

Prevalence and Determinants of Non-Communicable Diseases in Urban Slums of Bhubaneswar, Odisha, India

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Abstract

This study estimated the prevalence of self-reported non-communicable diseases (NCDs) and examined its association with demographic, social, cultural and other characteristics of 1269 adults aged 18 years and above residing in selected urban slums of Bhubaneswar city of Odisha, India. The reported prevalence of NCDs was 18.8 per cent. The reported prevalence of cardiovascular diseases was the highest followed by diabetes and arthritis. Among the respondents who reported having an NCD, 22.6 per cent reported having multiple NCDs. The reported prevalence of NCDs was higher in females than in males. Age, low or moderate physical activity, and stage 2 hypertension were independently associated with higher odds of reporting an NCD. High waist-to-hip ratio showed a positive but statistically insignificant association. Women had higher prevalence of NCDs than men. Although based on a purposive sample, these findings call for community-based health promotion, screening, early diagnosis, and treatment of NCDs in the underserved urban populations.

Introduction

India is currently undergoing epidemiological transition, marked by an increasing burden of non-communicable diseases (NCDs). According to the World Health Organization (WHO), NCDs have now emerged as the leading causes of disability and premature mortality among adults in India. It is estimated that approximately one out of every four Indians are, on average, estimated to be at the risk of dying from an NCD before reaching 70 years of age (WHO, 2010). Among different NCDs, hypertension and diabetes alone account for more than 70 per cent of all NCDs morbidity which highlights an urgent need for targeting public health interventions for the management of NCDs in the community. The drivers behind the increasing burden of NCDs include, among others, rapid urbanisation, changes in the life style of individuals and socioeconomic disparities. Urban growth, particularly unplanned urban growth or urban sprawl, characterised by overcrowding, poor sanitation facilities, limited access to clean water, and substandard housing conditions leading to a deteriorated physical environment and adoption of unhealthy behaviours by people living in these areas. These factors disproportionately affect the health status of the population residing in these areas (Brashier et al, 2012; Bhojani et al, 2013).

India has witnessed rapid urbanisation in the recent past because of strong rural to urban migration. However, despite rapid urban expansion, stark health inequalities are common within urban areas. Urban slum residents, specifically, face the dual burden of diseases and social disadvantages, making them highly vulnerable to chronic illnesses. Recent studies have documented high NCDs prevalence among slum populations across different Indian cities, including Bengaluru (Gowda et al, 2015), Puducherry (Naik et al, 2020), Salem (Shanmugam et al, 2018), and Delhi (Singh et al, 2023) underscoring the urgent need for localised health strategies.

Odisha is relatively a less urbanised states compared to some states of India but has marked urban health inequalities. The Annual Health Survey (AHS) 2012–13 covered selected high-focus states, including Odisha, but did not provide a national estimate. According to this survey Odisha had 9417 persons with at least chronic illness per 100,000 population (Government of India, 2013). Studies from Bengaluru, Puducherry, Salem, Delhi, and other Indian cities have described substantial health risks faced by the people living in urban slum. However, comparable evidence of the prevalence of NCDs in Odisha remains limited (Gowda et al, 2015; Naik et al, 2020; Shanmugam et al, 2018; Singh et al, 2023).

Bhubaneswar is the capital and the largest urban settlement of Odisha and is administered by the Bhubaneswar Municipal Corporation. The city of Bhubaneswar is administratively divided into 67 wards (Government of Odisha, 2025). A substantial share of the city population live in recognised, but informal slum settlements, where constrained housing, environmental exposure, and barriers to continuous health care increases the vulnerability to NCDs. The present study is, therefore, aims to estimate the prevalence of NCDs in urban slums of Bhubaneswar and analyse social, cultural and economic factors that may be associated with its prevalence. Collecting reliable community-level data on NCDs is crucial for informing prevention strategies, healthcare resource allocation, and progress toward achieving the United Nations Sustainable Development Goals in general and the goal of reducing premature NCD-related mortality by one-third by 2030.

Materials and Methods

Study Population

The study is based on a purposive sample of 1269 adults aged at least 18 years from 748 households selected from 22 slums, as recognised by the civic administration, in 10 of the 21 Municipal Wards under the North Administrative Zone of the Bhubaneswar Municipal Corporation.

Study Design and Participants

The study is based on the information collected through a community-based survey of a sample of households. All adults aged 18 years and above in the sampled households who were available at the time of the household visit and who provided their informed consent for participation in the survey were surveyed. Direct interview by investigators trained for the purpose was carried out to collect the information related to NCDs. The survey also collected the background demographic, social, economic characteristics of the respondents and the living conditions of the household.

Sampling Method

Although the sample for the study is not statistically representative of the slum population of the Bhubaneswar city, it was selected in three stages. At the first stage one, North Zone, out of the three administrative zones of the Bhubaneswar city was selected. At the second stage, 10 out of the 21 Municipal Wards in the North Zone were selected (Figure 1). At the third stage, 22 slum settlements within the selected wards were selected taking into consideration the operational constraints related to the household survey. In each selected slum, field investigators visited each and every household to identify adults at least 18 years old and sought their consent to participate in the survey. Only those adults aged at least 18 years were covered under the survey who provided their consent for participation in the survey. Since the sample for the survey is purposive, the findings based on the survey cannot be generalised for the entire slum population of the Bhubaneswar city. They, however, provide an idea of the seriousness of the problem of NCDs in urban slums and call for concerted efforts to address the problem.

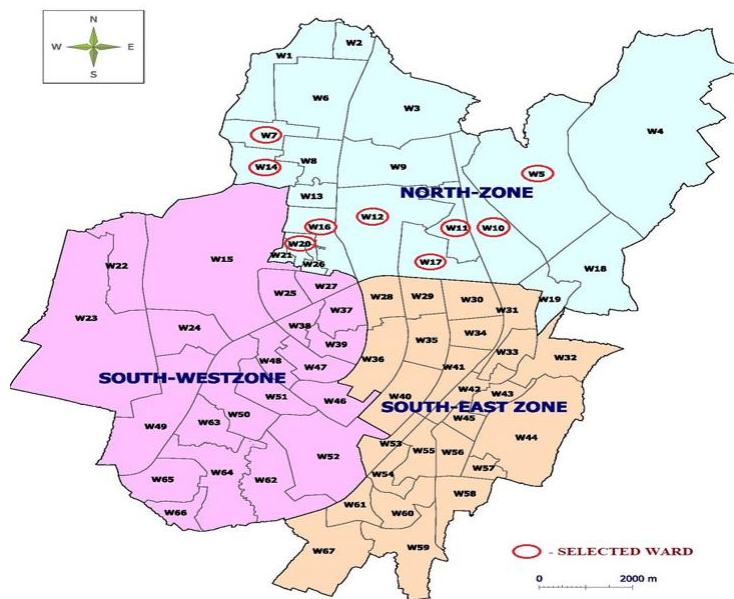


Figure 1: Municipal Wards selected of Bhubaneswar city selected for the survey.
Source: Authors

Technical Details

Data collection was informed by the World Health Organization STEPwise approach to NCD risk-factor surveillance. The step 1 of this approach uses interviewer-administered questions to collect sociodemographic characteristics, behavioural risk factors, and history of previously diagnosed conditions while the step 2 adds standardised physical measurements. In the present study, trained field investigators administered the questionnaire through direct

interview and physically measured height, weight, waist and hip circumferences, and blood pressure of the respondents using standardised procedures. No data about biochemical biomarkers were collected under the study.

Statistical Analysis

The dependent variable was the presence of at least one self-reported NCD (yes=1, no=0). Categorical variables were summarised using frequencies and percentages. Bivariate associations between the binary outcome and categorical explanatory variables were assessed using Pearson's chi-square test while Fisher's exact test was used when expected cell counts were small. Test statistics, degrees of freedom, and p-values are reported. The multivariable binary logistic regression model was then fitted to estimate adjusted associations, expressed as adjusted odds ratios (ORs) with 95 per cent confidence intervals (CIs). Variables were selected from the bivariate analysis and prior evidence. Data were analysed using IBM SPSS Statistics version 25.0, and two-sided $p < 0.05$ was considered statistically significant.

Results

Among 1269 respondents residing in 22 selected urban slums of Bhubaneswar, 238 (18.8 per cent) self-reported that they had at least one NCD (Figure 2). The reported conditions were based on the response of the participants and were not independently verified against medical records. Among these 238 participants, cardiovascular diseases were reported by 101 (42.6 per cent), diabetes by 96 (40.3 per cent), and arthritis by 41 (17.2 per cent) respondents. Chronic respiratory disease was reported by 25 (10.5 per cent), while cancer and chronic kidney disease were each reported by 2 (0.8 per cent) respondents. Many respondents reported that they were having more than one chronic condition. The disease-specific reported proportions, therefore, are not mutually exclusive and do not sum to 100 (Table 1).

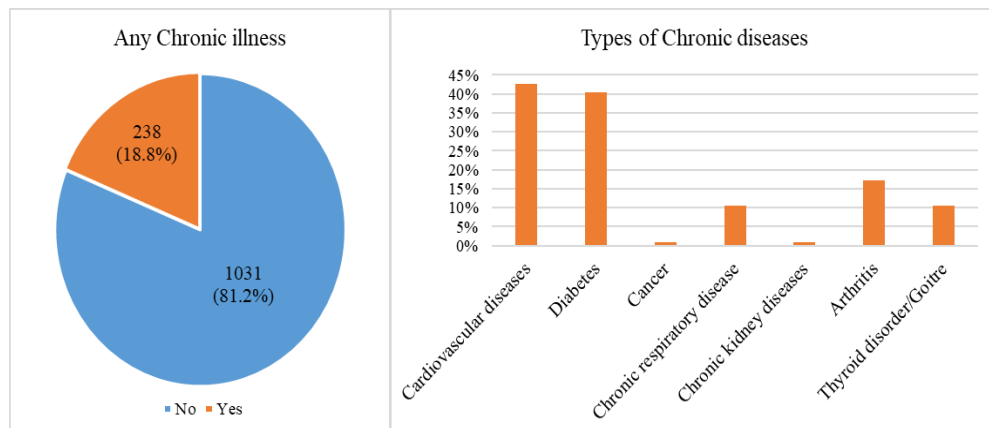


Figure 2: Proportion of respondents reporting at least one chronic disease and proportion of respondents reporting specific diseases.

Source: Authors

Table 1: Reported prevalence of any NCD and of specific NCDs in the total sample and in males and females.

NCD	Total	Male	Female	Female-male difference		
				SE	Z	p
Any NCD	18.8	16.3	20.8	0.022	2.099	<0.05
Cardiovascular diseases	8.0	6.4	9.3	0.015	1.892	≥0.05
Diabetes	7.6	7.4	7.7	0.015	0.156	≥0.05
Cancer	0.2	0.3	0.0	0.002	-1.562	≥0.05
Chronic respiratory diseases	2.0	2.2	1.7	0.008	-0.660	≥0.05
Chronic kidney diseases	0.2	0.3	0.0	0.002	-1.562	≥0.05
Arthritis	3.2	1.2	4.9	0.010	3.756	<0.05
Thyroid disorder/Goitre	2.0	0.3	3.3	0.008	3.843	<0.05
N	1269	578	691			

Source: Authors

Women constituted 54.5 per cent of the total sample. Overall, 144 of 691 women (20.8 per cent) and 94 of 578 men (16.3 per cent) reported at least one NCD. The reported prevalence of NCD in women was statistically significantly higher than that in men (Table 1). The reported prevalence of Cardiovascular diseases, Diabetes, Arthritis and Thyroid disorder/Goitre was higher in women compared to men, but the difference was statistically significant in case of Arthritis and Thyroid disorder/Goitre only. The reported prevalence of Cancer, Chronic respiratory diseases and chronic kidney diseases was higher in men compared to women. The female-male difference in the reported prevalence of these diseases was, however, not statistically significant. (Table 1)

Table 2 compares respondents who did not report any NCD and respondents who reported at least one NCD by their demographic characteristics. Age of the respondent shows a strong gradient. The reported prevalence of NCDs increased from 2.3 per cent in young adults aged 18–25 years to 12.3 per cent in adults aged 26–44 years, 29.1 per cent in middle-aged adults aged 45–59 years, and 42.6 per cent in adults aged 60 years or older and the difference was statistically significant. The reported prevalence of NCDs also differed statistically significantly by caste, marital status, education, and occupation in the bivariate analysis. These differences are, however, unadjusted and should not be interpreted as independent effects.

Table 3 presents bivariate associations between behavioural and measured factors and self-reported NCD status. Alcohol use ($\chi^2=25.455$, $df=3$, $p<0.001$) and smoking ($\chi^2=10.496$, $df=1$, $p=0.001$) is found to be statistically significantly associated with the prevalence of NCDs. The inverse pattern should, however, be not interpreted as protective because former users were not distinguished from never-users and reverse causation and reporting bias are possible. Chewing tobacco was not associated with the outcome ($\chi^2=0.123$, $df=1$, $p=0.726$).

Physical activity levels showed a strong inverse association with chronic illness ($p<0.001$). Individuals with low physical activity had the highest disease burden (40.5 per cent), compared to moderate (19.2 per cent) and high physical activity groups (10 per cent). No statistically significant association was observed between fruit and vegetables intake and chronic illness ($p=0.364$).

Table 2: Bivariate association of demographic, social, cultural and other characteristics of the respondents with self-reporting of at least one NCD.

Characteristic	Category	Reported at least one NCD	Not reported any NCD	Total	Test statistic (df)	p
Religion	Hindu	18.7	81.3	1261	Fisher's exact	0.649
	Muslim	25.0	75.0	8		
Caste	General	21.6	78.4	468	$\chi^2=13.064$ (4)	0.011
	Other Backward Classes	18.8	81.2	313		
	SEBC	21.7	78.3	60		
	Scheduled Castes	18.4	81.6	299		
	Scheduled Tribes	7.8	92.2	129		
Age group (years)	18–25	2.3	97.7	177	$\chi^2=124.813$ (3)	<0.001
	26–44	12.3	87.7	611		
	45–59	29.1	70.9	340		
	≥60)	42.6	57.4	141		
Sex	Male	16.3	83.7	578	$\chi^2=4.326$ (1)	0.038
	Female	20.8	79.2	691		
Marital status	Married	18.9	81.1	996	$\chi^2=54.812$ (2)	<0.001
	Unmarried	4.7	95.3	170		
	Widowed/divorced/separated	40.8	59.2	103		
Education	Illiterate/informal education	27.7	72.3	271	$\chi^2=20.328$ (5)	0.001
	Up to primary	19.8	80.2	167		
	Middle school	15.6	84.4	347		
	High school	17.1	82.9	222		
	Higher secondary	15.7	84.3	134		
	Graduate/postgraduate/professional	13.3	86.7	128		

Characteristic	Category	Reported at least one NCD	Not reported any NCD	Total	Test statistic (df)	p
Occupation	Daily-wage labour	10.3	89.7	155	$\chi^2=16.851$ (4)	0.002
	Private job	18.1	81.9	166		
	Semi-regular/ government job	5.1	94.9	39		
	Self-employed/ own trade or business	18.1	81.9	260		
	Housewife/student	22.1	77.9	647		
N		238	1060	1298		

Source; Authors

Table 3: Bivariate association of behavioural and measured factors with self-reported NCD status

Characteristic	Category	Reported at least one NCD	Not reported any NCD	Total	Test statistic (df)	p-value
Alcohol use	Never	21.7	78.3	954	$\chi^2=25.455$ (3)	<0.001
	Daily	4.3	95.7	92		
	Frequently	7.4	92.6	54		
	Occasionally	13.6	86.4	169		
Smoking	No	20.0	80.0	1130	$\chi^2=10.496$ (1)	0.001
	Yes	8.6	91.4	139		
Chewing tobacco	No	19.1	80.9	739	$\chi^2=0.123$ (1)	0.726
	Yes	18.3	81.7	530		
Physical activity	Low	40.5	59.5	173	$\chi^2=76.892$ (2)	<0.001
	Moderate	19.2	80.8	635		
	High	10.0	90.0	461		
Eating outside	Daily	9.0	91.0	100	$\chi^2=16.674$ (2)	<0.001
	Occasionally	8.3	91.7	108		
	Never	20.7	79.3	1061		
Fruit and vegetable intake	Daily	19.3	80.7	964	$\chi^2=2.023$ (2)	0.364
	Twice weekly	16.2	83.8	272		
	Occasionally	24.2	75.8	33		
Blood pressure	Normal	11.5	88.5	322	$\chi^2=56.768$ (3)	<0.001
	Prehypertension	15.4	84.6	486		
	Stage 1 hypertension	21.6	78.4	306		
	Stage 2 hypertension	38.7	61.3	155		

Characteristic	Category	Reported at least one NCD	Not reported any NCD	Total	Test statistic (df)	p-value
BMI	Underweight	17.0	83.0	100	$\chi^2=12.666$ (3)	0.005
	Normal weight	17.0	83.0	613		
	Overweight	18.3	81.7	431		
	Obese	30.4	69.6	125		
WHR	Low	10.9	89.1	366	$\chi^2=27.321$ (2)	<0.001
	Moderate	17.2	82.8	221		
	High	24.2	75.8	658		
N		238	1060	1298		

Source: Authors

Table 4: Results of binary logistic regression of self-reported NCD on selected explanatory variables.

Variables	Category	β	SE	Wald	p	OR	95 CI for OR
Caste	General	<i>Ref.</i>		7.57	0.109		
	OBC	-0.03	0.21	0.02	0.888	0.97	[0.65,1.46]
	SEBC	0.42	0.39	1.15	0.285	1.52	[0.71,3.24]
	SC	0.05	0.22	0.05	0.816	1.05	[0.69,1.61]
	ST	-0.91	0.39	5.37	0.020	0.40	[0.19,0.87]
Age (years)	18-25	<i>Ref.</i>		40.29	<0.001		
	26-44	1.54	0.60	6.58	0.010	4.69	[1.44,15.27]
	45-59	2.59	0.62	17.43	<0.001	13.29	[3.95,44.78]
	≥60	2.78	0.66	17.86	<0.001	16.12	[4.44,58.50]
Sex	Male	<i>Ref.</i>					
	Female	-0.49	0.31	2.39	0.122	0.62	[0.33,1.14]
Marital status	Married	<i>Ref.</i>		3.19	0.203		
	Unmarried	-0.38	0.47	0.68	0.411	0.68	[0.27,1.70]
	Widowed/Divorced/ separated	0.45	0.29	2.46	0.117	1.57	[0.89,2.76]
Education	Illiterate/Informal education	<i>Ref.</i>		2.60	0.761		
	Up to primary	-0.12	0.28	0.18	0.668	0.89	[0.51,1.54]
	Middle school	-0.16	0.25	0.39	0.532	0.85	[0.52,1.41]
	High school	0.01	0.29	0.00	0.982	1.01	[0.57,1.76]
	Higher secondary	0.32	0.36	0.82	0.366	1.38	[0.69,2.77]
Occupation	Graduate/Post graduate/professional	0.16	0.38	0.17	0.676	1.17	[0.56,2.45]
	Daily wage labour	<i>Ref.</i>		6.03	0.197		
	Private Job	0.52	0.38	1.86	0.172	1.69	[0.80,3.58]
	Semi regular/Govt. job	-1.09	0.81	1.81	0.179	0.34	[0.07,1.65]
	Self-employed/Own trade/business	0.23	0.35	0.44	0.507	1.26	[0.63,2.52]
	Housewife/student	0.42	0.36	1.36	0.244	1.53	[0.75,3.11]

Variables	Category	β	SE	Wald	p	OR	95 CI for OR
Alcohol consumption	Never	<i>Ref.</i>		5.31	0.151		
	Daily	-1.34	0.59	5.14	0.023	0.26	[0.08,0.83]
	Frequently	-0.39	0.59	0.45	0.504	0.67	[0.21,2.14]
	Occasionally	-0.09	0.30	0.09	0.770	0.92	[0.51,1.65]
Smoking	No	<i>Ref.</i>					
	Yes	-0.97	0.38	6.61	0.010	0.38	[0.18,0.79]
Physical Activity	High	<i>Ref.</i>		17.71	<0.001		
	Low	1.15	0.27	17.71	<0.001	3.15	[1.85,5.37]
	Moderate	0.55	0.21	6.47	0.011	1.73	[1.13,2.63]
How often do you eat outside	Never	<i>Ref.</i>		0.09	0.957		
	Daily	-0.03	0.44	0.00	0.954	0.97	[0.41,2.32]
	Occasionally	-0.12	0.42	0.09	0.767	0.88	[0.39,2.01]
Blood Pressure	Normal	<i>Ref.</i>		9.30	0.026		
	Prehypertension	0.06	0.24	0.07	0.794	1.06	[0.66,1.71]
	Stage 1 Hypertension	0.29	0.26	1.21	0.271	1.33	[0.80,2.22]
	Stage 2 Hypertension	0.74	0.28	6.76	0.009	2.10	[1.20,3.66]
BMI	Under weight	<i>Ref.</i>		4.04	0.257		
	Normal weight	-0.06	0.36	0.03	0.871	0.94	[0.47,1.90]
	Over weight	-0.14	0.38	0.13	0.719	0.87	[0.42,1.83]
	Obese	0.38	0.42	0.82	0.366	1.46	[0.64,3.30]
WHR	Low	<i>Ref.</i>		4.39	0.111		
	Moderate	0.08	0.28	0.09	0.763	1.09	[0.63,1.89]
	High	0.52	0.28	3.46	0.063	1.68	[0.97,2.91]
Constant		-4.29	0.79	29.32	<0.001	0.01	

Source: Authors

Clinical measurements were significantly associated with the presence of chronic illness (Table 3). Blood pressure showed a clear gradient: individuals with stage 2 hypertension had the highest prevalence (38.7 per cent) compared to those with Stage 1 hypertension (21.6 per cent), prehypertension (15.4 per cent), and normal blood pressure (11.5 per cent) ($p < 0.001$). BMI was similarly associated with NCD prevalence ($p = 0.005$). Obese individuals had the highest prevalence (30.4 per cent), followed by overweight (18.3 per cent), underweight (17.0 per cent), and normal weight individuals (17.0 per cent). WHR was also significantly linked to chronic illness ($p < 0.001$). Participants with high WHR had a chronic illness prevalence of 24.2 per cent, substantially higher than those with moderate (17.2 per cent) or low WHR (10.9 per cent).

In the multivariable binary logistic regression model, the dependent variable was reporting at least one NCD (yes=1; no=0) (Table 4). Compared with young adults aged 18–25 years, adjusted odds were higher among adults aged 26–44 years (OR=4.69, 95 per cent CI: 1.44–15.27; $p = 0.010$), middle-aged adults aged 45–59 years (OR=13.29, 95 per cent CI: 3.95–44.78; $p < 0.001$), and adults aged 60 years or older (OR=16.12, 95 per cent CI: 4.44–58.50; $p < 0.001$). Low physical activity (OR=3.15, 95 per cent CI: 1.85–5.37; $p < 0.001$), moderate physical activity (OR=1.73, 95 per cent CI: 1.13–2.63; $p = 0.011$), and stage 2 hypertension (OR=2.10, 95 per cent CI: 1.20–3.66; $p = 0.009$) were independently associated with higher odds. High WHR showed a positive but non-significant association (OR=1.68, 95 per cent CI: 0.97–2.91; $p = 0.063$). Daily alcohol use and current smoking showed inverse associations, but these estimates do not demonstrate protective effects and may reflect reverse causation, former-user misclassification, residual confounding, or reporting bias.

Discussion

This study provides a comprehensive assessment of the prevalence and determinants of NCDs in the urban slums of Bhubaneswar, Odisha. Our findings revealed that nearly one in five individuals (18.8 per cent) reported having at least one chronic condition, with cardiovascular disease (42.6 per cent), diabetes (40.3 per cent), and arthritis (17.2 per cent) being most prevalent. These results are consistent with findings from other studies in India, which report high NCD burdens in slum populations due to adverse living conditions and limited access to healthcare services (Brashier et al, 2012; Bhojani et al, 2013; Shanmugam et al, 2018).

Demographically, older age groups, particularly those aged 60 and above, were significantly more likely to report chronic illnesses, a finding aligned with global and national trends indicating increased NCD risk with advancing age (Naik et al, 2020). Women exhibited a higher burden of disease compared to men, especially in conditions like thyroid disorders, arthritis, and CVDs, indicating a potential gender disparity in disease vulnerability or healthcare access.

Social determinants such as education, marital status, and occupation also influenced NCD prevalence. Illiterate individuals and widowed/divorced/separated persons were disproportionately affected, underscoring the compounding effects of low literacy and social vulnerability on health outcomes. These findings resonate with prior research that

highlights how social-economic deprivation amplifies the health risks in slum environments (Singh et al, 2017).

Low physical activity was independently associated with chronic illness. Participants with low activity had 3.15 times the odds of chronic illness compared with those reporting high activity (OR = 3.15, 95 CI: 1.85-5.37; $p < 0.001$), and those with moderate activity had 1.73 times the odds (OR = 1.73, 95 CI: 1.13-2.63; $p = 0.011$). Similar patterns have been reported in other urban-slum settings, where physical inactivity is an important modifiable risk factor (Naik et al, 2020; Rakesh et al, 2023). Frequency of eating outside the home was not independently associated with chronic illness in the adjusted model.

Among physiological factors, stage 2 hypertension was independently associated with chronic illness: affected participants had 2.10 times the odds compared with those with normal blood pressure (95 CI: 1.20-3.66; $p = 0.009$). High WHR was associated with 1.68 times the odds relative to low WHR, but its confidence interval included the null value, and the association was not statistically significant at the 5 level (95 CI: 0.97-2.91; $p = 0.063$). BMI categories were also not independently associated after adjustment. These findings support regular blood-pressure and anthropometric screening while distinguishing statistically significant from borderline associations (WHO, 2010; Gowda et al, 2015; Mishra et al, 2017; Patel et al, 2011; Gupta et al, 2008).

Counterintuitive inverse associations were observed for current smoking (OR = 0.38, 95 CI: 0.18-0.79; $p = 0.010$) and daily alcohol consumption (OR = 0.26, 95 CI: 0.08-0.83; $p = 0.023$). The direction of coding and reference categories was rechecked against the tabulated analysis: 'No' was the reference for smoking and 'Never' was the reference for alcohol consumption. These estimates should not be interpreted as protective causal effects. Because exposure and disease status were measured at the same time, reverse causation is plausible: participants may have stopped smoking or drinking after diagnosis, moving former users into the non-user reference groups. The alcohol literature describes this as the 'sick-quitter' or former-drinker misclassification problem (Fillmore et al, 2006). Chronic-disease diagnosis has likewise been associated with subsequent smoking cessation (Hu et al, 2021). Residual confounding by age, sex, socioeconomic position, differential reporting, duration and amount of exposure, and survivor selection may also contribute. The survey did not distinguish never-users from former users or capture cumulative exposure; therefore, longitudinal studies with detailed exposure histories are required.

The implications of these findings are substantial for public health policy and urban planning. They emphasize the need for integrated, community-based interventions that address both the medical and socio-environmental determinants of NCDs. Such interventions should include: (i) health promotion and education targeting physical activity and dietary behaviours, (ii) early screening and regular monitoring for hypertension, obesity, and other NCD risk factors, (iii) improved access to healthcare services within slums, (iv) addressing structural inequities like housing, sanitation, and employment opportunities. These strategies are essential to meet the Sustainable Development Goal target of reducing premature mortality from NCDs by one-third by 2030 (WHO, 2010; Singh et al, 2023).

A key strength of this study is the use of a structured NCD-surveillance framework to collect behavioural and physical-measurement data from an underserved urban population. Several limitations should be considered. NCD status and behavioural exposures were self-reported and were not independently verified against medical records, creating potential recall and reporting bias. The questionnaire did not distinguish never-users from former users or quantify cumulative smoking and alcohol exposure. The Northern Zone and participating slums were purposively selected, although wards within the Northern Zone were randomly selected; therefore, the findings may not be generalizable to all slum residents of Bhubaneswar. The cross-sectional design establishes association, not temporal sequence or causation. Residual confounding and survivor selection are possible. Longitudinal studies using probability sampling, verified diagnoses, and detailed exposure histories are recommended.

Conclusion

This study has documented self-reported NCDs among adults in selected urban slums of Bhubaneswar; it did not measure all forms of chronic illness. Cardiovascular diseases and diabetes were the most frequently reported NCD categories. Older age, low or moderate physical activity, and stage 2 hypertension were independently associated with higher odds of reporting an NCD. The inverse associations for current smoking and daily alcohol consumption should not be interpreted as protective. Because disease status was self-reported and the Northern Zone and participating slums were purposively selected, while wards within the zone were randomly selected, the estimates should be interpreted as evidence from the surveyed slums rather than as city-wide prevalence. Prevention should be linked with confirmatory diagnosis, affordable treatment, referral, medication continuity, follow-up, risk-factor reduction, and stronger urban primary-care outreach.

Acknowledgements

PKS gratefully acknowledges the research support provided by the WB-OHEPEE Programme of Utkal University, Bhubaneswar, India. WB-OHEPEE had no role in the design, conduct, analysis, or interpretation of the study. The authors thank the field investigators for data collection and the participants for their participation.

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