ORIGINAL RESEARCH

Prevalence and Risk Factors of Non-Communicable Diseases in Urban Slums: A Cross-Sectional Study

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ABSTRACT
Aim: This study aimed to determine the prevalence and risk factors of non-communicable diseases (NCDs) in urban slums, focusing on conditions such as hypertension, diabetes, obesity, and cardiovascular diseases. **Material and Methods:** A community-based cross-sectional study was conducted among 200 participants aged 18 years and above from urban slum areas. A structured questionnaire was used to collect data on socio-demographics, lifestyle factors, and medical history. Anthropometric measurements and blood pressure readings were recorded, and blood glucose levels were measured to assess diabetes prevalence. Data were analyzed using SPSS version 25.0, and logistic regression was applied to identify significant risk factors for NCDs. **Results:** Hypertension was prevalent in 30% of participants, diabetes in 25%, and obesity in 22.5%. The study identified key lifestyle risk factors, such as smoking (37.5%) and physical inactivity (55%). Hypertension and diabetes were strongly associated with age over 40 years, obesity, smoking, and physical inactivity. The risk of hypertension increased with obesity (OR: 3.0, $p<0.01$), while the risk of diabetes was significantly linked to age and family history of the disease (OR: 2.5, $p<0.01$). **Conclusion:** The study reveals a high prevalence of NCDs in urban slums, driven by modifiable risk factors such as unhealthy diets, physical inactivity, and smoking. Addressing these factors through targeted public health interventions is critical for reducing the NCD burden in vulnerable populations.
Keywords: Non-communicable diseases, Urban slums, Hypertension, Diabetes, Risk factors.

INTRODUCTION

Non-communicable diseases (NCDs), such as hypertension, diabetes, cardiovascular diseases, chronic respiratory conditions, and cancer, have emerged as a global health crisis, affecting both developed and developing countries. Traditionally associated with affluence and sedentary lifestyles, NCDs are now increasingly prevalent in low-income settings, particularly in urban slums, where vulnerable populations are exposed to a myriad of risk factors that foster the development of these diseases. The shift from infectious diseases to NCDs as the dominant health burden in many urban slums signals a dramatic epidemiological transition that calls for urgent attention.[1]Urban slums are characterized by overcrowding, poverty, poor sanitation, inadequate healthcare access, and high levels of pollution. These conditions create an environment where the social determinants of health exacerbate the risk of NCDs. In these densely populated areas, individuals are more likely to face barriers to healthy living, including limited access to nutritious food, lack of safe spaces for physical activity, and exposure to environmental pollutants. Furthermore, economic constraints often push residents towards affordable, calorie-dense, but nutritionally poor diets, leading to a higher prevalence of obesity and associated conditions such as diabetes and hypertension.[2]The rising burden of NCDs in urban slums is closely linked to several modifiable lifestyle factors. Tobacco use and smoking, for instance, are rampant in many slum communities, contributing significantly to the incidence of cardiovascular and respiratory diseases. Alcohol consumption, another common behavior, has been associated with hypertension and liver diseases. Moreover, the sedentary lifestyle that many slum dwellers are forced into, due to lack of access to recreational areas or safe walking paths, further

increases their risk for obesity and its related comorbidities. These behaviors are compounded by a lack of awareness and health education, as well as inadequate healthcare infrastructure that limits the ability to conduct early screenings and interventions for NCDs.[3]

The demographic profile of urban slum residents further highlights their vulnerability to NCDs. Many residents fall within the age bracket where NCDs tend to manifest, particularly those aged 40 and above. The combined effects of aging, long-term exposure to unhealthy environments, and cumulative lifestyle risks accelerate the onset of these diseases. Additionally, gender differences in the prevalence and risk factors of NCDs have been noted, with men often displaying higher rates of tobacco and alcohol use, while women in slums may face unique barriers to healthcare access due to cultural or societal constraints.[4]

Compounding the problem is the dual burden of malnutrition that exists in urban slums. While undernutrition remains a significant issue, especially among children, there is a growing prevalence of overweight and obesity in adult populations. This paradoxical situation arises from the consumption of high-calorie but nutrient-deficient diets, driven by economic limitations and the availability of cheap processed foods. Obesity, in turn, increases the risk for NCDs such as type 2 diabetes, hypertension, and cardiovascular diseases. Furthermore, individuals with lower levels of education and employment are often more susceptible to adopting unhealthy lifestyles, as they lack the resources and knowledge to make informed health choices.[5]Environmental factors also play a critical role in the development of NCDs in urban slums. Air pollution, largely resulting from the burning of biomass fuels and vehicular emissions, is a major contributor to chronic respiratory diseases such as asthma and chronic obstructive pulmonary disease (COPD). The constant exposure to poor air quality in slums, combined with smoking and other risk behaviors, significantly elevates the risk of respiratory ailments. In addition, the lack of access to clean water and proper sanitation can lead to chronic infections, further weakening individuals' health and making them more susceptible to NCDs.[6]Despite the alarming rise of NCDs in urban slums, healthcare systems are often ill-equipped to manage this growing burden. Health services in these areas are typically underfunded, understaffed, and focused primarily on treating infectious diseases and maternal-child health issues. Consequently, the early detection, management, and prevention of NCDs are frequently neglected. Moreover, the high cost of chronic disease management, including medication and regular monitoring, is often beyond the financial reach of slum residents, leading to poor disease outcomes and increased mortality.[7,8]

MATERIAL AND METHODS

This is a community-based cross-sectional study designed to assess the prevalence and risk factors of non-communicable diseases (NCDs) in urban slums. A total of 200 participants aged 18 years and above were recruited for the study. The sample size was determined using prevalence estimates from previous studies on NCDs in similar settings, with a confidence level of 95% and a margin of error of 5%. A multi-stage sampling technique was used to select participants.Urban slum areas were identified within the city, and households were randomly selected. One eligible adult (aged 18 or older) was selected from each household for the study. Individuals were included if they had been residing in the slum for at least six months. Individuals with known severe medical conditions that limited their participation (e.g., terminal illness) were excluded.Ethical approval was obtained from the Institutional Ethics Committee of Institution. Informed written consent was obtained from all participants after explaining the purpose of the study, ensuring confidentiality, and emphasizing voluntary participation. Participants identified with health issues during the study were referred to the nearest health facility for further management.

Methodology

A structured and pre-tested questionnaire was used for data collection. The questionnaire covered socio-demographic variables, lifestyle factors (e.g., smoking, alcohol consumption, physical activity), medical history (e.g., hypertension, diabetes, cardiovascular diseases), and dietary habits. Anthropometric measurements (height, weight, BMI) and blood pressure readings were taken for all participants using standardized equipment. Blood glucose levels were measured using a glucometer to assess the prevalence of diabetes. Data were collected through face-to-face interviews conducted by trained healthcare workers. Blood pressure was measured using a digital sphygmomanometer, and participants were classified as hypertensive if their systolic blood pressure was $\geq$140 mmHg or diastolic blood pressure was $\geq$90 mmHg, according to WHO guidelines. Blood glucose levels were measured via capillary blood samples using a portable glucometer, with diabetes defined as fasting blood glucose $\geq$126 mg/dL. Body mass index (BMI) was calculated by dividing the weight in kilograms by height in meters squared, and participants were classified into categories based on WHO criteria.

Data Analysis

Data were entered into SPSS version 25.0 for analysis. Descriptive statistics were calculated for demographic and health-related variables. The prevalence of various NCDs, including hypertension, diabetes, and obesity, was reported as percentages. Logistic regression analysis was performed to identify

risk factors associated with NCDs. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated, and a p-value of <0.05 was considered statistically significant.

RESULTS

Table 1: Socio-demographic Characteristics of Participants

This table highlights the socio-demographic profile of the participants. The average age of participants was 38.5 ± 12.3 years, representing a broad range of ages across the sample. Gender distribution was relatively balanced, with 55% (n=110) male participants and 45% (n=90) female participants, showing no significant difference (p=0.12). Education levels varied, with 35% (n=70) of participants being illiterate and 65% (n=130) having completed at least primary education, a statistically significant difference (p<0.05). Regarding employment status, 47.5% (n=95) were unemployed, while 52.5% (n=105) were employed, with a p-value of 0.08, suggesting no significant difference between the two groups.

Table 2: Prevalence of Non-Communicable Diseases Among Participants

The prevalence of non-communicable diseases (NCDs) was analyzed among the participants, showing a substantial burden. Hypertension was present in 30% (n=60) of participants, significantly more than those without hypertension (p<0.01). Diabetes affected 25% (n=50) of the participants, and the absence of diabetes was noted in 75% (n=150) (p<0.05). Obesity, defined as a BMI ≥30, was present in 22.5% (n=45) of participants, with a p-value of <0.05. Cardiovascular disease was present in 10% (n=20), while 90% (n=180) did not report cardiovascular issues (p<0.05). Finally, chronic respiratory disease was present in 7.5% (n=15) of participants, indicating a lower prevalence compared to other conditions but still statistically significant (p<0.05).

Table 3: BMI Distribution of Participants

The BMI distribution among the participants reflects a range of nutritional statuses. Only 12.5% (n=25) were underweight (BMI <18.5), with a statistically significant finding (p=0.03). Nearly half of the participants, 47.5% (n=95), were within the normal BMI range (18.5-24.9), which was highly significant (p<0.01). Overweight individuals (BMI 25-29.9) made up 17.5% (n=35) of the sample, and those classified as obese (BMI ≥30) accounted for 22.5% (n=45) (p<0.01). This distribution shows a substantial

portion of the population experiencing overweight or obesity, which is a major risk factor for various NCDs.

Table 4: Lifestyle Risk Factors Among Participants

The lifestyle factors associated with NCDs were also explored. Smoking was prevalent in 37.5% (n=75) of participants, with 62.5% (n=125) reporting no smoking history (p<0.01). Alcohol consumption was present in 30% (n=60) of participants, while 70% (n=140) did not consume alcohol (p<0.05). Physical inactivity was reported in 55% (n=110) of participants, with 45% (n=90) reporting being active (p<0.01). An unhealthy diet was present in 45% (n=90) of the sample, with a significant portion, 55% (n=110), reporting healthier dietary habits (p<0.01). These findings indicate that lifestyle factors such as smoking, alcohol use, physical inactivity, and unhealthy diets are prevalent in the population and are linked to an increased risk of NCDs.

Table 5: Risk Factors for Hypertension

Several risk factors were identified as being significantly associated with hypertension. Age greater than 40 years was a strong risk factor, with an odds ratio (OR) of 2.5 (95% CI: 1.3-4.8, p<0.01), indicating that older age substantially increases the risk of hypertension. Smoking also posed a significant risk, with an OR of 1.9 (95% CI: 1.1-3.5, p<0.05). Alcohol consumption (OR: 1.7, 95% CI: 1.0-3.0, p<0.05) and physical inactivity (OR: 2.2, 95% CI: 1.3-3.7, p<0.01) were also linked to higher hypertension rates. Obesity was the strongest risk factor, with an OR of 3.0 (95% CI: 1.7-5.2, p<0.01), underscoring the critical relationship between elevated BMI and hypertension.

Table 6: Risk Factors for Diabetes

Similar to hypertension, several key risk factors were significantly associated with diabetes. Age over 40 years increased the odds of diabetes by 3.1 times (95% CI: 1.6-5.9, p<0.01), making it a substantial risk factor. Obesity had an OR of 2.8 (95% CI: 1.4-5.3, p<0.01), indicating a strong correlation between high BMI and diabetes. A family history of diabetes was another critical risk factor, with an OR of 2.5 (95% CI: 1.3-4.8, p<0.01). Physical inactivity was also associated with an increased risk, with an OR of 2.2 (95% CI: 1.1-4.3, p<0.05). A high-sugar diet further increased the odds of diabetes, with an OR of 1.8 (95% CI: 1.0-3.4, p<0.05), showing that diet plays a role in the development of diabetes.

Table 1: Socio-demographic Characteristics of Participants

Variable	Number (n)	Percentage (%)	p-value
Age (Mean ± SD)	38.5 ± 12.3	-	-
Gender			-
Male	110	55%	0.12
Female	90	45%	

Education			
Illiterate	70	35%	<0.05
Primary or Higher	130	65%	
Employment			
Unemployed	95	47.5%	0.08
Employed	105	52.5%	

Table 2: Prevalence of Non-Communicable Diseases Among Participants

Disease	Status	Number (n)	Percentage (%)	p-value
Hypertension	Present	60	30%	<0.01
	Absent	140	70%	
Diabetes	Present	50	25%	<0.05
	Absent	150	75%	
Obesity (BMI ≥ 30)	Present	45	22.5%	<0.05
	Absent	155	77.5%	
Cardiovascular Disease	Present	20	10%	<0.05
	Absent	180	90%	
Chronic Respiratory Disease	Present	15	7.5%	<0.05
	Absent	185	92.5%	

Table 3: BMI Distribution of Participants

BMI Category	Number (n)	Percentage (%)	p-value
Underweight (<18.5)	25	12.5%	0.03
Normal Weight (18.5-24.9)	95	47.5%	<0.01
Overweight (25-29.9)	35	17.5%	<0.05
Obesity (≥30)	45	22.5%	<0.01

Table 4: Lifestyle Risk Factors Among Participants

Lifestyle Factor	Status	Number (n)	Percentage (%)	p-value
Smoking	Present	75	37.5%	<0.01
	Absent	125	62.5%	
Alcohol Consumption	Present	60	30%	<0.05
	Absent	140	70%	
Physical Inactivity	Present	110	55%	<0.01
	Absent	90	45%	
Unhealthy Diet	Present	90	45%	<0.01
	Absent	110	55%	

Table 5: Risk Factors for Hypertension

Risk Factor	OR (95% CI)	p-value
Age > 40	2.5 (1.3-4.8)	<0.01
Smoking	1.9 (1.1-3.5)	<0.05
Alcohol Consumption	1.7 (1.0-3.0)	<0.05
Physical Inactivity	2.2 (1.3-3.7)	<0.01
Obesity (BMI ≥ 30)	3.0 (1.7-5.2)	<0.01

Table 6: Risk Factors for Diabetes

Risk Factor	OR (95% CI)	p-value
Age > 40	3.1 (1.6-5.9)	<0.01
Obesity (BMI ≥ 30)	2.8 (1.4-5.3)	<0.01
Family History of Diabetes	2.5 (1.3-4.8)	<0.01
Physical Inactivity	2.2 (1.1-4.3)	<0.05
High Sugar Diet	1.8 (1.0-3.4)	<0.05

DISCUSSION

The socio-demographic profile of the participants showed that the average age of 38.5 ± 12.3 years falls within the middle-aged population, which is consistent with other studies conducted in urban slums. For example, a study conducted by Patel et al. (2020) reported a similar mean age of 40.2 ± 11.6 years in urban slums, reflecting a population exposed

to long-term lifestyle factors that contribute to non-communicable diseases (NCDs) such as hypertension and diabetes.[8] The gender distribution, with 55% male and 45% female participants, is consistent with the general gender makeup of urban populations, although no significant difference was noted in this study (p=0.12). Studies such as those by Kumar et al. (2019) also reported a near-equal gender split in slum populations.[9]The high proportion of participants with at least primary education (65%) contrasts with other studies, such as one by Sharma et al. (2020), which reported a higher rate of illiteracy in urban slum settings (42%). The relatively higher education level in this study may suggest that some slum populations are more engaged in basic education initiatives.[10] Employment data indicated no significant difference between employed (52.5%) and unemployed (47.5%) participants (p=0.08), similar to findings by Roy et al. (2018), where employment status in slum populations was highly variable, with informal employment being prevalent.[11]The results of this study indicated a substantial burden of NCDs in the urban slum population. Hypertension was present in 30% of participants, significantly higher than in rural populations but consistent with other urban slum studies. According to Gupta et al. (2019), hypertension prevalence in urban slums was reported to be 28.4%, aligning closely with the current study. [12]The prevalence of diabetes (25%) was similarly high, comparable to the findings by Chowdhury et al. (2017), who reported a 22.8% prevalence of diabetes in slum populations.[13]Obesity (BMI ≥30) was present in 22.5% of participants, which is significant given the environment and socioeconomic status of urban slums. A study by Misra et al. (2018) also showed a similar prevalence of obesity (20%) in lower socioeconomic groups. This indicates that urbanization and lifestyle changes are leading to a rising burden of obesity even in slum populations.[14] Cardiovascular diseases were present in 10% of participants, slightly higher than the 8% reported in a study by Joshi et al. (2016) on urban slum residents. Chronic respiratory disease (7.5%) was also observed at a lower prevalence, likely due to lesser exposure to industrial pollution but still in line with studies reporting 8%-10% prevalence of respiratory diseases in slums (Verma et al., 2019).[15,16]

The BMI distribution reflects a growing trend of malnutrition in two directions: underweight and obesity. While 12.5% of participants were underweight, a significant 22.5% were classified as obese (BMI ≥30), with nearly half (47.5%) falling within the normal BMI range. This dual burden of malnutrition, where undernutrition and obesity coexist, is also reported in other slum studies, such as Ramachandran et al. (2017), which found similar proportions of underweight (13%) and obese individuals (19%). The increasing trend of overweight and obesity, particularly among adults in urban slums, is linked to the adoption of sedentary lifestyles and poor dietary habits, as evidenced by this study's data on lifestyle factors.[17]Lifestyle risk factors such as smoking, alcohol consumption, physical inactivity, and unhealthy diets were prevalent in the population. Smoking was present in 37.5% of participants, aligning with previous findings by Singh et al. (2019), who reported smoking prevalence of 35%-40% in slum populations. This high prevalence is a significant concern, given the well-established link between smoking and cardiovascular diseases.[18]Alcohol consumption (30%) was moderately high and comparable to the 28% found by Das et al. (2017).[19] Physical inactivity, reported by 55% of participants, was higher than that reported in rural populations but consistent with the findings of Bhatt et al. (2018), which highlighted that urban slums tend to have limited spaces for physical activity, leading to increased sedentary behavior.[20] The presence of an unhealthy diet in 45% of participants reflects the limited access to nutritious food in slums, corroborating the findings of Agarwal et al. (2019), who observed similar dietary patterns leading to high rates of obesity and other NCDs.[21]Age greater than 40 years was significantly associated with hypertension (OR: 2.5, p<0.01), which is consistent with numerous studies indicating that age is a primary risk factor for hypertension, particularly in urban areas (Mohan et al., 2020).[22] Smoking was another significant risk factor (OR: 1.9, p<0.05), as has been well-documented in studies such as Gupta et al. (2019), where smoking was linked to increased rates of hypertension. The study also identified physical inactivity and obesity as major contributors to hypertension, with ORs of 2.2 and 3.0, respectively (p<0.01). These findings are supported by studies by Patel et al. (2020), which also emphasized the role of obesity and sedentary lifestyle in the development of hypertension in urban populations.[8]The association between age and diabetes was even stronger than with hypertension, with participants over 40 years old having an OR of 3.1 (p<0.01). This is consistent with findings from Ramachandran et al. (2017), who highlighted age as one of the most critical risk factors for diabetes.[23] Obesity was again a significant risk factor for diabetes (OR: 2.8, p<0.01), reaffirming the findings of Kumar et al. (2018), where high BMI was linked to an elevated risk of diabetes in urban slum populations.[24]Family history of diabetes also significantly contributed to diabetes risk (OR: 2.5, p<0.01), a finding supported by Bhatt et al. (2018). Physical inactivity (OR: 2.2, p<0.05) and a high-sugar diet (OR: 1.8, p<0.05) were further identified as significant risk factors for diabetes, aligning with multiple studies that point to lifestyle factors as key contributors to the diabetes epidemic in urban slums.[25]

CONCLUSION

In conclusion, the prevalence of non-communicable diseases (NCDs) in urban slums is alarmingly high,

with conditions such as hypertension, diabetes, and obesity being common. Socioeconomic factors, including limited access to healthcare, poor nutrition, and lifestyle risk factors like smoking and physical inactivity, contribute significantly to the rise of NCDs in these communities. The study highlights the need for targeted interventions focusing on improving healthcare access, promoting healthy lifestyles, and addressing the broader social determinants of health to reduce the NCD burden in slum populations.

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