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Original Research Article

Prevalence and Risk Factor Profiling of Non-Communicable Diseases in an Urban Population: Evidence from a Cross-Sectional Study at Bundelkhand Medical College, Sagar

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Conflict of interest: Nil

Abstract

Background: Non-communicable diseases (NCDs) are the leading cause of morbidity and mortality globally and in India. Limited community-based data exist from central India regarding disease burden and utilization of services under national programs.

Objectives: To assess the prevalence of NCDs, associated risk factors, and utilization of screening and treatment services under NPCDCS.

Methods: A community-based cross-sectional study was conducted among 206 individuals aged ≥30 years in the urban field practice area of Bundelkhand Medical College, Sagar. Multistage random sampling was used. Data were collected using a semi-structured questionnaire. Analysis was performed using SPSS v26, and associations were tested using chi-square test.

Results: The prevalence of any NCD was 59.6%, with multimorbidity in 23.3%. Hypertension (34.0%) and diabetes (26.7%) were the most common conditions. Major risk factors included obesity (36.9%), physical inactivity (31.1%), tobacco use (29.6%), and stress (27.2%). Tobacco use (p=0.013) and physical inactivity (p=0.019) were significantly associated with NCDs. Screening coverage was 62.1%, and 88.9% of referred individuals complied. Among NCD patients, 71.3% reported regular medication adherence.

Conclusion: A high burden of NCDs and modifiable risk factors was observed. Although service utilization under NPCDCS is encouraging, gaps remain in continuity of care and medicine availability.

Keywords: NCDs, Hypertension, Diabetes, Risk factors, NPCDCS, Urban health, Screening, Madhya Pradesh.

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Introduction

Non-Communicable Diseases (NCDs) have emerged as a major public health challenge in both developed and developing nations. Unlike communicable diseases, NCDs are not transmitted from person to person and are typically chronic in nature [1]. The most common NCDs include cardiovascular diseases, diabetes, cancers, and chronic respiratory diseases.

According to the World Health Organization (WHO), NCDs are responsible for approximately 74% of global deaths, with a significant proportion occurring in low- and middle-income countries, including India [1]. India is currently undergoing an epidemiological transition characterized by a decline in infectious diseases and a concurrent rise in NCDs. As per the India: Health of the Nation's States Report (2017), NCDs accounted for over 55% of the total disease burden in the country [2]. This shift is attributed to changes in lifestyle, dietary patterns, increasing urbanization, tobacco use, alcohol consumption, sedentary behaviour, and increasing rates of obesity. The burden is further compounded by socioeconomic factors such as poverty, lack of awareness, and poor access to healthcare services [3]. A variety of factors have been identified as the leading causes of poor utilization of primary health care services, including poor socio-economic status, lack of physical accessibility, cultural beliefs and perceptions, low maternal literacy and large family size.

Madhya Pradesh, being one of the less developed states, has witnessed a notable rise in NCD prevalence. Despite several initiatives under the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS), there is still limited data on the actual burden and associated risk factors at the community level, particularly in urban field practice areas. Understanding the prevalence of

NCDs and the effectiveness of national health programmes at the local level is essential for better planning, resource allocation, and implementation of targeted interventions [4]. The Urban Health Training Centre (UHTC) of Bundelkhand Medical College, Sagar, serves as a vital link between academic training and community health service delivery.

This field practice area includes a diverse urban population that presents a unique mix of socio-demographic characteristics, potentially influencing the burden and risk profile of NCDs.

Conducting a cross-sectional study in this setting provides an opportunity to not only assess the magnitude of the problem but also to understand the community's awareness, health-seeking behaviour, and service utilization under national programmes such as NPCDCS.

Programmatic relevance: although NPCDCS currently focuses on individuals aged ≥30 years, the present findings may provide evidence to support policy expansion and highlight the need to revise age thresholds in future programme updates.

Furthermore, early detection of risk factors such as hypertension, dyslipidaemia, obesity, and sedentary lifestyles can guide preventive strategies and reduce long-term morbidity and mortality. This aligns with the Sustainable Development Goal (SDG), which aims to reduce premature mortality from NCDs by one-third by 2030 through prevention and treatment, and by promoting mental health and well-being [5,6]. The present study aims to assess the burden of NCDs and evaluate the associated risk factors among the population in the field practice area of UHTC, BMC Sagar. Additionally, it seeks to examine the extent to which community members are utilizing services under the national programmes for NCD prevention and control, thereby identifying gaps and opportunities for strengthening community health interventions.

Material and Methods

Study Design: This study employed a cross-sectional design to identify the prevalence of diseases and associated health behaviours, facilitating the capture of multiple variables at a single point in time.

Study Setting: The study was conducted in the field practice area of the Urban Health Training Centre, Bundelkhand Medical College, Sagar, Madhya Pradesh.

Sample Size: The current study adopted the following formula for sample size is Cochran's Formula:

$$\mathbf{n = \frac{z^2pq}{e^2}}$$

Where we Considered: n = sample size,

- z = 1.96 (at 95% confidence)
- p = 61% [6]
- q = (1-p)
- e = Margin of error is 7%

Considering a 10% non-response rate, the final sample size was adjusted to 206 participants.

Sampling Methods: This was a community-based cross-sectional study. A multi-stage random sampling strategy was adopted for selection of households in Study area.

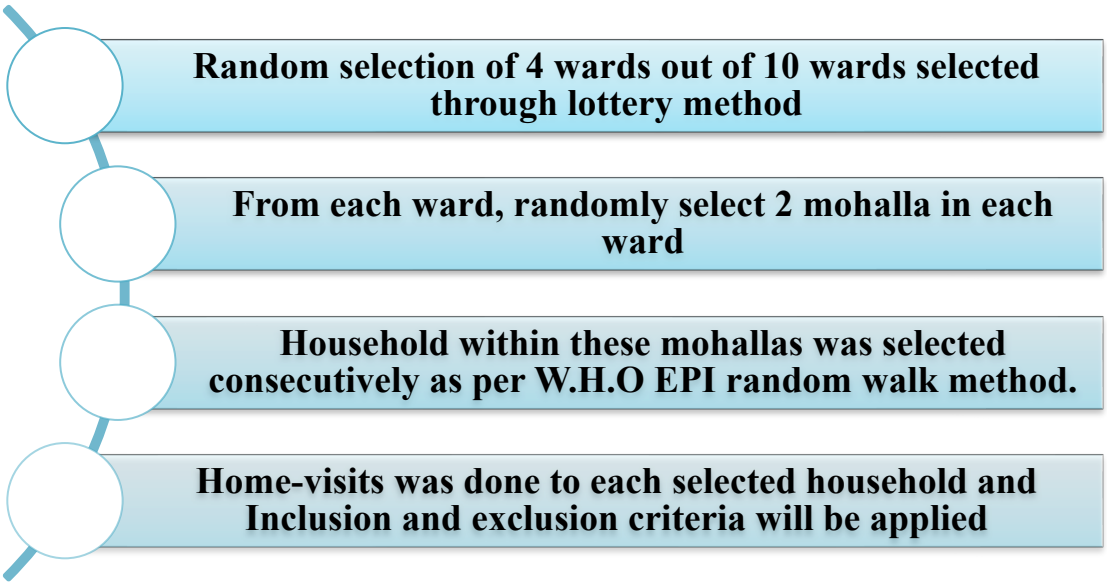

Figure 1: Multi-stage random sampling strategy adopted for the study

Data Collection Tool and Procedure: The study included residents aged 30 years and above who had lived in study area for at least six months. Those who were uncooperative, unable to understand the questionnaire, or not found at home after two visits were excluded.

Data were collected using a semi-structured, closed-ended questionnaire, developed by adapting questions from pre-validated tools used in previous Indian surveys on the utilization of government health services for non-communicable diseases (NCDs). Additionally, barriers to utilization of NCD screening and treatment services were assessed among participants who did not utilize services. A semi-structured questionnaire was used for data collection.

Data Analysis: The collective Data were entered into Microsoft Excel and analysed using SPSS Software version 26. The data were checked for missing variables and none were found. Some continuous variables such as age and distance to the nearest public health facility were converted into categorial variables. Variables with $p < 0.20$ in bivariate analysis were included in the multivariate logistic regression model to identify independent predictors of NCDs.

Results

A total of 206 participants were included using a multi-stage random sampling technique. Table 1 is showing the sociodemographic characteristics of the study participants. The age distribution revealed that the largest proportion of participants belonged to the 40–49 years age group (23.8%), followed closely by those aged 30–39 years (22.8%).

A gradual decline in proportion was observed with increasing age, although a notable proportion (18.4%) of participants were aged ≥70 years, indicating adequate representation of elderly individuals. The study population demonstrated a perfectly balanced gender distribution, with males and females contributing equally (50% each), thereby minimizing gender-related bias in outcome interpretation.

With respect to educational status, the majority of participants had completed at least high school education (28.6%), followed by primary education (23.3%). However, a considerable proportion (16.5%) of participants were illiterate, reflecting persistent educational disparities in the community.

Table 1: Sociodemographic Characteristics of Participants (n = 206)

Variable	Category	n (%)
Age (years)	30–39	47 (22.8)
	40–49	49 (23.8)
	50–59	39 (19.0)
	60–69	32 (15.6)
	≥70	38 (18.4)
Gender	Male	103 (50.0)
	Female	103 (50.0)
Education	Illiterate	34 (16.5)
	Primary	48 (23.3)
	High School	59 (28.6)
	Intermediate	37 (18.0)
	Graduate & above	28 (13.6)

The burden of non-communicable diseases (NCDs) among participants is shown in Table 2. Out of the total participants, 123 individuals (59.6%) were found to have at least one NCD, indicating a high overall disease burden in the study population. Furthermore, multimorbidity (presence of ≥2 NCDs) was observed in 23.3% of participants, highlighting the coexistence of multiple chronic conditions. Among specific diseases, hypertension emerged as the most prevalent condition (34.0%), followed by diabetes mellitus (26.7%). Other conditions such as non-alcoholic fatty liver disease (15.1%), cardiovascular diseases (9.8%), and chronic respiratory diseases (9.7%) were also observed. Stroke prevalence was relatively low (2.5%), but remains clinically significant.

Table 2: Prevalence of NCDs and Multimorbidity (n = 206)

Variable	n (%)
Any NCD present	123 (59.6)
Multimorbidity (≥2 NCDs)	48 (23.3)
Hypertension	70 (34.0)
Diabetes mellitus	55 (26.7)
NAFLD	31 (15.1)
Cardiovascular disease	20 (9.8)
Asthma/COPD	20 (9.7)
Stroke	5 (2.5)

In terms of occupational status, skilled or professional workers formed the largest group (25.2%), followed by homemakers (20.9%), unskilled labourers (18.9%), and semi-skilled workers (15.0%). Unemployed individuals accounted for 10.2%, while retired participants made up 9.8% of the study population (Figure 2).

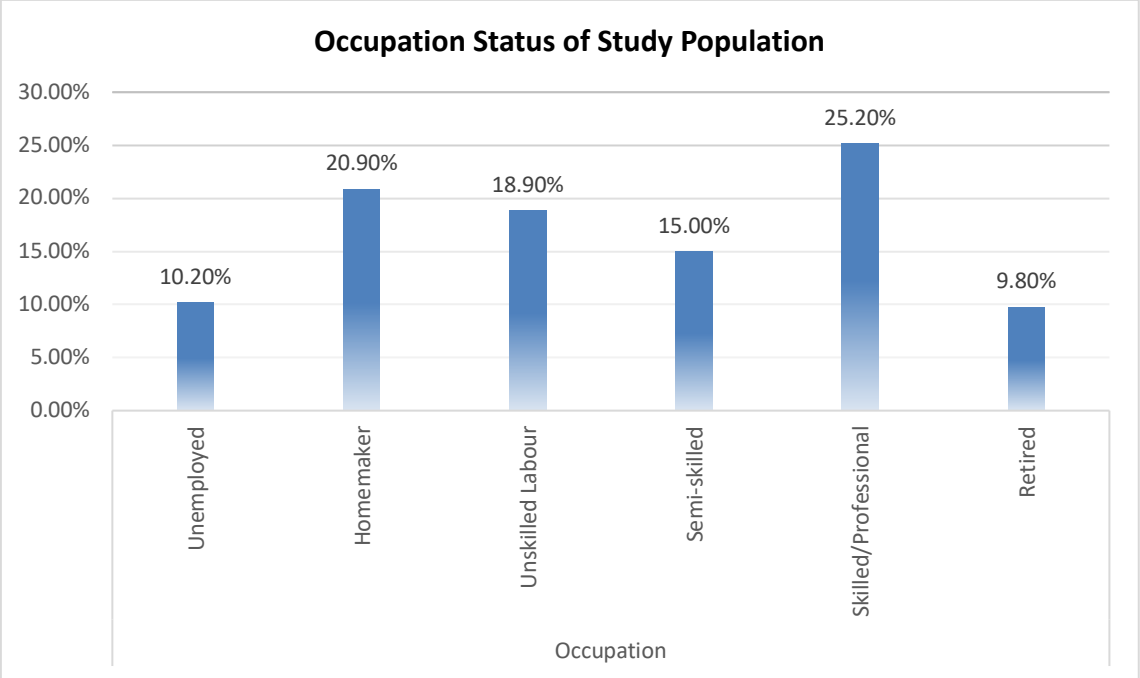

Figure 2: Occupation Status of study population

The distribution of behavioural and physiological risk factors among the study participants is presented in Table 3.

Among the assessed risk factors, obesity (BMI ≥25) was the most prevalent, affecting 36.9% of participants, indicating a substantial burden of overweight and obesity in the study population. This was followed by physical inactivity (31.1%), suggesting that nearly one-third of participants did not meet recommended levels of physical activity.

Behavioural risk factors were also prominent, with tobacco use reported by 29.6% of participants and alcohol consumption by 18.0%. In addition, high perceived stress was observed in 27.2% of individuals, highlighting the role of psychosocial determinants in chronic disease risk.

Table 3: Distribution of Behavioural and Physiological Risk Factors (n = 206)

Risk Factor	n (%)
Tobacco use	61 (29.6)
Alcohol use	37 (18.0)
Physical inactivity	64 (31.1)
Obesity (BMI ≥25)	76 (36.9)
High perceived stress	56 (27.2)

The association between behavioural risk factors and the presence of non-communicable diseases was further analysed using chi-square test and odds ratio (OR) with 95% confidence intervals, as shown in Table 4. Tobacco use demonstrated a statistically significant association with NCDs ($\chi^2 = 6.12$, $p = 0.013$). Participants who used tobacco had 2.42 times higher odds of having NCDs compared to

non-users (OR = 2.42; 95% CI: 1.20–4.86), indicating a strong positive association. Similarly, physical inactivity was significantly associated with NCDs (χ^2 = 5.47, p = 0.019). Physically inactive individuals had approximately two times higher odds of developing NCDs (OR = 2.05; 95% CI: 1.05–4.01) compared to physically active participants.

Table 4: Association of Risk Factors with NCDs (n = 206)

Risk Factor	NCD Present n (%)	NCD Absent n (%)	χ^2	p-value	Odds Ratio (95% CI)
Tobacco use	42 (68.9)	19 (31.1)	6.12	0.013*	2.42 (1.20–4.86)
Physical inactivity	41 (64.1)	23 (35.9)	5.47	0.019*	2.05 (1.05–4.01)

***Statistically significant**

Multivariate logistic regression analysis demonstrated that tobacco use, physical inactivity, and obesity were significant independently associated with the presence of NCDs after adjusting for potential confounding variables (Table 4A).

Among these, obesity showed the strongest association, with participants having 2.63 times higher odds of NCDs compared to non-obese individuals (AOR = 2.63; 95% CI: 1.34–5.15; p = 0.005). Tobacco use was also significantly associated with NCDs, with users having 2.18 times higher odds (AOR = 2.18; 95% CI: 1.08–4.39; p = 0.029). Similarly, physical inactivity increased the odds of NCDs by nearly twofold (AOR = 1.96; 95% CI: 1.01–3.81; p = 0.046).

Table 4A: Multivariate Logistic Regression Analysis for Predictors of NCDs

Variable	Adjusted Odds Ratio (AOR)	95% CI	p-value
Tobacco use	2.18	1.08–4.39	0.029*
Physical inactivity	1.96	1.01–3.81	0.046*
Obesity (BMI ≥25 kg/m²)	2.63	1.34–5.15	0.005*

***Statistically significant**

The utilization pattern of NCD-related screening and treatment services is depicted in Table 5.

Out of the total participants, 128 individuals (62.1%) had undergone NCD screening, indicating moderate uptake of preventive health services. Among those screened, 54.9% accessed government healthcare facilities, reflecting a substantial reliance on public sector services. Among the participants who were referred to higher centres (n = 63), a high proportion (88.9%) complied with referral advice and visited the referral facility, suggesting good health-seeking behaviour and adherence to medical guidance.

Table 5: Utilization of Screening and Treatment Services (n = 206)

Variable	n (%)
Attended NCD screening	128 (62.1)
Screening at government facility	70 (54.9)
Referred to higher facility	63 (30.6)
Visited referral centre	56 (88.9) *
On treatment (NCD patients, n=123)	92 (74.8)
Regular medication adherence	67 (71.3)
Receiving all medicines	65 (69.1)

***Among those screened**

Among participants diagnosed with NCDs (n = 123), 74.8% were receiving treatment, indicating a relatively satisfactory treatment coverage. However, only 71.3% reported regular adherence to medication, and 69.1% reported receiving all prescribed medicines, highlighting gaps in continuity of care and drug availability.

Table 6: Reasons for Non-Utilization of NCD Services

Reason for Non-utilization	Frequency (n)	Percentage (%)
Lack of awareness about NCD services	22	28.2
Long waiting time at government facility	14	17.9
Distance to health facility	10	12.8
Non-availability of medicines	16	20.5
Financial constraints	8	10.3
Preference for private healthcare	18	23.1
Lack of perceived need (asymptomatic)	20	25.6
Fear / stigma	6	7.7
Previous bad experience	9	11.5

Among participants who did not utilize NCD services (n = 78), the most commonly reported reasons were lack of awareness about available services (28.2%) and lack of perceived need due to absence of symptoms (25.6%). A substantial proportion of participants also preferred private healthcare facilities (23.1%) and reported non-availability of medicines (20.5%) at government facilities. System-related barriers such as long waiting time (17.9%) and distance to health facility (12.8%) were also notable. Financial constraints (10.3%), previous negative experiences (11.5%), and fear or stigma (7.7%) were less commonly reported but still contributed to reduced utilization.

Table 7: Association of Non-Utilization with Sociodemographic Factors (n = 206)

Variable	Category	Non-utilization n (%)	Utilization n (%)	χ^2	p-value
Gender	Male	42 (40.8)	61 (59.2)	0.84	0.36
	Female	36 (35.0)	67 (65.0)		
Education	≤Primary	38 (46.9)	43 (53.1)	5.12	0.024*
	≥High School	40 (31.7)	86 (68.3)		
Age group	<50 years	30 (31.6)	65 (68.4)	4.28	0.038*
	≥50 years	48 (43.6)	62 (56.4)		
Socioeconomic status	Lower	45 (45.9)	53 (54.1)	6.02	0.014*
	Middle/Upper	33 (30.3)	76 (69.7)		

***Statistically significant**

The association between sociodemographic factors and non-utilization of NCD services revealed that education, age, and socioeconomic status were significantly associated with service utilization. Participants with lower educational status (≤primary education) had significantly higher non-utilization (46.9%) compared to those with higher education (31.7%) (p = 0.024). Similarly, individuals aged ≥50 years showed higher non-utilization (43.6%) than younger participants (31.6%) (p = 0.038). Non-utilization was also significantly higher among participants belonging to lower socioeconomic status (45.9%) compared to middle and upper classes (30.3%) (p = 0.014). However, no statistically significant association was observed with gender (p = 0.36).

Discussion

The present study assessed the burden of non-communicable diseases (NCDs), associated risk factors, and healthcare utilization among adults aged ≥30 years. The findings revealed a high prevalence of NCDs along with substantial exposure to modifiable behavioural and physiological risk factors, reflecting the ongoing epidemiological transition in India.

In the present study, the majority of participants belonged to the 40–49 years age group (23.8%), followed by 30–39 years (22.8%), with equal gender distribution. Similar findings were reported by Geldsetzer et al. (2022), who observed that a substantial proportion of hypertension and diabetes cases in India occur among individuals aged 30–50 years, which is consistent with the age distribution observed in the present study [7]. The equal gender distribution in the present study is comparable with recent epidemiological trends, although Vedanthan R et al. (2022) reported higher prevalence among males due to greater exposure to behavioural risk factors [8].

The present study reported a high prevalence of NCDs (59.6%), with hypertension (34.0%) and diabetes mellitus (26.7%) being the most common conditions. These findings are comparable with Geldsetzer et al. (2022), who reported hypertension prevalence of approximately 32–34% among Indian adults, which is similar to the present study [7]. However, Anjana et al. (2023) reported a lower national diabetes prevalence of approximately 10–11%, which is lower than that observed in the present study (26.7%), indicating a relatively higher-risk study population [9]. The prevalence of cardiovascular diseases in the present study (9.8%) is also consistent with findings by Prabhakaran et al. (2022), who reported prevalence ranging from 8–12% in Indian populations [10]. Multimorbidity observed in the present study (23.3%) is slightly higher than that reported by Sinha et al. (2022) (approximately 18–20%), suggesting an increasing coexistence of chronic conditions due to shared risk factors [11]. With regard to behavioural and physiological risk factors, obesity (36.9%) was the most prevalent in the present study, followed by physical inactivity (31.1%) and tobacco use (29.6%). These findings are consistent with Luhar et al. (2022), who reported obesity prevalence ranging between 30–40% among Indian adults [12]. Similarly, Guthold et al. (2023) reported global physical inactivity prevalence of approximately 27%, which is slightly lower than the present study (31.1%), indicating higher sedentary behaviour in this population [13]. Tobacco use in the present study (29.6%) is comparable with estimates reported by the World Health Organization (2023), which reported prevalence of around 28% in India [14]. The prevalence of high perceived stress (27.2%) is also supported by findings from Patel et al. (2022), who highlighted a similar burden of psychosocial stress in developing countries [15].

The present study demonstrated a statistically significant association between tobacco use and NCDs, with tobacco users having 2.42 times higher odds of NCDs. Similar findings were reported by Jha and Peto (2022), who demonstrated that tobacco use significantly increases the risk of cardiovascular diseases and other chronic conditions [16]. Likewise, physical inactivity in the present study was associated with 2.05 times higher odds of NCDs, which is consistent with findings by Guthold et al. (2023), who reported that physically inactive individuals have approximately 1.5–2 times higher risk of NCDs [13]. The consistency in magnitude of association across studies supports the strong role of behavioural risk factors in NCD development.

Further, multivariate logistic regression analysis in the present study showed that obesity (AOR = 2.63), tobacco use (AOR = 2.18), and physical inactivity (AOR = 1.96) were independently associated with the presence of NCDs. These findings are in agreement with Afshin et al. (2023), who reported that obesity is associated with approximately 2–3 times higher risk of cardiometabolic diseases [17]. Similarly, GBD Risk Factor Collaborators (2022) demonstrated that behavioural risk factors such as tobacco use and physical inactivity independently contribute to NCD burden [18]. The stronger association observed with obesity in the present study highlights its central role as a metabolic risk factor.

In terms of healthcare utilization, the present study found that 62.1% of participants had undergone NCD screening, indicating moderate uptake of preventive services. This is higher than findings by Vedanthan et al (2022), who reported screening coverage of approximately 40–50% in low- and middle-income countries [8].

However, treatment adherence in the present study (71.3%) is comparable to findings by Gupta et al. (2023), who reported adherence rates between 65–75% [19]. Despite this, only 69.1% of participants reported receiving all prescribed medicines, highlighting gaps in drug availability. Similar challenges have been reported in recent studies, where effective control rates remain suboptimal. Overall, the findings of the present study are consistent with recent national and global evidence and demonstrate a high burden of NCDs associated with modifiable risk factors. The comparable prevalence rates and strength of associations observed across studies reinforce the need for comprehensive strategies focusing on lifestyle modification, early detection, and strengthening of primary healthcare systems to reduce the growing burden of NCDs.

The present study further identified key barriers to utilization of NCD services, including lack of awareness, asymptomatic perception of disease, and non-availability of medicines. Similar findings have been reported in previous studies from low- and middle-income countries, where both demand-side and supply-side barriers significantly affect service uptake. The observed association between lower education and non-utilization highlights the need for targeted health education interventions.

Additionally, higher non-utilization among older individuals and lower socioeconomic groups suggests inequities in access to care, warranting strengthened primary healthcare outreach and improved availability of essential medicines under NPCDCS.

Conclusion

The present study demonstrates a high burden of NCDs and significant exposure to modifiable risk factors among adults. Obesity, tobacco use, and physical inactivity were identified as independent predictors of NCDs, highlighting the importance of integrated preventive strategies. Strengthening screening programs, ensuring treatment continuity, and promoting lifestyle modifications are essential to reduce the growing burden of NCDs in India.

Study Limitations

The present study has certain limitations that should be considered while interpreting the findings. First, the cross-sectional design of the study limits the ability to establish causal relationships between risk factors and non-communicable diseases (NCDs), and only associations can be inferred. Second, some of the behavioural risk factors, such as tobacco use, alcohol consumption, physical activity, and perceived stress, were based on self-reported information and may be subject to recall bias or social desirability bias. Third, the study was conducted in a specific geographic area, which may limit the generalizability of the findings to other regions with different sociodemographic and cultural characteristics.

Consent

Written informed consent was obtained from all participants prior to their inclusion in the study. Participants were informed about the purpose of the study, procedures involved, potential benefits, and their right to withdraw at any stage without any consequences. Confidentiality and anonymity of the participants were strictly maintained throughout the study.

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