

Fish marketing system in Patna, Bihar: A socioeconomic analysis of constraints, channel efficiency, and management strategies

Pooja Kumari*, Aryan Raj & Dileep Kumar

Department of Zoology, Patna University, Patna, Bihar, India

Received : 25th May, 2026 ; Accepted : 25th June, 2026

DOI:- <https://doi.org/10.5281/zenodo.21965252>

ABSTRACT

Fish marketing has played a vital role as an influential indicator in terms of returns, nutrition and efficient operation of the supply chain of inland fisheries. This study examined the fish marketing system of Patna district, Bihar, by considering the socioeconomic profile of the market actors, prevailing marketing channels, functioning constraints and possible measures for improvement. For this purpose, a multistage stratified random sample of one hundred respondents, such as wholesalers, semi-wholesalers, retailers, and consumers, was selected from seven big fish markets, namely, Rajapul fish market, Bazar Samiti fish market, Musallahpur Hat fish market, Bhikhna Pahari fish market, Machhua Toli fish market, Patna City fish market, and Kumharar fish market. using a pre-tested interview schedule in May-June 2026. The analysis of results indicated that the fish marketing system in Patna is still operating in an unorganised way where market actors include multiple intermediary layers, widening the producer price-consumer price differences with an extent to the tune of four-fold. The greatest constraints to fish marketing in Patna market were found to be inadequate post-harvest cold chain infrastructure (Garrett's Rank I), lack of proper sanitation of markets (Rank II) and poor transport network (Rank III). SWOT analysis revealed huge potential for the digital market and a cooperative marketing approach. Site-specific cold storages, establishment of cooperative and digital marketing networks in the markets, improved infrastructure and more institutional intervention under Pradhan Mantri Matsya Sampada Yojana (PMMSY) should be made available.

Key Words - Fish marketing; supply chain; Garrett's ranking; SWOT analysis; cold chain; PMMSY; Patna.

***Corresponding author** : poojamani0256@gmail.com

INTRODUCTION

Global food security, human nutrition, income, and employment rely heavily on the fisheries sector, which employs roughly 600 million people around the world. Among nations, India is the world's third biggest fish producer, with second place in inland fish output, while Bihar is currently one of the top states in producing fish from internal waters due to the presence of the river Ganga and its many tributaries. As one of Bihar's key fish-market

locations, Patna gets fish from regional river fisheries, as well as from states like West Bengal and Andhra Pradesh. Nonetheless, a variety of issues undermine Patna's fish-market framework, including supply-chain fragmentation, in sum. lucent cold storage facilities, anaemic hygiene standards, meagre post-harvest infrastructure, an absence of digitally-enabled markets, and an absence of economic strength amongst merchants.

In addition to lowering effectiveness, these factors lead to losses in productivity. The study aims to analyse the organisational structure of fish-markets in Patna, investigate the socioeconomic attributes of fish sellers and their businesses, analyse the structure of supply chains and market channels, investigate and rank important market limitations employing Garret's technique, evaluate the scheme by SWOT analysis and offer recommendations to achieve optimum market performance. Previous studies emphasise issues of intermediary excess, absence of institutional finance, poor infrastructure for the cold-chain to post-harvest loss (PHL), and, to a significant degree, digital marketplaces and organisations for the benefit of fishermen to address the need for marketing. While the existing literature covers some of these problems, it lacks an in-depth investigation of inland urban markets for fish in eastern India. The study will help in a comprehensive investigation of the overall management of fish marketing in Patna.

MATERIALS & METHODS

Study Area

The study was conducted in the big markets of fish, Patna District, Patna, Bihar, India, such as in Rajapul fish market, Bazar Samiti fish market, Musallahpur Hat fish market, Bhikhna Pahari fish market, Machhua Toli fish market, Patna City fish market, and Kumhrar fish market. These market centres are the centre of diverse categories of fish markets of different kinds, nature and range of business. This was done since those sites represent diverse markets and have distribution patterns of trade and Geographical location in Patna city. The fieldwork for this survey was conducted in May and June 2026.

Sampling Design and Sample Size

The procedure of sampling used was a multi-stage stratified random sampling. In the first stage, the selected Primary sampling units were the seven most significant fish markets based on their commercial value. In the second stage, respondents were categorised into wholesalers, semi-wholesalers, retailers and consumers and selected at random proportional to the estimated numbers

in all sites with N=100 respondents. (n=11, n=24, n=14, n=3, n=9, n=28 and n=11) In the case of Rajapul fish market, Bazar Samiti fish market, Musallahpur hat fish market, Bhikhna Pahari fish market, Machhua Toli fish market, Patna City fish market and Kumhrar fish market, respectively.

Data Collection Instrument

The semi-structured interview schedule, designed and pre-tested among the fish traders, consists of 6 theme-based modules, viz., (i) demographic and socioeconomic profile, (ii) market operation and business information, (iii) market channel and value chain information, (iv) infrastructure and facilities, (v) constraints and problems faced, and (vi) awareness and access to government welfare schemes. The separate consumer schedule contained details on household data, fish consumption patterns, preferences, and price perception and experience of consumers. Both schedules were pre-tested on 10% sub-sample, and the revised schedule was used for data collection. Verbal informed consent of the respondent was obtained before collecting data.

Statistical Analysis

Descriptive and inferential statistical methods were adopted to analyse the collected data. Percentage analysis and average value were used to find socioeconomic characteristics of the respondents and economic variables. Price spread analysis was adopted for estimating marketing margins and the producer's share of the consumer's rupee. Operational problems were ranked by using Garrett's Ranking Technique, and the marketing system was assessed using SWOT analysis.

RESULTS

Demographic and Socioeconomic Profile of Respondents

The total number of respondents is 100, selected from 7 different fish markets. Most of them are male 87% while only 14% is female, which reflects the nature of a male-dominated profession. 63% of the respondents are of the working group age 30-50 yrs, 20% below 30 years & 17% above 50 yrs. The educational qualification level of the majority is very low i.e.53% have no education/ primary

education, 40% are higher secondary/ Intermediate education, while only 7% have graduate /post graduate degrees. Most of the respondents have experience between 10-20 yrs (39%), 5-10 yrs (28%), more than 20 yrs (20%) & less than 5 yrs (13%).

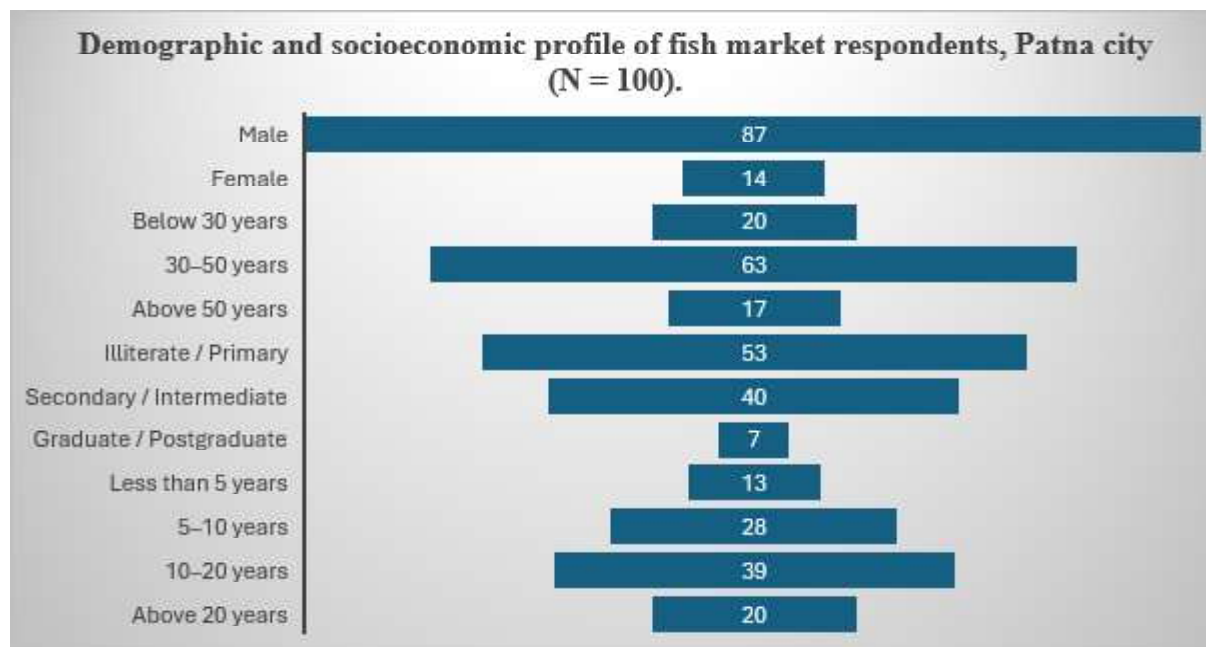


Figure 1. Demographic and socioeconomic profile of fish market respondents, Patna city (N = 100).

Source: Primary field survey, Patna city, May-June 2026.

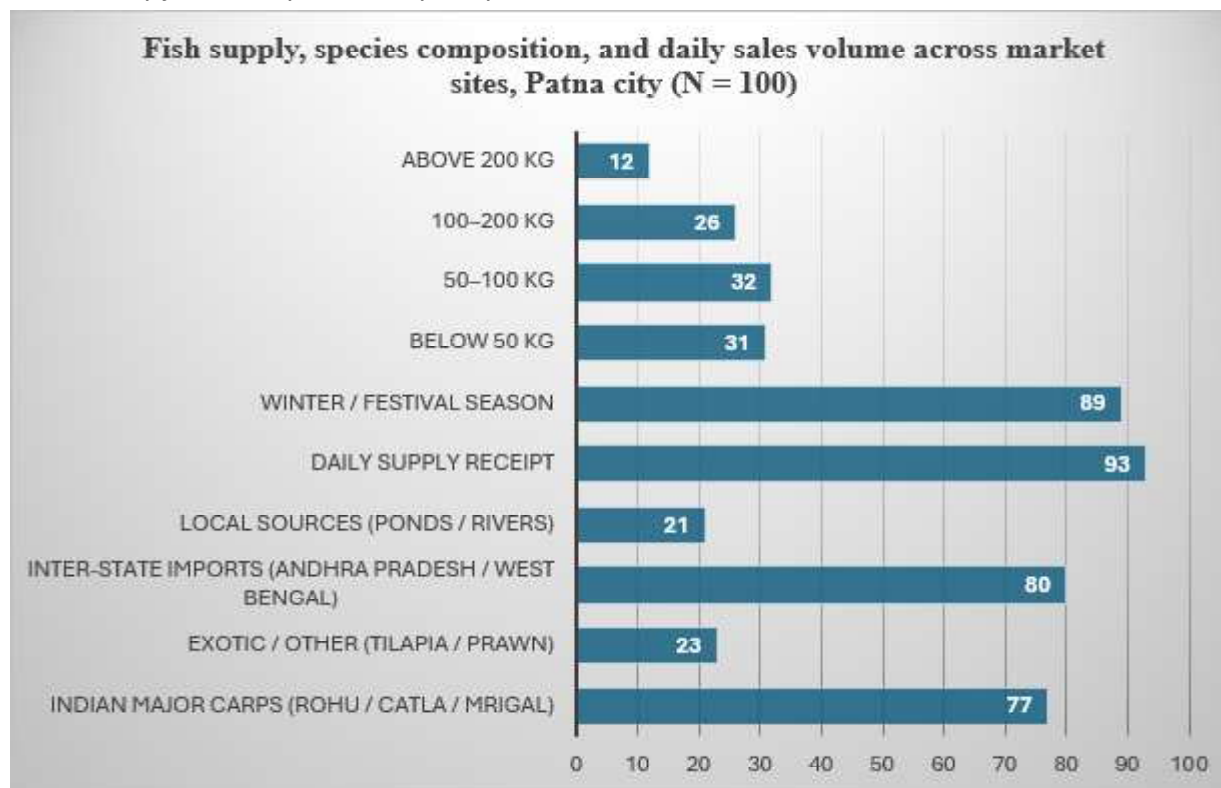


Figure 2. Fish supply, species composition, and daily sales volume across market sites, Patna city (N = 100).

Source: Primary field survey, Patna city, May- June 2026.

Fish Supply, Species Composition, and Market Operations

One hundred (100) fish vendors were interviewed, of whom 100% were actively involved in the fish business on a day-to-day basis. The Indian Major Carps (IMCs), including Rohu (*Labeo rohita*), Catla (*Catla catla*) and Mrigal (*Cirrhinus mrigala*) comprised of 77% of the vendor’s business, while the remaining 23% dealt with exotic and high-value fishes like Tilapia (*Oreochromis niloticus*) and Freshwater prawn (*Macrobrachium rosenbergii*). Eighty per cent (80%) of the fish vendors obtained fish by importing from other states such as Andhra Pradesh and West Bengal, while 20% purchased from local sources such as ponds, the River Ganga, and nearby fish farms. Ninety three percent (93%) of vendors received fish supplies daily. Thirty three percent (33%) of vendors claimed no effect of seasons, while 83% said business had a considerable/moderately high effect. Eighty-nine per cent (89%) of vendors had stated maximum demand for fish during the winter season and at major festivals. Out of the fish vendors interviewed, 31% sold less than 50 kg of fish per day, 32% sold

between 50-100 kg/day, 26% sold 100-200 kg/day, and 12% sold more than 200 kg/day. Consumers largely preferred live and fresh fish. Ninety two percent (92%) of vendors observed more preference for live fish than dead fish, and 95% vendors also reported that live or fresh fish also attracted customers in the market (Figure 2).

Health, Hygiene, and Economic Status

Infrastructure Survey Results. In sum, the infrastructure assessment indicated widespread vulnerabilities in the markets sampled. Potable water sources are only present at 42% of visited sites (58% of responses confirmed water wasn’t available at their sites). Refrigeration is available at just 14% of the sites visited (86% lacked any), and only 87% said they had ice available sometimes or often (a formal cold chain basically doesn’t exist at all). Over half of the responses (59%) identified sanitation conditions at their site as bad or very bad. There are apparently no adequate water drainage facilities at any of the sites. Odours, solid waste accumulation, and flies were a problem in 81% of respondents’ responses (Figure-3).

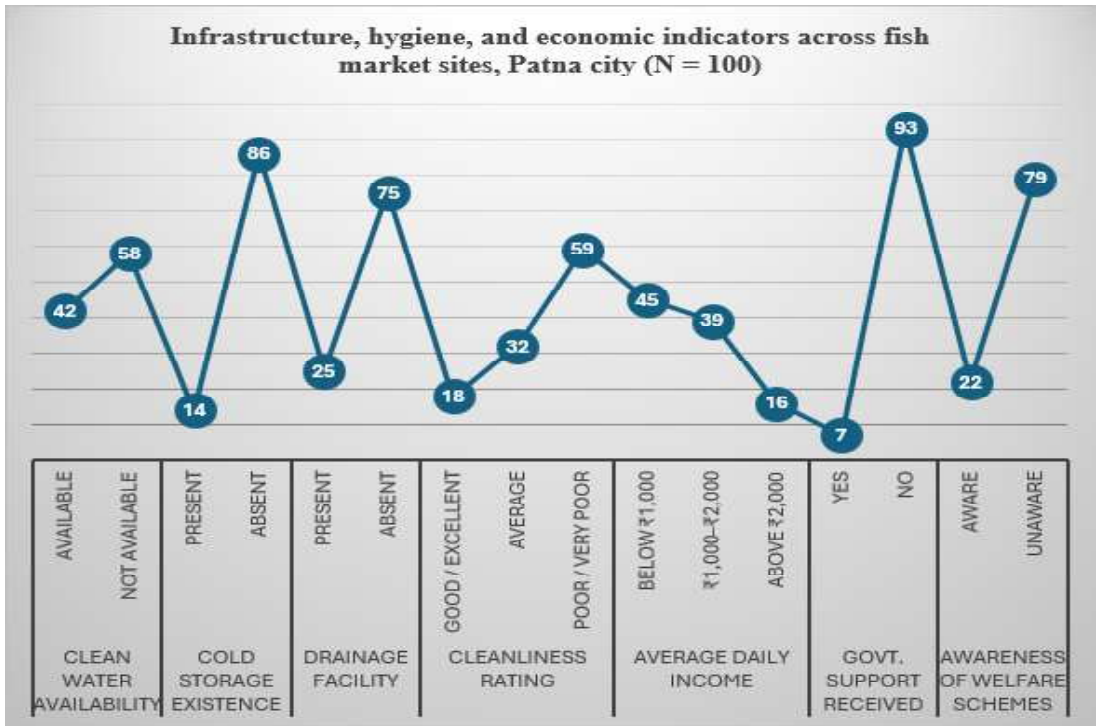


Figure 3. Infrastructure, hygiene, and economic indicators across fish market sites, Patna city (N = 100).

Source: Primary field survey, Patna city, May-June 2026.

Constraint Analysis: Garrett's Ranking

The ranking of perceived seriousness of the constraints in operations was performed by Garrett's Ranking Technique among 100 respondents. A summary of the ranking order with Garrett scores of the perceived seriousness of constraints among the 100 respondents is shown in Table 1. Rank I of serious constraint with the Garrett score was poor cold chain and post-harvest infrastructure; it was followed by the sanitation and hygiene of markets in Rank II (68.9); transportation and connectivity at Rank III (63.4); market fluctuations and uncertainty of the price at Rank IV (57.8); limited access to institutional finance and credit at Rank V (52.1); limited knowledge regarding government programs at Rank VI (46.7); digital access and e-commerce at Rank VII (41.2). Therefore, the ranking reflected infrastructure and transport as the highest priority areas that require investment, and digital market and finance as strategically important but lesser prioritised.

Table 1. Garrett's ranking of operational constraints faced by fish marketers in Patna city (N = 100).

Rank	Constraint	Mean Garrett Score	Rank Assigned
I	Inadequate cold chain and post-harvest infrastructure	74.3	I
II	Poor market sanitation and hygiene conditions	68.9	II
III	Inadequate transportation and market connectivity	63.4	III
IV	Price volatility and market uncertainty	57.8	IV
V	Restricted access to institutional credit	52.1	V
VI	Insufficient awareness of government welfare schemes	46.7	VI
VII	Limited digital market access and e-commerce adoption	41.2	VII

Garrett's Score computed using: Percent Position = $100 \times (Rb'' - 0.5) / N$; scores converted to Garrett values using standard conversion table [11]

SWOT Analysis

A SWOT analysis of Patna's fish marketing system revealed strong consumer demand and a well-established traditional market network with experienced vendors and good transport connectivity. However, major weaknesses include

inadequate cold chain facilities, poor sanitation, low educational and digital literacy among vendors, dependence on informal credit, and limited direct farmer-to-consumer linkages. Key opportunities lie in digital and cooperative-based marketing, government support through fisheries schemes, increasing demand for live and value-added fish products, and the expansion of online fish marketing. Major threats include competition from other states, climate change-related supply disruptions, rising transportation costs, and weak enforcement of hygiene standards. Overall, the sector has strong market potential but requires significant improvements in infrastructure, marketing, and regulatory support.

DISCUSSION

These findings are broadly in conformity with existing literature on fish marketing inefficiency in the inland urban centres of India, but at the same time bring out certain unique structural features of Patna fish market which require specific policy action. Male domination of vendors (87%), with 53% having low education and majority (85%) working in the age segment of 10-20 years, indicates the historical roots, family-based (hereditary) and segmented fish marketing system of eastern India and confirms largely observations made for this part of India by Kumar [6] and Mishra and Singh [7] in relevant contexts. Low education of fish vendors considerably curtails their ability to approach formal sources of credit, apply for any of the govt welfare schemes, connect to the digital market and maintain accounts. Inter-state import of fish from Andhra Pradesh and West Bengal (80%) reflects an inability to supply local fish to meet the demand of urban market, leading to a structurally dependent and precarious market. As observed by FAO [9] in developing countries, fish markets in urban inland areas increasingly dependent on the long-distance supply chain. Patna market is vulnerable to disruptions in the supply chain, increasing transportation costs and interstate price variations. Almost all vendors (86%) in the market reported not having access to even any form of cold storage, in the market while only 14% reported

some kind of storage. The study also identifies the poor performance of government welfare scheme, only 7% of the vendors reported having received government support, and 79% of vendors were ignorant of any welfare programs, which indicates problems with the implementation of government schemes and reaching urban vendors by the government implementing agency like PMMSY/NFDB [2]. The potential for e-marketing and group organisation of vendors that emerges from SWOT analysis is underexploited. That as many as 82% of vendors reported using UPI/digital payment shows basic internet literacy for monetary transactions, and a potential for building their capacity for using the Internet for e-commerce.

CONCLUSION

The study concludes that Patna's fish marketing system faces major challenges, including inadequate cold chain infrastructure, poor sanitation, inefficient transport, and weak institutional support, which reduce marketing efficiency, lower vendor incomes, and increase consumer prices. Strengthening cold storage, refrigerated transport, and icing facilities should be the top priority to minimise post-harvest losses and improve producer returns. Capacity building through vendor training, financial literacy, and awareness of government schemes, along with promoting cooperative marketing and regulating intermediaries, can enhance equity and market efficiency. Adoption of digital technologies for price information and e-trading, supported by improved digital skills and connectivity, can further modernise the sector. Future research should include longitudinal studies, broader geographic coverage across Bihar, and econometric analyses to assess the long-term impacts of these interventions.

STATEMENTS AND DECLARATIONS

Financial support was not received for this work from any funding agency. Data will be available from the corresponding author on reasonable request, subject to the confidentiality of participants. We equally participated in conceptualisation, methodology, investigation,

data acquisition, analysis, visualisation, manuscript writing and editing and overall supervision and approval of this work.

ACKNOWLEDGEMENT

We express our sincere thanks to all fish vendors, retailer and whole Saler, consumers, fish market administrative and traders in the sampled markets for their support during the entire process of data collection. We also wish to thank the P.G Department of Zoology, Patna University, and the supervision by the concerned teachers for their proper guidance and approval for the conducted study and related analysis, visualisation, and paper writing process.

REFERENCES

- Food and Agriculture Organisation 2024. *The State of World Fisheries and Aquaculture 2024: Blue Transformation in Action*. FAO, Rome.
- Ministry of Fisheries, Animal Husbandry and Dairying 2024. *Annual Report 2023–24*. Department of Fisheries, Government of India, New Delhi.
- National Fisheries Development Board 2024. *Annual Report 2023–24*. NFDB, Hyderabad.
- Kumar BG 2008. *Fish Marketing in India: Status, Constraints and Opportunities*. Indian Council of Agricultural Research, New Delhi.
- Sharma V, Pandey S 2012. Supply chain analysis of fish marketing in Muzaffarpur district, Bihar. *Indian Journal of Fisheries* 59(3): 71–78.
- Kumar R 2008. Socio-economic status and marketing behaviour of fish vendors in Patna city. *Journal of the Inland Fisheries Society of India* 40(2): 55–62.
- Mishra S, Singh RK 2001. Marketing efficiency and price spread in fish markets of Bihar. *Indian Journal of Agricultural Marketing* 15(2): 45–52.
- Roy A, Gupta S 2016. Fish marketing practices and constraints in Bihar: Impact of NFDB interventions. *Journal of the Inland Fisheries Society of India* 48(1): 60–68.

- Food and Agriculture Organisation 2022. *The State of World Fisheries and Aquaculture 2022: Towards Blue Transformation*. FAO, Rome. <https://doi.org/10.4060/cc0461en>
- Roth E, Satia B, Bavinck M 2008. *Fish Marketing and Credit in Developing Countries*. FAO/WorldFish, Rome.
- Garrett HE, Woodworth RS 1969. *Statistics in Psychology and Education*. Vakils, Feffer and Simons, Bombay.
- Althubaiti A 2016. Information bias in health research: Definition, pitfalls, and adjustment methods. *Journal of Multi-disciplinary Healthcare* 9: 211–217.
- Acharya SS, Agarwal NL 2011. *Agricultural Marketing in India*. 5th edn. Oxford & IBH Publishing, New Delhi.
- Kothari CR 2004. *Research Methodology: Methods and Techniques*. 2nd edn. New Age International, New Delhi.
- Department of Fisheries, Government of Bihar 2023. *Annual Report 2022–23*. Government of Bihar, Patna. <https://fisheries.bihar.gov.in/>
- Government of India 2020. *Pradhan Mantri Matsya Sampada Yojana (PMMSY): Scheme Guidelines*. Department of Fisheries, New Delhi.
- Indian Council of Agricultural Research 2022. *Handbook of Fisheries and Aquaculture*. ICAR, New Delhi.