

# Analysis of Health Ailments and Associated Risk Factors in Small-Scale Fisherfolk Community of Indian Sundarbans: A Cross-Sectional Study

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## Abstract

**Background:** Small-scale fishers of Indian Sundarbans depend on open-water fisheries for their livelihoods. They often face health, occupational, and safety issues in their profession due to environmental, socio-economic, and policy changes. The morbidity pattern and related risk factors are important indicators of well-being for any community, hence applicable to small-scale fishers of Sundarbans. The present study was designed to assess patterns of morbidities, associated risk factors including occupational health hazards, and treatment-seeking behavior of small-scale fishers in the Indian Sundarbans. **Material and Methods:** Household surveys, focused group discussions, and personal interviews were conducted through a predesigned pretested structured questionnaire. Associated risk factors and the nature of seeking treatment were considered during the data collection covering 650 individuals from 132 fishers' families. **Results:** Morbidities were more frequent in males (39.33%) than in females (28.5%). The fever (31%) was the most dominant reason for morbidities followed by ocular ailments (23%), musculoskeletal disorder (20%), dermatological ailments (17%), and respiratory illness (9%). The highest morbidities (25%) were recorded in the age group of 21-30 years in males while that was 20% in the 11-20 years age group in the case of the females. Physical labor for fishing activities predisposes to health ailments of the studied population. **Conclusions:** The prevalence of morbidity among the fishermen community was found to be 28.5%. The understanding of the morbidity profile of a population in general and specific age groups of both sexes in specific sheds light on the vulnerability of working groups that will help for effective healthcare planning and resource allocation.

**Keywords:** Artisanal fisher, associated risk factors, health issues, morbidity pattern, Sundarbans

## INTRODUCTION

Small-scale traditional fishers of Sundarbans are highly dependent on nature for lives and livelihoods and the majority of the populace in Indian Sundarbans depend on fisheries directly or indirectly for their livelihoods.<sup>[1]</sup> Small-scale inland fisheries have the potential to play a key role in meeting United Nations Sustainable Development Goals (SDGs) 1 (no poverty), 2 (zero hunger), and 3 (good health and well-being) as they provide food and nutrition for billions of people globally, including protein and micronutrients<sup>[2]</sup> and their effective management is necessary to achieve the United Nations SDGs<sup>[3]</sup> in the context of India. Even though small-scale fishers are harnessing numerous benefits from fisheries, occupational health hazards and safety issues are

major concerns in this profession.<sup>[4]</sup> In many literatures, fishing is considered the oldest and one of the most perilous occupations in the world.<sup>[5,6]</sup> As per the World Health Organization, 2017 health is affected by the social, political, economic, and behavioral situation of any population, so is the case for the physical and

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mental health of this community as may be affected by the environmental, socio-economic, and policy change.<sup>[7]</sup>

The human face of Sundarbans is such that life is defined by extreme hardships, abject poverty, deprivation, and acute struggle against geographical challenges. The socio-economic status, socio-cultural variations, and poor connectivity affect the healthcare status of rural Sundarbans. Though health is the most important human development indicator and crucial in determining the level of welfare of individuals and a community, healthcare has been one of the most neglected aspects of development in this area. The healthcare infrastructure in Sundarbans is insufficient with respect to population pressure, i.e. 7 doctors/100,000 population.<sup>[8]</sup> Lack of access and a crumbling infrastructure<sup>[9,10]</sup> have resulted in a huge shortfall in the existing number of primary health centers (PHCs) and healthcare personnel under the public health system in Sundarbans. Frequent floods and occasional cyclones contribute to the prevalence, severity, and frequency of various ailments in the population. Poor education status and lack of hygiene further exacerbate the problem. Contamination of drinking water<sup>[11]</sup> or limited quantity of safe drinking water,<sup>[12]</sup> poor nutritional status, and food habits cause various illnesses and prolong convalescence. The remote and formidable geographic location and persistent hot and humid weather favor the occurrence of various infectious diseases which include water, food, and vector-borne diseases. For small-scale fishers, various occupational health hazards often contribute to the risk factors associated with vector- and water-borne infectious diseases. In this context, health-seeking behavior can be a tool for understanding how people interact with the healthcare systems in their respective socio-cultural, economic, and demographic set-ups. In Sundarbans, mortality and morbidity due to various communicable and non-communicable diseases are determined by socio-cultural variations, low socio-economic status, poor healthcare facilities, lack of awareness about health, and overall compromised living standards. While there have been some studies regarding the healthcare system of Sundarbans, no detailed epidemiological study has been carried out in this particular region. Primarily, the health status of the fishing community is linked to access to healthcare facilities and occupational aspects.<sup>[13]</sup> The present study was attempted with the objective of assessing the health status, the pattern of morbidities, access to healthcare facilities, and treatment-seeking behavior among the small-scale fishers residing in the Namkhana block of Indian Sundarbans.

## MATERIAL AND METHODS

### Selection of study site

The Sundarbans is a biodiversity hotspot located in the southernmost part of the Gangetic delta. This global heritage site is a unique biosphere reserve of mangrove forests intersected by innumerable tidal rivers creating a beautiful but largely hostile terrain. The areas of 54 islands outside the reserve forest are home to about 4.2 million people spread over 19 administrative blocks.<sup>[14-16]</sup> Among those, the

Namkhana block of South 24 Parganas (Sundarbans) was selected for the study. The present study was conducted on fisherfolk, particularly the small-scale fishers across various age groups from six villages surrounding Dwariknagar Rural Hospital (RH), which is under the administrative control of the Department of Health and Family Welfare, Govt. of West Bengal. The duration of the study was from April 2017 to March 2018. The entire area is intersected/separated by rivers and creeks; hence, the attendance of medical emergencies of the inhabitants is entirely dependent on the RH.

### Selection of samples

Six villages of Namkhana Gram Panchayat, namely, Narayanganj, Namkhana, Madanganj, Shibnagar abad, Dwariknagar, and Debnagar were selected purposively since these are the surrounding villages of the Dwariknagar RH. From these six selected villages, 110 respondents were selected randomly from each village from the 22 selected fishermen's households (whose primary occupation is fisheries). However, the non-response rate was 1.56% from the selected 132 households of the six villages. Therefore, a total of 650 individuals (from 132 households) in the fishermen's community were surveyed through the pretested questionnaire. For the children, the caregivers or guardians were also interviewed.

### Inclusion criteria

All the people residing in the study area, except those meeting the exclusion criteria, were eligible for selection as respondents.

### Exclusion criteria

Terminally ill people with prediagnosed conditions, who were under medication, were excluded from the study.

### Methodology of data collection

A predesigned pretested structured questionnaire including socio-demographic details and specific questions was developed to collect the necessary information based on study objectives. The household survey was conducted both to test the questionnaire and to collect data from fishers. The questionnaire was tested for the interview schedule and clarity of stated questions with a pilot study on 50 respondents from the study area. After checking the reliability of the questions, suitable modifications were made before finally using them to collect data from the respondents. The data was also collected through focused group discussion and personal interviews of the respondents as the interview and focused group discussion method along with the questionnaire guide helps the researchers to explore the respondents systematically<sup>[17]</sup> and add substantial depth to our understanding.<sup>[18]</sup> The cross-checking and verification of the collected data was done through the case study method at the Dwariknagar RH.

### Parameters studied

Socio-demographic and health profile was studied for all the fishers' families. For the socio-demographic profile, six variables, viz., age, sex, education, family description, and addiction to

tobacco and alcohol were studied. For the health profile, body mass index (BMI) was assessed as it provides a quick and easy way to measure whether a person has a healthy weight in relation to his height. BMI is a widely used anthropometric index for the assessment of the nutritional status in adults. BMI was calculated on the height and weight of respondents using the standard formula weight in kg/height in meters.<sup>[4]</sup> Overall morbidity and age-specific morbidity were also studied.

Morbidity refers to the prevalence of diseases and their impact on the health of a population. The morbidity rate was estimated based on the persons reporting ailment suffered and measures the frequency of illnesses prevailing during the reference period. However, we were reporting any ailment during a 15-day period per 1000 persons<sup>[19]</sup> using the formula as follows:

$$\text{Morbidity} = \frac{\text{Number of ailing persons}}{\text{Total Number of persons in the sample households}} \times 1000$$

Besides this, the associated risk factors were studied considering the varied household sanitation facilities and occupational health hazards associated with fisheries.

The five strata of healthcare facilities available in this region are the Sub-center (SC), Primary Health Center (PHC), Block Primary Health Center (BHPC), Rural Hospital (RH), and Sub-divisional Hospital (SDH). The Dwariknagar RH which has been upgraded to a RH from BHPC is the only hospital in the block. The number of PHC and SC in this block is 4 and 37, respectively. The sheer contrast between the number of health centers and the total population indicates a lack of healthcare facilities in this region. The lack of connectivity of residents to the health centers also acts as a serious factor in seeking treatment among patients of this region. Data was also collected on access to healthcare facilities and patterns of treatment-seeking during the survey including cause for delay in initiation of treatment, reasons for preferring the healthcare provider, mode of travel, etc.

### Data analysis

The data were compiled in a spreadsheet using Microsoft Excel, Microsoft Corporation software. Furthermore, SPSS, IBM and Microsoft Excel were used to analyze the data for descriptive statistics like mean, frequency, and percentage to achieve the desired outcomes of getting the answers to the questions each variable poses. The demographic profile of fishing households was analyzed through descriptive statistics like range, frequency, percentage, and mean values. The mode was also calculated. Data on age-specific morbidity profiles and morbidity patterns of the males and females of the fisherfolk community was calculated in terms of percentage. The risk factors associated with fisheries activities and treatment-seeking behavior were ascertained in terms of percentage.

### Ethics and consent

The approval for this study was obtained from the Institute Ethics Committee and dated 16.3.2021.

## RESULTS

### Socio-demographic and health profile

The age of the respondents ranged between 4 months and 76 years with an average of  $33.6 \pm 20.02$  standard deviation (SD) years and a median value is 35.5 years. Gender pattern was observed as 51% for males and 49% for females. The respondents were 22.9% illiterates, 29% completed the primary level of education, and 11% were high school passers. Among the adult respondents, 76.3% of the responding fishers were married with 46.6% of them being either widowed or separated. 68.7 percent of the respondents belonged to a joint family. The majority of the respondents (68%) were addicted to tobacco either chewable or smoking or both. About 61% of the adult male respondents consume alcohol frequently. It was revealed that 20% of the males, 26.2% of the females, and 23.6% of the children of the age group 1 to 10 years in the community were underweight [Table 1] as their BMI was less than 18.5. Among them, 5% of males, 3.3% of females, and 2% of children were reported to have severe thinness. A study on basic amenities available to fishers revealed tube wells as the source of drinking water for almost all the respondents. The type of toilet facilities available was in terms of households with 75% of the households with pucca toilets, 14% with kachha toilets, and 11% with no toilets.

### Morbidity profile

During the yearlong study covering 650 respondents from fishermen communities across various age groups revealed fever (31%) followed by ocular disease (23%), musculoskeletal disorder (20%), dermatological condition (17%), and respiratory illness (9%) to be the most prevalent ailments recorded in the study population. Morbidities were found to be more common in males (39.33%) as compared to females (28.5%). Overall, the prevalence rate of morbidity among the study populace was 28.5%.

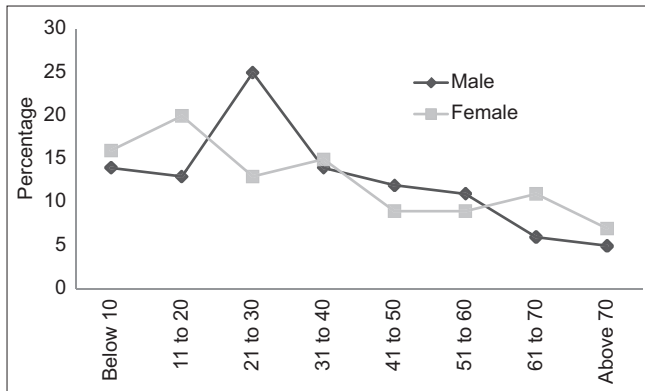
Differences were recorded in the distribution of morbidities among different age groups of both male and female respondents of the fishing community. In the case of the male population, the highest morbidities (25%) were recorded in the age group of 21-30 years followed by the below 10 years age group and 31-40 years age group (14%) closely followed

**Table 1: Percentage distribution of BMI in the fishermen community (n=650)**

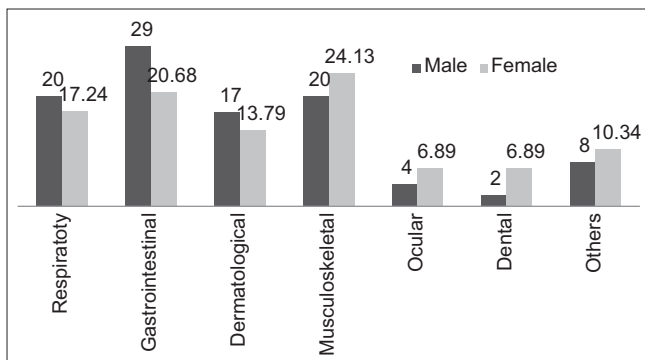
Classification	BMI (kg/m <sup>2</sup> )	Male (%)	Female (%)	Children (%)
Severe thinness	<16.00	5	3.3	2
Mild thinness	16.00-18.49	15	22.9	23.5
Normal range	18.50-24.99	70	70.1	73
Overweight	>=25	Nil	Nil	Nil
Preobese	25.00-29.99	10	3.3	1.5

\*Body Mass Index

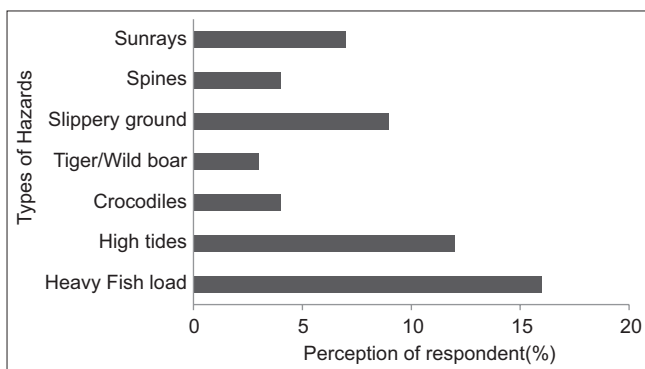
by the 11-20 (13%), 41-50 (12%), and 51-60 (11%) years age groups. The female populace had the highest morbidity in the 11-20 years age group (20%) followed by the below 10 (16%), 31-40 (15%), 21-30 (13%), and 61-70 (11%) years age group [Figure 1]. With respect to system-associated ailments of the body, the hierarchy of prevalence rates was 29%, 20%, 20%, and 17% in males for gastrointestinal disorder, musculoskeletal disorder, respiratory illness, and ocular ailments, respectively, as against 20.68%, 24.13%, 17.24%, and 13.79% in females showing more morbidity in males than females [Figure 2].



**Figure 1:** Age-specific morbidity profile of the fishermen community (N = 650)



**Figure 2:** Morbidity pattern of common ailments of fishermen community (N = 650)



**Figure 3:** Occupational hazards encountered by the small-scale fishers of Sundarbans (N = 516)

### Fisheries activities associated risk factors

Occupational hazards related to fishery are also potential risk factors that lead to various morbidity, as perceived by the respondents [Figure 3]. About 16% of the respondents perceived that carrying, pulling, or lifting heavy loads of fish and slippery ground (9%) in mangrove swamps often cause musculoskeletal injuries. Bites and pricks from spines (4%) or fins of the fishes/crabs sometimes cause abrasions, which create a gateway for various pathogens. The respondents also perceived that high tides (9%) during spawn collection, and spending a long time in salty water create dermatological problems and pose risks to life. Attack and life loss due to tiger (3%) or crocodile (4%) during fishing were also considered occupational hazards by the fishers.

### Treatment-seeking behavior during illness

The treatment for general morbidity issues can be categorized into two broad categories, namely, inpatient care and outpatient care. It was found that only 3.8% were hospitalized for various inpatient services which is almost similar to about 4.2% as recorded by the Institute of Health Management Research. A considerable number of the study populace (9.5%) primarily follows home remedies or depends on the traditional knowledge of elderly persons. A large number of the sampled populace (16.5%) depends on “Quacks” who are mostly unqualified medical practitioners.

The sampled population also tends to visit the SDH in Kakdwip (Distance from the study area ≈ 20 km) and the Super-speciality Hospital in Diamond Harbour (Distance from the study area ≈ 64 km) for better treatments. About 33% of the sampled population reported that they used to move to Diamond Harbour for treatment in Private Hospitals which added a burden of expenditure to the patients belonging to economically weaker fisher communities.

Most of the perceived constraints for availing healthcare by the fisher community include access to facilities, and medical infrastructure followed by financial matters related to livelihood. As Indian Sundarbans is a geographically disadvantageous place, lack of proper transport facility/link is perceived as a major constraint (73%) by the respondents to access the healthcare facilities on time. The long waiting period in Government Hospitals sometimes compels them to access costly private healthcare facilities. Most of the time the respondents are unable to afford this facility and therefore perceive it as one of the major constraints (69%). Some of the respondents (47%) also perceived that accessing healthcare services takes lots of time, thus it will lead to the loss of their working days and subsequently, affect their livelihoods.

### DISCUSSION

The most prevalent morbidity fever, often accompanied by headache is commonly associated with viral or bacterial infection or physical stress. The study area comes under a hot and humid mangrove environment. Further, the fishers are exposed to this hot humid weather for longer hours to carry out



multiple fisheries activities. Morbidity of eye-related disorders like eye diseases and vision disorders including cataracts and glaucoma were the second most prevalent ailments and may be associated with nutritional deficiency (primarily vitamin A), infections, aging, exposure to sunlight, and accidental injuries.<sup>[20]</sup> Low back pain (LBP) is a common musculoskeletal disorder among farmers/fishers/agricultural laborers and is associated with lifestyle and occupation hazards.<sup>[21,22]</sup> The nature of morbidity and its prevalence rate depends on socio-economic conditions and predisposing factors including hygiene and nutritional aspects of the fishers. The socio-demographic pattern of the respondents highlighted that the working population was in the middle age group with prevalent illiteracy in the studied small-scale fisher's community. In the study area, the addiction of the fishermen community towards tobacco and alcohol was quite prevailing. A study in Denmark shows that the mortality and morbidity rate was higher among people with low education levels compared with higher education levels<sup>[23]</sup> showing the role of awareness and education level of the population on the mortality and morbidity profile of the populace. A similar trend was found in a study in Udipi Taluk, Karnataka which shows that the prevalence of tobacco use and alcohol consumption among fishermen were 64.5% and 45.6%, respectively.<sup>[24]</sup> The BMI of the study subjects was calculated from height and weight measurements and reflected the effect of both acute and chronic nutritional and energy status.<sup>[25]</sup> The higher prevalence of underweight and thinness in different age groups of the community may be due to malnutrition or imbalanced nutrition<sup>[26]</sup> and might have resulted in a higher prevalence of morbidities in both sexes. A study among the fishermen community of Bangladesh depicts that about 36% of the total community members had energy deficiency (BMI <18.5).<sup>[27]</sup> The morbidity scenario of an area like Sundarbans are in line with other studies and is characterized by a hot humid mangrove environment, changing climate, poor literacy, lower health awareness, and crippling poverty.<sup>[28]</sup>

The high occurrence of respiratory illness could be attributed to the poor socio-economic condition of the fisher communities<sup>[29]</sup> and abuses by tobacco. The use of solid fuels like wood and charcoal in households may also increase respiratory diseases among the respondents.<sup>[30]</sup> The most commonly reported gastrointestinal illnesses might be due to the poor sanitation and hygiene<sup>[31]</sup> and diet composition of the study population. Improper and poorly balanced diet can also be accountable for the high number of gastrointestinal illnesses as well as musculoskeletal ailments of the study population. Nutritional deficiency is often liable for low bone density and musculoskeletal problems. Deficiency of vitamin D may lead to bone pain, muscle weakness, low bone mass, and fractures.<sup>[32]</sup> Moreover, occupational skin problem, particularly scabies was found to be the common form of dermatological illness which are associated with the temperature and humidity of the particular region.<sup>[33]</sup> The hot and humid climate of Sundarbans along with the unhygienic living environment is contributing to

this dermatological problem caused by mite infestation. Other than that, dental problems, high blood pressure, and animal bites are also reported morbidities in this region.

The gastrointestinal, eyes, respiratory, and skin were the body systems affected most in the studied group which are influenced by socio-demographic parameters like poor literacy, poor BMI, and poor hygiene as evidenced by the availability of toilet facilities, nutritional status, poor economic condition, and fisheries-related occupational hazards and aggravate the vulnerability of the fisher folk to associated health ailments.

The studied populaces are mostly associated with fisheries-related activities. Activities associated with fisheries in this disadvantaged mangrove forested area pose potential risk to the fishers' population which may directly or indirectly lead to type and degree of different morbidities. Physical labor for fishing activities like carrying, pulling, or lifting fish catch on slippery ground in the mangrove, skin abrasions during fish harvest, and spending a long time in brackish water in the hot humid sun during spawn collection, harvesting, handling, grading, processing, and fishing predispose ailments of musculoskeletal and dermatological system and fever. Both males and females involved in small-scale fisheries in Indian Sundarbans face similar kinds of occupational hazards and risks.<sup>[34]</sup> A study reported that in Bangladesh, 75% of fishers are suffering from musculoskeletal injuries due to various fisheries activities.<sup>[35]</sup> The respondents also perceived that being taken away/attacked by a tiger<sup>[36]</sup> or crocodile<sup>[37]</sup> or wild boar is a serious hazard or risk associated with their occupation and may cause severe morbidity due to injuries and mortality as well. Unsafe drinking water, poor sanitation, improper feeding practices for infants and child, and consumption of tobacco and alcohol are general risk factors associated with income, education, access to the resource, distribution of resources, etc., and affects the health and predispose to health ailments. When we explore the various risk factors associated with the most prevalent morbidities of health ailments of Namkhana gram panchayat, considerable factors were associated with the general living conditions of the rural populace of Sundarbans.

The highest prevalence of morbidities in the 21-30 age groups of male respondents and the 11-20 age group of females was quite noteworthy and depicts working group of males and reproducibly vulnerable females are mostly affected. The childhood morbidity may have an association with health and hygienic conditions in early adulthood and adolescence.<sup>[38]</sup> A study reported an anxious picture of higher morbidity in the adult females of Madanganj village, Namkhana due to a lack of awareness of formal treatment-seeking tendencies in women in general in the studied region.<sup>[39]</sup> A similar trend was also found among rural women in Telangana.<sup>[40]</sup> The treatment-seeking from health agencies is more common among the age group of 46-65 years.<sup>[41]</sup> A study conducted in Southern India showed that the majority of families (48.15%) preferred to visit government hospitals, whereas the majority of those who

visited private doctors (55.54%) favored the allopath system of medicine.<sup>[42]</sup> Dependency on “Quacks” is reported to be due to easy access, availability of medicine on the spot, reduced transaction cost as compared with Govt. health centers, level of trust in “Quacks” and private practitioners from earlier favorable results, and non-availability of qualified doctors at the public facilities.<sup>[43]</sup> The PHCs serve as the initial point of contact of the local community with the medical practitioners. With a focus on the preventive, curative, and promotional components of healthcare, the PHCs are intended to offer the rural people primary integrated curative and preventative healthcare.<sup>[44]</sup> However, an insufficient number of beds available at BPHCs (45% in North Sundarbans, 73% in South Sundarbans, compared to 91% in other parts of West Bengal) showed that many patients were compelled to avail facilities and seek treatment from other multi-facility hospitals.<sup>[45]</sup>

## CONCLUSION

In the present study, the prevalence of morbidity among the fishermen community was found to be 28.5%. Higher prevalence of morbidities of fever, ocular disease, musculoskeletal disorder, and dermatological problems were related to occupation and general socio-demographic condition of the fishermen community. The productive population of both males and females was more morbid to health ailments. The understanding of the morbidity profile of a population in general and specific age groups of both sexes in specific sheds light on the vulnerability of working groups that will help for effective healthcare planning and resource allocation. Thus, the policymakers and development agencies may address the most prevalent health issues by targeted interventions in the health sector allocating resources for reducing occupational hazards and improving socio-hygienic conditions and livelihood that will improve health outcomes for the fishermen community of Sundarbans.

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## Conflicts of interest

There are no conflicts of interest.

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