Original article

Integrated Risk Factors and Self-Reported Non-Communicable Diseases in Lahore: A Cross-Sectional Analysis

Mehreen Nasir[1], Iram Manzoor[2], Guzel Umar[2], Esha Alam[2], Fatima Anum[2], Hadiqa Tariq[2]
[1]Services Institute of Medical Sciences, Lahore, Pakistan, [2]Akhtar Saeed Medical and Dental College, Lahore, Pakistan
Correspondence to: Mehreen Nasir, Email: fabia.nasir@gmail.com

ABSTRACT

Background: Integrated risk factors of non-communicable diseases (NCDs) are those that contribute collectively to the development of a variety of chronic diseases such as cardiovascular diseases, diabetes, cancers, and chronic respiratory diseases. The study aims to determine the prevalence of non-communicable diseases and their integrated risk factors in the adult population of Lahore through a self-reported questionnaire.

Methods: This analytical cross-sectional study was conducted in Lahore from April to September 2023. A sample size of 1833 was included in the study. The eligibility criteria were the general population of Lahore aged above 18 years who could understand English. Participants were accessed via online Google Forms shared by 4th year students as per of their project using convenience sampling. The WHO STEP-wise questionnaire was used for data collection. Data was entered and analyzed by SPSS version 23. Chi-square was applied between any non-communicable disease and sociodemographic data and risk factors. A p-value less than 0.05 was considered statistically significant.

Results: The study of 1833 participants (51.3% males, 48.7% females) found hypertension (29.4%) as the most common self-reported non-communicable disease. Key risk factors included insufficient fruit and vegetable intake (>95%), smoking, and physical inactivity. Non-communicable diseases were significantly associated with age >40, male gender, and lower socioeconomic status ($p < 0.05$).

Conclusion: Smoking, inadequate fruit and vegetable consumption, high salt intake, and physical inactivity are the most prevalent risk factors of non-communicable diseases in this community. Urgent public health interventions are needed to reduce them, especially in the youth and young adults.

Keywords:
Hypertension, non-communicable diseases, physical activity, tobacco use

INTRODUCTION

Non-communicable diseases (NCDs) are the leading cause of death globally, accounting for approximately 74% of all deaths worldwide. They contribute significantly to the global disease burden, with the four primary types—cardiovascular diseases, diabetes, chronic respiratory diseases, and cancers—being the most prominent. NCDs result in substantial disability-adjusted life years (DALYs) and quality-adjusted life years (QALYs) lost, reflecting their profound impact on individual health and societal productivity.[1,2]

ARTICLE INFO

Article History
Received: 20.05.2024 | Accepted: 10.04.2025
Conflict of Interest: The authors declare no conflict of interest.
Funding: None

Citation: Nasir M, Manzoor I, Umar G, Alam E, Anum F, Tariq H. Prevalence of integrated risk factors of non-communicable diseases in Lahore: A cross-sectional survey. J Fatima Jinnah Med Univ. 2025; 19(1): 40–44.

DOI: https://doi.org/10.37018/WSDW6624

The economic burden is staggering, with global losses projected in trillions due to healthcare costs and reduced workforce participation.[3]

The situation is especially dire in low- and middle-income countries (LMICs), where over 85% of premature deaths (ages 30–69 years) due to NCDs occur. Limited healthcare infrastructure, inadequate resources, and insufficient availability of essential medications exacerbate the NCD crisis in these regions.[1,4] Pakistan exemplifies this challenge, with NCDs responsible for 58% of all deaths. Hypertension (38.7%) and diabetes (14.6%) are among the most prevalent conditions, driven by urbanization, sedentary lifestyles, unhealthy dietary habits, and tobacco use.[5]

The complex interplay of risk factors—including behavioral (e.g., poor diet, physical inactivity, smoking, alcohol use), metabolic (e.g., hypertension, hyperglycemia, obesity), social (e.g., socioeconomic disparities), and environmental (e.g., urban pollution)—amplifies the NCD burden. These integrated risk factors not only reduce quality of life but also increase healthcare costs, creating a dual burden on individuals and health systems.[2,6]

In Pakistan, the economic strain of NCDs is compounded by the lack of preventive measures and

inadequate early detection strategies.[4,5] The growing youth population presents an opportunity for targeted public health interventions to mitigate the long-term impact of these chronic diseases. Understanding the prevalence and patterns of risk factors is critical for crafting effective interventions.[6,7]

This study investigates the prevalence of integrated risk factors and self-reported NCDs in Lahore, Pakistan. By identifying modifiable risk factors such as smoking, unhealthy diets, and sedentary behaviors, this research aims to inform public health policies and interventions that address the rising tide of NCDs. This knowledge is pivotal for reducing DALYs, enhancing QALYs, and alleviating the economic and health system burden in Pakistan.

PARTICIPANTS AND METHODS

After approval from the institutional review board, this Cross-sectional study was done in Lahore from April 2023 to September 2023. The sample size was calculated to be 1815 by the WHO sample size calculator for surveys using 95% Confidence interval and 5% margin of error using anticipated prevalence of smoking to be 18% and applying age and gender estimates.[8] However, a sample size of 1833 was included in the study. The eligibility criteria were the general population of Lahore above 18 years of age who can understand English. The exclusion criteria involved individuals unable to provide informed consent.

WHO STEP-wise questionnaire was used for data collection according to the population. In this study Steps 1 and 2 were included. Core components of Step 1 related to tobacco use, diet, history of blood pressure, diabetes, high cholesterol, cardiovascular disease, and physical activity were included in the questionnaire. Dietary habits were quantified using standard serving sizes as defined by the WHO guidelines. For example, one medium-sized fruit or one cup of raw vegetables was considered one serving. Participants were provided with examples and visual aids in the Google Form to enhance clarity. Activity levels were categorized based on the WHO guidelines into three groups: less than 30 minutes, 30-60 minutes, and more than 60 minutes of moderate-to-vigorous intensity activity per day. In step 2, physical measurements (height and weight) were asked. Height was asked in feet and inches whereas weight was asked in kilograms. Body mass Index was calculated by applying formula in excel sheet. Pilot testing was done on 100 participants and modifications were done on questionnaire according to local needs. Data from pilot study was not included in analysis. Data collection was carried out by 4th-year MBBS students, who distributed Google Forms as per their convenience through social media platforms, local networks, and community groups. This approach facilitated the inclusion of participants from various socioeconomic and occupational backgrounds across urban, peri-urban, and rural regions within Lahore. These 20 students got the desired sample size by getting the questionnaires as part of their research project on Google forms using convenience based sampling after informed consent. Confidentiality of data was maintained as names were not recorded. Moreover, the access to the Google forms was limited.

Data was analyzed by SPSS version 23. For qualitative variables (tobacco use, dietary factors, physical inactivity and Body mass index) frequencies and Percentages (%) for risk factors were calculated. For Bivariate analysis, chi-square was applied between any non-communicable disease and sociodemographic data and risk factors. A p-value less than 0.05 was taken as significant.

RESULTS

In the study; age distribution shows that: 243 out of 1833(13.3%) were between 18 to 20 years, 509 (27.8%) were between 21 to 25 years, 247 (13.5%) were between 26 to 30 years, 214 (11.7%) were between 31 to 35 years, 173 (9.4%) were between 36 to 40 years, 131(7.1%) were between 41 to 45 years, 81 (4.4%) were between 46 to 50 years, 92 (5%) were between 51 to 55, 52(2.8%) were between 56 to 60 years, 47 (2.6%) were between 61 to 70 years and 44(2.4%) were more than 71 years. There were 893 (48.7%) females and 940 (51.3%) males. Occupational status shows that: 60(3.3%) of respondents were in banking, 254(13.9%) were in business, 231 (12.6%) were engineers, 89 (4.9%) were lawyers, 416 (22.7%) were in medicine, 28 (1.5%) were in military, 257 (14%) were in teaching and 498 (27.2%) were in other occupations. Out of 1833 participants in the study, 361 (19.7%) had monthly family income less than Rs. 50,000, 630 (34.4%) had family income between Rs. 50,000 to 100,000, 623 (34.4%) had family income between Rs. 100,000 to 300000 and 291 (11.9%) had family income more than Rs. 300,000.

Insufficient vegetable and fruit intake were the most prevalent risk factors in the participants (95.3% and 95.1 respectively). The most common self-reported non-communicable disease was hypertension (29.4%) as shown in Table 1.

Bivariate analysis was done between any non-communicable disease and sociodemographic data and risk factors as shown in Table 2. Non communicable diseases were significantly higher above 40 years (p-value 0.000), males (p-value 0.000), lower socioeconomic class (p-value 0.001), smokers (p-value 0.000) and those with physical activity less than 30 minutes per day (p-value 0.030).

Table 1: Prevalence of self-reported non-communicable diseases between males and females

Non-communicable diseases	Total (n=1833)		Males (n=940)		Females (n=893)	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Hypertension	539	29.4%	328	34.9%	211	23.6%
Diabetes	393	21.4%	250	26.6%	143	16.0%
High Cholesterol	421	23.0%	264	28.1%	157	17.6%
History of Cardiovascular disease	395	21.5%	261	27.8%	134	15.0%
Total	739	40.3%	429	45.6%	310	34.7%

Table 2: Bivariate analysis between any non-communicable disease and sociodemographic data and risk factors

Variables	Total (n = 1833)	Non-communicable disease reported (n = 739)	Non-Communicable disease not reported (n = 1094)	P-value
Age				
Less than 40 years	1386 (75.6%)	479 (34.6%)	907 (65.4%)	0.000*
40 to 60 years	356 (19.4%)	208 (58.4%)	148 (41.6%)	
More than 60 years	91 (5.0%)	52 (57.1%)	39 (42.9%)	
Gender				
Female	893 (48.7%)	310 (34.7%)	583 (65.3%)	0.000*
Male	940 (51.3%)	429 (45.6%)	511 (54.4%)	
Smoking				
Yes	527 (28.8%)	365 (69.3%)	162 (30.7%)	0.000*
No	1306 (71.2%)	374 (28.6%)	932 (71.4%)	
Fruit Intake per day				
Less than 5 servings	1743 (95.1%)	676 (38.8%)	1067 (61.2%)	0.000*
More than 5 servings	90 (4.9%)	63 (70.0%)	27 (30.0%)	
Vegetable Intake per day				
Less than 5 servings	1747 (95.3%)	684 (39.2%)	1063 (60.8%)	0.000*
More than 5 servings	86 (4.7%)	55 (64.0%)	31 (36.0%)	
Physical Inactivity per day				
Less than 30 minutes	906 (49.4%)	391 (43.2%)	515 (56.8%)	0.030*
30 to 60 minutes	707 (38.6%)	259 (36.6%)	448 (63.4%)	
More than 60 minutes	220 (12.0%)	89 (40.5%)	131 (59.5%)	
Body Mass Index				
Below 18.5	118 (6.4%)	56 (47.5%)	62 (52.5%)	0.063
18.4 to 24.9	755 (41.2%)	322 (42.6%)	433 (57.4%)	
25 to 30	598 (32.6%)	222 (37.1%)	376 (62.9%)	
Above 30	362 (19.7%)	139 (38.4%)	223 (61.6%)	

*p-value less than 0.05, was taken as significant

DISCUSSION

Non-communicable diseases (NCDs) are on the rise globally and represent a significant health challenge, contributing to high morbidity and mortality, particularly in urban settings like Lahore. The current study underscores the high prevalence of modifiable risk factors and self-reported NCDs, emphasizing the need for coordinated efforts involving health, agriculture, and education sectors to address these challenges effectively.[5]

The study population included a balanced representation of males (51.3%) and females (48.7%), with the majority (75.6%) under 40 years of age. This younger demographic is particularly vulnerable to lifestyle-related risk factors. Consistent with findings from the National Diabetes Survey of Pakistan, males in this study exhibited higher rates of hypertension (34.9%) and diabetes (26.6%) compared to females (23.6% and 16.0%, respectively), likely due to behavioral differences such as higher smoking prevalence among males.[9–11] Similar findings have been reported in studies from India and Bangladesh, which highlighted gender-specific differences in NCD prevalence due to variations in physical activity levels and dietary behaviors.[12–13]

Self-reported NCDs were prevalent among 40.3% of participants, with hypertension being the most commonly reported condition (29.4%), followed by high cholesterol (23.0%), diabetes (21.4%), and cardiovascular diseases (21.5%). These findings align with regional studies that demonstrate an increasing burden of hypertension and diabetes in South Asia, largely driven by urbanization and lifestyle changes.[14–15] The high prevalence of hypertension emphasizes the need for community-wide screening and public awareness campaigns to ensure timely detection and management. High cholesterol prevalence reflects dietary and lifestyle factors that necessitate proactive interventions.[16] Diabetes prevalence, reported at 21.4%, is consistent with recent findings highlighting the rapid rise

of diabetes cases in urban populations across Pakistan and neighboring countries.[17]

Behavioral risk factors such as smoking, poor dietary habits, and physical inactivity were significantly associated with NCDs. Smoking prevalence was 28.8%, with 45.7% of smokers initiating the habit before the age of 20. These findings are consistent with prior studies reporting early smoking initiation during adolescence.[9] Early intervention programs targeting youth are crucial to reducing smoking-related health risks. Dietary inadequacies were striking, with 95.3% and 95.1% of participants reporting insufficient vegetable and fruit intake, respectively. These findings exceed those reported in the Pakistan STEPS Survey and highlight urban dietary challenges influenced by economic and cultural factors.[18] A systematic review reported that low fruit and vegetable consumption significantly increases the risk of cardiovascular diseases and cancers, further emphasizing the need for dietary interventions.[19]

Physical inactivity was reported by 49.4% of participants, paralleling previous national surveys.[9] Combined with a high prevalence of overweight (32.6%) and obesity (19.7%), these findings highlight the need for community-based initiatives to encourage physical activity and improve fitness.[20] Rising rates of obesity and overweight individuals are consistent with global trends, where rapid urbanization and lifestyle changes have significantly impacted health behaviors.[21]

The reliance on self-reported data introduces potential biases, such as recall and social desirability, which may lead to underestimation or overestimation of certain conditions. Additionally, the use of convenience sampling limits the generalizability of the findings. Despite these limitations, the study provides valuable insights into NCD risk factors in Lahore and serves as a foundation for future research. Given the reliance on self-reported data and convenience sampling, future research should incorporate objective clinical measures and randomized sampling methods to enhance the accuracy and generalizability of findings. Addressing these modifiable risk factors through targeted interventions, community awareness campaigns, and multisectoral collaboration is critical to reducing the growing burden of NCDs and improving population health outcomes.

CONCLUSION

This study highlights the significant burden of non-communicable diseases (NCDs) and their associated risk factors in the urban population of Lahore. Hypertension, diabetes, high cholesterol, and cardiovascular diseases emerged as the most commonly self-reported conditions, with behavioral risk factors such as smoking, insufficient fruit and vegetable intake, physical inactivity, and obesity being highly prevalent. These findings underscore the urgent need for public health strategies that focus on lifestyle modifications, early screening, and effective management of NCDs.

Author contributions

Mehreen Nasir: Conception and design, analysis and interpretation of data, drafting the article, critical revision for important intellectual content, final approval.
Iram Manzoor: Conception and design, analysis, and final approval of draft.
Guzel Umar: Acquisition of data, analysis and interpretation of data, drafting the article.
Esha Alam: Acquisition of data, conception and design, analysis and interpretation.
Fatima Anum: Acquisition of data, analysis and interpretation of data, proofreading.
Hadiqa Tariq: Acquisition of data, analysis and interpretation of data.

REFERENCES

1. Qiao J, Lin X, Wu Y, Huang X, Pan X, Xu J, et al. Global burden of non-communicable diseases attributable to dietary risks in 1990–2019. Journal of Human Nutrition and Dietetics. 2022;35(1):202-13. https://doi.org/10.1111/jhn.12953
2. Kazibwe J, Tran PB, Annerstedt KS. The household financial burden of non-communicable diseases in low-and middle-income countries: a systematic review. Health Research Policy and Systems. 2021;19(1):96. https://doi.org/10.1186/s12961-021-00745-5
3. Azadnajafabad S, Mohammadi E, Aminorroaya A, Fattahi N, Rezaei S, Haghshenas R, et al. Non-communicable diseases' risk factors in Iran; a review of the present status and action plans. Journal of Diabetes and Metabolic Disorders. 2024;23(2):1515-23. https://doi.org/10.1007/s40200-023-00988-8
4. Kostova D, Richter P, Van Vliet G, Mahar M, Moolenaar RL. The role of noncommunicable diseases in the pursuit of global health security. Health Security. 2021;19(3):288-301. https://doi.org/10.1089/ hs.2020.0156
5. Kazmi T, Nagi ML, Razzaq S, Hussnain S, Shahid N, Athar U. Burden of noncommunicable diseases in Pakistan. Eastern Mediterranean Health Journal. 2022;28(11):798-804. https://doi.org/10.26719/emhj.22.071
6. Almas A, Awan S, Bloomfield G, Nisar MI, Siddiqi S, Ahmed A, et al. Opportunities and challenges to non-communicable disease (NCD) research and training in Pakistan: a qualitative study from Pakistan. BMJ Open. 2022;12(12):e066460. https://doi.org/10.1136/bmjopen-2022-066460
7. GBD 2019 Risk Factors Collaborators. Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. The Lancet. 2020;396(10258):1223-49. https://doi.org/10.1016/S01406736(20)30752-2
8. Reitsma MB, Flor LS, Mullany EC, Gupta V, Hay SI, Gakidou E. Spatial, temporal, and demographic patterns in prevalence of smoking tobacco use and initiation among young people in 204 countries and territories, 1990–2019. Lancet Public Health. 2021;6(7):e472-e481. https://doi.org/10.1016/S2468-2667(21) 00058-9
9. Basit A, Younus BB, Waris N, Fawwad A. Prevalence of tobacco use in urban and rural areas of Pakistan; a sub-study from second National Diabetes Survey of Pakistan (NDSP). Pakistan Journal of Medical Sciences. 2020;36(4):808-13. https://doi.org/10.12669/pjms.36.4.2505
10. Siddiqui S, Malik W, Haque N. Gender-based risk factors for hypertension in Pakistan: a population-based study. BMC Public Health. 2022;22:240. https://doi.org/10.1186/s12889-022-12648-7

11. Rafique I, Saqib MA, Munir MA, Qureshi H, Rizwanullah KS, Khan SA, et al. Prevalence of risk factors for noncommunicable diseases in adults: key findings from the Pakistan STEPS survey. Eastern Mediterranean Health Journal. 2018;24(1):33-41. https://doi.org/10.26719/ 2018.24.1.33
12. Ghosh S, Kumar M. Gender disparities in prevalence and management of hypertension and diabetes in India: Evidence from NFHS-5. International Journal of Public Health. 2022;67:1604116. https://doi.org/10.3389/ijph.2022.1604116
13. Biswas T, Islam MS, Linton N. Prevalence and determinants of diabetes and hypertension in Bangladesh: Evidence from a large-scale survey. PLoS One. 2022;17(4):e0267010. https://doi.org/10.1371/ journal.pone.0267010
14. Sadiq F, Shafi S, Sikonja J, Khan M, Ain Q, Khan MI, et al. Mapping of familial hypercholesterolemia and dyslipidemias basic management infrastructure in Pakistan: a cross-sectional study. Lancet Regional Health Southeast Asia. 2023;12:100214. https://doi.org/10.1016/ j.lansea.2023.100214
15. Siddiqui A, Malik MA. Urbanization and its impact on hypertension and diabetes in South Asia. Journal of Urban Health. 2021;98(5):650-8. https://doi.org/10.1007/s11524-021-00557-4
16. Yang G, Wang Y, Zeng Y, Gao GF, Liang X, Zhou M, et al. Rapid health transition in China, 1990-2010: findings from the Global Burden of Disease Study 2010. The Lancet. 2013;381(9882):1987-2015. https://doi.org/10.1016/S0140-6736(13)60937-1
17. World Health Organization. Noncommunicable Diseases Country Profiles 2021: South-East Asia Region. Geneva: WHO; 2021. https://www.who.int/publications/i/item/9789240049339
18. National Institute of Population Studies. Pakistan Demographic and Health Survey 2017–18. Islamabad: NIPS; 2019. https://dhsprogram.com/publications/publication-fr354-dhs-final-reports.cfm
19. Woodside JV, Nugent AP, Moore RE, McKinley MC. Fruit and vegetable consumption as a preventative strategy for non-communicable diseases. Proceedings of the Nutrition Society. 2023;82(2):186-99. https://doi.org/10.1017/S002966512300003X
20. Murray CJ, Lopez AD. Measuring the global burden of disease. New England Journal of Medicine. 2013;369(5):448-57. https://doi.org/10.1056/NEJMra1201534
21. World Health Organization. Global status report on noncommunicable diseases. Geneva: WHO; 2021. https://www.who.int/publications/i/item/9789240041142
22. Das Gupta R, Asaduzzaman M, Roy A, Mandal D, Roy SK. The urban NCD crisis: Contextualizing South Asia's challenge. Journal of Epidemiology and Global Health. 2023;13(1):9-18. https://doi.org/10.1007/s44197-022-00005-1
23. Khan MS, Mahmood S, Khan S, Ahmed A, Ali U, Saeed K, et al. Burden of non-communicable diseases among middle-aged and elderly population in Karachi, Pakistan. BMC Public Health. 2021;21(1):22. https://doi.org/10.1186/s12889-020-10003-5.