.

Table 1. Comparison of fish consumption among coastal and inland households

Parameters	District	Mean value (kg/year)	Mean value (kg/month)	Standard deviation	t	p
Household fish consumption	Coastal	156.00	13.0	8.01	3.619	0.000
	Inland	123.60	10.3	6.17		
Per capita fish consumption	Coastal	37.56	3.13	1.97	2.027	0.043
	Inland	24.36	2.03	1.75		

RESULTS

Fish consumption status in coastal and inland districts of Kerala

The current study encompassed a representative sample of 396 households in Kerala, all of which were engaged in fish consumption. The average age of the surveyed fish consumers was 40 years, and a significant proportion—approximately two-thirds—had attained education levels up to secondary (32%) and graduation (33%). The average family size was identified as 4 members, and the consumers exhibited diverse occupational backgrounds, including farming, labor, fishing, fish vending, self-employment, private-casual, private-salaried, and government service. When examining the distribution across residential areas, the majority of the surveyed households were from rural areas, constituting 48.8 per cent of the sample. Urban households comprised 31 per cent, and semi-urban households accounted for 20.3 per cent of the total, reflecting a varied representation of consumers across different geographical settings.

Monthly fish consumption of the households surveyed varied between one kg to 50 kg and percapita fish consumption was calculated as 0.11 kg to 9.33 kg per month. Monthly household consumption (13 kg) and per capita consumption (3.13 kg) were higher in coastal districts of Kerala compared to inland districts (10.3 kg and 2.03 kg). It is clear from Table 1 that coastal households had a significantly higher monthly fish consumption ($t = 3.619$, $p = 0.000$) and a significantly higher percapita fish consumption than that of inland households ($t = 2.027$, $p = 0.043$).

Perception regarding nutritional-health benefits and quality-safety concerns

The study revealed that the majority of fish consumers, accounting for 81.0 per cent, held a medium perception regarding the nutritional and health benefits of fish consumption. In contrast, a smaller proportion, 11.8 per cent, exhibited a high perception, while only 7.2 per cent fell into the low perception category, as

Table 2. Perception regarding nutritional-health benefits and quality-safety concerns of fish consumption

Dimension	Categories	Percent
Nutrition and health benefits	Low (below 16.50)	7.2
	Medium (between 16.50 & 30.00)	81.0
	High (above 30.00)	11.8
Quality and safety concerns	Low (below 16.00)	8.0
	Medium (between 16.00 & 28.00)	83.0
	High (above 28.00)	9.0

outlined in Table 2. Additionally, when considering the quality and safety of fish available in markets, a substantial 83.0 per cent of consumers in Kerala demonstrated a medium perception, as indicated in Table 2.

Perception differences among coastal and inland fish consumers

Results of Mann-Whitney U test (Table 3) identified that consumers from inland districts (Kottayam and Palakkad) differed significantly from consumers of coastal districts (Ernakulam and Kozhikkode) with respect to their overall perception on nutritional and health benefits from fish consumption. Consumers from inland districts had comparatively less perception regarding benefits from fish eating for all age groups ($p=0.000$) and better health benefits of fish compared to that of red meat ($p=0.000$). Consumers residing in inland districts exhibited significantly lower concern about the quality of fish from other states ($p=0.000$). Conversely, consumers in coastal districts showed heightened concerns about their inability to assess fish quality in the market ($p=0.000$), as well as expressing higher levels of concern regarding both quality and safety certification aspects ($p=0.000$).

Perception differences among rural, semi-urban and urban fish consumers

The results from the Kruskal-Wallis test indicated a noteworthy difference in the perception of health benefits related to fish consumption among urban, semi-urban, and rural consumers ($p=0.011$), with urban consumers exhibiting a significantly higher

perception (Table 4). In the case of semi-urban consumers, there was a strong belief that local fish surpasses the quality of fish from other states ($p=0.045$). Additionally, rural consumers expressed higher concern compared to urban consumers regarding the absence of a certification system to communicate fish safety ($p=0.029$) and the perceived ineffectiveness of government machinery in ensuring safe fish for consumers ($p=0.018$).

DISCUSSION

The state of Kerala always records a high per capita fish consumption (DoF, 2022). It is clear from Table 1 that coastal households had a significantly higher monthly and per capita fish consumption than that of inland households. The steady supply of fresh catch in coastal districts helps them to achieve high per capita consumption in comparison with inland districts who have to rely on supply from coastal districts as well as neighbouring states. Apart from supply issues, inland districts have reduced number of vendors and markets particularly in rural areas compared to coastal districts which affects the availability and consumption in comparison with coastal districts. Numerous prior studies have underscored the disparity in per capita fish consumption across Indian states, with the northern states notably falling well below the national average (Sabater et al., 2008; Mugaonkar et al., 2011). Conversely, states such as Tripura, Kerala, Goa, and Assam have been identified for their notably high levels of fish consumption in various studies (Prasad & Madhavi, 2014; Bhuyan et al., 2017; Sajeev et al., 2021; Shil et al., 2022). The distance from source to the inland markets also leads to the increase in price of fish which

Table 3. Perception differences among coastal and inland fish consumers

Perception statements	Mean rank		Mann-Whitney U	p
	Coastal districts	Inland districts		
It is advisable for individuals of all age groups to include fish in their diet	209.13	166.97	13764.000	.000
Fish is considered a healthier option compared to red meat	212.01	160.80	12672.500	.000
The quality of locally sourced fish surpasses that of fish from other states	211.20	174.47	15060.500	.001
Consumers face challenges in accurately evaluating the quality of fish during the purchasing process.	210.13	166.83	13677.500	.000
A certification system indicating the freshness of fish is lacking, leaving consumers without proper guidance.	215.44	160.09	12460.500	.000
Authorities have allowed vendors to deceive consumers when it comes to the quality and safety of fish.	190.33	163.93	13317.500	.011
Currently, there is no certification system in place to communicate the safety of fish to consumers.	207.75	165.44	13503.000	.000

Table 4. Perception differences among rural, semi-urban and urban fish consumers

Perception statements	Mean rank			Kruskal-Wallis χ^2	p
	Rural	Semi-urban	Urban		
Incorporating fish into your diet contributes to improved overall nutrition and health.	183.04	212.02	220.43	8.993	.011
Consuming fish is associated with a decreased risk of cardiovascular diseases	171.56	203.12	197.67	7.413	.025
The quality of locally sourced fish is superior to that of fish originating from other states.	181.03	215.48	197.48	6.208	.045
Consumers face challenges in accurately evaluating the quality of fish in the market	203.94	196.51	160.94	12.769	.002
The quality of fish is impacted by the time it takes to reach the market after being captured.	204.77	188.56	164.79	11.062	.004
Currently, there is a lack of a certification system to communicate the safety of fish	201.20	183.41	169.26	7.103	.029
The government machinery falls short in ensuring the safety of fish for consumers	201.85	193.80	167.90	8.004	.018

also inversely affects consumption. Sajeev et al., (2021, 2023) had earlier identified price of fish and market accessibility as barriers to fish consumption in inland districts of Kerala and Karnataka. In the past, EUMOFA (2017) & Helsedirektorat (2020) documented the factor 'price of fish' serving as a barrier to the acquisition of fish.

The majority of fish consumers held a moderate perception regarding the nutritional and health benefits of fish consumption, as well as the safety of fish available in markets (Table 2). These findings indicate that, in the context of Kerala, individuals generally acknowledge fish as a highly nutritious food suitable for all age groups. However, a limited awareness of the specific health benefits associated with fish consumption highlights the need for future health awareness programs in Kerala to prioritize the dissemination of scientifically-backed data concerning the distinct advantages of incorporating fish into one's diet. Consumer perceptions emerge as a pivotal influence on fish consumption patterns. The majority of consumers exhibit a moderate perception of the nutritional and health benefits of fish, underscoring the need for targeted health awareness programs. Concerns over fish quality and safety, exacerbated by instances of adulteration, present a pressing issue requiring concerted efforts from regulatory bodies and awareness campaigns.

Mann-Whitney U test results (Table 3) indicated that consumers from inland district differed significantly with that of coastal district consumers with comparatively less perception about the benefit of fish eating for all age groups and health benefits of fish compared to that of red meat. This may be due to the fact that fish is readily available in coastal districts and eating fish is a routine practice for coastal people regardless of age groups and hence they exhibited more awareness about dietary advantage of fish among all age groups. Similar result was obtained in Bhubaneswar (Tanuja et al., 2020). The moderate perception regarding specific health benefits from fish suggests that health awareness programs in Kerala should prioritize conveying scientific data on the specific health advantages of fish consumption. Studies indicate a less effective implementation of research findings in nutrition-health awareness programs in our country (Asha et al., 2020). It's noteworthy that consumers from inland districts demonstrated relatively lower concern about the quality of fish originating from other states. A similar trend was found in case of quality certification for fish safety and assessment of the fish quality in market. Inland consumers were resigned to the fate that they will be receiving inferior quality fish due to the length of the supply chain from coastal areas as well as the number of days taken to transport fish from other states. Fish quality was found influencing consumer behaviour in inland Kerala (Geethalakshmi et al., 2013). Safety of fish is also compromised in inland districts due to application of adulterants in fish to keep it fresh until it reaches the consumers in hinterlands. According to reports, deficiencies in cold storage and transportation facilities at the retail level led to the sale of poor-quality fish to consumers (CII & Yes Bank, 2020). The coastal populace, accustomed to readily available fish, demonstrates heightened awareness, while inland consumers express resignation to lower quality due to geographical constraints. This difference in perception has an implication for authorities

that consumers from inland district require more customized information about nutritional-health benefits and about possible quality-safety risks associated with fish consumption instead of making them resign to the fate that they can get only low quality and unsafe fish for consumption due to the geographical limitations of their districts.

Kruskal-Wallis test results show that urban consumers, conversely, display a more optimistic perception of health benefits (Table 4), in contrast with concerns voiced by rural counterparts regarding the lack of certification systems and government inefficiencies in ensuring safe fish. Semi-urban consumers had stronger perception that local fish is having better quality than the fish coming from other states. Surprisingly, rural consumers had more concern about lack of certification system than urban consumers. Consumer rights need to be honored thereby building confidence in food available for consumption (Fox et al., 2018). The rural consumers strongly perceived the inefficiency of government machinery in ensuring safe fish. In rural areas, consumers also hold the belief that fish might contain adulterants, and there is a prevalent issue of spoiled fish from other states being sold in markets across Kerala. Sajeev et al., (2021, 2022, 2023) have documented comparable concerns among various communities in Kerala and Karnataka. It is recommended to conduct awareness programs addressing specific safety risks to alleviate unnecessary concerns. Gupta et al., (2020) concluded that government policies and programs should be more nutrition-sensitive to effectively influence the health and productivity of families.

CONCLUSION

Coastal districts exhibit higher fish consumption, inland areas face supply chain challenges. Consumer perceptions play a key role, with the majority holding a moderate view of fish's nutritional benefits, necessitating tailored health awareness programs. Concerns over fish quality and safety, compounded by adulteration, require concerted regulatory efforts and awareness campaigns. Coastal and inland consumers show distinct perceptions, with coastal residents more aware due to ready fish availability. Urban consumers express optimism, while rural concerns focus on certification and government efficiency. A comprehensive approach, combining health programs and regulatory measures, is essential to bridge perception gaps and enhance both the quantity and quality of fish consumption. On the policy front, it is suggested to implement a targeted and comprehensive strategy that combines region-specific health awareness programs, strengthened regulatory measures, and improved supply chain infrastructure to address distinct consumer perceptions and challenges, thereby fostering sustainable and equitable enhancement of fish consumption in both coastal and inland areas of Kerala.

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