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Research Article

Burden and Pattern of Infectious Diseases among Tribal and Non-Tribal Peoples of North Bengal, India

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A B S T R A C T

Introduction: The present study was conducted to ascertain the types and patterns of infectious diseases among the diverse tribal and non-tribal populations living in tea gardens in North Bengal, India.

Method: The present study was conducted in five blocks in two districts of West Bengal, India. 71,609 patients visited our mobile medical clinics (MMCs) between April 2021 and March 2022. Descriptive statistics were used to draw our inference. To analyse the association between demographic factors and illness category, the multinomial logistic regression model was used.

Results: Overall, 14,841 patients with infectious diseases belonged to 61.9% (9190) tribal and 38.1% (5651) non-tribal populations. Females were more prone to reproductive tract infection (RTI), digestive infections, and oral health-related diseases than males. We observed significant gender and ethnicity disparities in the presenting complaints (p value ≤ 0.001). Block-wise, Dhupguri block showed more than four times the risk of gastrointestinal problems (AOR = 4.01; 95% CI: 3.02-5.33), more than twenty-nine times the risk of RTI/ urinary tract infection (UTI) (AOR = 29.99; 95% CI: 18.38-48.95), more than ten times the risk of ear, nose and throat (ENT) and eye problems (AOR = 10.25; 95% CI: 4.40-23.86) and more than three times the risk of oral problems (AOR = 3.75; 95% CI: 2.38-5.88) than the other blocks. Kalchini and Jalpaiguri block showed more than eleven and six times the risk of skin problems (AOR = 11.38; 95% CI: 9.83-13.18) (AOR = 6.63; 95% CI: 5.69–7.72) than the other illnesses, respectively.

Conclusion: For better treatment of infectious diseases, mobile medical clinics are useful for reaching tribal and non-tribal people living in underserved areas.

Keywords: Infectious Diseases, Disease Burden, Morbidity, North Bengal

Introduction

Infectious diseases have killed more people than famine, accidents, war and crimes.[1] Brazil, Russia, India, China, and South Africa (BRICS) countries accounted for 32% of infectious disease associated global deathsin 2019.[2] Infectious diseases account for 90% of global health issues and kill approximately 14 million people annually, with 90% of these individuals living in developing countries.[1] These diseases not only negatively impact an individual's health but also impose an economic burden.[3] The Lancet Global Burden of Disease study in 2016, revealed that communicable diseases accounted for 27.5% of all deaths.[4] The Global Burden of Disease (GBD) Project indicates that approximately 30% of India's disease burden is attributed to infections.[5] West Bengal's disease burden profile report reveals that non-communicable diseases account for 62.7% of the total, followed by communicable diseases at 24.8% and injuries at 12.6%.[6]

Despite the successful treatment of numerous life-threatening diseases through preventive, curative, and policy measures, infectious diseases remain the leading cause of death in low and middle-income countries (LMICs).[7,8] The majority of these infectious diseases have been observed in LMICs.[2,9] In 2002, 41% of DALYs globally contributed to infectious diseases, 47% were non-communicable diseases, and 12% were accidents, compared to 56% infectious diseases, 33% non-communicable diseases, and 11% accidents in low-income countries.[10]

Tribal communities, particularly primitive ones, are highly disease-prone, lacking access to basic health facilities and being neglected, and they are highly vulnerable to malnutrition, morbidity, and mortality.[11] The traditional healthcare system, a part of their medical knowledge, utilises both herbal and psychosomatic treatment methods.[12] According to the 2018 tribal health report, communicable diseases affect the tribal population disproportionately which include malaria (30% of all cases), tuberculosis (11% of the total population), skin infections (leprosy-18.5%), sexually transmitted diseases, typhoid, cholera, diarrhoeal diseases, hepatitis, viral fever, etc.[13]

Infectious diseases pose a significant public health threat due to their alarming nature, the emergence of new and re-emergence of old diseases.[14] Secondary hospital data can serve as a proxy indicator, as studies in India and other countries have utilised retrospective hospital data analysis for useful information.[15–17]

This article is the first to comprehensively address all age groups, and tribal and non-tribal patients in this region with infectious diseases. Only one study was found in India, which had studied the morbidity patterns among tribal and non-tribal patients in the Mysore district,[18] and three studies were found from West Bengal.[5,19,20] A few studies focused on the topic of communicable disease outbreaks in the northern districts of West Bengal.[19] The study utilised mobile medical clinic data to evaluate the current burden of infectious diseases and their trends, with the aim of suggesting future prevention and management measures.

Material and Method

Ethical approval

The MMCs have received endorsement from the MANT and the West Bengal Health Department. The current study received approval from the Human Research Ethics Committee of MANT without revealing any patient identities (MANT/CO/Research/HEC/2023/06/03). Verbal consent was secured from the respondent prior to data collection.

Study Area and Population

The present study was conducted in five blocks in two districts of West Bengal; Dhupguri and Nagrakata blocks from Jalpaiguri district and Kalchini, Alipurduar II, and Kumargram blocks from Alipurduar district of West Bengal. These blocks are selected through purposive sampling methods and MMC service availability. Overall, 71609 patients visited the five mobile clinics between April 2021 and March 2022. The data covers five blocks across twelve months, thus it is a panel data. We only included those people suffering from infectious diseases either diagnosed by MBBS doctors or by diagnostic tests. The people who visited us for the first time were included in our study. A total of 14,981 people (tribal: 9296 & non-tribal: 5685) visited our mobile clinics to diagnose infectious diseases for the first time considered for this study.

Health Service Programme

With assistance from the West Bengal Health Department, the institute has offered primary healthcare services since February 16, 2007 initially, under the Tribal Reproductive and Child Health Programme. At the beginning of 2012, these services were renamed as Mobile Medical Clinics (MMCs). Each MMC has one MBBS physician, nursing staff, lab technologist, pharmacist, and X-ray technician, making up a team of five individuals responsible for providing clinical services. The clinics are open for six hours each day and offer one fix-day, one fix-location, and one fix-time service. The regions or gram panchayats (the lowest level of government for a collection of villages) where the clinics serve are completely underserved areas, as these areas lack any primary health care centres (PHCs).

Assessment of Illness Categories

Different types of infectious diseases were classified as follows: cold, cough, and fever including cold, cough, fever,

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headache, and weakness. Skin problems include allergies, fungal infections, itching, ringworm, burn infections, leg abscesses, cellulitis, and scabies. Gastrointestinal problems include diarrhoea, dysentery, worms, abdominal pain, gastritis, loose motions, and digestive problems. Reproductive tract infection (RTI) and urinary tract infection-related problems include UTI, RTI, urine infection, abdominal pain in females (during menstrual time), and leucorrhoea. The respiratory problems include asthma, chest pain, and acute respiratory infection. Ear, nose and throat (ENT) and eye problems include eye, throat infection, tonsil, and vertigo. Oral problems include mouth infections, dental, and toothache. Other infectious diseases includefilaria, and tuberculosis.

Inclusion and Exclusion Criteria

We only included those people suffering from infectious diseases, either diagnosed by MBBS doctors or by diagnostic tests and visiting us for the first time between April 2021 and March 2022. People who have suffered from other diseases (except infectious diseases) are excluded from this study. Those patients who visited more than once with infectious diseases were not considered for the study as the study focused on enumerating the disease pattern among the targeted population.

Statistical Analysis

All data were entered on the Beta version of the data-collection software, exported into MS Excel, verified, cleaned up, and statistically analysed using SPSS software (version 27). Cramer's V test was used to know any association between the categorical data. The associations between demographic factors and sickness categories were examined using multinomial logistic regression.

Results

Table 1 shows the demographic characteristics-wise registration of infectious diseases (IDs) among the studied MMCs. Lower age groups (38.6%), females (54.1%), tribals (61.9%), Alipurduar districts (61.7%), and Kumargram blocks (23.3%) showed higher infectious disease registration than the others. Disease-wise, colds, coughs, and fever were observed to be the main health problems (62.5% of the total infectious diseases), followed by skin problems (22.0%), gastrointestinal problems (6.5%), RTI and UTI (3.8%), respiratory problems (2.7%), ENT, and eye problems (1.5%) among the studied MMCs (Figure 1).

Table 2 represents the sex, ethnicity, and block-wise distribution of infectious diseases within one year. A total of 14,841 out of 71,609 patients were found with infectious diseases from five blocks in two districts (Dhupguri and Nagrakata Blocks from Jalpaiguri district, Kalchini, Alipurduar II and Kumargram Blocks from Alipurduar district) and visited first time for treatment. Overall, 45.9% (6805) of males and 54.1% (8036) of females had infectious diseases; out of that, 61.9% (9190) were tribal, and 38.1% (5651) were non-tribal.

Table 3 represents the age, sex, district, ethnicity, and block-wise prevalence of different types of infectious diseases among the studied MMCs. The younger age group showed a high prevalence of RTI/ UTI (4.8%) and respiratory problems (3.7%). Adults had a high prevalence of skin (26.6%), and oral (1.5%) problems. Older age groups showed a high prevalence of colds, coughs and fever (73.1%), gastrointestinal problems (7.2%), and ENT and eye problems (1.8%). Females were more affected by digestive (6.9%), RTI/ UTI (5.1%), and oral health-related diseases (1.1%) than males. Alipurduar district and non-tribal people were more affected by colds, coughs, and fever, as well as digestive problems and ENT-related diseases, than Jalpaiguri district and tribal people. District and ethnicity-wise, significantly strongest associations were found (Cramer's V = 0.33 and Cramer's V = 0.16; $p \leq 0.001$) with the infectious disease categories, respectively. Block-wise, a high prevalence of gastrointestinal problems (8.7%), RTI/ UTI (17.7%) and oral-related problems (3.2%) was found in Dhupguri block. A high prevalence of respiratory (11.9%) and other (filaria, and tuberculosis) problems (0.3%) was observed in the Nagrakata block. Kalchini block had a high prevalence of skin diseases (45.7%), and ENT problems (6.2%), and Kumargram block had a high prevalence of cold, cough, and fever-related diseases (83.2%). Block-wise, significant associations were found (Cramer's V = 0.32; $p \leq 0.001$) with the infectious disease categories.

The association between demographic factors and illness category through the multinomial logistic regression model is represented in Table 4. Adults aged 26–40 years showed more than one time the risk (AOR = 1.48; 95% CI: 1.22–1.79) of skin problems than the other age groups. Jalpaiguri district showed a higher risk, likely more than six times the risk of skin problems (AOR = 6.63; 95% CI: 5.69–7.72) than the other illnesses. The Dhupguri block was found to be associated with a higher risk of gastrointestinal problems (AOR = 4.01; 95% CI: 3.02–5.33), RTI/ UTI (AOR = 29.99; 95% CI: 18.38–48.95), ENT and eye problems (AOR = 10.25; 95% CI: 4.40–23.86) and oral problems (AOR = 3.75; 95% CI: 2.38–5.88) compared to the other blocks. Kalchini block showed more than eleven times the risk of skin problems (AOR = 11.38; 95% CI: 9.83–13.18) and more than one times the risk of gastrointestinal problems (AOR = 1.59; 95% CI: 1.28–1.98) than the other illnesses and MMCs.

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Table 1.Demographic Characteristics-Wise Registration of Infectious Diseases

Variables	Categories	Frequency	Percentage
Age (years)	0.1–25 (younger age groups)	5732	38.6
	26–40 (adults)	3952	26.6
	41–60 (middle age groups)	3914	26.4
	> 60 (older age groups)	1243	8.4
Sex	Male	6805	45.9
	Female	8036	54.1
Ethnicity	Tribal	9190	61.9
	Non-tribal	5651	38.1
Districts	Jalpaiguri	5688	38.3
	Alipurduar	9153	61.7
Blocks	Dhupuri	2882	19.4
	Nagrakata	2806	18.9
	Kalchini	2552	17.2
	Alipurduar II	3145	21.2
	Kumargram	3456	23.3
Diseases	Cold, cough & fever	9276	62.5
	Skin problem	3260	22.0
	Gastrointestinal problem	967	6.5
	RTI & UTI	570	3.8
	Respiratory problem	405	2.7
	ENT & eye problem	221	1.5
	Oral problem	134	0.9
	Others (filaria- 1; tuberculosis- 7)	8	0.1

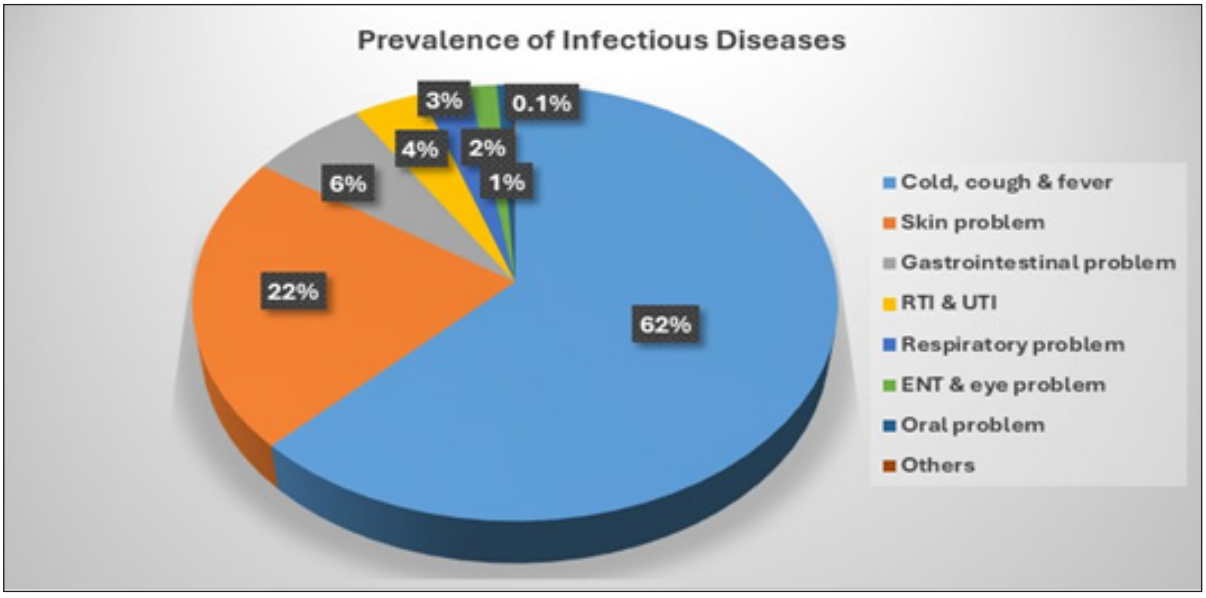

Figure 1.Prevalence (%) of Infectious Diseases among the Studied Patients

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Table 2.Block, Ethnicity and Sex-Wise Prevalence of Infectious Diseases (%) of the Participants

Districts	Studied Blocks	Male n (%)	Female n (%)	Tribal n (%)	Non-tribal n (%)	Overall N (%)
Jalpaiguri	Dhupuri	1093 (16.1)	1789 (22.3)	2714 (29.5)	168 (3.0)	2882 (19.4)
	Nagrakata	1384 (20.3)	1422 (17.7)	2512 (27.3)	294 (5.2)	2806 (18.9)
Alipurduar	Kalchini	1288 (18.9)	1264 (15.7)	1015 (11.0)	1537 (27.2)	2552 (17.2)
	Alipurduar II	1485 (21.8)	1660 (20.7)	1129 (12.3)	2016 (35.7)	3145 (21.2)
	Kumargram	1555 (22.9)	1901 (23.7)	1820 (19.8)	1636 (29.0)	3456 (23.3)
Total		6805 (45.9)	8036 (54.1)	9190 (61.9)	5651 (38.1)	14841 (100)

Table 3.Demographic Variables-Wise Infectious Diseases (%) among the Studied Participants

Demographic Variables	Category	Cold, Cough & Fever	Skin Problem	Gastrointestinal Problem	RTI/ UTI	Respiratory Problem	ENT & Eye Problem	Oral Problem	Others	Cramer's V Test
Age (years)	0.1–25	3506 (61.2)	1223 (21.3)	397 (6.9)	278 (4.8)	210 (3.7)	74 (1.3)	36 (0.6)	8 (0.1)	0.08[d] (p = 0.000)
	26–40	2280 (57.7)	1050 (26.6)	214 (5.4)	185 (4.7)	108 (2.7)	54 (1.4)	61 (1.5)	-	
	41–60	2581 (65.9)	804 (20.5)	266 (6.8)	100 (2.6)	58 (1.5)	71 (1.8)	34 (0.9)	-	
	> 60	909 (73.1)	183 (14.7)	90 (7.2)	7 (0.6)	29 (2.3)	22 (1.8)	3 (0.2)	-	
Sex	Male	4307 (63.3)	1557 (22.9)	416 (6.1)	161 (2.4)	208 (3.1)	109 (1.6)	42 (0.6)	5 (0.1)	0.08[d] (p = 0.000)
	Female	4969 (61.8)	1703 (21.2)	551 (6.9)	409 (5.1)	197 (2.5)	112 (1.4)	92 (1.1)	3 (0.0)	
District	Jalpaiguri	2818 (49.5)	1482 (26.1)	314 (5.5)	528 (9.3)	356 (6.3)	64 (1.1)	118 (2.1)	8 (0.1)	0.33[a] (p = 0.000)
	Alipurduar	6458 (70.6)	1778 (19.4)	653 (7.1)	42 (0.5)	49 (0.5)	157 (1.7)	16 (0.2)	-	
Ethnicity	Tribal	5459 (59.4)	2025 (22.0)	596 (6.5)	514 (5.6)	351 (3.8)	117 (1.3)	120 (1.3)	8 (0.1)	0.16[b] (p = 0.000)
	Non-tribal	3817 (67.5)	1235 (21.9)	371 (6.6)	56 (1.0)	54 (1.0)	104 (1.8)	14 (0.2)	-	
Blocks	Dhupuri	1380 (47.9)	568 (19.7)	250 (8.7)	511 (17.7)	22 (0.8)	58 (2.0)	93 (3.2)	-	0.32[a] (p = 0.000)
	Nagrakata	1438 (51.2)	914 (32.6)	64 (2.3)	17 (0.6)	334 (11.9)	6 (0.2)	25 (0.9)	8 (0.3)	
	Kalchini	977 (38.3)	1167 (45.7)	144 (5.6)	42 (1.6)	49 (1.9)	157 (6.2)	16 (0.6)	-	
	Alipurduar II	2607 (82.9)	297 (9.4)	241 (7.7)	-	-	-	-	-	
	Kumargram	2874 (83.2)	314 (9.1)	268 (7.8)	-	-	-	-	-	
Total		9276 (62.5)	3260 (22.0)	967 (6.5)	570 (3.8)	405 (2.7)	221 (1.5)	134 (0.9)	8 (0.1)	

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Table 4.Multinomial Logistic Regression between Demographic Variables and Infectious Diseases among the Patients

Demographic Variables	Category	Skin Problem	Gastrointestinal Problem	RTI & UTI	Respiratory Problem	ENT & Eye Problem	Oral Problem	Others
Age (years)	0.1–25	0.84 (0.7–1.02)	1.00 (0.77–1.28)	1.14 (0.51–2.52)	0.49*** (0.31–0.75)	0.32*** (0.19–0.53)	0.46 (0.14–1.53)	-
	26–40	1.48*** (1.22–1.79)	0.87 (0.67–1.13)	1.78 (0.80–3.96)	0.56* (0.35–0.88)	0.54* (0.31–0.92)	1.79 (0.55–5.86)	-
	41–60	1.17 (0.97–1.43)	0.96 (0.75–1.24)	1.31 (0.58–2.96)	0.43*** (0.26–0.70)	0.69 (0.41–1.16)	1.38 (0.42–4.59)	-
	> 60	-	-	-	-	-	-	-
Sex	Male	1.17 (0.97–1.10)	0.89 (0.78–1.02)	0.55*** (0.45–0.67)	1.10 (0.89–1.36)	0.98 (0.75–1.30)	0.56** (0.38–0.81)	1.58 (0.38–6.64)
	Female	-	-	-	-	-	-	-
District	Jalpaiguri	6.63*** (5.69–7.72)	0.46*** (0.35–0.62)	-	-	-	-	-
	Alipurduar	-	-	-	-	-	-	-
Ethnicity	Tribal	0.84** (0.76–0.94)	1.09 (0.93–1.27)	0.97 (0.69–1.36)	1.30 (0.93–1.81)	0.79 (0.57–1.09)	1.29 (0.68–2.45)	-
	Non-tribal	-	-	-	-	-	-	-
Blocks	Dhupuri	0.65*** (0.57–0.74)	4.01*** (3.02–5.33)	29.99*** (18.38–48.95)	0.07*** (0.05–0.11)	10.25*** (4.40–23.86)	3.75*** (2.38–5.88)	-
	Nagrakata	-	-	-	-	-	-	-
	Kalchini	11.38*** (9.83–13.18)	1.59*** (1.28–1.98)	-	-	-	-	-
	Alipurduar II	1.00 (0.84–1.18)	1.01 (0.84–1.21)	-	-	-	-	-
	Kumargram	-	-	-	-	-	-	-

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Discussion

Overall, 71609 patients visited our mobile clinics between April 2021 and March 2022. A total of 14841 (20.73%) patients (9190/12.83% tribal and 5651/7.89% non-tribal) attend our mobile clinics for infectious disease diagnosis for the first time. The West Bengal disease burden profile report (2016) indicates that communicable diseases account for 24.8% of the total disease burden.[6] In 2016, the GBD Study revealed that communicable diseases accounted for 27.5% of all deaths.[4] The GBD project indicates that approximately 30% of India's disease burden is attributed to infections.[5] Previous studies indicate that the country's burden of infectious diseases remains at 27.5%.[22,23] A previous report published from Health and Family Welfare statistics in India (2019–2020) showed that 31.4% of patients were hospitalised for infectious illnesses.[24] So, present and previous studies show prevalence of infectious diseases varies from 21 to 33% of the disease prevalence.

In the case of the present study, colds, coughs, and fever were found to be the main health problems (62.5% of the total infectious diseases), followed by skin problems (22.0%), gastrointestinal problems (6.5%), RTI and UTI (3.8%), respiratory problems (2.7%), ENT, and eye problems (1.5%), oral (0.9%) and others (0.1%) among the studied MMCs (Figure 1). A previous report published from Health and Family Welfare statistics in India (2019-2020) showed that 9.9%, 4.2%, 5.9%, 3.6% and 11.1% of patients were hospitalised for gastrointestinal illnesses, respiratory illnesses, genito-urinary illnesses, eye problems and others problems respectively.[24] Another study conducted in Sikkim found out 22.6% were skin diseases, and 17.6% suffered from oral diseases.[25]

The younger age group shows a high prevalence of RTI/ UTI (4.8%) and respiratory problems (3.7%). Adults have a high prevalence of skin (26.6%), and oral health (1.5%) problems. Older age groups show a high prevalence of colds, coughs and fever (73.1%), gastrointestinal problems (7.2%), and ENT and eye problems (1.8%). North Bengal Medical College and Hospital's study revealed a high prevalence of diarrhoeal diseases (45.2%) in the 20-39 age group.[5] The global disease impact is particularly significant in developing countries, as most diseases impact children and adults during their most productive part of life.[26]

The present study shows that overall, 45.9% (6805) of males and 54.1% (8036) of females were found to have infectious diseases. Females were more affected by infectious diseases than males. There are several studies which found that women are more vulnerable to infectious diseases.[27-29] A study in West Bengal revealed that 66% of females and 34% of males were admitted due to infectious diseases.[20] According to the current and previous studies, females are more susceptible to infectious diseases, particularly digestive, eye, and genito-urinary diseases.

61.9% (9190) tribal and 38.1% (5651) non-tribal were found to have infectious diseases in the present study. Our study showed that tribal peoples were more affected by skin diseases (22.0%) than non-tribal peoples (21.9%). Another study conducted in the Gundlupet forest area, Mysore district, found similar results, i.e., 12.78% of the tribals were found to have skin diseases compared to 5.52% among non-tribals.[18] Our study shows that non-tribal peoples are more affected by digestive diseases (6.6%) than tribal peoples (6.5%). It may be the reason for the pattern of food intake and lifestyle pattern.

The present study interprets that Jalpaiguri district shows a higher risk, likely more than six times the risk of skin problems (AOR = 6.63; $p \leq 0.001$) than other illnesses. Blockwise, Dhupguri blocks show more than four times the risk of gastrointestinal problems (AOR = 4.01; $p \leq 0.001$), more than twenty-nine times the risk of RTI/ UTI (AOR = 29.99; $p \leq 0.001$), more than ten times the risk of ENT and eye problems (AOR = 10.25; $p \leq 0.001$) and more than three times the risk of oral problems (AOR = 3.75; $p \leq 0.001$) than the other blocks. Kalchini block shows more than eleven times the risk of skin problems (AOR = 11.38; $p \leq 0.001$) and more than one times the risk of gastrointestinal problems (AOR = 1.59; $p \leq 0.001$) than the other illnesses and MMCs. So, this result will be more helpful for a special focus on the basis of block-wise infectious disease risk.

Limitations

Socio-economic and demographic backgrounds are not included in the present study. Infectious disease-related risk factors are not observed. A large-scale and longitudinal study may be necessary to understand the exact trends and patterns of infectious diseases across different regions.

Conclusion

Overall, 20.92% of patients (12.98% of tribal and 7.94% of non-tribal) attend our mobile clinics to diagnose infectious diseases. The mobile medical clinics, as found in the study, have provided basic Outpatient clinic-like services needed for under-served populations. This is especially important in light of the data reported in the most recent Rural Health Statistics Report (2022), which highlighted that the healthcare in tribal areas is not adequately staffed.[30] The common ailments, as found in the report, may be considered in designing health care service delivery in similar areas in India. The prevention programme may also be designed to decrease the incidence and prevalence rate of such diseases. Out Patient Clinic data of each Community Health Centre may be regularly analysed to determine the block-specific risk of common ailments, and accordingly, both prevention and management programmes may be designed.

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Conflict of Interest: None

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