

# Morbidity among the tribal populations of West Bengal: A study based on data collected from the Mobile Medical Clinic

Biswajit Mahapatra<sup>1</sup>, Nirmalya Mukherjee<sup>1</sup>, Sajda Khatoon<sup>1</sup>,  
Paramita Bhattacharya<sup>1</sup>, Denny John<sup>1,2</sup>

<sup>1</sup>Centre for Public Health Research, Manbhumi Ananda Ashram Nityananda Trust (MANT), Kolkata, West Bengal, India,

<sup>2</sup>Faculty of Life and Allied Health Sciences, M.S. Ramaiah University of Applied Sciences, Bengaluru, Karnataka, India

## ABSTRACT

**Background:** Tribes are the most socially excluded group in the nation due to their restricted access to healthcare. There are little data on the real burden and distribution of illnesses among tribes. The present study determines the types and patterns of sickness among tribal populations in West Bengal. **Methods:** Five blocks from five districts in West Bengal were used for this cross-sectional study. Between the years 2018 and 2019, 52,189 patients visited these mobile medical clinics (MMCs), but only 36,128 were included in our study. Data were analyzed using the SPSS software (ver. 27.0). **Results:** Younger age groups (1-25 years) show higher primary registration compared to other age categories; older age groups (>60 years) show higher repeat registration. High prevalence in infectious diseases (44.5% of the total primary registration) and high repeated cases in NCDs (11.5% to 33.2%), which are nearly three times higher than primary cases (Cramer's V test = 0.29;  $P = .001$ ) are observed. Among the studied MMCs, Binpur II and Matiali MMC have more than two times the risk of gastrointestinal problems, while Madarihath MMC has more than one time the risk. Garbeta II MMC shows more than three times the risk of NCDs (adjusted odds ratio = 3.97; 95% confidence interval: 3.05-5.17) than the other diseases. **Conclusion:** The present study shows high prevalence of infectious diseases, injury and pain, NCDs, gastrointestinal problems, and vertigo in tribal populations of West Bengal.

**Keywords:** Mobile medical clinics, morbidity, tribal peoples, West Bengal

## Introduction

Indigenous people have different social, cultural, and economic roots from the rest of the population, and their status is entirely or partially governed by their own traditions, practices, and laws.<sup>[1]</sup> Scheduled Tribes make up 8.6% of India's total population (104.5 million people).<sup>[2]</sup> In India, 30% of rural residents travel more than 30

kilometers to receive primary healthcare, while more than 65% of rural residents lack access to essential medications.<sup>[3]</sup> In this situation, primary care providers like MMC, primary healthcare (PHC) physicians, and family physicians play an important role in providing healthcare services. Diseases have a "triple burden" on tribal societies due to high rates of malnutrition and infectious diseases, the onset of rapid urbanization and altering lifestyles and surroundings have resulted in an increase in noncommunicable diseases.<sup>[4]</sup> Information on the actual burden and trends of the illnesses that affect them is scarce and dispersed in the Indian context.<sup>[5]</sup>

Mobile medical clinics (MMCs) are one type of primary care provider that improves access to healthcare, especially for rural, vulnerable,

**Address for correspondence:** Dr. Nirmalya Mukherjee, Centre for Public Health Research (CPHR), Manbhumi Ananda Ashram Nityananda Trust (MANT), Kolkata - 700 078, West Bengal, India.

E-mail: nirmalya@cphr-mant.org

Received: 20-06-2023

Revised: 24-07-2023

Accepted: 18-08-2023

Published: 06-03-2024

### Access this article online

#### Quick Response Code:



**Website:**  
<http://journals.lww.com/JFMPC>

**DOI:**  
10.4103/jfmprc.jfmprc\_1018\_23

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**For reprints contact:** WKHL.RPMedknow\_reprints@wolterskluwer.com

**How to cite this article:** Mahapatra B, Mukherjee N, Khatoon S, Bhattacharya P, John D. Morbidity among the tribal populations of West Bengal: A study based on data collected from the Mobile Medical Clinic. *J Family Med Prim Care* 2024;13:627-34.

and underserved populations. MMCs that deliver medical services have the potential to improve access to high-quality, affordable healthcare for people living in underdeveloped countries.<sup>[6]</sup> Mobile health clinics are a viable option for both urban and rural populations in economically developing countries.<sup>[6]</sup> According to the literature, MMCs, the principal means of delivering healthcare in developing nations, have played a crucial role in providing not only primary healthcare but also specialized healthcare services in rural areas.<sup>[7,8]</sup> Additionally, it has been demonstrated that primary healthcare by MMCs are quite effective at providing health services to India's disadvantaged and underserved communities.<sup>[9]</sup> MMCs provider can offer not just primary healthcare but also specialty treatments in locations where fixed facilities are either limited or unavailable.<sup>[10]</sup>

In 2017, more than 10.3 million fatalities worldwide (18.6%) of a total of 55.9 million were attributed to infectious disease, maternal, neonatal, and nutritional causes, according to the World Health Organization's Global Burden of Disease research. Contrarily, noncommunicable diseases (NCDs) were responsible for 41 million or 73.4% of all fatalities worldwide.<sup>[11]</sup> In 2016, communicable diseases caused 27.5% of all fatalities, while NCDs caused 61.8% of all deaths, according to the Lancet Global Burden of Disease Study.<sup>[12]</sup> According to West Bengal's 2016 illness burden profile report, NCDs account for 62.7% of the state's overall disease burden, communicable diseases for 24.8%, and injuries make up 12.6%.<sup>[13]</sup>

The information gathered in India through community-based surveillance is woefully insufficient. There are very few studies on health aspects related to morbidity pattern among tribal communities in the Indian context. Ali *et al.* (2012)<sup>[14]</sup> examined the pattern of morbidity in both tribal and nontribal patients in the Mysore district, while Jain *et al.* (2015)<sup>[5]</sup> examined the burden and distribution of illnesses among tribal communities in the states of Chhattisgarh and Madhya Pradesh. In West Bengal, community-specific studies or community morbidity data among tribal populations have not been published yet, but three studies were identified focusing on communicable and infectious diseases. One study was undertaken on the pattern and trends of infectious diseases at North Bengal Medical College and Hospital<sup>[15]</sup> and another was on communicable diseases in the northern area of West Bengal.<sup>[16]</sup> There are very few studies on this subject, with only one focusing on the patterns and trends of several infectious diseases, including seasonal variations in West Bengal.<sup>[17]</sup> To the best of our knowledge, this paper presents the first ever analysis of the burden and pattern of illnesses among tribal patients suffering from various illnesses in West Bengal. The present study was conducted using data from primary care provider (MMCs) to evaluate the existing burden of sickness and its trends with the goal of providing future prevention and management strategies for such diseases.

## Material and Methods

### Study design

A cross-sectional study design was conducted between January 2018 and December 2019.

### Study setting and population

Clinic-level data collected from five MMCs in five districts of West Bengal (Matiali MMC in Jalpaiguri, Madarihat MMC in Alipurduar, Garbeta II MMC in Paschim Medinipur, Binpur II MMC in Jhargram, and Raipur MMC in Bankura district) [Figure 1]. Overall, 52,189 patients visited the MMC but only 36,128 patients were included in our study. We only included patients with any ailment who had been identified by MBBS doctors. As there was no age restriction, only tribal patients regardless of age group, all patients attending the MMC were included in the analysis. The study did not include any counselling and family planning services, any pathological tests such as blood groups, blood sugar, or pregnancy tests, etc.

### Data collection

Five MMCs have been chosen for this analysis based on data availability and using purposive sampling methods. MANT had delivered software in 2017 that was in its Beta form and was designed to capture clinic-level data. Each MMC is given a tablet on which to record information about each and every patient who has visited the clinics. The present study gathered basic information such as age, sex, and occupation, as well as information about the various illnesses and patient-related data. Also collected were those patients who repeated themselves many times in their illness.

### Primary healthcare provider and services

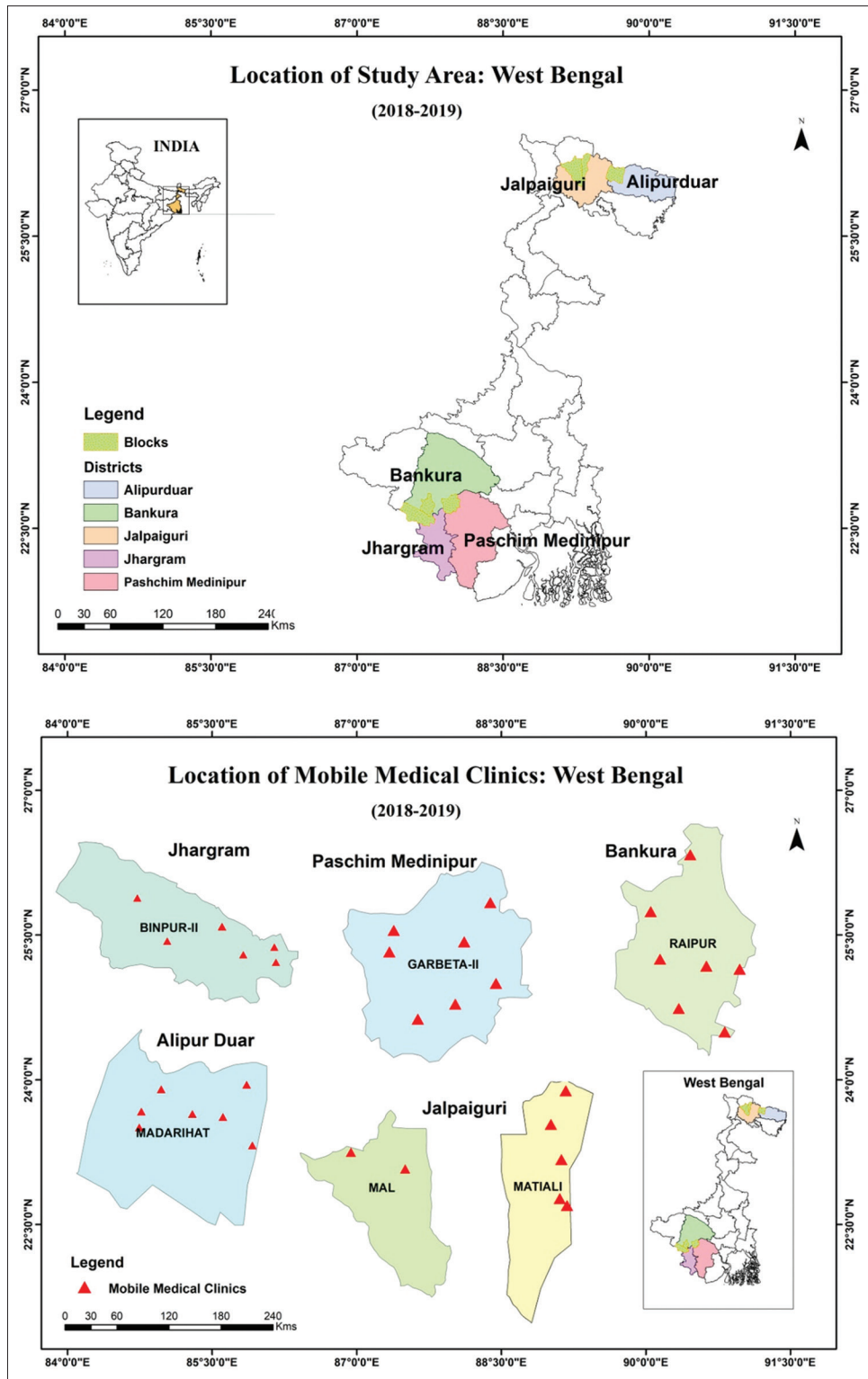
With assistance from the State National Health Mission, Government of West Bengal, MANT has been offering primary healthcare services since February 16, 2007. In 2012, these services were renamed MMCs. MANT has been implementing 23 clinics in 22 blocks in seven districts of West Bengal. A primary care physician (MBBS), nursing staff, a laboratory technologist, a pharmacist, and an x-ray technician make up a team of five individuals responsible for providing primary healthcare services. The clinics are open for six hours each day and offer one fix-day, one fix-location, one fix-time service. The regions or gram panchayats (lowest level of government for a collection of villages) where the clinics serve are completely underserved areas, as these blocks lack any PHCs.

### Assessment of illness categories

Infectious diseases including skin conditions such as eczema, boils, impetigo, scabies, ringworm, cold, cough, fever as well as tonsillitis and weakness, acute respiratory infections, urinary tract infections, worm infection, ear infection, eye infection, oral infection, glossitis, fungal infection, and sexually transmitted diseases. Injury and pain including lower back discomfort, leg pain, arthritis, joint pain, and hand injury. NCDs including diabetes and hypertension. Gastrointestinal problems including abdominal pain, gastritis, diarrhoea, dysentery, irritable bowel syndrome, and anorexia. Others included reproductive issues, anemia, and antenatal care. Vertigo was considered as a single disease category.

### Ethical clearance

The present research addressed the Declaration of Helsinki, a set of guidelines published by the World Medical Association



**Figure 1:** Location map among the five MMUs from various districts of West Bengal, India

to ensure the safety of human participants in medical research. The MMCs have been endorsed by the MANT and West Bengal Health Department. The present study approved by the Ethical Committee of MANT (Human Research Ethics Committee at MANT) without disclosure of any patient name (MANT/CO/Research/HEC/2023/06/03). Verbal

consent was obtained from the respondent before the data collection.

### Statistical analysis

All data were entered into MS Excel, verified, cleaned up, and statistically analyzed using SPSS software (version 27). The

connection between the category data was examined using the Cramer's V test. The associations between demographic factors and sickness category were examined using multinomial logistic regression. The cut-off value of Cramer's V test, according to Akoglu (2018), is <0.05, which is regarded as very weak or of no association, 0.05-0.10, which is regarded as weak association, >0.10-0.15, which is regarded as moderate association, >0.15 to 0.25, which is regarded as strong association, and >0.25 which is regarded as very strong association.<sup>[18]</sup>

### Results

Table 1 provides year-wise details of the patients attending MMCs. The present study included 36,128 participants (primary registration: 17,316; repeated registration: 18,812). In the case of primary registration, 12,317 (71.1%) patients made a single visit to any MMC. Four thousand nine hundred ninety nine (28.1%) individuals repeated themselves numerous times (between two and 63 times), with 18,812 individuals being repeat patients overall.

Table 2 shows the relationship between demographic factors and type of registration. Age categories demonstrate that younger age groups (1-25 years) had greater primary registration rates (38.1%) than older age groups, whereas older age groups (>60 years) repeat nearly twice (11.6%-23.4%) for illness diagnosis or treatment, and statistically strongest associations were found (Cramer's V test = 0.26; P = <.001). Compared to men, women register at a higher rate (57.8%). Higher primary registration (78.8%) and repeated registration rates (87.4%) are seen among children and the unemployed group. Across both years, the primary registration appears to have been nearly unchanged, while the first year (2018) included many returning patients. In terms of mobile medical units, Matiali MMC had higher primary registration rates (55.6%) and repeated registration rates (78.3%) with a strong statistical association (Cramer's V test = 0.36; P = <.001). Primary registration is high in infectious diseases (44.5% of the overall primary registration) and non communicable diseases (NCDs) have high repeated cases (11.5% to 33.2%), almost three

**Table 1: Characteristics of patients attending MMC clinics**

Variables	Category	2018		2019		Total	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
Total patient details (36128)	Primary registration	8,574	46.7	8,742	49.2	17,316	47.9
	Total repeated registration	9,781	53.3	9,031	50.8	18,812	52.1
Primary registration details (17316)	Not repeated (one time visit)	6,033	70.4	6,284	71.9	12,317	71.13
	Repeated many times (2-63 times)	2,541	29.6	2,458	28.1	4,999	28.87

**Table 2: Association between demographic variables and type of registration among the study participants attending the MMCs**

Variables	Category	Total registration, n=36,128 (%)	Primary registration, n=17,316 (%)	Repeated registration, n=18,812 (%)	Cramer's V test
Age	1-25 years	9,892 (27.4)	6,603 (38.1)	3,289 (17.5)	0.26 <sup>a</sup> ; (P= <0.001)
	26-40 years	7,199 (19.9)	3,609 (20.8)	3,590 (19.1)	
	41-60 years	12,629 (35.0)	5,092 (29.4)	7,537 (40.1)	
	> 60 years	6,408 (17.7)	2,012 (11.6)	4,396 (23.4)	
Sex	Male	15,920 (44.1)	7,300 (42.2)	8,620 (45.8)	0.04 <sup>d</sup> ; (P= <0.001)
	Female	20,208 (55.9)	10,016 (57.8)	10,192 (54.2)	
Occupation	Service	110 (0.3)	52 (0.3)	58 (0.3)	0.13 <sup>c</sup> ; (P= <0.001)
	Farmer	557 (1.5)	461 (2.7)	96 (0.5)	
	Daily wage labour	3,249 (9.0)	1,907 (11.0)	1,342 (7.1)	
	Others work	2,125 (5.9)	1,246 (7.2)	879 (4.7)	
Year-wise patient	Children, unemployed	30,087 (83.3)	13,650 (78.8)	16,437 (87.4)	0.03 <sup>d</sup> ; (P= <0.001)
	2018	18,355 (50.8)	8,574 (49.5)	9,781 (52.0)	
Districts (MMCs name)	2019	17,773 (49.2)	8,742 (50.5)	9,031 (48.0)	0.36 <sup>a</sup> ; (P= <0.001)
	Jalpaiguri (Matiali)	24,370 (67.5)	9,634 (55.6)	14,736 (78.3)	
	Alipurduar (Madarihat)	3,816 (10.6)	2,882 (16.6)	934 (5.0)	
	Paschim Medinipur (Garbeta II)	3,691 (10.2)	1,207 (7.0)	2,484 (13.2)	
	Jhargram (Binpur II)	2,186 (6.1)	1,674 (9.7)	512 (2.7)	
	Bankura (Raipur)	2,065 (5.7)	1,919 (11.1)	146 (0.8)	
Illness category	Infectious diseases	13,773 (38.1)	7,711 (44.5)	6,062 (32.2)	0.29 <sup>a</sup> ; (P= <0.001)
	Injury and pain	8,869 (24.5)	4,894 (28.3)	3,975 (21.1)	
	Non communicable diseases	8,241 (22.8)	1,993 (11.5)	6,248 (33.2)	
	Gastro-intestinal pain	3,285 (9.1)	1,470 (8.5)	1,815 (9.6)	
	Vertigo	1,083 (3.0)	457 (2.6)	626 (3.3)	
	Others	877 (2.4)	791 (4.6)	86 (0.5)	

Cramer's V test: 'a' means very strong association, 'b' means strong association, 'c' means moderate association, and 'd' means weak association (according to Akoglu, 2018)

times from the primary cases, with a very strong statistical associations (Cramer's V test = 0.29; P = .001).

Table 3 illustrates the relationship between demographic factors and disease categories. Infectious disease (54.1%), gastrointestinal problems (37.8%), and others (76.2%) are more prevalent in younger age groups (1 to 25 years). Age groups between 41 and 60 years are more likely to experience NCDs (51.4%), injuries and pain (39.4%), and vertigo (41.1%). The strongest association was found between age and sickness (Cramer's V test = 0.33; P = .001). Males have lower rates of all illnesses than females and there is a moderate association found (Cramer's V test = 0.15; P < .001). In comparison to the other MMCs, Matiali MMC showed a higher prevalence of infectious disease (61.7%), injury and pain (57.8%), gastrointestinal problems (64.6%), and vertigo (67.2%). Garbeta II MMC showed a higher prevalence of NCDs (31.3%), and Raipur MMC demonstrated a higher prevalence of other illness (40.2%). The strongest correlation is between sickness categories by district (Cramer's V test = 0.25; P < .001).

The multinomial logistic regression model in Table 4 shows the associated demographic characteristics with illness categories. Compared to the other factors, daily wage labour has a higher risk of gastrointestinal problem (adjusted odds ratio [AOR] = 1.25; 95% confidence interval [CI]: 1.03-1.53). In the year

2018, the risk of NCD (AOR = 1.15; 95% CI: 1.02-1.30) and vertigo (AOR = 1.24; 95% CI: 1.02-1.51) was more than one-time higher than the risk of the other illness. In the Jalpaiguri district, Matiali MMC shows more than two times the risk of gastrointestinal problems (AOR = 2.04; 95% CI: 1.56-2.67) and more than one time the risk of other problems (AOR = 1.00; 95% CI: 0.08-0.12). Alipurduar district (Madarihat MMC) shows more than a one-time higher risk of gastrointestinal problems (AOR = 1.89; 95% CI: 1.42-2.52). Compared to other diseases and other MMC, the NCD is at more than three times higher risk in the Paschim Medinipur district (Garbeta II MMC) (AOR = 3.97; 95% CI: 3.05-5.17). Jhargram district (Binpur II MMC) shows more than one time the risk of Injury and pain (AOR = 1.42; 95% CI: 1.18-1.71) and more than two times the risk of gastrointestinal problems (AOR = 2.51; 95% CI: 1.82-3.46).

The prevalence of repeated patients in different illness categories is represented in Figure 2. The present study shows NCDs get repeated more frequently than other disease categories. Infectious diseases exhibit high patient repetition rates at first, but after three to four repetitions, NCDs exhibit higher patient repetition rates than the others. Figure 3 displays month-wise patient registrations. From June to August (rainy season), most sickness categories exhibit rising trends, specifically infectious

**Table 3: Association between demographic characteristics and illness category (based on primary registration) among the study participants attending the MMC**

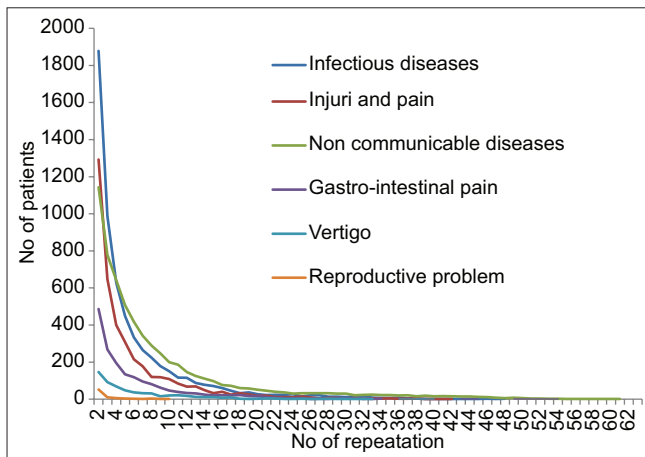
Demographic Category variables		Infectious diseases, n=7,711	Injury and pain, n=4,894	Noncommunicable diseases, n=1,993	Gastrointestinal problem, n=1,470	Vertigo, n=457	Others, n=791	Cramer's V test
Age	1-25 (6,603)	4,175 (54.1)	1,160 (23.7)	60 (3.0)	555 (37.8)	50 (10.9)	603 (76.2)	0.33 <sup>a</sup> ; (P= <0.001)
	26-40 (3,609)	1,496 (19.4)	1,268 (25.9)	140 (7.0)	412 (28.0)	112 (24.5)	181 (22.9)	
	41-60 (5,092)	1,563 (20.3)	1,929 (39.4)	1,024 (51.4)	382 (26.0)	188 (41.1)	6 (0.8)	
	> 60 (2,012)	477 (6.2)	537 (11.0)	769 (38.6)	121 (8.2)	107 (23.4)	1 (0.1)	
Sex	Male (7,300)	3,469 (45.0)	2,216 (45.3)	882 (44.3)	574 (39.0)	152 (33.3)	7 (0.9)	0.15 <sup>c</sup> ; (P= <0.001)
	Female (10,016)	4,242 (55.0)	2,678 (54.7)	1,111 (55.7)	896 (61.0)	305 (66.7)	784 (99.1)	
Occupation	Service (52)	28 (0.4)	9 (0.2)	10 (0.5)	2 (0.1)	2 (0.4)	1 (0.1)	0.05 <sup>d</sup> ; (P= <0.001)
	Farmer (461)	140 (1.8)	145 (3.0)	87 (4.4)	28 (1.9)	12 (2.6)	49 (6.2)	
	Daily wage labour (1,907)	729 (9.5)	691 (14.1)	208 (10.4)	190 (12.9)	46 (10.1)	43 (5.4)	
	Others work (1,246)	563 (7.3)	324 (6.6)	201 (10.1)	96 (6.5)	41 (9.0)	21 (2.7)	
	Children, unemployed (13,650)	6251 (81.1)	3725 (76.1)	1487 (74.6)	1154 (78.5)	356 (77.9)	677 (85.6)	
Year-wise patient	2018 (8,574)	3,948 (51.2)	2,229 (45.5)	1,199 (60.2)	733 (49.9)	235 (51.4)	230 (29.1)	0.12 <sup>c</sup> ; (P= <0.001)
	2019 (8,742)	3,763 (48.8)	2,665 (54.5)	794 (39.8)	737 (50.1)	222 (48.6)	561 (70.9)	
MMCs-wise	Matiali (9,634)	4,759 (61.7)	2,828 (57.8)	555 (27.8)	949 (64.6)	307 (67.2)	236 (29.8)	0.25 <sup>b</sup> ; (P= <0.001)
	Madarihat (2,882)	1,395 (18.1)	823 (16.8)	350 (17.6)	270 (18.4)	43 (9.4)	1 (0.1)	
	Garbeta II (1,207)	320 (4.1)	210 (4.3)	624 (31.3)	43 (2.9)	7 (1.5)	3 (0.4)	
	Binpur II (1,674)	510 (6.6)	538 (11.0)	224 (11.2)	128 (8.7)	41 (9.0)	233 (29.5)	
	Raipur (1,919)	727 (9.4)	495 (10.1)	240 (12.0)	80 (5.4)	59 (12.9)	318 (40.2)	

Cramer's V test: 'a' means very strong association, 'b' means strong association, 'c' means moderate association, and 'd' means weak association (according to Akoglu, 2018)

**Table 4: Multinomial logistic regression models in demographic characteristics and illness category (based on primary registration) among the study participants attending the MMC**

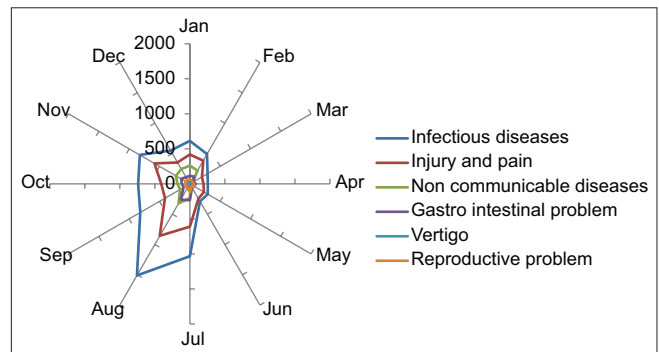
Category	Category	Infectious diseases	Injury and pain OR (95% CI)	NCD OR (95% CI)	Gastrointestinal problem OR (95% CI)	Vertigo OR (95% CI)	Others OR (95% CI)
Age	1-25 years	Ref	0.25*** (0.22-0.29)	0.01*** (0.01-0.02)	0.50*** (0.40-0.63)	0.05*** (0.04-0.07)	74.58*** (10.42-534.1)
	26-40	Ref	0.75*** (0.65-0.88)	0.07*** (0.06-0.09)	1.00 (0.79-1.26)	0.32*** (0.24-0.43)	56.16*** (7.80-404.2)
	41-60	Ref	1.09 (0.95-1.26)	0.48*** (0.41-0.56)	0.89 (0.70-1.12)	0.52*** (0.40-0.68)	1.71 (0.20-14.29)
	>60	Ref	-	-	-	-	-
Sex	Male	Ref	1.07 (0.99-1.15)	0.98 (0.87-1.11)	0.79*** (0.70-0.89)	0.62*** (0.51-0.77)	0.01*** (0.01-0.02)
	Female	Ref	-	-	-	-	-
Occupation	Service	Ref	0.35** (0.16-0.74)	1.23 (0.56-2.72)	0.34 (0.08-1.42)	0.77 (0.18-3.28)	0.43 (0.05-3.80)
	Farmer	Ref	0.98 (0.75-1.29)	1.10 (0.78-1.55)	1.45 (0.92-2.28)	0.72 (0.37-1.40)	1.68* (1.07-2.64)
	Daily wage labour	Ref	1.03 (0.90-1.18)	0.74** (0.60-0.92)	1.25* (1.03-1.53)	0.83 (0.58-1.19)	0.76 (0.51-1.13)
	Others work	Ref	0.85* (0.72-0.99)	0.90 (0.72-1.12)	1.02 (0.81-1.30)	0.88 (0.61-1.28)	0.35*** (0.21-0.57)
	Children, unemployed	Ref	-	-	-	-	-
Years	2018	Ref	0.84*** (0.77-0.90)	1.15* (1.02-1.30)	1.03 (0.91-1.15)	1.24* (1.02-1.51)	0.47 (0.39-0.56)
	2019	Ref	-	-	-	-	-
Districts (MMC name)	Jalpaiguri (Matiali)	Ref	0.85* (0.73-0.98)	0.43*** (0.35-0.54)	2.04*** (1.56-2.67)	0.83 (0.59-1.17)	1.00*** (0.08-0.12)
	Alipurduar (Madarihat)	Ref	0.97 (0.82-1.14)	1.25 (0.99-1.57)	1.89*** (1.42-2.52)	0.46*** (0.30-0.71)	0.01*** (0.00-0.01)
	Paschim	Ref	0.79* (0.63-1.00)	3.97*** (3.05-5.17)	1.24 (0.82-1.87)	0.18*** (0.08-0.40)	0.03*** (0.01-0.09)
	Jhargram (Binpur II)	Ref	1.42*** (1.18-1.71)	1.24 (0.95-1.62)	2.51*** (1.82-3.46)	0.88 (0.56-1.39)	0.90 (0.70-1.16)
	Bankura (Raipur)	Ref	-	-	-	-	-

\*\*\*means P= <0.001; \*\*means P= <0.01; \* means P= <0.05



**Figure 2: Prevalence of repeated patients and illness category among the studied MMCs**

diseases [Figure 3]. Compared to the other months, August had the highest registration for four different illnesses (infectious diseases, injuries and pain, communicable diseases, and gastrointestinal problems).



**Figure 3: Month-wise illness prevalence (primary registration) among the studied MMCs**

## Discussion

According to the present study’s findings, lower age groups (1-25 years) register for primary care at a higher rate (38.1%) than the other age groups, whereas older age groups (>60 years) repeat the diagnosis almost twice (11.6%-23.4%). Compared to the other four districts, Matiali MMC from the Jalpaiguri

district had higher rates of primary (55.6%) and repeated registration (78.3%). Infectious diseases have a high primary registration rate in the present study (44.5% of the total primary registration), followed by injury and pain (24.5%), NCDs (22.8%), and NCDs show high repeated cases (11.5% to 33.2%), almost three times from the primary registration, and significant statistical associations were found (Cramer's V test = 0.29;  $P < .001$ ). According to West Bengal's 2016 illness burden profile report, NCDs account for 62.7% of the state's overall disease burden, communicable diseases for 24.8%, and injuries for 12.6%.<sup>[13]</sup> The present study shows NCDs repeat more frequently than other disease groups [Figure 2]. Infectious diseases, NCDs, and injuries are therefore quite common morbidity in India as well as West Bengal, and NCDs are the main burden of this study location, which is repeated frequently in primary care provider (MMC), according to present and previous studies.

Our study, which includes younger age ranges (1-25 years), reveals a higher prevalence of infectious disorders (54.1%), gastrointestinal issues (37.8%), and other problems (76.2%). Age groups between 41 and 60 years are more likely to experience vertigo (41.1%), NCDs (51.4%), and injury and pain (39.4%). A high prevalence of NCDs (23%) was observed in an earlier research on the tribal population of Western India.<sup>[19]</sup> According to a prior study from the Health and Family Welfare Statistics in India (2019-2020), infectious illnesses caused 31.4% of hospitalizations (M = 31.3%; F = 31.6%), while gastrointestinal ailments caused 9.9% (M = 8.7%; F = 11.2%) of hospitalizations.<sup>[20]</sup> The present study shows women had moderately higher rates of all illnesses than men (Cramer's V test = 0.15;  $P = .001$ ). Another study on noncommunicable illnesses in India discovered that women had a considerably higher chance of developing NCDs (AOR = 1.11,  $P = < 0.01$ ).<sup>[21]</sup> Similar findings were found in a second study carried out in West Bengal, where 66% of women and 34% of men were hospitalized as patients in wards for infectious diseases.<sup>[17]</sup> Females are more susceptible to infectious diseases, NCDs, and gastrointestinal disorders according to the present study and prior research.

Our study finds that daily wage labour is associated with a higher risk of gastrointestinal problems than the other illnesses. Jalpaiguri district (Matiali MMC) shows more than two times the risk of gastrointestinal problems (AOR = 2.04;  $P = < .001$ ) and more than one time the risk of other problems (AOR = 1.00;  $P = < .001$ ), respectively. Alipurduar district (Madarihat MMC) shows more than a one-time higher risk of gastrointestinal problems (AOR = 1.89;  $P = < .001$ ). Compared to other diseases and other MMC, the NCD is at more than three times higher risk in the Paschim Medinipur district (Garbeta II MMC) (AOR = 3.97;  $P = < .001$ ). Jhargram district (Binpur II MMC) shows more than one time the risk of infectious diseases (AOR = 1.42;  $P = < .001$ ) and more than two times the risk of gastrointestinal problems (AOR = 2.51;  $P = < .001$ ). An earlier study in Central India (Chhattisgarh and Madhya Pradesh) found that tribal people have alarmingly high rates of undernutrition and a disproportionate burden of both

communicable and NCDs.<sup>[5]</sup> So, community-specific morbidity results help us understand the actual burden of diseases and also help the practices of primary care physicians and family physicians.

### Strengths and limitations of the study

The five primary care providers (MMCs) from five districts were included in the present study, which focuses on any morbidity faced by tribal populations in the target blocks over the previous 2 years. Thus, the present study is able to analyze the enormous amounts of data and keeps track of which patients repeat how frequently over the course of 2 years as well as which illnesses repeat frequently. As a result, our data make it abundantly evident which diseases are more common in specific areas, age groups, sexes, and calendar years. Our morbidity results are helpful to the practice of primary care physicians and family physicians.

The study's main limitations are that we were unable to get information about the participants' homes, families, or their parents' histories of chronic illnesses. Additionally, we could not gather any information about the patients under study regarding their personal hygiene which might be important to highlight some of the association with hygiene-related diseases.

### Practice and policy implications

Our analysis shows that there is a higher prevalence of NCDs in tribal populations across all the primary care providers (MMCs) under study. The present study recommended that more public awareness efforts focusing on family history, dietary practices, and personal cleanliness will be required to play the key role in the management of infectious and NCDs in tribal communities in the country. Also, the present study informs us which illnesses are common in tribal and remote areas. We will extend the study to the next level and recommend the policy to the people for better health.

### Conclusion

The present study shows high prevalence of infectious diseases, injury and pain, gastrointestinal problems, and vertigo in Matiali MMC of Jalpaiguri district, high prevalence of NCDs in Garbeta II MMC of Paschim Medinipur district compared to other MMCs. A special focus is needed for the two MMCs that represent the highest disease prevalence. The present study shows high primary registration in infectious diseases and NCDs showing high repeated cases, almost three times the primary cases. Females show higher rates of all types of illness than males. Primary care providers like MMCs and family physicians in India can help improve access to healthcare, especially for rural, vulnerable, and underserved populations.

### Acknowledgments

The authors acknowledge all participants, MMCs team and also acknowledge the Manbhum Ananda Ashram Nityananda

Trust (MANT) and West Bengal Health Department for extending their support for this study.

### Ethical clearance

The Mobile Medical Clinics have been endorsed by the Manbhumi Ananda Ashram Nityananda Trust (MANT) and West Bengal Health Department. The present study approved by the Ethical Committee of MANT and ethical clearance no: MANT/CO/Research/HEC/2023/-06/03.

### Financial support and sponsorship

The West Bengal Health Department has provided financial support to the MANT to operate the MMCs.

### Conflicts of interest

There are no conflicts of interest.

## References

- United Nations development Group's Guidelines on Indigenous Peoples' Issues. New York, NY and Geneva: United Nations; 2009.
- Census of India. New Delhi: Registrar General of India, Government of India; 2011.
- Khorakiwala H. Mobile Medical Vans : Overcoming India's Last-mile Health Care Challenges ? 2013. Available from: <https://knowledge.wharton.upenn.edu/article/mobile-medical-vans-overcoming-indias-last-mile-health-care-challenges/>. [Last accessed on 2023 May 30].
- Marfatia A. New report highlights the neglect of the health of India's tribal communities. Scroll Media Incorporation. 2018. Available from: <https://scroll.in/pulse/902787/new-report-highlights-the-neglect-of-the-health-of-indias-tribal-communities>. [Last accessed on 2023 May 30].
- Jain Y, Kataria R, Patil S, Kadam S, Kataria A, Jain R, *et al.* Burden and pattern of illnesses among the tribal communities in central India : A report from a community health programme. *Indian J Med Res* 2015;141:663-72.
- Prabhakaran A, Nongkynrih B, Pandav C, Goswami A, Krishnan A. Cost of ambulatory care by mobile health clinic run by a Medical College in India for the year 2008-09. *Indian J Public Health* 2014;58:100.
- Mauad E, Nicolau S, Moreira L, Haikel R Jr, Longatto-Filho A, Baracat E. Adherence to cervical and breast cancer programs is crucial to improving screening performance. *RRH* 2009. Available from: <https://www.rrh.org.au/journal/article/1241>. [Last accessed date 2023 May 30].
- Mauad EC, Silva TB, Latorre MR, Vieira RA, Haikel RL, Vazquez VL, *et al.* Opportunistic screening for skin cancer using a mobile unit in Brazil. *BMC Dermatol* 2011;11:12.
- Kumar A, Khattar P, Tiwari VK, Shivdasani JP, Dhar N, Nandan D. An assessment of functioning of mobile medical units in Jharkhand. *Indian J Public Health* 2009;53:157-60.
- Chillimuntha AK, Thakor KR, Mulpuri JS. Disadvantaged rural health-issues and challenges : A review. *Natl J Med Res* 2013;3:80-2.
- Roth GA, Abate D, Abate KH, Abay SM, Abbafati C, Abbasi N, *et al.* Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980-2017: A systematic analysis for the Global Burden of Disease Study 2017. *Lancet* 2018;392:1736-88.
- Vos T, Abajobir AA, Abate KH, Abbafati C, Abbas KM, Abd-Allah F, *et al.* Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990-2016: A systematic analysis for the Global Burden of Disease Study 2016. *Lancet* 2017;390:1211-59.
- West Bengal: Disease Burden Profile, 1990 to 2016. Available from: [https://www.healthdata.org/sites/default/files/files/West\\_Bengal\\_-\\_Disease\\_Burden\\_Profile%5B1%5D.pdf](https://www.healthdata.org/sites/default/files/files/West_Bengal_-_Disease_Burden_Profile%5B1%5D.pdf). [Last accessed on 2023 May 30].
- Ali S, Divakar S, Balaji P. Morbidity pattern in tribals and non tribals above the age of 5 years of Gundlupet forest area, Mysore district, India. *J NTR Univ Health Sci* 2012;1:233.
- Basak M. Pattern and Trend of Morbidity in the Infectious Disease Ward of North Bengal Medical College and Hospital. *JCDR*; 2015. Available from: [http://jcdcr.net/article\\_fulltext.asp?issn=0973-709x&year=2015&volume=9&issue=11&page=LC01&issn=0973-709x&id=6741](http://jcdcr.net/article_fulltext.asp?issn=0973-709x&year=2015&volume=9&issue=11&page=LC01&issn=0973-709x&id=6741). [Last accessed date 2022 Dec 06].
- Sharma P, Tilak R. Outbreak prone communicable diseases of public health importance in the northern districts of West Bengal - Current status and the way forward. *Indian J Med Res* 2021;153:358.
- Roy R, Maji B, Haldar A, Chatterjee T. Trend and seasonality of infectious diseases - An overview from a tertiary care hospital of West Bengal, India. *J Mahatma Gandhi Inst Med Sci* 2020;25:39.
- Akoglu H. User's guide to correlation coefficients. *Turk J Emerg Med* 2018;18:91-3.
- Patwa JR, Patel RM, Nagar SS, Pandit NB. Study of self-reported morbidity profile among the rural tribal population in a district of Western India *Healthline J* 2020;11:16-22.
- Health and Family Welfare Statistics in India 2019-20. National Health Mission. Ministry of Health and Family Welfare Government of India. 2020. p. 1-253. Available from: <https://main.mohfw.gov.in/sites/default/files/HealthandFamilyWelfarestatisticsinIndia201920.pdf>. [Last accessed on 2023 May 30].
- Sharma SK, Vishwakarma D, Puri P. Gender disparities in the burden of non-communicable diseases in India: Evidence from the cross-sectional study. *Clin Epidemiol Global Health* 2020;8:544-9.