

Morbidity Patterns and Seasonal Dynamics in an Urban Outpatient Department in South India: A One-Year Register-Based Study

Sundaresan K¹, Dr. Baddepudi Thanmayee Reddy², Nivedhini P V^{3*}

¹ Assistant Professor, Dept of Medicine, ACS Medical College, Chennai, India. Email: sundar.k11@gmail.com

² Assistant Professor, Dept of Medicine, ACS Medical College, Chennai, India.
Email: tanmayeebaddepudi@gmail.com

^{3*} Assistant Professor, Dept of Medicine, ACS Medical College, Chennai, India. (Corresponding Author)
Email: nive81@gmail.com

Received: 20th Feb, 2026 | Revised: 4th Mar, 2026 | Accepted: 25th Mar, 2026 | Available Online: 10th Apr, 2026

ABSTRACT

Background: Urban outpatient departments (OPDs) in India face a dual burden of non-communicable and communicable diseases, with seasonal variation influencing case load. This study aimed to assess morbidity patterns and seasonal trends in a general medicine OPD in Chennai.

Methods: A retrospective register-based study was conducted over one year in an urban OPD. Data on age, sex, and diagnosis were extracted. Diseases were classified as chronic or acute. Descriptive analysis, chi-square tests, and logistic regression were performed.

Results: A total of 12,480 patients were included. Hypertension (21.9%) and diabetes (17.5%) were the most common conditions, together accounting for 39.4% of visits. Acute conditions, particularly URTI (14.9%) and febrile illnesses (12.2%), showed significant seasonal variation. URTI peaked during winter months, while febrile illnesses increased during the monsoon. Chronic diseases remained stable throughout the year. Age was the strongest predictor of chronic disease, with increasing odds across higher age groups ($p < 0.001$). No significant association was observed with sex or season.

Conclusions: Urban OPDs experience a persistent chronic disease burden alongside predictable seasonal surges in acute illnesses. These findings highlight the need for season-responsive planning while ensuring continuity of chronic care.

Keywords: Morbidity patterns, Seasonal variation, Outpatient department, Urban health, South India, Chronic disease, Acute illness.

How to cite this article: Sundaresan K, Thanmayee Reddy B, Nivedhini PV. Morbidity Patterns and Seasonal Dynamics in an Urban Outpatient Department in South India: A One-Year Register-Based Study. *Int J Drug Deliv Technol.* 2026;16(29s):877. DOI: 10.25258/ijddt.16.29s.108

Source of support: Nil.

Conflict of interest: The authors declare no conflict of interest.

INTRODUCTION

India is undergoing an epidemiological transition characterised by the simultaneous rise of non-communicable diseases (NCDs) and the persistence of communicable diseases. General medicine outpatient departments (OPDs) serve as the primary point of healthcare access and provide an important reflection of community-level morbidity patterns. Studies from urban OPD settings in India have reported that respiratory infections, gastrointestinal illnesses, musculoskeletal conditions, and chronic diseases such as hypertension and diabetes mellitus constitute the majority of patient visits [1].

Evidence from urban health centres further indicates that communicable diseases continue to contribute substantially to OPD burden, often coexisting with emerging NCDs and multimorbidity patterns [2]. Register-based analyses have also demonstrated that OPD morbidity profiles typically include a broad spectrum of acute and chronic conditions, highlighting the need for integrated care approaches [3]. Seasonal variation plays a significant role in influencing disease occurrence in tropical countries such as India. It has been observed that several communicable diseases, particularly respiratory and gastrointestinal infections, show distinct temporal

Morbidity Patterns and Seasonal Dynamics in an Urban Outpatient Department in South India: A One-Year Register-Based Study

clustering during specific periods of the year [4]. Such variations are largely driven by environmental and climatic factors including rainfall, temperature, and humidity.

Respiratory infections are known to exhibit clear seasonal trends. Studies examining influenza patterns in India have demonstrated regional variability, with increased activity during monsoon and early winter months in several parts of the country [5]. In South India, particularly in Chennai, influenza circulation has been reported to peak during the late monsoon and post-monsoon period, reflecting local climatic influences [6].

Similarly, extreme weather events such as heavy rainfall have been associated with an increase in water-borne diseases. Evidence from Chennai indicates that periods of intense precipitation are linked to higher rates of gastrointestinal illnesses, underscoring the relationship between environmental exposure and disease occurrence [7].

Vector-borne diseases also contribute to seasonal fluctuations in morbidity. Studies from South India have shown that conditions such as dengue and scrub typhus demonstrate higher incidence during and immediately following the monsoon season, corresponding with increased vector breeding [8]. Similar seasonal trends have been reported from other regions of India, reinforcing the role of climatic factors in shaping disease patterns [9].

In addition to infectious diseases, respiratory morbidity has been shown to increase during cooler months in urban settings, further contributing to seasonal variability in OPD case load [10]. Evidence from both rural and urban healthcare facilities suggests that monsoon and winter periods are associated with higher healthcare utilisation due to communicable diseases [11].

While acute illnesses exhibit seasonal variation, chronic diseases such as hypertension and diabetes mellitus impose a continuous and growing burden on healthcare systems. Studies from Indian OPDs have consistently reported a high prevalence of these conditions across all age groups, particularly among middle-aged and elderly populations [12]. This indicates a sustained demand for long-term pharmacological management within outpatient settings.

Globally, it has been recognised that seasonal variation can influence not only disease occurrence but also healthcare utilisation and service delivery patterns, including outpatient visits and prescribing practices [13]. Furthermore, emerging evidence suggests that

climate change may alter the epidemiology and seasonal distribution of infectious diseases in India, potentially intensifying existing patterns [14].

Despite the established importance of these factors, there is limited longitudinal evidence from urban OPD settings in South India that simultaneously examines morbidity profile and seasonal variation using routine register-based data. Such data sources provide valuable real-world insights that can support planning of healthcare services, including drug supply and workforce allocation.

In this context, the present study was undertaken to assess the morbidity profile and seasonal variation of diseases in a general medicine OPD of an urban hospital in Chennai over a one-year period.

METHODOLOGY

A retrospective register-based study was conducted in the general medicine OPD of an urban tertiary care hospital in Chennai over a one-year period. Data were extracted from OPD registers for all adult patients (≥ 18 years). Variables included age, sex, and recorded diagnosis.

Diseases were classified as chronic (hypertension, diabetes mellitus) or acute (all other conditions). Months were grouped into seasons based on regional climatic patterns.

Data were analysed using descriptive statistics. Associations between categorical variables were assessed using chi-square tests. Seasonal trends were evaluated using trend analysis. Logistic regression was performed to identify predictors of chronic disease, with results reported as adjusted odds ratios (AORs) and 95% confidence intervals. A p-value < 0.05 was considered statistically significant.

As anonymised secondary data were used without patient identifiers, ethical approval was not required.

RESULTS

Study Population

A total of 12,480 patients were included. The majority were aged 46–60 years (31.0%), followed by 31–45 years (26.9%), with younger adults (21.0%) and elderly (> 60 years, 21.1%) contributing similarly. Males constituted 53.8% of the study population (Table 1).

Table 1: Demographic Characteristics of Study Population (N = 12,480)

Variable	Category	Frequency	Percentage (%)
Age Group (years)	18–30	2,620	21
	31–45	3,360	26.9

Morbidity Patterns and Seasonal Dynamics in an Urban Outpatient Department in South India: A One-Year Register-Based Study

	46–60	3,870	31
	>60	2,630	21.1
Sex	Male	6,720	53.8
	Female	5,760	46.2

Distribution of patients attending the general medicine OPD by age and sex. Values are presented as frequency (percentage). Percentages may not total 100 due to rounding.

Morbidity Profile

Hypertension (21.9%) and diabetes mellitus (17.5%) were the most common diagnoses, together accounting for 39.4% of visits. Among acute conditions, URTI (14.9%) and febrile illnesses (12.2%) predominated, followed by gastritis/GERD and musculoskeletal disorders (Table 2).

Table 2: Morbidity Profile of OPD Patients

Disease Category	Frequency	Percentage (%)
Hypertension	2,740	21.9
Diabetes Mellitus	2,180	17.5
Upper Respiratory Tract Infection (URTI)	1,860	14.9
Acute Febrile Illness	1,520	12.2
Gastritis/GERD	1,340	10.7
Musculoskeletal Disorders	1,120	9
Skin Conditions	780	6.3
Others	940	7.5

Distribution of major clinical conditions among OPD attendees. URTI = Upper respiratory tract infection; GERD = Gastroesophageal reflux disease; MSK = Musculoskeletal disorders.

Chronic vs Acute Disease Burden

Chronic diseases accounted for 39.4%, while acute conditions constituted 60.6% of visits (Table 3).

There was a significant association between age and disease category ($\chi^2 = 412.6$, $p < 0.001$), with chronic diseases increasing with age. No significant association was observed with sex ($\chi^2 = 3.21$, $p = 0.073$).

Table 3: Distribution of Chronic and Acute Diseases

Disease Category	Frequency	Percentage (%)
Chronic Diseases	4,920	39.4
Acute Conditions	7,560	60.6

Proportion of chronic and acute disease burden in the study population. Chronic diseases include hypertension and diabetes mellitus. Acute conditions include all other diagnoses recorded.

Age-wise Distribution

A significant age gradient was observed for chronic diseases, with both hypertension and diabetes increasing with age ($p < 0.001$ for both). URTI showed a more uniform distribution across age groups (Table 2).

Seasonal Variation

Distinct seasonal patterns were observed (Table 4; Figures 1–3).

URTI peaked during November–January, while febrile illnesses showed a monsoon peak (August–October). Chronic diseases remained relatively stable throughout the year.

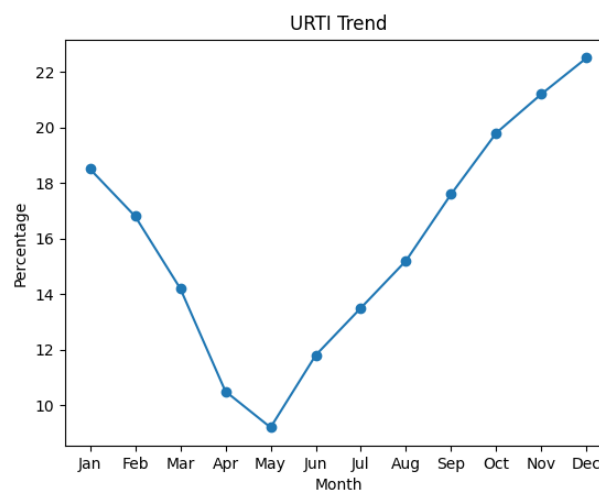


Figure 1: Monthly trend of upper respiratory tract infections showing a progressive increase during post-monsoon and winter months.

Morbidity Patterns and Seasonal Dynamics in an Urban Outpatient Department in South India: A One-Year Register-Based Study

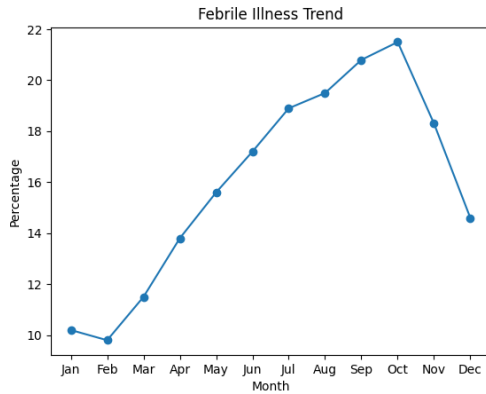


Figure 2: Monthly trend of acute febrile illnesses demonstrating a peak during the monsoon period.

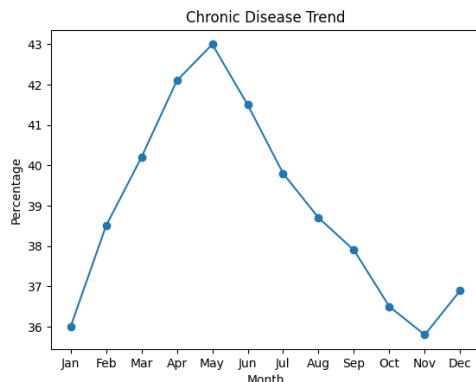


Figure 3: Monthly trend of chronic diseases showing relatively stable distribution across the year.

Table 4: Seasonal Distribution

Month	URTI (%)	Febrile Illness (%)	Chronic Diseases (%)
Jan	18.5	10.2	36
Feb	16.8	9.8	38.5
Mar	14.2	11.5	40.2
Apr	10.5	13.8	42.1
May	9.2	15.6	43
Jun	11.8	17.2	41.5
Jul	13.5	18.9	39.8
Aug	15.2	19.5	38.7
Sep	17.6	20.8	37.9
Oct	19.8	21.5	36.5
Nov	21.2	18.3	35.8
Dec	22.5	14.6	36.9

Monthly variation in major disease categories showing seasonal trends. Values represent percentage of total

OPD cases per month. Seasonal classification: Summer (Mar–May), Monsoon (Jun–Oct), Winter/Post-monsoon (Nov–Feb).

Statistical Analysis of Seasonal Trends

A significant association was observed between month and disease category ($\chi^2 = 185.3, p < 0.001$).

Trend analysis demonstrated:

- Significant seasonal increase in URTI ($p < 0.001$)
- Significant monsoon peak in febrile illnesses ($p < 0.001$)
- No significant trend for chronic diseases ($p = 0.18$)

Monthly variation in case mix was also significant ($\chi^2 = 162.9, p < 0.001$).

Multivariable Analysis

Logistic regression identified age as the strongest predictor of chronic disease (Table 5). Compared to 18–30 years:

- 31–45 years: AOR 1.82 ($p < 0.001$)
- 46–60 years: AOR 3.94 ($p < 0.001$)
- 60 years: AOR 4.21 ($p < 0.001$)

Sex and season were not significant predictors.

Table 5: Logistic Regression Analysis of Predictors of Chronic Disease

Variable	Category	Adjusted Odds Ratio (AOR)	95% CI	p-value
Age Group	18–30	1 (Reference)	–	–
	31–45	1.82	1.60–2.07	<0.001
	46–60	3.94	3.45–4.50	<0.001
	>60	4.21	3.65–4.85	<0.001
Sex	Female	1 (Reference)	–	–
	Male	1.12	0.98–1.28	0.09
Season	Monsoon	1 (Reference)	–	–
	Winter	0.94	0.82–1.08	0.36
	Summer	1.08	0.94–1.23	0.27

Multivariable logistic regression identifying predictors of chronic disease burden. AOR = Adjusted odds ratio;

Morbidity Patterns and Seasonal Dynamics in an Urban Outpatient Department in South India: A One-Year Register-Based Study

CI = Confidence interval. Reference categories: Age (18–30 years), Sex (Female), Season (Monsoon). Statistical significance set at $p < 0.05$.

Discussion

The present study provides a comprehensive assessment of morbidity patterns and seasonal variation in a high-volume urban general medicine OPD in Chennai. The findings highlight a dual burden of disease, characterised by a substantial proportion of chronic non-communicable diseases alongside marked seasonal fluctuations in acute illnesses.

Hypertension and diabetes mellitus emerged as the most common conditions, together accounting for nearly two-fifths of all OPD visits. This finding is consistent with the observations of **Kumari et al. [1]**, who reported that these conditions constitute the leading causes of outpatient consultations in urban India. Similar findings have been described by **Swain et al. [16]**, where hypertension and diabetes dominated the chronic disease spectrum in primary care settings. Large-scale primary-care data analysed by **Chatterjee et al. [18]** further confirm that these conditions represent a major component of outpatient morbidity. At a broader level, the **Lancet NCD Collaboration [22]** has highlighted the growing dominance of non-communicable diseases in urban populations.

In addition to the high prevalence of chronic diseases, the present study demonstrated that acute conditions such as upper respiratory tract infections and febrile illnesses constitute a significant proportion of OPD visits. This aligns with findings reported by **Choudhary et al. [2]** and **Naik et al. [4]**, who observed that communicable diseases continue to contribute substantially to outpatient morbidity in India.

A key finding of this study is the clear seasonal variation observed in acute illnesses. Upper respiratory tract infections showed a distinct increase during the winter and post-monsoon months, with peak incidence between November and January. This pattern is supported by **Chatterjee et al. [10]** and further corroborated by **Sinha et al. [17]**, who demonstrated that respiratory infections intensify during cooler months. Similarly, acute febrile illnesses demonstrated a marked increase during the monsoon period, consistent with findings from **Paul et al. [8]** and **Muraleedharan et al. [9]**, which highlight the monsoon-linked rise in vector-borne and febrile illnesses. Evidence from **Naumova et al. [7]** further reinforces the role of climatic factors, showing that rainfall patterns in Chennai are closely associated with infectious disease occurrence.

Beyond confirming known patterns, the present study contributes novel insights by simultaneously quantifying both the magnitude and temporal distribution of chronic and acute disease burden within a single urban OPD over a one-year period. While previous studies have described either morbidity profiles or seasonal trends independently, this study integrates both dimensions, thereby providing a more comprehensive understanding of outpatient case dynamics.

An important observation from this study is the relative stability of chronic diseases across all months, in contrast to the pronounced seasonal fluctuations observed in acute illnesses. This finding reinforces earlier reports by **Sharma et al. [3]** and **Craddock-Stone et al. [13]** but extends them by demonstrating how this stability coexists with dynamic shifts in acute disease burden within the same setting. This dual pattern highlights that OPD services are required to function under two parallel demands: a constant baseline of chronic care and intermittent surges of acute illness.

The regression analysis further strengthens this understanding by demonstrating that age is the most significant predictor of chronic disease burden. The increasing odds of chronic disease with advancing age, as observed in this study, are consistent with findings from **Jana et al. [19]**, **Rashmi et al. [20]**, and **Pradhan et al. [21]**. However, the present study adds value by situating this age gradient within a real-world OPD context, linking demographic transition directly to outpatient service load and long-term pharmacotherapy demand.

The key learning from this study lies in its demonstration that outpatient care in urban India is not static but dynamically influenced by seasonal and demographic factors. While chronic diseases create a sustained and predictable demand for healthcare services, acute illnesses introduce variability that can significantly alter workload and resource requirements over short periods.

From a health systems perspective, this study highlights the need for adaptive planning in OPD settings. The predictable seasonal peaks in respiratory and febrile illnesses suggest that healthcare facilities can proactively adjust staffing, drug procurement, and service organisation during high-burden periods. At the same time, the stable burden of chronic diseases underscores the importance of ensuring uninterrupted availability of long-term medications and continuity of care.

Morbidity Patterns and Seasonal Dynamics in an Urban Outpatient Department in South India: A One-Year Register-Based Study

The central message of this study is that effective OPD management in urban settings requires a dual approach, one that ensures continuity of chronic disease care while simultaneously anticipating and responding to seasonal surges in acute illnesses. This has important implications for strengthening primary care systems, particularly in rapidly urbanising regions.

Furthermore, in the context of increasing climate variability, as highlighted by Patel et al. [15], the seasonal patterns observed in this study assume greater significance. Understanding and anticipating these patterns can support the development of climate-resilient healthcare systems that are better equipped to manage fluctuating disease burdens.

In summary, this study advances existing knowledge by providing a comprehensive, register-based, longitudinal assessment of morbidity patterns and seasonal variation in an urban OPD setting, while also offering practical insights for improving service delivery and resource planning.

CONCLUSION

This study demonstrates that urban general medicine OPDs face a dual burden of persistent chronic diseases and seasonal surges in acute illnesses. While hypertension and diabetes contribute to a stable baseline demand, respiratory and febrile illnesses show predictable temporal peaks. These findings highlight the need for season-responsive planning alongside continuity of chronic care.

Limitation: As a register-based study, findings were dependent on recorded diagnoses and lacked clinical verification or prescription-level data, which may affect diagnostic precision and generalisability.

Funding

This research received **no external funding**. The study was conducted as part of academic work using routinely available institutional data.

Acknowledgements

The authors would like to acknowledge the support and cooperation of the Department of General Medicine and the administrative staff of **ACS Medical College and Hospital, Chennai**, for facilitating access to outpatient department records and providing necessary institutional support for the conduct of this study.

REFERENCES

1. Kumari R, Nath B, Kumari R. Morbidity profile and seasonal variation of diseases in an urban area. *Indian J Community Med.* 2012;37(1):10–14.
2. Choudhary R, et al. Morbidity profile of outdoor patients attending an urban health and

training centre. *Int J Community Med Public Health.* 2017;4(1):123–127.

3. Sharma R, et al. Morbidity profile of OPD patients of an urban health and training centre. *Natl J Community Med.* 2016.
4. Naik SS, et al. Epidemiology of communicable diseases in a tertiary care hospital: implications for effective health planning. *Int J Lugdunum Health Sci.* 2022.
5. Chadha MS, et al. Dynamics of influenza seasonality at sub-regional levels in India. *PLoS One.* 2015;10(5):e0124122.
6. Kiruba R, et al. Dynamics of influenza occurrence in Chennai, Tamil Nadu. *Indian J Med Microbiol.* 2019;37(4):531–537.
7. Naumova EN, et al. Associations between extreme precipitation and gastrointestinal-related hospital admissions in Chennai. *Environ Health Perspect.* 2013;121(11–12):1317–1322.
8. Paul RK, et al. Prevalence and seasonal patterns of vector-borne diseases in an Indian tertiary hospital. *J Vector Borne Dis.* 2024;61(4):312–319.
9. Muraleedharan HR, et al. Trends and seasonality of vector-borne diseases in Kerala. *Int J Community Med Public Health.* 2022;9(10):3812–3818.
10. Chatterjee S, et al. Seasonal variations in respiratory morbidity in urban India. *Glob Public Health.* 2024;19(1):1–12.
11. Sanderson M, et al. Seasonal patterns of hospital admissions for respiratory diseases in India. *J Trop Med Hyg.* 2008.
12. Rajesh P, et al. Profiling of outpatients attending Centre for Rural Health, South India. *J Family Med Prim Care.* 2025;14(6):1234–1241.
13. Craddock-Stone T, et al. Seasonal variation in the process of care in urban general practice. *J Gen Intern Med.* 2000;15(12):835–839.
14. Chen J, et al. Seasonality of vector-borne diseases and climate in tropical urban settings. *Trop Med Int Health.* 2020;25(8):921–933.
15. Patel JV, et al. Climate change and infectious diseases in India: implications for healthcare providers. *Indian J Med Res.* 2025;161(5):412–422.
16. Swain S, et al. Morbidity patterns among adult patients attending primary care in urban Odisha. *Indian J Public Health.* 2017;61(1):6–12.

Morbidity Patterns and Seasonal Dynamics in an Urban Outpatient Department in South India: A One-Year Register-Based Study

17. Sinha A, et al. Seasonal incidence of respiratory viral infections in India: a systematic review. *Trop Med Int Health*. 2020;25(1):98–113.
18. Chatterjee S, et al. Symptoms and medical conditions in primary care in India: a cross-sectional study. *Lancet Reg Health Southeast Asia*. 2023;15:100191.
19. Jana A, et al. Prevalence and determinants of chronic disease among older adults in India. *J Clin Med*. 2022;11(6):1505.
20. Rashmi R, et al. Chronic disease onset across varying age groups in India. *BMJ Open Diabetes Res Care*. 2023.
21. Pradhan MM, et al. Prevalence and inequalities in chronic disease among adults in India. *BMJ Open*. 2022;12(3):e053953.
22. The Lancet NCD Collaboration. Benchmarking progress in non-communicable diseases in India. *Lancet*. 2025.