## **Original Research Article**

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# Prevalence of diabetes, hypertension, and the socio-demographic predictors of the type of facility utilized for related services in rural Telangana

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#### **ABSTRACT**

**Background:** Diabetes mellitus and hypertension are chronic conditions that, on one hand demand early detection, screening, and treatment and on the other, require longitudinal follow-up for their successful management. Piramal Swasthya's Arogyaseva program uses two contrasting methods (MMU and static clinic) to deliver diabetes and hypertension-related care. The MMU provides doorstep delivery of care, while the static clinic is located by the highway, is equipped with a telemedicine center, and has slightly higher diagnostic and therapeutic capabilities. The study aims to find the prevalence of diabetes and hypertension, and determine the association between the sociodemographic factors and the type of facility utilized for these conditions.

**Methods:** This cross-sectional study is a secondary data analysis of the aggregated data of patients who availed health services at the Mobile Medical Unit and the static clinic. The data was analyzed to find out the prevalence of diabetes and hypertension, and Binary logistic regression was used to determine socio-demographic predictors of the type of health facility used for diabetes and hypertension-related care.

**Results:** Overall hypertension and diabetes prevalence was 24% and 7%, respectively. Women (aOR 1.3; 95% CI 1.122–1.510), illiterate (aOR 2.61; 95% CI 2.021-3.392), hypertensives (aOR 3.28; 95% CI 2.807-3.846) and the elderly (aOR 1.43; 95% CI 1.204-1.721) were significantly more likely to utilize MMU based outreach facility compared to their respective baseline counterparts.

**Conclusions:** The mobile medical unit can play a significant role in delivering hypertension and diabetes-related care, especially to women and the elderly.

Keywords: Diabetes mellitus, Hypertension, Mobile medical unit, Non-communicable disease, Rural health

#### **INTRODUCTION**

Non-Communicable Diseases (NCDs) are the leading cause of deaths worldwide.<sup>1</sup> It is estimated that at the current rate, 15 million people aged between 30 and 70 will continue to die due to NCDs each year.<sup>2</sup> It is reported that even among the NCDs, the rising prevalence of certain chronic conditions like Diabetes Mellitus (DM), Hypertension (HTN) and stroke is of even greater concern.<sup>3</sup> They are known to have a huge impact on morbidity and mortality, life expectancy, and quality of

life, as well as individual and national income.<sup>4</sup> According to estimates, 463 million people currently have DM, and over a billion people are currently living with HTN worldwide. At the current rate, the number of individuals with DM and HTN is expected to reach 552 million and 1.56 billion by 2025 and 2030, respectively.<sup>5,6</sup> The number of people with diabetes in India has increased from 26 million in 1990 to 65 million in 2016, and over 200 million Indians are currently estimated to be suffering from hypertension.<sup>7,8</sup> Telangana despite being one of the well-performing states in health, has a higher

prevalence of hypertension and diabetes than its national average.<sup>7,9</sup>

Management and control of both DM and HTN are challenging. Both of them are chronic conditions that demand early detection, screening, and treatment, along with longitudinal follow-up and care coordination for their successful management. The existing institutional arrangements in the public health sector only partially addresses the requirement. To,11

Much like the other developing nations, the Indian healthcare systems is primarily focused on providing acute, episodic care and have limited capacity to provide longitudinal care. <sup>10,11</sup> In order to better address NCDs, the current healthcare systems will not only need more resources but will need to be redesigned. <sup>11</sup> It will have to reorient itself to be more responsive and take into consideration the additional barriers imposed by agerelated mobility, gender norms, associated cost, availability of transport, drugs, and doctors emerge as a huge deterrent for successful management. <sup>12-14</sup>

The Piramal Swasthya's Arogyaseva program is one such initiative. The program is unique as it uses two different methods of health service delivery (MMU and static clinic) to provide free comprehensive primary health care services with a special focus on diabetes and hypertension to the residents of Medak district in Telangana. While the MMU reaches out to the community and delivers care close to home, the static clinic is located by the national highway, has a wider range of medicines, diagnostics, facility for specialist telemedicine consultation, and also serves as a referral center for the MMU.

The MMU makes at least one fixed, predetermined visit per month to 23 different villages of the catchment area with its team of health professionals comprising of a medical doctor, pharmacist, lab technician, nurse, pilot, and equipped with basic laboratory and a pharmacyrelated service. The static clinic has a similar human resource structure with a telemedicine technician as the only addition. It in a few ways, is similar to the government Primary Healthcare Center (PHC). Both MMU and Clinic are equipped with computer-based electronic health records that capture data regarding socio-demographic details. morbidity. examination, lab investigation, and drug prescribed for each beneficiary.

Given that the two-service delivery system provides similar care but use contrasting approach, we seek to study and understand the socio-demographic factors that influence the type of healthcare facility utilisation (MMU or static clinic), specifically for DM and HTN.

An understanding of this would help in tailoring the service delivery method to reach a distinct target audience and thereby maximize utilisation and improve health outcomes.

#### **METHODS**

This cross-sectional study was a secondary data analysis of routine program data of patients who had availed NCD related health services at the Mobile Medical Unit (MMU) and the static clinic of the Arogyaseva program aggregated over a period of last five months (February 2019 to June 2019). The Arogyaseva program is set in Digwal village panchayat, which is situated in Medak district of Telangana. The program has a mobile medical unit that visits 23 villages in and around Digwal to provide primary healthcare with a special focus on NCDs, in a way that is accessible and affordable. The program also has a Static clinic with a facility for specialist telemedicine consultation and a slightly wider range of diagnostics and medicines.

The collected beneficiary data consisted of beneficiary details such as age, sex, location, income level, education level, etc.), personal history (lifestyle, diet, tobacco and alcohol usage, family history of disease), visit type, visit number along with details regarding vital health parameters (height, weight, Body-Mass Index (BMI), systolic and diastolic Blood Pressure (BP)), information about results of laboratory procedures (random blood sugar) and the clinical diagnosis prepared by a physician. All beneficiaries who were above 18 years of age, had visited the MMU or the static clinic between February 2019 – June 2019 and had essential data fields (visit type, visit date age, gender, marital status, education, economic status, BP, RBS, BMI and diagnosis) were included for the study. Analysis of the socio-demographic profile and the prevalence of diabetes and hypertension is done considering only the new registrations. While the association between the type of facility utilized and sociodemographic factors, is calculated using both the new registrations and the repeat visits of patients who are diagnosed with hypertension and diabetes.

The aggregated data received was cleaned to remove outliers, duplicates, empty fields, and normalized. This data was analyzed to form the socio-demographic profile and prevalence of diabetes and hypertension. Binary logistic regression is used to determine socio-demographic predictors of the type of health facility used for diabetes and hypertension-related care.

These analyses are done using IBM SPSS# version 25 software.

#IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.

#### **RESULTS**

#### Socio-demographic profile

In the study reference period (February 2019 to June 2019), 1822 beneficiaries made 7035 visits at the Arogyaseva program. 2794 (40%) of these visits are made

to the MMU (outreach facility), and the remaining 4241 (60%) were at the static clinic. 55% of the individuals utilizing services at the outreach facility were women, 47% of visits were made by beneficiaries above the age of 50 years, 83% visits were made by illiterate, and 32% visits were made by overweight compared to 52%, 27%, 66%, and 35% at the static clinic respectively.

Table 1: Type of healthcare facility used.

Variables	New n=1822 (26)	Repeat n=5213 (74)	Grand Total 7035 (100)
Facility utilized	n, (%)	n, (%)	n, (%)
MMU	868 (48)	1926 (37)	2794 (40)
Static Clinic	954 (52)	3287 (63)	4241 (60)

Table 2: Sociodemographic profile of the sample.

Variables	MMU n=868 (48)	Static Clinic n=954 (52)	Grand Total n=1822 (100)			
Gender	N (%)	N (%)	N (%)			
Female	477 (55)	499 (52)	976 (54)			
Male	391 (45)	455 (48)	846 (46)			
Age category						
<20	33 (4)	82 (9)	115 (6)			
20-35	179 (21)	319 (33)	498 (27)			
36-50	251 (29)	290 (30)	541 (30)			
51-65	265 (31)	204 (21)	469 (26)			
>65	140 (16)	59 (6)	199 (11)			
Educational st	tatus					
Illiterate	717 (83)	625 (66)	1342 (74)			
7th Pass	38 (4)	58 (6)	96 (5)			
10th	59 (7)	136 (14)	195 (11)			
Intermediate	40 (5)	81 (8)	121 (7)			
Graduate	14 (2)	51 (5)	65 (4)			
Post	0	3 (0)	3 (0)			
Graduate		3 (0)	3 (0)			
Marital status						
Married	810 (93)	815 (85)	1625 (89)			
Unmarried	58 (7)	139 (15)	197 (11)			
Social status						
BC	544 (63)	691 (72)	1235 (68)			
OBC	2 (0)	3 (0)	5 (0)			
OC	58 (7)	41 (4)	99 (5)			
SC	230 (26)	207 (22)	437 (24)			
ST	34 (4)	10(1)	46 (3)			
Economic status						
APL	1 (0)	1 (0)	2 (0)			
BPL	867 (100)	953 (100)	1820 (100)			
BMI status						
Normal	383 (44)	410 (43)	793 (44)			
Underweight	206 (24)	213 (22)	419 (23)			
Overweight	145 (17)	143 (15)	288 (16)			
Obese	134 (15)	188 (20)	322 (18)			

#### Prevalence of hypertension and diabetes mellitus

The overall prevalence of hypertension and diabetes among the persons utilising services at the Arogyaseva program was 24% and 7%, respectively. 30% of the individuals visiting the MMU were hypertensive, while 4% were diabetic compared to 19% and 11% at the clinic.

Table 3: Prevalence of hypertension and diabetes mellitus.

Variables	MMU n=868 (48)	Static Clinic n=954 (52)	Grand Total n=1822 (100)
Hypertension Status	N (%)	N (%)	N (%)
Normal	245 (28)	392 (41)	637 (35)
Pre- Hypertension	368 (42)	381 (40)	749 (41)
Stage1 Hypertension	162 (19)	117 (12)	279 (15)
Stage2 Hypertension	93 (11)	64 (7)	157 (9)
Variables	MMU n=868 (48)	Static Clinic n=954 (52)	Grand Total n=1822 (100)
Diabetes Status	N (%)	N (%)	N (%)
Diabetic	32 (4)	104 (11)	136 (7)
Normal	836 (96)	850 (89)	1686 (93)

BMI: individuals with BMI scores of <18.5= underweight, (18.5-22.9)= normal, (23.0-24.9)= overweight and  $\ge 25=$  obese.

Hypertension: individuals with systolic and diastolic BP of <120 and <80= normal, (120-139) or (80-89)= prehypertensive, (140-159) or (90-99)= stage 1 hypertension and  $\geq$ 160 or  $\geq$ 100= stage 2 hypertension.

Diabetes: individuals with RBS reading of <140= normal, (140-200)= pre-diabetic and >200= diabetic

Vulnerable and non vulnerable: the population belonging to schedule tribe and schedule caste and below poverty level were considered as Vulnerable; and rst were included into Non-vulnerable category.

# Association between age, gender, education and the type of facility utilized (static clinic and MMU)

Utilisation of services at the outreach facility (MMU) showed a positive association with illiteracy, female gender, being hypertensive and old age (age>50 years) (p<0.0000001). Women, illiterate, hypertensives and the elderly were 1.3 (aOR 1.3; 95% CI 1.122–1.51), 2.61 (aOR 2.61; 95% CI 2.021 - 3.392), 3.28 (aOR 3.28; 95% CI 2.807-3.846) and 1.43 (aOR1.43; 95% CI 1.204-1.721) times more likely to utilize MMU based outreach facility compared to their male, literate, diabetic, young and socially non-vulnerable counterparts.

Table 4: Adjusted Odds Ratio (with Confidence Interval) of the utilisation of MMU concerning other predictor variables.

Variables		Adjusted Odds	Significance	Confidence interval
Condon		ratio	(P value)	(95%)
Gender				
	Female	1.302	0.001	1.122–1.510
	Male	1.00		
Marital status				
	Unmarried	1.725	0.261	0.667-4.464
	Married	1.00		
Social status				
	Vulnerable	.461	0.000	0.376-0.564
	Non-vulnerable	1.00		
Literacy status				
	Illiterate	2.619	0.000	2.021-3.392
	Literate	1.00		
Age				
(in years)	≥51	1.439	0.000	1.204-1.721
	≤50	1.00		
Diagnosis				
	Hypertension	3.286	0.000	2.807-3.846
	Diabetes	1.00		

#### **DISCUSSION**

The study shows that the prevalence of diabetes and hypertension among the individuals utilising services at the Arogyaseva program was 7% and 24%, respectively. This prevalence finding is higher compared to the findings of other studies in similar settings. <sup>15</sup> Higher prevalence of diabetes and hypertension in this study could be attributed to high share of the elderly population (37% over 50 years of age) in our sample. Several studies that show a higher prevalence of hypertension and diabetes in a sample of older age group, and hypertension is known to be positively associated with old age. <sup>16</sup>

The individuals availing services were predominantly poor, uneducated, and old. Arogyaseva provides free screening, diagnostic, and treatment-related to primary health and NCDs. It is a known fact that the poor and the marginalized are more likely to utilize free health care facilities.<sup>17</sup>

Utilisation of MMU services (community-based) for NCDs was positively associated with being women, illiterate, hypertensive, old, and from a vulnerable social group. The disempowering effect of illiteracy, old age, and female gender are well known. 13-15,18 These factors are known to limit mobility, decision-making authority, bargaining capacity, financial independence and the overall position within the family. 13-19 All of these are known to demand-side barriers to accessing institution-based healthcare. 6,7,14,15,18,19

Community-based service delivery through mobile medical units has been successfully used to breakdown some of these barriers to healthcare and improve utilisation of health services. <sup>20,21</sup> Especially, for the old, women, poor, and the marginalized. This could be the reason for more women, old and uneducated individuals utilizing healthcare services at the community/ MMU.

In 2010-11 The National Programme for the Healthcare of the Elderly (NPHCE) was launched to provide separate, specialized, and comprehensive healthcare to senior citizens (aged 60 years and above) across the state healthcare system.<sup>22</sup> The program aims to set up geriatric departments in identified regional geriatric centers (RGCs), 10-bedded geriatric units at district hospitals, rehabilitation units at all community health centers, and weekly geriatric clinics by trained medical officers at primary health centres.<sup>22</sup> However, to overcome barriers imposed by limited mobility during old age and the general lack of transport, there is a need to provide services closer to home. Therefore, while PHCs could continue providing primary healthcare services, the use of MMU to provide health services to the elderly with a special focus on NCDs could be explored.

#### **CONCLUSION**

The study shows that a significant proportion of the beneficiaries of the Arogyaseva program had diabetes and hypertension. A major proportion of them are old, poor, women, and uneducated. The utilisation of services for diabetes and hypertension by the women, elderly, and the

illiterate was significantly higher at the mobile community-based facility as compared to the men, educated and young individuals who used the static institution-based facility.

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