The Biobrio ISSN : 2393-9508 e-ISSN: 2582-4902
An International Quarterly Journal of Life Sciences
Website: www.thebiobrio.in SJIF: 8.525
13(1&2): 1836-1843, 2026

A comprehensive survey of the demography, socio-economic and health status of the fishermen community along the Gangetic stretch from Fatuha to Gaighat, Patna District, Bihar, India

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Received : 17th May, 2026 ; Accepted : 17th June, 2026
DOI:- https://doi.org/10.5281/zenodo.21965190

ABSTRACT

It's undeniable that fishermen from India's Gangetic plain are among the poorest working populations - however, comprehensive, site-specific household data that captures their nutritional, social, health, and economic profile has hitherto been unavailable in Bihar, at the Fatuha-Gaighat corridor of River Ganga in Patna district. This paper presents a baseline cross-sectional, mixed-methods survey that collected data from 150 fishing households through a survey that used a structured questionnaire with 128 questions. Participants totalled 1,065, and the sample consisted of 4 major sub-castes involved in fishing: Nishad (38.7%), Mallah (28.0%), Bind (18.7%), and Kevat (9.3%). The average family size was 7.1, the dependency ratio is 0.83, and there were only 836 women for every 1,000 men in the population. Community literacy was low (58.3% of the population could read and write; for men, it was 69.8%, and for women, it was 45.0%), and the average monthly household income was 8,430. About 82.4% of families lived in poverty, with the highest income quintile earning 4.3 times the income of the lowest quintile. Income was extremely volatile through the seasons, from a high of 12,450 during the monsoons to a low of 3,800 in the dry season. Nearly 78.4% of households had experienced a waterborne disease in their lifetime; for children under five years, the rate of overall acute malnutrition was as high as 43.0%, which is 3 times the international threshold of 15%. The infant mortality rate was as high as 48 per 1,000 live births, which is almost 10 higher than the state average of 38. Awareness and uptake of a fisheries empowerment scheme run by the federal government (PM Matsya Sampada Yojana) were appallingly low, at only 12% and 0.5% respectively. This suggests a deeply impoverished and precarious community that relies on a degraded environment for survival, and points to an urgent need for holistic and integrated approaches in fisheries governance, nutrition and health care delivery.

Key Words - Ganga River fisheries; artisanal fishermen; socio-economic status; Bihar; inland fisheries; child malnutrition; occupational health; Fatuha-Gaighat; water quality; welfare schemes

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INTRODUCTION

The most ancient of all the livelihoods are fisheries found on the banks of Indian rivers and of all rivers of South Asia; it's the river Ganga that plays a significant role providing livelihood for a number of riverine households across an entire basin of over 8, 60, 000 sq. Km. In the present day, India

stands second among countries in global fish production which represents close to 8% of world output and achieved production of 197.75 lakh tonnes in 2024-25 (Ministry of Fisheries, Animal Husbandry and Dairying, 2025), with almost three-fourths being derived from inland fisheries. Bihar the central plains of which have been bisected by the river Ganga, stands 3rd at the national level with respect to inland fish production, with about 6 million fisherfolk livelihoods at risk in the region (COFFED, 2024; CIFRI, 2020).

The segment of the river Ganga in Patna spans over about 25km (Fatuha in the east to Gaighat in the west), with densely populated river banks, encroaching sub urbanisation, with a multitude of municipal and industrial pollutants coming from the neighbouring state capital.

The rate of fish yield from the Ganga in the middle part of the river has decreased significantly, a decline linked to unregulated fishing, sand extraction, altered flow regime (as a consequence of the Farakka Barrage) and river pollution (Singh *et al.,* 2013; Sarkar *et al.,* 2012). In Bihar, fishing communities that predominantly belong to the Nishad, Mallah, Bind, Kevat sub-castes form the bottom rung of the society; a deprived community with poor economic conditions, limited schooling, restricted access to health care and very little or no participation in formal welfare institutions or credit markets (Kumar *et al.,* 2015; Route *et al.,* 2016). The importance of the Ganga Fishery in Patna district and reliance of a significant proportion of households on this fishery, makes it important to study this region. This household level, demographic, economic, nutritional, health and environmental based empirical study has not previously been published for the 25km corridor stretch of the Ganga River between Fatuha and Gaighat.

This study seeks to provide such information to aid in future fisheries governance, public health and social welfare policy making.

Objectives 1. To record the demographic profile of fishing households along the Fatuha-Gaighat stretch, including subcaste composition, age distribution, household size, sex ratio, and literacy. **2.** To evaluate the socioeconomic and livelihood profile, which includes housing, municipal amenities, fishing methods, seasonal variations, and income structure of the fisherman community. **3.** To examine the community's health, nutrition, and maternal-child status using anthropometric measurements, and markers of healthcare access to each and everyone. 4. To record river water quality conditions, ecological information. 5. To evaluate sampled households' knowledge of and participation in government welfare and fishery programs.

MATERIALS & METHODS

Study Area: The study was conducted along a 25 km reach of the River Ganga in Patna district, Bihar, extending from Fatuha to Gaighat, encompassing six landing sites: Fatuha Ghat, Triveni Ghat, Kataiya Ghat, Devanti Ghat, Bhadra Ghat and Gaighat.

Table 1-

Ghat site	Enumerated HHs	Sample allocated	% of sample
Fatuha Ghat	53	25	16.7
Triveni Ghat	37	18	11.7
Kataiya Ghat	43	20	13.7
Devanti Ghat	58	27	18.3
Bhadra Ghat	74	35	23.3
Gaighat	52	25	16.3
Total	318	150	100

The corridor is distinguished by sandy diaras, steep river banks, and various sources of human-induced pollution; Patna produces roughly 600 million liters of sewage daily, with only 109 percent of it coming from indigenous sources.

Study Design and Sampling of the survey area

The design for a mixed-methods household survey was cross-sectional. The first census results showed 318 fishing households across the six ghat sites, with proportionate stratified random sampling of 150 (47.2%) and a 95% confidence level at approximately an 8% margin (see Table 1).

Data Collection of the fisherman community

The questionnaire: demographic profile, housing, sanitation, asset ownership, occupation, income,

debt, fishing practices, health, healthcare access, nutrition, food security, environmental perception, social exclusion, welfare (as described in the Appendix). The instrument was back-translated and pre-tested in Hindi by 15 households, with an average interview duration of 15-20 minutes. Using WHO protocols, they conducted 25 key-informant interviews, 8 focus-group discussions with around 60 participants, structured field observation and anthropometric measurements (height, weight, waistline), and mid-upper arm circumference. The study was successful. The classification of adult nutritional status was determined by the Body Mass Index, while children aged 6 to 59 months were classified according to their MUAC cut-offs.

Statistical Analysis

Data were analysed using descriptive statistics (frequencies, percentages, means, standard deviations), with sex- and quintile-disaggregated analysis for key indicators and seasonal comparison across three fishing seasons. Pearson's correlation coefficient was used to examine the relationship between perceived fish-catch decline and household income change. Benchmarking was performed against Bihar and national NFHS-5 data, Census 2011 and CIFRI (2020).

Section A: Fishing Practices & Livelihood

1. Fishing gear used:

2. Type of boat used:

3. Where do you sell your catch?

4. In your estimate, what percentage of the retail price do you receive for your fish?

Section B: Health Status & Healthcare Access

5. Has any household member suffered from the following in the past year?

6. What is your primary healthcare provider when someone is ill?

7. Does any member of your household have health insurance?

8. Is there a child under 5 years in your household? If yes, have they been fully vaccinated?

9. What are the main barriers to accessing healthcare?

Section C: Nutrition & Food Security

10. How many times per day does your household consume fish?

11. What happens to most of the fish you catch?

12. In the past month, has your household faced food shortage due to lack of money?

Section D: Environmental Perceptions & Ecological Knowledge

13. Compared to 10 years ago, how has fish availability in the river changed?

14. What do you believe is the main cause of declining fish catch?

15. How would you describe the quality of the river water now compared to 10 years ago?

16. Has flooding affected your livelihood in the past 3 years? loss (house/boat destroyed) & Yes - displaced household

17. Are you aware of the mandatory fishing ban (June-August)?

18. What government action would most improve your livelihood?

Section E: Social Exclusion & Welfare

36. Is your community represented by an active cooperative or fisher union?

38. Overall, how would you rate your household's quality of life compared to 5 years ago?

RESULTS

Demographic Profile

The Nishad community predominates in the area between Fatuha and Gaighat, according to a study of 150 households that was carried out. The largest sub-caste group was Nishad households (38.7%), followed by Mallah (28.0%), Bind (18.7%), Kevat (9.3%), and other groupings (5.3%). Similar to the caste hierarchy (Nishad 64%, Mallah 48%, Bind 36%), boat ownership structures uneven access to productive capital. The average age of the respondents was 42.3 ± 12.8 years, which is quite similar to the CIFRI–NMCG middle-Ganga mean of 43.67 years. Of the respondents, 13.5% were over 60 and still working without a pension.

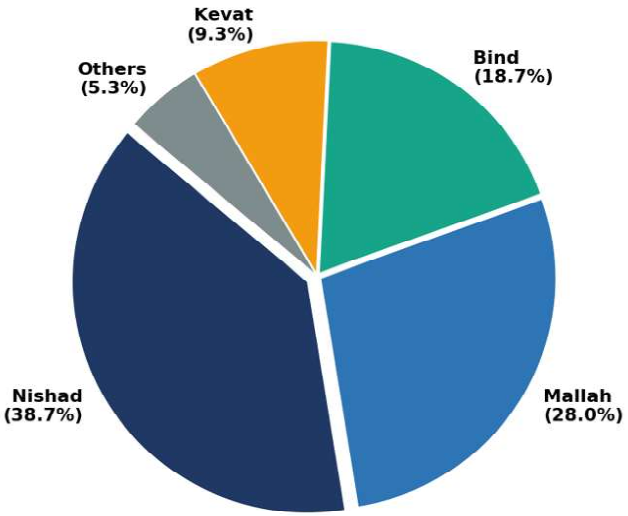

Fig. 1- Caste/ Sub-community composition of surveyed households (n=150)

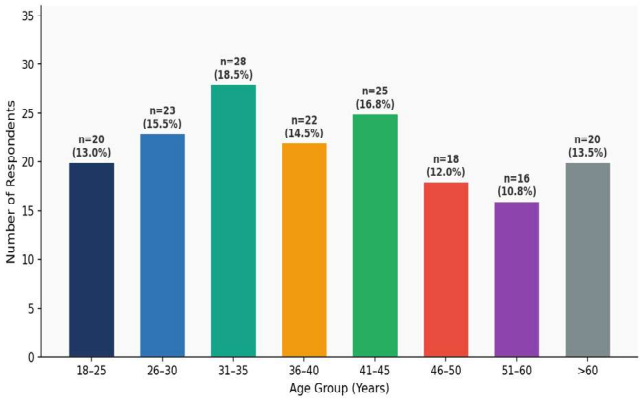

Fig. 2- Age distribution of surveyed respondents (n = 150)

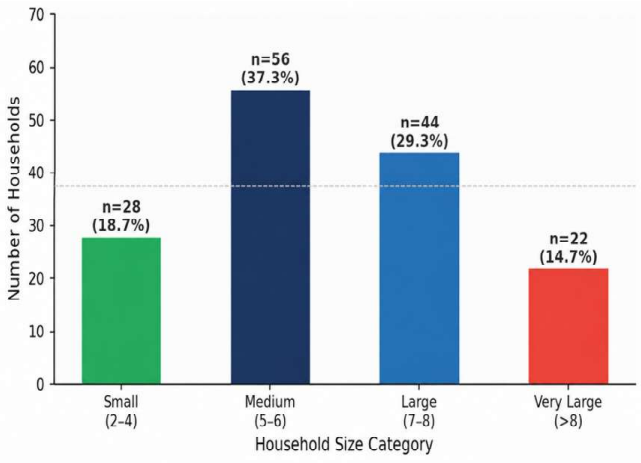

Fig. 3- Household size distribution(n = 150) Mean = 7.1 persons per household

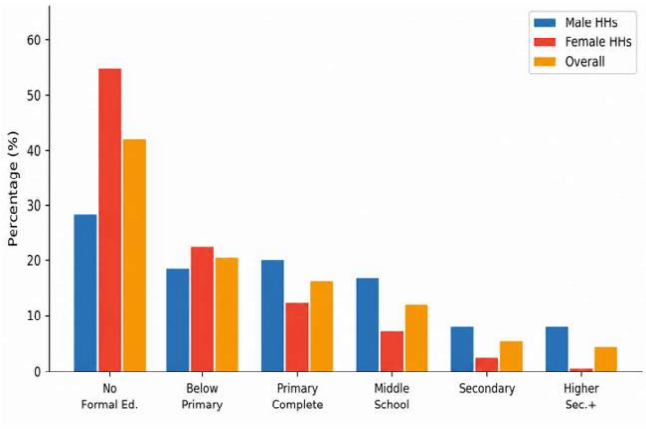

Fig. 4- Educational attainment by gender (n=150)

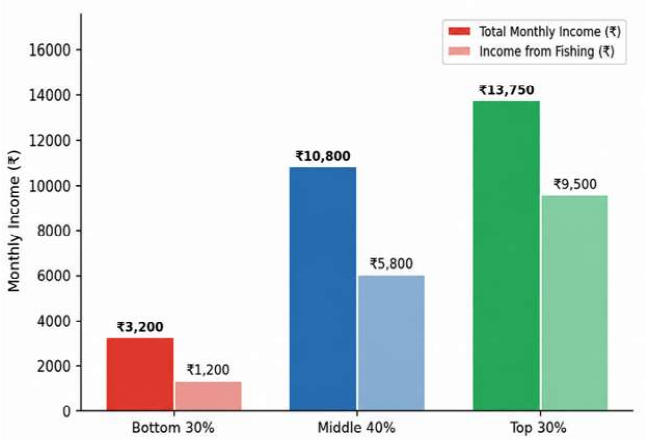

Fig. 5- Monthly household income by economic quintile (n=150)

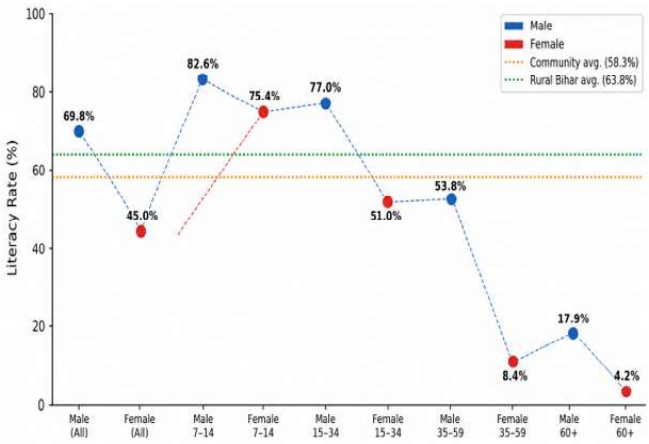

Fig. 6- Literacy rate by gender and age groups (population ≥ 7 years)

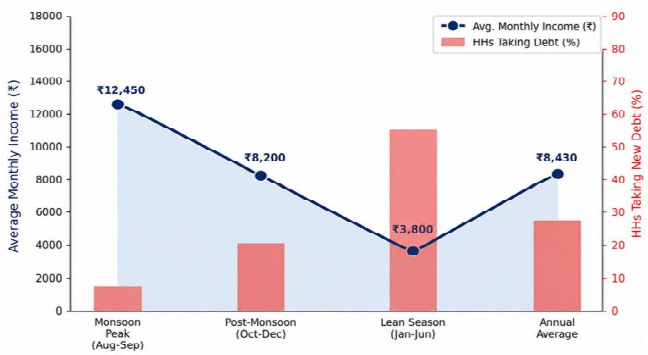

Fig. 7- Seasonal income fluctuation & debt burden among fishing households (n = 150)

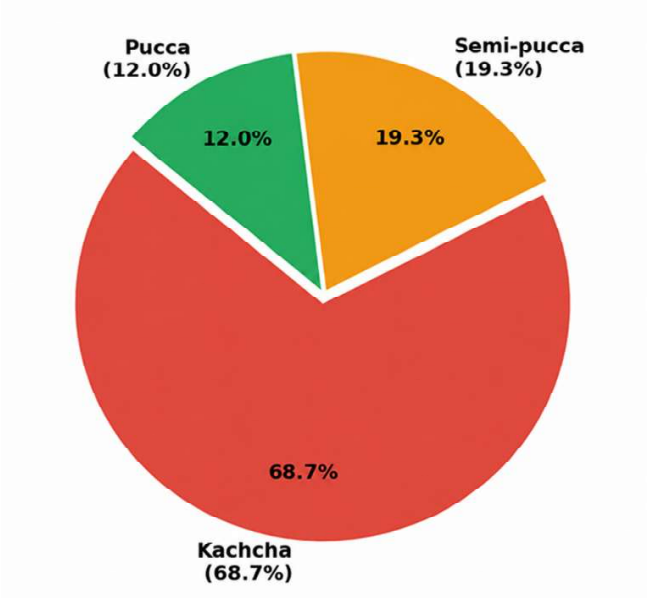

Fig. 8- Housing construction type among surveyed households (n = 150)

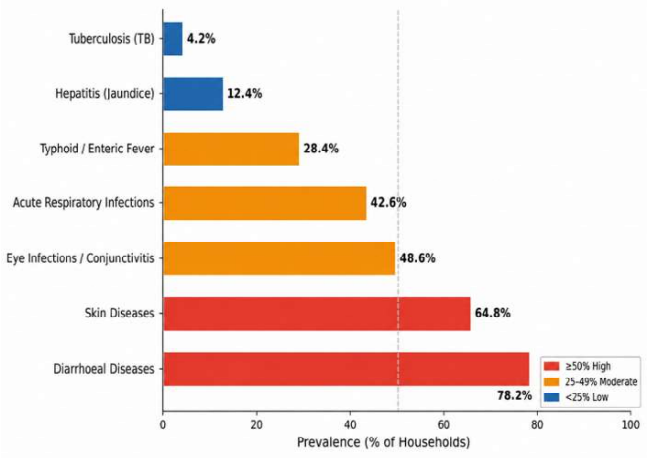

Fig. 9- Waterborne & infectious disease prevalence among fishing households (n = 150)

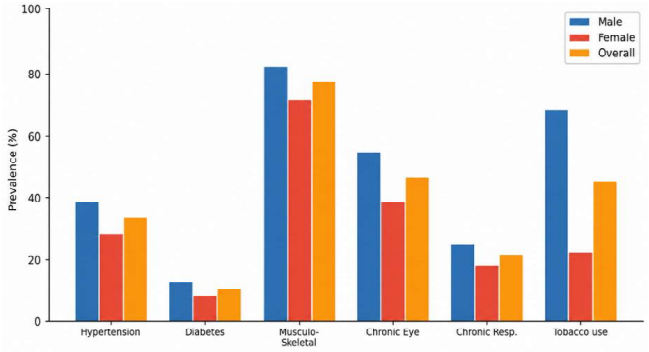

Fig. 10- Non-communicable disease prevalence by gender (n = 150)

Table 2-

Indicator	Study area
Adult underweight, BMI <18.5 (%)	40.5
Acute malnutrition, children 6–59 mo (%)	43
Anaemia in women (%)	68.4
Anaemia in children (%)	74.6
Complete antenatal care, 4+ visits (%)	42.6
Institutional delivery (%)	58.6
Infant mortality (per 1,000 live births)	48
Under-five mortality (per 1,000 live births)	62
Full childhood immunisation (%)	58.6
Any health insurance coverage (%)	18.6

The mean household size was 7.1 persons, exceeding the rural average of 5.8, with a dependency ratio of0.83 and joint family comprises of 52.7% household. The population displayed a skewed sex ratio of 836 females per 1000 males, well below rural Bihar average of 925 and national rural of 949, this indicates that a sustained female out- marriage rather than sex selection, since child sex below the age of 14 remained near balanced.

Education and Literacy

In Education, 41.8% of the population had no formal education in which males and females standing at 28.7% and 54.8%. Community litracy reaches at 58.3%, which trailed both the rural Bihar (63.8%) and national rural (68.9%).

The mean years of schooling were 3.8 years and only about 12% of the children reaches class 10. The gender gap in literacy widened sharply as the age progresses as only 8.4% females at the age of 35-59 years continue their studies, a pattern of direct implication for maternal health seeking behaviour and child nutrition.

Occupation, Income and Livelihood

Fishing was the principal and hereditary occupation of 88.7% of household, contributing 62% of households. The mean income of these households is around ¹ 5,227/month, though 72.4% operated under exploitative sharecropping or contractor arrangements that transferred 40-50%of catch value to boat owners and intermediaries. Income inequality within the community was pronounced as the top 30% of households earned ¹ 13,750 against ¹ 3,200 for the bottom 30%, a ratio of 4.3:1 driven chiefly by differential boat and engine ownership. Per-capita income (¹ 1,187) fell below the Tendulkar poverty line of approximately ¹ 1,650, and 82.4% of households lived below the poverty line.

Seasonal volatility in income was extreme as monsoon peak income increases to ¹ 12,450 and then fell by 69.5% to 3800 during the lean seasons, triggering meal reduction in 68% of households. Which makes them to borrow another loan at 24-60% interest for about 58% of the population.

The prevailing 'bigha' cash advance system tied fishers into recurring debt bondage to middlemen.

Gill nets are used by 68% of fishermen, only 34% owned a motorised boat, 72% sold their catch to middlemen, and 14% admitted to occasionally using electrofishing.

Housing, Sanitation and Civic Amenities

There were three main categories of housing conditions: 1. Kaccha 2. Semi Pucca 3. Pucca 38.0% of households resided on riverbed land without a stable tenure, while 68.7% of households lived in kachcha (mud/thatch) homes and only 12.0% in pucca housing. Despite coliform counts much over allowable limits (Section 3.8), 58.7% of families drank drinking water directly from the Ganga, reflecting the close proximity of towns to the river; open defecation continued in 54.0% of households, with only 13.3% purifying water before consumption. While mobile phone ownership (78.0%) and electricity access (74.0%) were quite common, formal bank account ownership (38.0%) remained low.

Disease Burden and Health Status

Waterborne and infectious disease dominated the morbidity profile: 78.4% of households reported diarrhoeal illness in the preceding year (rising to 92%)

In addition to skin illness (64.8%), eye infection (48.6%), acute respiratory infection (42.6%), and typhoid (28.4%), it accounts for 68% of morbidity in children under five during the monsoon peak (Figure 9). Nearly one-third of households were impacted by vector-borne illness, with malaria alone accounting for 32.4%. Occupational and non-communicable diseases were equally prevalent: 77.0% of respondents had chronic musculoskeletal problem, which was linked to extended bending and repetitive net hauling, and 71.7% of men had alcohol use disorder, which was associated with a 4.26-fold increased risk of drowning.

Only 10.4% of fishermen regularly wore personal protective equipment, and 82.4% had never undergone water safety instruction, indicating that inland fishing in the research area is still not covered by any occupational safety framework.

The infant mortality (48 per 1,000 live births) and under-five mortality rate (62 per 1,000) were well above Bihar's rates (38; 46) and national rates (28; 32), respectively. Of the under-five deaths, 6.8% were vaccine-preventable deaths and associated with missing due to migrant status and gaps in immunisation cover; Only 58.6% of under-five children achieved full childhood immunisation

Maternal Indicators for maternal and child health were far below state and national benchmarks. Only 42.6% of women received complete

Government Welfare Schemes

Fishing community members' awareness of and access to schemes targeted at their livelihoods, especially the PMMSY and MGNREGA, was negligible: PMMSY showed only 12% awareness and 0.5% benefits availed, while only 18 of 100 days were delivered through MGNREGA (Fig 13). Many reasons, such as absence of caste certificates (42%), BPL cards (38%), Aadhaar cards (18%), functional illiteracy (58%) and working hours that coincide

with the times when one must go out to sea to fish, prevent people from accessing these schemes; 94% of the households did not have membership of a fisheries cooperative, and 81.4% had not registered under a health insurance scheme.

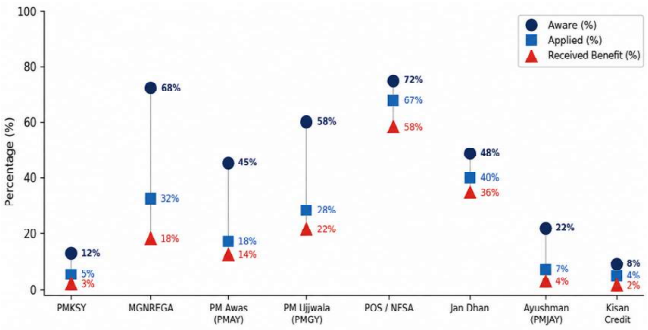

Fig. 11- Government scheme awareness, application & benefit realisation (n = 150)

DISCUSSION

Findings reveal severe, structurally entrenched, multi-dimensional deprivation a diagnosis of institutional failure spanning ecological governance, welfare delivery and healthcare access.

The 43.0% combined child acute malnutrition rate- undocumented previously for this stretch- illustrates the paradox of food production without food security: economic necessity compels sale of most catch. Literacy (58.3%, collapsing to 8.4% among women 35–59) functions as a cross-cutting multiplier of poverty, disease and exclusion, consistent with NFHS-5 evidence linking maternal illiteracy to higher child malnutrition and lower immunisation. PMMSY's near-total non-penetration (0.5%) mirrors national patterns documented by Narwadkar *et al.,* (2023) and Route *et al.,* (2016), reflecting 'paper inclusion, practical exclusion.' Compared with the Bhagalpur stretch (Aryan Raj, 2026), Fatuha–Gaighat's marginally better civic infrastructure does not translate into better health or scheme outcomes – urban proximity alone is insufficient without targeted outreach.

CONCLUSION & RECOMMENDATIONS

This study provides the first comprehensive, household-level baseline for 150 fishing households across six Fatuha–Gaighat ghats, documenting simultaneous educational, economic, nutritional, occupational, environmental and institutional deprivation. Priority interventions include: (i) targeted adult and female literacy programmes, given that literacy is the highest-leverage entry point for breaking the poverty–disease–exclusion cycle; (ii) an unconditional cash transfer during the monsoon fishing-ban period to offset the 69.5% seasonal income collapse; (iii) mobile Nutritional Rehabilitation Centres with ASHA-linked home visits to address the 43.0% child acute malnutrition rate; (iv) fortnightly mobile health camps and documentation-free Ayushman Bharat enrolment; (v) dedicated extension workers and in-situ document-facilitation camps to raise PMMSY penetration beyond its current 0.5%; (vi) targeted WASH interventions to reduce open defecation (54.0%) and untreated river-water consumption (58.7%); and (vii) formal engagement of the 82.4% of households willing to serve as 'Ganga Praharis' as an underused resource for participatory river-conservation governance, including meaningful consultation under Namami Gange.

ACKNOWLEDGEMENT

The authors gratefully acknowledge the fishermen and their families along the Fatuha–Gaighat stretch for their cooperation and willingness to share their experiences, and thank the P.G. Department of Zoology, Patna University, for institutional support during the course of this study.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

COFFED. 2024. Annual Report on Fisheries Development in Bihar. Cooperative Fish Farmers' Federation of Bihar, Patna.

Ekka, A., Katiha, P. K., Pandit, A., Barik, N., Shyam, S. S., & Ganesh Kumar, B. 2012. Socio-economic status of fishers of reservoirs in India. *J. Inland Fish. Soc. India*, 44(2), 79–87.

ICAR-CIFRI. 2020. Annual Report 2019–20. ICAR-Central Inland Fisheries Research Institute, Barrackpore.

Karuppusamy, S., Murugan, A. & Kumar, P.S. 2021. Socio-economic status of artisanal fishermen along the Coromandel Coast, India. *Indian J. Geo-Marine Sci.*, 50(5), 345–352.

Kumar, A., Baradwaj, A. & Kumar, S. 2018. Socio-economic conditions of fishermen community in Dholi, Muzaffarpur, Bihar. *Int. J. Social Sci. Econ. Res.*, 3(8), 4234–4244.

Kurien, J. 2017. The Blue Economy and Small-scale Fisheries: Challenges and Opportunities. ICSF, Chennai.

National Family Health Survey (NFHS-5). 2021. India, 2019–21: Bihar. International Institute for Population Sciences, Mumbai.

NMCG. 2017. Ganga River Basin Management Plan. Ministry of Water Resources, New Delhi.

Pauly, D. 1995. Anecdotes and the shifting baseline syndrome of fisheries. *Trends Ecol. Evol.*, 10(10), 430.

Route, S.K., Singh, B.K. & Kumar, D. 2016. Socio-economic condition of fishing community in Madhubani district, Bihar. *Int. J. Fish. Aquat. Stud.*, 4(3), 115–120.

Sen, A. 2005. *The Argumentative Indian: Writings on Indian History, Culture and Identity.* Farrar, Straus and Giroux, New York.

Singer, M. & Clair, S. 2003. Syndemics and public health: reconceptualizing disease in bio-social context. *Med. Anthropol. Q.*, 17(4), 423–441.

Singh, S.K., Upadhyay, A.K. & Kumar, A. 2013. Declining fish diversity in the Ganga River: causes and consequences. *J. Environ. Biol.*, 34(2), 345–352.

Susanna, Dr. P. Velayutham. 2023. Socio-economic status of fishermen in Thoothukudi district, Tamil Nadu. *Res Militaris,* 13(3): 6912-6920.

Tiwari, A. *et al.* 2023. Heavy metal contamination in the Ganga River near Fatuha industrial zone, Patna, Bihar. *Environ. Monit. Assess.*, 195(3), 412–428.

Vaseem, H. & Banerjee, T.K. 2016. Heavy metal contamination in fish of the Ganga River: bioaccumulation and human health risk assessment. *Environ. Monit. Assess.*, 188(5), 1–15.

World Health Organization. 2020. Health in Fishing Communities: A Global Overview. WHO, Geneva.