

Morbidity profile of the patients attending Mobile Medical Unit camps in Telangana: A record-based study

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ABSTRACT

Mobile Medical Units (MMUs) are one of the major initiatives under the National Rural Health Mission. These MMUs help people in remote, underserved areas access healthcare at affordable prices on their doorstep. The present record-based study aimed to assess the morbidity profile of the patients attending Mobile Medical Unit camps in the Yadadri-Bhuvanagiri district between April 2022 and December 2022. The MMU is run by the Department of Community and Family Medicine, AIIMS, Bibinagar, in six selected villages of the Yadadri-Bhuvanagiri district. (Figure 1). A register is maintained to record the details of patients visiting the MMU camp. Patient's name, age, gender, place, mobile number, height, weight, blood pressure (BP), glucometer Random Blood Sugar, diagnosis, and details of medication dispensed were entered in the register. Diabetes, hypertension, and obesity were diagnosed using the World Health Organization (WHO) criteria, the Eighth Joint National Committee guidelines, and WHO Asia Pacific guidelines, respectively. Mobile Medical Unit Camp data are entered into the Excel database at the end of every month. Since it is a record-based analysis, we used data for analysis between April 7, 2022, and December 31, 2022. A total of 1494 patients were treated in the MMU camps during this period. Among them, 89.4% were adults, and 10.6% were children (less than 18 years). Among 1,336 adult patients, the majority of participants suffered from osteoarthritis, followed by non-communicable diseases (NCDs). The mean scores of systolic and diastolic BP of the adult population were obtained at 131 ± 21 and 77 ± 13 mm Hg, respectively. The mean random blood glucose level of the adult population was 150 ± 74 mg/dl. A total of 158 children were younger than 18 years old, out of whom 78 and 80 participants were males and females, respectively. Moreover, 23.1% and 25% of males and females suffered from upper respiratory tract infections, respectively. The study further suggests that the NCD epidemic is spreading to rural areas where necessary health infrastructure is insufficient. MMUs can bring a significant change to the public health system, which needs to re-orient its priorities.

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5

1

Mobile Medical Units (MMUs) are one of the major initiatives under the National Rural Health Mission (1). These MMUs help people in remote, underserved areas access healthcare at affordable prices on their doorstep. As of March 2018, 1,427 MMUs were operating in the country; nonetheless, these units are very few in the state of Telangana (2). All India Institutes of Medical Sciences (AIIMS), Bibinagar, has adopted six villages as part of its MMU program. These six villages were selected based on the scarcity of health care services in that area and consisting of tribal or backward populations. This program was started on April 7, 2022. The health camps are conducted every fortnightly in each of these six villages. MMU team consists of a community health physician and a specialist doctor in rotation, a medico-social worker, a nursing officer, a pharmacist, and a vehicle driver. Local Gram Panchayat informed Accredited Social Health Activists and Auxiliary Nurse Midwives about the conduction of camps. Patients were screened for non-communicable diseases, anemia, cataracts, and other diseases. They were provided with appropriate medications every two weeks, and cases requiring further evaluation were referred to AIIMS and other tertiary care centers. This helps prevent complications and extravagant expenditures. These camps serve as outpatient clinics where basic anthropometric measurements and lab investigations are conducted. After the screening, patients are sent to the physician for diagnosis and treatment. In India, nearly 69% of people reside in rural areas; nonetheless, only 26% of hospital beds and 33% of healthcare professionals are allocated to these regions. (3) Due to the unequal distribution of healthcare resources, the rural public health system in India remains inefficient. These inefficiencies can be ascribed to inadequate health facilities, constant human resource shortages, and frequent drug stockouts, particularly in rural public health facilities (4). In addition, the rural realities of steep terrain, infrequent transport services, illiteracy, and economic constraints further impose major barriers to health service utilization, pushing people to seek care from the unorganized, informal, and costly private healthcare sector (5). Delivering medical services to remote areas is a highly intensive task that is often not viable for private healthcare providers (6). MMU services are envisaged to meet technical and service quality standards for a primary health center (PHC) by providing services.

2. Materials and Methods

This is a record-based study. MMU is run by the Department of Community and Family Medicine, AIIMS,

Bibinagar, in six selected villages of Yadadri-Bhuvanagiri district (Figure 1). The details of patients visiting the MMU camp are documented and kept in a register. Patient's name, age, gender, place of residence, mobile number, height, weight, blood pressure (BP), glucometer random blood sugar (GRBS), diagnosis, and details of medication dispensed were entered in the register. Diabetes, hypertension, and obesity were diagnosed using the World Health Organization (WHO) criteria (7), the Eighth Joint National Committee guidelines (8), and WHO Asia Pacific guidelines, respectively (9). MMU camp data were entered into the Excel database at the end of every month. Since it was a record-based analysis, we used data from April 7, 2022, to December 31, 2022, for analysis. We included children and adult patients in this study. We excluded the follow-up patients to avoid data duplication. Data were analyzed using SPSS software (version 17) and presented as frequencies and percentages. Figure 1 describes the route map of six MMU villages in Yadadri-Bhuvanagiri district. These villages are situated 35-45 km from the AIIMS hospital.

3. Results

This record-based study included 1,494 participants attending MMU camps from April 7, 2022, to December 31, 2022. A total of 1,494 patients were treated in the MMU camps during this period. Out of this population, 89.4% were adults and 10.6% were children (under 18). The majority of participants were female (62.3%) and belonged to the age group of 46-60 years (41.2%). The mean age of the participants was 49.67 ± 18.75 years, and their median age was 55 years. The age of participants varied between 3 months to 95 years (Table 1). According to the 2011 census (10), around 30% of the Indian population was younger than 18 years of age. Considering this, the morbidity profile of adult patients above 18 years of age is described in table 2. Among 1,336 adult patients, the majority of participants suffered from osteoarthritis, followed by non-communicable diseases. Around one-fifth (18.9%) of participants suffered from osteoarthritis among both males and females. In men, hypertension accounted for 12.7%, diabetes for 4.9%, and both diabetes and hypertension for 15.1%, while these diseases formed 15.7%, 5.6%, and 10% of the total female population in the study, respectively. The other diseases diagnosed were myalgia, gastritis, cataracts, and skin allergies, as represented in table 2.



Figure 1. Route Map of MMU Villages from AIIMS at Bibinagar

Table 1: Socio-demographic details of the study participants (n= 1494)

S. No.	Age in years	Male No. (%)	Female No. (%)	Total No.(%)
1.	0-5	27 (4.9)	23 (2.5)	50(3.3)
2.	6-18	50 (8.9)	56 (6.1)	106(7.1)
3.	19-45	91(16.1)	225 (24.1)	316(21.1)
4.	46-60	210 (37.3)	406 (43.5)	616(41.2)
5.	Above 60	184 (32.8)	222 (23.8)	406(27.1)
	Total	562	932	1494

Table 2: Morbidity profile of the adults (above 18 years) attending MMU (n=1336)

S.No.	Morbidity	Male No. (%)	Female No. (%)
1.	Hypertension	64 (12.7)	131 (15.7)
2.	Diabetes	26 (4.9)	47 (5.6)
3.	Diabetes and Hypertension	76 (15.1)	84 (10.0)
4.	Osteoarthritis	95 (18.9)	158 (18.9)
5.	Gastritis	29 (5.8)	38 (4.5)
6.	Skin allergies	14 (2.8)	16 (1.9)
7.	Upper Respiratory Tract Infection	24 (4.7)	32 (3.8)
8.	Myalgia	60 (11.9)	112 (13.5)
9.	Others*	115 (22.9)	215 (25.8)
	Total	503	833

It was also found that (25.4%) and (18.7%) of males and females were undernourished, respectively. In addition, 23.5% and 23.7% of male and female participants were in the obese 1 category, respectively (Table 3). A total of 158 children were younger than 18 years old, out of which 78 participants were male and 80 cases were female. Moreover, 23.1% and 25% of men and women suffered from URTIs, respectively (Table 4). Table 5 tabulates the total adult population of the village who were screened for hypertension and diabetes in each of the MMU villages between April and December 2022. In three villages, services were utilized by almost one-third of the adult population, while in the other three villages, the uptake of services was lower.

The mean scores of systolic and diastolic BP of the adult population were reported as 131 ± 21 and 77 ± 13 mm Hg, respectively. The mean random blood glucose level of the adult population was 150 ± 74 mg/dl. For one MMU camp, the cost spent on human resources, transportation, free medications, and other contingencies was equal to 14,297 Indian rupees (Table 6). Nevertheless, this table needs to be interpreted with caution since most human resources required for MMU camps were staff of the Medical College who did not get paid separately for MMU; however, the amount mentioned in table 6 was part of their salary.

Table 3: Distribution of adult participants according to BMI (n=1336)

S.No.	BMI*	Male No. (%)	Female No. (%)
1.	Underweight (<18.5)	128 (25.4)	156 (18.7)
2.	Normal (18.5-22.9)	147 (29.2)	258 (30.9)
3.	Overweight (23.0-24.9)	83 (16.5)	149 (17.9)
4.	Obese 1(25.0-29.9)	118 (23.5)	198 (23.7)
5.	Obese 2(≥ 30)	27 (5.1)	72 (8.6)
	Total	503	833

*According to Asia-pacific classification of BMI

Table 4: Morbidity profile of children (less than 18 years) attending MMU (n=158)

S.No.	Morbidity	Male No. (%)	Female No. (%)
1.	Acute Respiratory Infection	18 (23.1)	20 (25)
2.	Underweight	10 (12.8)	8(10)
3.	Diarrhoea	12 (15.3)	8(10)
4.	Routine Health Check Up	17(21.7)	32(40)
5.	Skin allergies	3(3.8)	4(5)
6.	Others*	18 (23.1)	8(10)
	Total	78	80

* Others include poor appetite, injuries, constipation etc.

Table 5: Distribution of Adult participants according to screening done (n=1336)

S.No.	Village	Total adult population (>18 years of age) of the village	Total adult population screened for Hypertension/Diabetes No. (%)*	Total number of Hypertension/Diabetes patients registered under MMU No. (%)
1.	Moripirala	946	281 (29.7)	42(4.4)
2.	Koyyalagudem	2345	323 (13.8)	61(2.6)
3.	Puttagudem	721	194 (26.9)	20(2.8)
4.	Janampally	1561	151 (9.7)	50(3.2)
5.	Vachayathanda	737	203 (27.5)	27(3.7)
6.	Bibinagar	5824	184 (3.1)	55(0.9)
	Total	12134	1336	255

*Includes row percentages

Table 6: Cost of organising 12 MMU camps in one month

S. No.	Item	Number of Units	Cost
1.	Diesel for 720 kms	36 litres	3,960 rupees
2.	Driver pay	12 days *5 hours	5256 rupees
3.	MSW pay	12 days *5 hours	10236 rupees
4.	Nursing officer	12 days *5 hours	24, 720 rupees
5.	Pharmacist	12 days *5 hours	10236 rupees
6.	Community Medicine Physician	12 days*5 hours	33, 480 rupees
7.	Specialist doctor	12 days * 5 hours	33, 480 rupees
8.	Cost of Medicines dispensed for 12 days	12 days	50,000 rupees
9.	Equipment maintenance cost*	1 BP apparatus, 1 Glucometer, 1 weighing machine, 1 stadiometer,	100 rupees
10.	Record maintenance		100 rupees
	Total		1,71,568 rupees

*Equipment maintenance cost includes replacement of batteries

4. Discussion

Mobile Medical Units play a vital role in providing healthcare services in remote and rural areas. The current study presented the morbidity profile of 1,494 patients who were treated in the MMU camps from April 7, 2022, to December 31, 2022. This cross-sectional study (11) aimed to identify the reported morbidity and socio-demographic profile of people attending the medical camp in Jogaradoddi, Ramanagara District, Karnataka. Out of 123 patients attending the camp, 55.28% were male and 44.71% were female. Regarding age, 33.8% of the subjects were in the age group of 21-30 years. In our study, the majority of patients (62.3%) were female. This can be attributed to the fact that men are mostly away from home due to their occupational role during the morning hours (10 am-1 pm) of medical camp; therefore, it may not be feasible for them to refer for health check-ups. The other reasons could be a lack of awareness and prioritization of their own health. The majority of patients were in the 40-60 age group, followed by the senior age group (Table 1). Since NCDs, such as diabetes and hypertension, are common in this age group, patients often refer for BP and GRBS monitoring, as well as for free medications. The elderly population often depends on a caretaker to utilize the health care services situated far away, whereas when health services are provided in their village, it is often convenient for them to use these services. This study included 1,336 adult patients (>18 years), and almost one-third of them (37.8%) suffered from osteoarthritis. This finding is consistent with the results of another study by Arti Gupta et al. (12) in which musculoskeletal complaints were reported by most adult populations attending the outpatient department at a rural PHC in the Union territory of Pondicherry. Since most of our patients were farmers and weavers, the hard work and manual labor involved in these professions could have been the primary reason. In this study, the overall prevalence rates of diabetes, hypertension, and generalized obesity were 5.4%, 14.5%, and 30.9%, respectively. According to the Indian Council of Medical Research-India Diabetes study (13), the prevalence rates of diabetes, hypertension, and generalized obesity in rural areas of Telangana were calculated at 5-7.4%, 25-29.9%, and 15-19.9%, respectively. Among males, the prevalence rates of hypertension and diabetes were 12.7% and 4.9%, respectively. These values were lower than the data in the National Family Health Survey 2019-2021 (NFHS-5) (14) reported for the state of Telangana in rural areas, where prevalence rates of hypertension and diabetes

were 28.9% and 16.6% among men, respectively. Among females, the prevalence rates of hypertension and diabetes were 15.7% and 5.1%, respectively, whereas in NFHS-5, these values were found to be 24.7% and 13.0%. These disparities could be ascribed to differences in cut-off age. Another possible reason is that this data pertained to patients visiting the camps rather than the entire village. A study conducted by Savita et al. (11) revealed that out of 123 patients attending a medical camp, 46.1%, 25.5%, 18.6%, and 9.8% of cases were normal, overweight, underweight, and obese, respectively. The current study pinpointed that among adults, the majority were in the normal weight category (30.3%), followed by the obese I category (23.6%) and overweight (17.3%). This trend was similar among both men and women. This finding is alarming since being overweight and obese can be a potential risk factor for the development of NCDs. The other common diseases included acid peptic disease or gastritis, skin infections, URTIs, cataracts, and myalgia. This finding is in accordance with the results of the study conducted by Chinmay et al. (15) on patients attending a rural training and health center. Along the same lines, a survey conducted by Banker et al. (16) demonstrated that the three most commonly observed disorders were URTIs (17%), cardiovascular disease (12%), and gastrointestinal disease (12%). Among 158 children attending the camp, 30.6% suffered from acute respiratory tract infections, followed by underweight (11.1%) and skin allergies (4.4%). The percentage of children attending the camps was very low since most of them attended schools during the hours of camp. The percentage of the population utilizing these services ranged from 10-30%, except for the Bibinagar district (3.3%), which is near the tertiary care center. The current study found that 14,297 rupees (Table 6) were required to conduct a one-day camp in which 60 patients were treated on average. Our study also found that most expenses were incurred in the procurement and distribution of free medication, followed by human resources. A study performed by Venkata et al. (5) indicated that 34,940 Indian rupees (INR) (549.5 US\$) were required for conducting a one-day health camp in a hilly terrain village in Uttarakhand with a provisional 250-patient load. The mean cost of specialist care for health camps was 2,803.1 INR. Free medication dispensing accounted for most expenses (28.6%). Nevertheless, in the current study, the manpower was sought from the employees of the Medical College, and therefore, these kinds of services can be cost-effective when organized by medical colleges.

4.1 Strengths and limitations

The strength of the current study was that it included data from more than 1,000 participants from MMU camps in six remote villages for almost one year. The previous studies mainly described the morbidity profile of patients attending PHCs or a single camp. This study provided new insights that should be considered when planning for such services. It also shed light on the need and demand for healthcare services in rural areas despite the existence of PHCs and sub-centers. On the other hand, the main limitation of this study was a failure to maintain a longitudinal record of BP and blood glucose readings to calculate the percentage of patients with uncontrolled and controlled diabetes and hypertension. The screening for complications in patients with these chronic diseases, such as nephropathy and retinopathy, could not be provided. The present study was conducted in six villages of one district in south India; therefore, the generalizability of the results could be applied to limited settings. The cross-sectional design of the study restricts the understanding of the longitudinal effects and impact of MMUs on the health outcomes of the populations served. The study revealed that osteoarthritis was the most common morbidity, followed by NCDs among adults, while URTI was the most prevalent morbidity among children. It was also estimated that 14,297 INR was required to conduct a single camp in rural areas in South India. Therefore, it is feasible for medical colleges to provide these kinds of services since the majority of them possess strong human resources. The study further suggested that the NCD epidemic is spreading to rural areas where necessary health infrastructure is insufficient. MMUs can bring a significant change to the public health system, which needs to re-orient its priorities.

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Authors' Contribution

Conceived and designed the analysis: B.K.

Collected data, analysed data, and prepared manuscript: C.K. and S.K.

Provided technical inputs and revised manuscript: K.Y., R.K., N.A., and V.B.

Ethics

Exemption from review was sought from the Institutional Ethics Committee, AIIMS, Bibinagar (AIIMS/BBN/2023/116 dated 11/2/2023). All personal information was maintained confidential. As this was a record-based study, informed consent was deemed unnecessary.

Conflict of Interest

The authors declare that they have no conflict of study.

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Data Availability

The data that support the findings of this study are available on request from the corresponding author.

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