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Research paper

Impact Assessment of Contaminated Water of Morar River, Gwalior (MP), India on Human Health Risks

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ABSTRACT

Water pollution is a big issue that mankind is facing in recent years. Life without water cannot be considered. Numerous individuals are either directly or indirectly suffering from diseases caused by contaminated water. The primary objective of this research is to provide a comprehensive understanding of the pollution occurring in Morar River and connecting area with which the local population is impacted by excessive pollution. The Morar River and its adjacent areas experience annual water pollution, and the situation is deteriorating. Contaminated water from the river is affecting men, women, and children in various harmful ways. Water is the most crucial necessity for carrying out household tasks, predominantly performed by women, making them more susceptible to illnesses linked to polluted water. Due to their low economic status, they have no alternative but to utilize this water for their daily activities. This study seeks to identify the sources of water pollution and examine how the local residents are impacted by different types of water-borne diseases through their everyday usage.

1. Introduction

Water resources are crucial in developing any area as they serve as a major source of potable, agricultural, and industrial water. Water contamination, caused by natural and anthropogenic activities, poses a significant threat to public health globally. Water quality is suffering greatly as a result of rising water demand. Urbanization, agriculture, and industrialization have all contributed to environmental pollution and degradation, which has a negative impact on the water bodies (oceans and rivers) that are essential to life and, ultimately, human health and sustainable social development (Xu et al., 2022). An estimated 80% of urban and industrial wastewater worldwide is released into the environment untreated, endangering ecosystems and human health (Mahala, 2024).

Concerns regarding water pollution are widespread as it damages people's health and well-being. To support life, improving public health, halting the development of waterborne illnesses, and access to clean, safe water is crucial. However, water quality may be harmed by several contaminants, rendering it unfit for daily use and consumption (Babuji et al., 2023). River Water pollution is one of the major concerns of many countries. In a country like India, where rivers are considered goddesses, numerous factors are responsible for the degrading quality of river water. All the factors affecting the quality of water should be handled with equal attention (Kamble, and Patil, 2012).

2. Study Area

Morar River was selected to assess the physico-chemical characteristics, Heavy metal and health survey along the river. Morar River originates from the Ramoua Dam and flows through Morar area mid of Gwalior city. During the flow from city in downstream sites a variety of point sources are joining the Morar River and discharge their raw effluents into it. The Morar river area under investigation lies between Ramoua Dam and Jaderua dam and their surroundings. The explore area enjoys humid to sub- humid type of climate characterized by extreme summers and chilly winters with large seasonal fluctuation in both temperature and rainfall. The temperature may rise up to 47^0 C in hottest month and may drop to less than 3^0 C in winter.

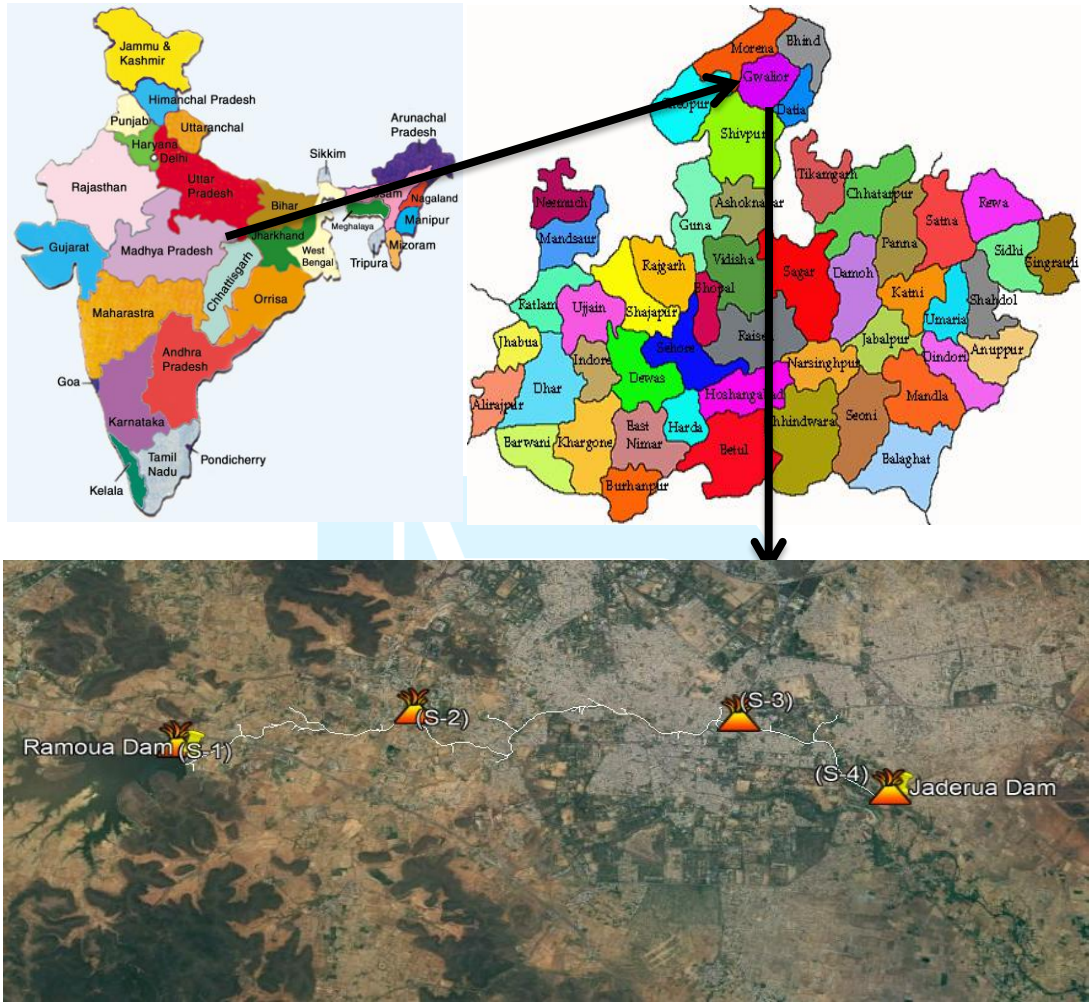

Fig. 1 Location map of study area (Courtesy: Google earth)

3. Methodology

Comprehensive interviews were conducted with a group of individuals to ascertain their present and historical health concerns. Additionally, secondary data were gathered to examine if the reported health changes by the local population aligned with the health indicators identified by local public health experts. The "Health Questionnaire" tool was utilized for data collection.

4. Result and Discussion

Qualitative information and various case studies suggest that pollution and health problems may have relation between them. Another worry throughout the stretch of a river was skin diseases, especially in the middle and lower stretch of a river. As this region is agriculturally flourished area and people directly pump the polluted water of river into their field. During investigation it was found that people generally pour the water with bare footed and they are in direct contact with polluted water. River water pollution occurs when pollutants are discharged directly or indirectly into rivers without adequate treatment of harmful compounds. It affects humans, plants, and organisms depending in these rivers. Water pollutants are damaging not only the individual species and populations but also the natural biological communities (Sahdev, 2024). Many water-borne diseases are spreading from man to man (Halder, *et al.,* 2015).

Human health impact was observed in different season during the study period during Oct 2024-Sep 2025 (Table 1 and 2). A health survey was also conducted to strengthen the work. The results undoubtedly verify that the quality of Ghaggar river

water is not suitable to withstand the aquatic life and not fit for domestic uses. The people living in Ghaggar river basin are facing various waterborne diseases due to polluted water of Ghaggar River (Pareek et al., 2020).

Occupational contact dermatitis was higher observed 31(14.62%) of N= 100 followed the age of (30-45 N=60) 20 (33.34 %), age of (46-60 N=40) 11 (27.5 %) people in summer season while lower occupational contact dermatitis was observed 18 (7.69 %) of N= 100 followed the age of (30-45 N=60) 11 (18.33 %), age of (46-60 N=40) 7 (17.5 %) people in monsoon season during Oct 2023-Sep 2024 and Occupational contact dermatitis was higher observed 37(14.45 %) of N= 100 followed the age of (30-45 N=60) 28 (46.67 %), age of (46-60 N=40) 9 (22.5 %) people in summer season while lower occupational contact dermatitis was observed 23 (8.81 %) of N= 100 followed the age of (30-45 N=60) 15 (25 %), age of (46-60 N=40) 8 (20%) people in monsoon season during Oct 2024-Sep 2025. The people here come into contact with the river water whilst using it for agricultural purpose or when they come for fishing (Halder and Islam, 2015).

Where eye irritation was found higher in monsoon season 25 (10.68 %) of N= 100 to followed the age of (30-45 N=60) 10 (16.67 %) age of (46-60 N=40) 15 (37.5 %) people while lower was found in summer season 17 (8.01 %) of N= 100 to followed the age of (30-45 N=60) 4 (6.67 %) age of (46-60 N=40) 13 (32.5%) people during Oct 2023-Sep 2024. Similarly during Oct 2024-Sep 2025 higher eye irritation was found in monsoon season 28 (10.72%) among the people N=100 followed the age of (30-45 N=60) 11 (18.33 %), age of (46-60 N=40) 17 (42.5 %) while lower eye irritation was recorded in summer season 14 (5.46%) among the people N=100 followed the age of (30-45 N=60) 6 (10 %), age of (46-60 N=40) 8 (20 %).

Chronic Bronchitis was found maximum 8 (3.41 %) among the people N= 100 to followed the age of (30-45 N=60) 3 (5 %), age of (46-60 N=40) 5 (12.5 %) in monsoon season while minimum was found 5 (1.77 %) among the people N= 100 to followed the age of (30-45 N=60) 1(1.66%) , age of (46-60 N=40) 4 (10 %) in winter season during Oct 2023-Sep 2024. During Oct 2024-Sep 2025 people was affected by chronic bronchitis was found maximum 10 (3.83 %) among the people N= 100 to followed the age of (30-45 N=60) 6 (10 %), age of (46-60 N=40) 4 (10 %) in monsoon season while minimum affected people recorded 6 (1.94 %) among the people N= 100 to followed the age of (30-45 N=60) 1(1.67%) , age of (46-60 N=40) 5 (12.5 %) in winter season.

Shortness of breath was found higher 8(3.77 %) of N= 100 followed the age of (30-45 N=100) 6 (10 %), age of (46-60 N=40) 2 (5 %) people in summer season while shortness of breath was found lower 3 (2.99 %) among the people N= 100 to followed the age of (30-45 N=60) 5 (8.33 %), age of (46-60 N=40) 2 (5 %) people in monsoon season during Oct 2023-Sep 2024. Shortness of breath was found higher 12 (4.68 %) of N= 100 followed the age of (30-45 N=60) 8 (13.33 %), age of (46-60 N=40) 4 (10 %) people in summer season while it was found lower 5 (1.91 %) among the people N= 100 to followed the age of (30-45 N=60) 2 (3.33 %), age of (46-60 N=40) 3 (7.5 %) people in monsoon season during Oct 2024-Sep 2025.

Shortness of Breath (walking fast and slow) was observed higher 6 (2.13 %) of N= 100 followed the age of (30-45 N=60) 1 (1.66 %), age of (46-60 N=40) 5 (12.5 %) in winter season while lowest was observed 4 (1.71 %) of N= 100 followed the age of (30-45 N=60) 1 (1.67 %), age of (46-60 N=40) 3 (7.5 %) people in monsoon season during Oct 2023-Sep 2024 and shortness of breath (walking fast and slow) was observed higher 11 (3.57 %) of N= 100 followed the age of (30-45 N=60) 5 (8.33 %), age of (46-60 N=40) 6 (15 %) in winter season while lower was found 5 (1.95 %) of N= 100 followed the age of (30-45 N=60) 3 (5 %), age of (46-60 N=40) 2 (5 %) in summer season during Oct 2024-Sep 2025.

Coughing was observed higher in summer season 13 (6.13) of N= 100 followed the age of (30-45 N=60) 5 (8.33%), age of (46-60 N=40) 8 (20 %) people while lower in monsoon season 9 (3.85 %) of N= 100 followed the age of (30-45 N=60) 4 (6.67 %), age of (46-60 N=40) 5 (12.5 %) people during Oct 2023-Sep 2024. Highly affected people from coughing was observed 26 (10.15 %) of N= 100 followed the age of (30-45 N=60) 9 (15 %), age of (46-60 N=40) 17 (42.5 %) in summer season while lowest affected people form coughing was observed 14 (5.36 %) of N= 100 followed the age of (30-45 N=60) 9 (15 %), age of (46-60 N=40) 5 (12.5 %) in summer season during Oct 2024-Sep 2025.

Chest pain found in maximum numbers of people 20 (9.43 %) of N= 100 followed the age of (30-45 N=60) 13 (21.67 %), age of (46-60 N=40) 7 (17.5 %) in summer season while it is found in minimum numbers of people 3 (1.66 %) of N= 100 followed the age of (30-45 N=60) 1 (1.66 %), age of (46-60 N=40) 2 (5 %) in winter season during Oct 2023-Sep 2024 and Chest pain found in maximum numbers of people 13 (5.07 %) of N= 100 followed the age of (30-45 N=60) 5 (8.33 %), age of (46-60 N=40) 8 (20 %) in summer season while it is found in minimum numbers of people 4 (1.29 %) of N= 100 followed the age of (30-45 N=60) 3 (5 %), age of (46-60 N=40) 1 (2.5 %) in winter season during Oct 2024-Sep 2025.

Physical disorders numbness was observed higher in summer season 15 (7.07 %) of N= 100 followed the age of (30-45 N=60) 5 (8.33 %), age of (46-60 N=40) 10 (25 %) people, injuries was higher found 13 (6.13 %) of N= 100 followed the age of (30-

45 N=60) 8 (13.33 %), age of (46-60 N=40) 5 (12.5 %) people in summer season, Anxiety was maximum 17 (7.26 %) of N= 100 followed the age of (30-45 N=60) 8 (13.33 %), age of (46-60 N=40) 9 (22.5 %) people in monsoon season, maximum numbers of weakness was recorded 31 (10.99 %) of N= 100 to followed the age of (30-45 N=60) 19 (31.67 %), age of (46-60 N=40) 12 (30 %) people in winter season, Weakness in any of your arms was higher found in monsoon season 14 (5.98 %) of N= 100 to followed the age of (30-45 N=60) 9 (15 %), age of (46-60 N=40) 5 (12.5 %), headache was observed higher in winter season 19 (6.73 %) N= 100 to followed the age of (30-45 N=60) 8 (13.33 %), age of (46-60 N=60) 11 (27.5 %) people, Depression was higher observed in winter season 24 (8.51 %) N= 100 followed the age of (30-45 N=60) 17 (28.33 %), age of (46-60 N=40) 7 (17.5 %) people while numbness was observed lower in winter season 6 (2.12 %) of N= 100 followed the age of (30-45 N=60) 5 (8.33 %), age of (46-60 N=40) 1 (2.5 %) people, injuries was lower found 3 (1.28 %) of N= 100 followed the age of (30-45 N=60) 3 (5 %), age of (46-60 N=40) people were not affected in monsoon season, Anxiety was minimum 11 (5.18 %) of N= 100 followed the age of (30-45 N=60) 9 (15 %), age of (46-60 N=40) 2 (5 %) people in summer season, minimum numbers of weakness was recorded 6 (2.83 %) of N= 100 to followed the age of (30-45 N=60) 1 (1.66%), age of (46-60 N=40) 5 (12.5 %) people in summer season, weakness in any of your arms were lower recorded 4 (1.88 %) of N= 100 followed the age of (30-45 N=60) 3 (5 %), age of (46-60 N=40) 1 (2.5 %) people in summer season, headache was observed lower in monsoon season 11 (4.70 %) N= 100 to followed the age of (30-45 N=60) 7(11.67 %), age of (46-60 N=40) 4(10 %) people, Depression was lower observed in summer season 7(3.30 %) N= 100 followed the age of (30-45 N=60) 5 (8.33 %), age of (46-60 N=40) 2 (5 %) people during Oct 2023-Sep 2024.

Physical disorders numbness was observed higher in monsoon season 17 (6.64 %) of N= 100 followed the age of (30-45 N=60) 10 (16.67 %), age of (46-60 N=40) 7 (17.5 %) people, injuries was higher found 13 (5.07 %) of N= 100 followed the age of (30-45 N=60) 11 (18.33 %), age of (46-60 N=40) 2 (5 %) people in summer season, Anxiety was maximum 22 (8.42 %) of N= 100 followed the age of (30-45 N=60) 13 (21.67 %), age of (46-60 N=40) 9 (22.5 %) people in monsoon season, maximum numbers of weakness was recorded 42 (13.64 %) of N= 100 to followed the age of (30-45 N=60) 27 (45 %), age of (46-60 N=40) 15 (37.5 %) people in winter season, weakness in any of your arms was maximum 12 (4.59 %) of N= 100 followed the age of (30-45 N=60) 7 (11.67 %), age of (46-60 N=40) 5 (12.5 %) people in monsoon season, headache was observed higher in winter season 22 (7.14 %) N= 100 to followed the age of (30-45 N=60) 8 (13.33%), age of (46-60 N=40) 14 (35 %) people, Depression was higher observed in winter season 25 (8.11 %) N= 100 followed the age of (30-45 N=60) 9 (15 %), age of (46-60 N=40) 16 (40%) people while numbness was observed lower in winter season 9 (2.92 %) of N= 100 followed the age of (30-45 N=60) 6 (10 %), age of (46-60 N=40) 3 (7.5 %) people, injuries was lower found 6 (1.94 %) of N= 100 followed the age of (30-45 N=60) 2 (3.33 %), age of (46-60 N=40) 4 (10 %) people in winter season, Anxiety was minimum 15 (5.85 %) of N= 100 followed the age of (30-45 N=60) 8 (13.33%), age of (46-60 N=40) 7 (17.5 %) people in summer season, minimum numbers of weakness was recorded 9 (3.44 %) of N= 100 to followed the age of (30-45 N=60) 6(10 %), age of (46-60 N=40) 3 (7.5 %) people in monsoon season, minimum numbers of weakness in any of your arms was recorded 5 (1.95 %) of N= 100 to followed the age of (30-45 N=60) 2(3.33 %), age of (46-60 N=40) 3 (7.5 %) people in summer season, headache was observed lower in summer season 9 (3.51 %) N= 100 to followed the age of (30-45 N=60) 8(13.33 %), age of (46-60 N=40) 1 (2.5 %) people and Depression was lower observed in summer season 7(2.73 %) N= 100 followed the age of (30-45 N=60) 2 (3.33 %), age of (46-60 N=40) 5 (12.5 %) people during Oct 2024-Sep 2025.

Biological hazards Sharp related injuries such as needle sticks cuts and wounds was observed higher 27 (9.57 %) N= 100 followed the age of (30-45 N=60) 15 (25 %), age of (46-60 N=40) 12 (30 %) people in winter season, Air borne diseases was found higher in monsoon season 31 (10.99 %) N= 100 followed the age of (30-45 N=60) 8 (13.33 %), age of (46-60 N=40) 23 (57.5 %) people, Infectious Diseases\ blood borne Pathogens\vectors was found in winter season higher 18 (7.69 %) N= 100 followed the age of (30-45 N=60) 10 (16.67 %), age of (46-60 N=40) 8 (20 %) people while Biological hazards Sharp related injuries such as needle sticks cuts and wounds was observed lower 13 (5.55 %) N= 100 followed the age of (30-45 N=60) 9 (15 %), age of (46-60 N=40) 3 (7.5 %) people in monsoon season, Air borne diseases was found lower in summer season 5 (2.35%) N= 100 followed the age of (30-45 N=60) 3 (5 %), age of (46-60 N=40) 2 (5 %) people and Infectious Diseases\ blood borne Pathogens\vectors was found in summer season lower 11 (5.66 %) N= 100 followed the age of (30-45 N=60) 6 (11.67 %), age of (46-60 N=40) 5 (12.5 %) people during Oct 2023-Sep 2024.

Biological hazards Sharp related injuries such as needle sticks cuts and wounds was observed higher 34 (11.03 %) N= 100 followed the age of (30-45 N=60) 23 (38.33 %), age of (46-60 N=40) 11 (27.5 %) people in winter season, Air borne diseases was found higher in winter season 29 (9.41 %) N= 100 followed the age of (30-45 N=60) 12 (20 %), age of (46-60 N=40) 17 (42.5 %) people, Infectious Diseases\ blood

borne Pathogens\vectors was found in monsoon season higher 15 (5.74 %) N= 100 followed the age of (30-45 N=60) 6 (10 %), age of (46-60 N=40) 9 (22.5 %) people while Biological hazards Sharp related injuries such as needle sticks cuts and wounds was observed lower 17 (6.51 %) N= 100 followed the age of (30-45 N=60) 11 (18.33 %), age of (46-60 N=40) 6 (15 %) people in monsoon season, Air borne diseases was found lower in summer season 17 (6.64 %) N= 100 followed the age of (30-45 N=60) 6 (10 %), age of (46-60 N=40) 11 (27.5 %) people and Infectious Diseases\blood borne Pathogens\vectors was found in winter season lower 8 (2.59 %) N= 100 followed the age of (30-45 N=60) 3 (5 %), age of (46-60 N=40) 5 (12.5 %) people during Oct 2024-Sep 2025.

Non Biological Hazards stress was observed higher in monsoon season 5 (2.14%) N= 100 followed the age of (30-45 N=60) 4(6.67%), age of (46-60 N=40) 1 (2.5%) people, Physical, psychological sexual or verbal abuse was observed higher in Monsoon season 2 (0.85%) N= 100 followed the age of (30-45 N=60) 2(3.33 %), age of (46-60 N=40) zero people and other chemical spills/noise/bums and radiations was higher observed 18 (6.38 %) N= 100 followed the age of (30-45 N=60) 13 (21.67 %), age of (46-60 N=40) 5(12.5 %) people in winter season while Non Biological Hazards stress was observed lower in monsoon season 2 (0.94%) N= 100 followed the age of (30-45 N=60) 2(3.33 %), age of (46-60 N=40) 0 people, Physical, psychological sexual or verbal abuse was not observed in summer season and other chemical spills/noise/bums and radiations was lower observed 8(3.77 %) N= 100 followed the age of (30-45 N=60) 6 (10 %), age of (46-60 N=40) 2 (5 %) people in summer season during Oct 2023-Sep 2024.

Non Biological Hazards stress was observed higher in monsoon season 3 (1.14 %) N= 100 followed the age of (30-45 N=60) 3 (5 %), age of (46-60 N=40) 0 people, Physical, psychological sexual or verbal abuse was observed higher in monsoon season 2 (0.76 %) N= 100 followed the age of (30-45 N=60) 2 (3.33 %), age of (46-60 N=40) 0 people and other chemical spills and radiations was higher observed 24 (7.79 %) N= 100 followed the age of (30-45 N=60) 10 (31.42 %), age of (46-60 N=40) 14 (35 %) people in winter season while Non Biological Hazards stress was not observed in winter and summer season, Physical, psychological sexual or verbal abuse was not observed in summer season and other chemical spills/noise/bums and radiations was lower observed 13 (4.98 %) N= 100 followed the age of (30-45 N=60) 5 (8.33%), age of (46-60 N=40) 8 (20 %) people in monsoon season during Oct 2024-Sep 2025.

Table 1 Seasonal observation of Impact on Human health during Oct 2023-Sep 2024

S. No.	Complaints	Monsoon Season			Winter Season			Summer Season		
	Age	N= 100	N=60 (30-45)	N=40 (46-60)	N= 100	N=60 (30-45)	N=40 (46-60)	N= 100	N=60 (30-45)	N=40 (46-60)
1	Occupational contact dermatitis	7.69	18.33	17.5	7.8	21.66	22.5	14.62	33.324	27.5
2	Eye Irritation	10.68	16.67	37.5	6.02	20	15	8.01	6.67	32.5
3	Chronic Bronchitis	3.41	35	12.5	1.77	1.66	10	3.3	3.33	12.5
4	Shortness of Breath	2.99	8.33	5	2.83	3.33	15	3.77	10	5
5	Shortness of Breath (walking fast and slow)	1.71	1.67	7.5	2.13	1.66	12.5	2.35	3.33	7.5
6	Coughing	3.85	6.67	12.5	4.25	6.66	20	6.13	8.33	20
7	Chest Pain	2.56	6.67	5	1.06	1.66	5	9.43	21.67	17.5
8	Numbness	5.12	13.33	10	2.12	8.33	2.5	7.07	8.33	25
9	Injuries	1.28	5	0	2.83	5	12.5	6.13	13.33	12.5
10	Anxiety	7.26	13.33	22.5	4.96	20	5	5.18	15	5
11	Weakness	8.54	21.67	17.5	10.99	31.67	30	2.83	1.66	12.5
12	Weakness in any of your arms	5.98	15	12.5	4.61	8.33	20	1.88	5	2.5
13	Headache	4.7	11.67	10	6.73	13.33	27.5	5.66	6.67	20
14	Depression	3.41	10	5	8.51	28.33	17.5	3.3	8.33	5
15	Sharp related injuries	5.55	15	7.5	9.57	25	30	7.54	15	17.5
16	Air borne diseases	10.25	28.33	17.5	10.99	13.33	57.5	2.35	5	5
17	Infectious diseases	7.69	16.67	20	4.25	8.33	17.5	5.66	11.67	12.5
18	Stress	2.14	6,67	2.5	1.42	6.66	0	0.94	3.33	0
19	Physical, psychological sexual	0.85	3.33	0	0.71	2.33	0	0	0	0
20	Other chemical spills	4.27	6.67	15	6.38	21.67	12.5	3.77	10	5

Table 2 Seasonal observation of Impact on Human health during Oct 2024-Sep 2025

S. No.	Complaints	Monsoon Season			Winter Season			Summer Season		
	Age	N= 100	N=60 (30-45)	N=40 (46-60)	N= 100	N=60 (30-45)	N=40 (46-60)	N= 100	N=60 (30-45)	N=40 (46-60)
1	Occupational contact dermatitis	8.81	25	20	5.84	20	15	14.45	46.67	22.5
2	Eye Irritation	10.72	18.33	42.5	6.16	8.33	14	5.46	10	20
3	Chronic Bronchitis	3.83	10	10	1.94	1.67	12.5	2.73	3.33	12.5
4	Shortness of Breath	1.91	3.33	7.5	2.27	5	10	4.68	13.33	10
5	Shortness of Breath (walking fast and slow)	3.44	11.67	5	3.57	8.33	15	1.95	5	5
6	Coughing	5.36	15	12.5	15.52	11.67	25	10.15	15	42.5
7	Chest Pain	2.68	6.67	7.5	1.29	5	2.5	5.07	8.33	20
8	Numbness	3.83	10	10	2.92	10	7.5	6.64	16.67	17.5
9	Injuries	3.06	1.67	17.5	1.94	3.33	10	5.07	18.33	5
10	Anxiety	8.42	21.67	22.5	6.16	18.33	20	5.85	13.33	17.5
11	General weakness	3.44	10	7.5	13.64	45	37.5	4.68	5	22.5
12	Weakness in any of your arms	4.59	11.67	12.5	2.27	8.33	5	1.95	3.33	7.5
13	Headache	5.36	8.33	22.5	7.14	13.33	35	3.51	13.33	2.5
14	Depression	4.59	6.67	20	8.11	15	40	2.73	3.33	12.5
15	Sharp related injuries such as needle sticks cuts and wounds	6.51	18.33	15	11.03	38.33	27.5	8.20	23.33	17.5
16	Air borne diseases	10.73	11.67	52.5	9.41	20	42.5	6.64	10	27.5
17	Infectious Diseases	5.74	10	22.5	2.59	5	12.5	4.29	6.67	17.5
18	Stress	1.14	5	0	0	0	0	0	0	0
19	Physical, psychological sexual	0.76	3.33	0	0.32	1.67	0	0	0	0
20	Other chemical spills	4.98	8.33	20	7.79	10	35	5.85	5	30

5. Conclusion

River pollution is an escalating issue in India today, factors contributing to river pollution must be managed, including industrial, agricultural, oil, social, and religious influences, as well as the disposal of untreated sewage, littering, urban activities, and domestic practices. It is essential that India's Water Conservation Act is adhered to diligently. Industrial water should be recycled following appropriate treatment procedures. The government must take significant measures to ensure the cleanliness of river water, and both the government and NGOs should work collaboratively to educate the public on the importance of rivers.

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