

Original Research Article

Multimorbidity, polypharmacy and the clinical profile of adults attending a rural primary care hospital: a retrospective cross-sectional study

Christina Gomes¹, Merlyn Joseph^{2*}

¹St. Francis' Hospital, Khatauli, Uttar Pradesh, India

²Department of Community Medicine, St. John's Medical College, Bengaluru, Karnataka, India

Received: 27 August 2026

Accepted: 15 October 2026

*Correspondence:

Dr. Merlyn Joseph,

E-mail: merlyn.j@stjohns.in

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Multimorbidity is an increasing challenge in primary care, particularly in rural settings. This study characterized the clinical profile of adults attending a rural primary care hospital and assessed the prevalence of multimorbidity and polypharmacy.

Methods: A retrospective cross-sectional study was conducted using outpatient records generated from January 2023 to December 2025 at St. Francis Hospital, Khatauli, Uttar Pradesh. Adults attending for the first time during the study period with documented blood pressure and at least one of random blood glucose or hemoglobin were included. Sociodemographic characteristics, clinical measurements, diagnoses, medication burden, tobacco and alcohol use were extracted. Binary logistic regression was used to identify factors associated with multimorbidity.

Results: Among 304 participants, the mean age was 47.07±17.70 years and 69.1% were female. Hypertension, diabetes mellitus and anemia were present in 39.6%, 31.6% and 61.5%, respectively. Polypharmacy was present in 9.9%. Participants aged ≥60 years had higher odds of multimorbidity than those aged <60 years (adjusted odds ratio 1.87, 95% confidence interval 1.03-3.40; p=0.040). Polypharmacy was associated with increased odds of multimorbidity, although the adjusted association was not statistically significant (adjusted odds ratio 2.31, 95% confidence interval 0.92-5.81; p=0.076).

Conclusions: Multimorbidity was common among adults attending this setting. The findings support integrated chronic disease management, routine assessment of multimorbidity, and periodic medication review in rural primary care.

Keywords: Diabetes mellitus, Hypertension, Multimorbidity, Polypharmacy, Primary care, Rural health

INTRODUCTION

Multimorbidity, commonly defined as the coexistence of two or more chronic conditions in an individual, is an important challenge for clinicians and health systems. Patients with multimorbidity have greater treatment complexity, medication burden, healthcare utilisation and risk of adverse outcomes than those with a single chronic condition.¹⁻³

Multimorbidity is increasingly recognised in low- and middle-income countries, where health systems are often organised around individual diseases rather than coordinated care for people with multiple conditions.^{4,5}

In India, hypertension and diabetes mellitus are major chronic diseases, while anaemia remains highly prevalent across adult age groups. Their coexistence may increase treatment complexity and the risk of polypharmacy. Polypharmacy is clinically important because multiple

medicines may be appropriate in complex disease, but inappropriate medication burden can contribute to medication-related problems and other harms.⁶⁻⁸

Primary care is well placed to provide continuous and coordinated chronic disease management. WHO guidance for low-resource settings also emphasises integrated management of non-communicable diseases at the primary-care level.^{9,10}

Evidence from India suggests substantial variation in multimorbidity prevalence across settings. A recent systematic review estimated a pooled prevalence of 20% across Indian studies, while primary-care studies have reported higher prevalence in healthcare-seeking populations. Risk-factor analyses among older Indian adults consistently identify advancing age as an important determinant.¹¹⁻¹³

However, evidence from rural primary-care outpatient settings using routinely collected clinical records remains limited. This study therefore aimed to characterise the clinical profile of adults attending a rural primary-care outpatient clinic, estimate the prevalence and patterns of multimorbidity, assess polypharmacy, and examine factors associated with multimorbidity.

METHODS

Study design and setting

This retrospective record-based cross-sectional study was conducted at St. Francis Hospital, Khatauli, Uttar Pradesh, India, a 30-bed rural secondary-care facility serving a predominantly agricultural and low-income population in Muzaffarnagar district. The outpatient department has an average daily load of approximately 20-25 patients across general practice and specialty clinics. Routine outpatient documentation includes blood pressure measurement, random blood glucose, hemoglobin estimation and prescription records.

Study period and participants

Outpatient records generated between January 2023 and December 2025 were reviewed. Adults aged ≥ 18 years attending the outpatient department for the first time during the study period were eligible if blood pressure and at least one of random blood glucose or hemoglobin were documented at the index visit. Pregnant women were excluded because of altered physiological reference ranges. Duplicate or follow-up entries were excluded, retaining the first eligible record.

Variables

Hypertension was defined as systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg at the index visit, or a documented previous diagnosis with ongoing antihypertensive treatment. Diabetes mellitus

was defined as random blood glucose ≥ 200 mg/dl in a symptomatic patient or a documented previous diagnosis with ongoing antidiabetic treatment. Anemia was defined as hemoglobin < 13 gm/dl in men or < 12 gm/dl in non-pregnant women. Polypharmacy was defined as prescription of ≥ 5 medications at the index outpatient visit. Multimorbidity was defined as coexistence of ≥ 2 of hypertension, diabetes mellitus and anemia in the same individual.

Data collection and bias handling

Outpatient registers and prescription records were reviewed using a structured data-extraction proforma. Variables included age, sex, blood pressure, random blood glucose, hemoglobin, number and classes of medications, prior diagnoses, and tobacco and alcohol use. Each record was assigned a study identification number and personal identifiers were not entered into the research database. Records missing blood pressure documentation were excluded. A pre-piloted proforma was used to promote consistent data extraction, and no imputation was performed for missing laboratory values.

Sample size

The minimum sample size was estimated using the single-population proportion formula, assuming a reported multimorbidity prevalence of 28.3% among adults attending primary-care facilities in India, a 95% confidence level and an absolute precision of 5%, giving a minimum required sample of 312 participants. As this was a retrospective record-based study, all eligible records available during the predefined study period were reviewed. The final analytical sample comprised 304 participants.

Statistical method and analysis

Data were analysed using Jamovi version 2.7.30. Continuous variables were summarised using mean and standard deviation, and categorical variables using frequencies and percentages. Prevalence estimates were reported with 95% confidence intervals. Associations between categorical variables were assessed using the chi-square test. Variables with clinical relevance or significant univariable associations were entered into a binary logistic regression model. Adjusted odds ratios with 95% confidence intervals and exact p values were reported. A two-sided p value < 0.05 was considered statistically significant.

Ethics

The study was approved by the Institutional Ethics Committee, St. John's National Academy of Health Sciences, Bengaluru. A waiver of informed consent was granted because the study used retrospective, de-identified records and involved minimal risk.

Administrative permission was obtained from the Medical Officer-in-Charge of St. Francis Hospital.

RESULTS

A total of 304 eligible outpatient records were included. The mean age was 47.07 ± 17.70 years; 210 (69.1%) participants were female. Tobacco use was documented in 93 (30.6%) and alcohol use in 85 (28.0%). Mean hemoglobin was 11.40 ± 2.03 gm/dl overall, 12.59 ± 2.10 gm/dl among males and 10.87 ± 1.77 gm/dl among females (Table 1).

Hypertension was present in 120 (39.6%), diabetes mellitus in 96 (31.6%), and anemia in 187 (61.5%) participants. Polypharmacy was present in 30 (9.9%) (Table 1).

Multimorbidity was more common among participants aged ≥ 60 years than among those aged < 60 years (53.5% versus 31.7%; $\chi^2=11.59$, $p<0.001$). Polypharmacy was also associated with multimorbidity on univariable analysis (66.7% among participants with polypharmacy versus 34.7% among those without; $\chi^2=10.45$, $p=0.001$). No significant association was observed with sex, tobacco use or alcohol use (Table 2).

In multivariable logistic regression, age ≥ 60 years remained independently associated with multimorbidity (adjusted odds ratio 1.87, 95% confidence interval 1.03-3.40; $p=0.040$). Polypharmacy showed higher odds of multimorbidity, but the association was not statistically

significant after adjustment (adjusted odds ratio 2.31, 95% confidence interval 0.92-5.81; $p=0.076$) (Table 3).

Table 1: Baseline sociodemographic and clinical characteristics of study participants (n=304).

Characteristics	Category	N (%) / Mean $\pm$ SD
Age (years)	Mean $\pm$ SD	47.07 $\pm$ 17.70
	18-39	117 (38.6)
	40-49	50 (16.5)
	50-59	50 (16.5)
	60-69	41 (13.5)
	≥ 70	45 (14.9)
Sex	Female	210 (69.1)
	Male	94 (30.9)
Tobacco use	Yes	93 (30.6)
	No	211 (69.4)
Alcohol use	Yes	85 (28.0)
	No	219 (72.0)
Hemoglobin (gm/dl)	Overall	11.40 $\pm$ 2.03
	Male	12.59 $\pm$ 2.10
	Female	10.87 $\pm$ 1.77
Hypertension	Present	120 (39.6)
	Absent	184 (60.4)
Diabetes mellitus	Present	96 (31.6)
	Absent	208 (68.4)
Anemia	Present	187 (61.5)
	Absent	117 (38.5)
Polypharmacy	Present	30 (9.9)
	Absent	274 (90.1)

Table 2: Association of baseline characteristics with multimorbidity.

Variables	Category	Multimorbidity present n/N (%)	Chi square χ^2	P value
Age group	< 60 years	69/218 (31.7)	11.59	< 0.001
	≥ 60 years	46/86 (53.5)		
Sex	Female	78/210 (37.1)	0.80	0.670
	Male	37/93 (39.8)		
Tobacco use	No	72/211 (34.1)	3.53	0.060
	Yes	43/93 (46.2)		
Alcohol use	No	78/219 (35.6)	1.31	0.252
	Yes	37/85 (43.5)		
Polypharmacy	Absent	95/274 (34.7)	10.45	0.001
	Present	20/30 (66.7)		

Table 3: Binary logistic regression analysis of factors associated with multimorbidity (n=304).

Variables	Comparison	Adjusted odds ratio	95% confidence interval	P value
Age	≥ 60 years versus < 60 years	1.87	1.03-3.40	0.040
Polypharmacy	Present vs absent	2.31	0.92-5.81	0.076

The model included variables selected on the basis of clinical relevance or significant univariable association. CI, confidence interval.

DISCUSSION

In this rural primary-care outpatient population, more than one-third of adults had multimorbidity. The prevalence was higher than the pooled estimate reported across Indian studies, but is consistent with the higher prevalence often observed in healthcare-seeking populations. Differences in study setting, condition definitions and ascertainment methods may explain variation between estimates.^{11,13}

Age was the most important independent factor associated with multimorbidity. Participants aged ≥ 60 years had almost twice the odds of multimorbidity compared with younger participants. This is consistent with evidence from India showing that multimorbidity increases with advancing age and with systematic-review evidence identifying age as an important risk factor among older adults.^{12,13}

The coexistence of hypertension, diabetes mellitus and anaemia has implications for primary-care delivery because patients may require coordinated assessment, monitoring and treatment across several chronic conditions. Integrated approaches to non-communicable disease management are particularly relevant in resource-constrained primary-care settings.^{9,10}

Polypharmacy was relatively uncommon in this cohort but was associated with multimorbidity in univariable analysis. The association was attenuated after adjustment for age, suggesting that part of the observed relationship may be explained by the higher medication burden among older adults. Medication review remains important when several chronic conditions coexist, while the use of multiple medicines should not itself be assumed to be inappropriate.^{7,8}

The findings have practical implications for rural primary care. A structured approach incorporating screening for common chronic conditions, identification of multimorbidity, medication review and coordinated follow-up may be more appropriate than isolated disease-specific management. Strengthening primary care is also important for equitable population health and chronic disease control.^{10,14}

The study provides real-world evidence from a rural Indian outpatient setting and used routinely collected clinical records over a three-year period. The use of predefined operational definitions and a structured extraction proforma reduced variation in data abstraction. However, the study was retrospective and single-centre, limiting generalisability. Only three conditions were included in the definition of multimorbidity, so the reported prevalence may underestimate the broader burden. The hospital-based sample may overrepresent individuals with health conditions compared with the general rural population. Some clinical variables and laboratory measurements were unavailable for all

patients, and the analysis was based on available records. Because of the cross-sectional design, causal relationships between age, polypharmacy and multimorbidity cannot be established.

CONCLUSION

Multimorbidity was common among adults attending a rural primary-care outpatient clinic, with older age independently associated with higher odds of multimorbidity. Hypertension, diabetes mellitus and anaemia were frequent chronic conditions, while polypharmacy was less prevalent but associated with multimorbidity before adjustment. Routine identification of multimorbidity and periodic medication review should be considered within integrated chronic disease management in rural primary care.

ACKNOWLEDGEMENTS

The authors acknowledge the administrative and clinical staff of St. Francis Hospital for facilitating access to the relevant outpatient records.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Barnett K, Mercer SW, Norbury M, Watt G, Wyke S, Guthrie B. Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study. *Lancet*. 2012;380:37-43.
2. Violan C, Foguet-Boreu Q, Flores-Mateo G, Salisburry C, Blom J, Freitag M, et al. Prevalence, determinants and patterns of multimorbidity in primary care: a systematic review of observational studies. *PLoS One*. 2014;9:e102149.
3. Glynn LG, Valderas JM, Healy P, Burke E, Newell J, Gillespie P, et al. The prevalence of multimorbidity in primary care and its effect on health care utilization and cost. *Fam Pract*. 2011;28:516-23.
4. Skou ST, Mair FS, Fortin M, Guthrie B, Nunes BP, Miranda JJ, et al. Multimorbidity. *Nat Rev Dis Primers*. 2022;8:48.
5. Muth C, Blom JW, Smith SM, Johnell K, Gonzalez-Gonzalez AI, Nguyen TS, et al. Evidence supporting the best clinical management of patients with multimorbidity: a systematic review and recommendations from the European General Practice Research Network. *J Intern Med*. 2019;285:447-58.
6. World Health Organization. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Geneva: World Health Organization; 2011.

7. Maher RL Jr, Hanlon J, Hajjar ER. Clinical consequences of polypharmacy in elderly. *Exp Opin Drug Saf*. 2014;13:57-65.
8. Rankin A, Cadogan CA, Patterson SM, Kerse N, Cardwell CR, Bradley MC, et al. Interventions to improve the appropriate use of polypharmacy for older people. *Cochrane Database Syst Rev*. 2018;9:CD008165.
9. World Health Organization. WHO package of essential noncommunicable disease interventions for primary health care. Geneva: World Health Organization; 2020.
10. Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. *Milbank Q*. 2005;83:457-502.
11. Varanasi R, Sinha A, Bhatia M, Nayak D, Manchanda RK, Janardhanan R, et al. Epidemiology and impact of chronic disease multimorbidity in India: a systematic review and meta-analysis. *J Multimorb Comorb*. 2024;14:26335565241258851.
12. Goel N, Biswas I, Chattopadhyay K. Risk factors of multimorbidity among older adults in India: a systematic review and meta-analysis. *Health Sci Rep*. 2024;7:e1915.
13. Pati S, Swain S, Knottnerus JA, Metsemakers JFM, van den Akker M. Magnitude and determinants of multimorbidity and health care utilization among patients attending public versus private primary care: a cross-sectional study from Odisha, India. *Int J Equity Health*. 2020;19:57.
14. World Health Organization. Package of essential noncommunicable disease interventions for primary health care in low-resource settings. Geneva: World Health Organization; 2010.

Cite this article as: Gomes C, Joseph M. Multimorbidity, polypharmacy and the clinical profile of adults attending a rural primary care hospital: a retrospective cross-sectional study. *Int J Community Med Public Health* 2026;13:6692-6.