



Diabetes and Hypertension: An International Health Challenge for 2022-24

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ABSTRACT. Diabetes and hypertension are known to be major risk factors for kidney failure, cardiovascular disease and early death among the most common non-communicable diseases in the world. These two conditions have become more common in recent years in low- and middle-income countries, including Iran. This article analyses scientific data for the period 2022-2024 to investigate the causes of the rise in diabetes and hypertension, their interactions and the treatment options to reduce the global burden. The results show that the main causes of the epidemic are changes in lifestyles, the rise in obesity and poor access to health services. Prevention and control of these diseases also depend heavily on the integration of public education and health care systems. Chronic diseases such as diabetes and hypertension are a major challenge to global health. In addition to being a threat to health, they are closely linked and increase the risk of complications such as stroke, kidney failure and cardiovascular disease. Diabetes and hypertension have become much more common in Iran and worldwide in recent years, and in 2022-2024, they were identified as the leading cause of death and disability in several communities. The World Health Organization (WHO) estimates that by 2045, 700 million people worldwide will have diabetes, up from the current 422 million (WHO, 2021). Similarly, more than 1 in 13 people worldwide have hypertension, a major risk factor for cardiovascular disease (NCD Risk Factor Collaboration, 2017). The frequent occurrence of these two conditions increases the likelihood of serious complications © 2025 Published by Public Knowledge Project (PKP).

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Introduction

Diabetes and hypertension are among the most common non-communicable diseases in the world, with significant impact on morbidity, mortality and healthcare costs (WHO, 2021). According to Sowers, Epstein and Frohlich (2001), both disorders increase the risk of severe complications and are important risk factors for renal failure, stroke and cardiovascular disease. Adults in Iran are 11 percent likely to suffer from diabetes and 27 percent are likely to suffer from hypertension (Esteghamati et al.). (2023). Urbanization, sedentary lifestyles, poor diet and rising rates of obesity are the main causes of the rapid rise in these diseases, particularly in low- and middle-income countries (IDF [21] Mills, Stefanescu, & Co., 2020). The study, which focuses on Iran and the international context, examines epidemiological trends, common risk factors and policy implications of diabetes and hypertension in the period 2022-2024. Diabetes (a chronic metabolic disorder characterized by elevated blood sugar levels) and hypertension are among the most significant non-communicable diseases (NCDs), known for their widespread prevalence, high treatment costs, and severe complications. Both conditions are leading causes of mortality and disability worldwide.

As diabetes and hypertension greatly increase the risk of major complications when they co-exist, their management is of the highest importance for global health. Two of the biggest health problems of the 21st century are diabetes and high blood pressure. Statistics show that the adult population in Iran has 11.5 percent prevalence of diabetes and 27 percent prevalence of hypertension. These diseases have a significant financial impact on health systems and reduce the quality of life of citizens.

Rapid lifestyle changes, unhealthy diets, and growing urbanization have all contributed to the alarming rise in the prevalence of these conditions in the Middle East and North Africa (MENA) region. Over 10 million

deaths worldwide are attributed to hypertension, one of the most important risk factors for cardiovascular diseases. Changes in lifestyle, rising obesity rates, and decreased physical activity have all contributed to the rise in diabetes and hypertension in Iran in recent years. Finding trends in disease prevalence and creating preventative and control plans depend heavily on epidemiology, the study of disease distribution and determinants in human populations. Type 1 and Type 2 diabetes are the two primary forms of the disease; the latter is more strongly linked to environmental and lifestyle factors. About 90% of cases of diabetes are type 2, and lifestyle factors like obesity, poor diets, and inactivity are closely associated with this condition. In low- and middle-income nations, the prevalence of diabetes is rising quickly; this trend is strongly associated with dietary modifications and urbanization (International Diabetes Federation, 2021).

Material and methods

This study combined qualitative and quantitative data sources for the years 2022-24 using a design of descriptive analysis and systematic reviews. The study was conducted in three phases: integrative (summary of evidence for policy recommendations), quantitative (analysis of epidemiological and economic data) and qualitative (identification of risk factors and interviews with experts).

Study Design

This study examines various aspects of diabetes and hypertension in 2022-24 through a descriptive and analytical systematic review. The secondary sources from which data were derived included peer reviewed publications, reports from national and international organizations and reliable databases. The study is divided into three phases: - Qualitative phase: through expert interviews and systematic review, risk factors, social determinants and governance issues are identified. The quantitative phase includes the use of secondary data sets for the analysis of economic and epidemiological data. The integration phase involves the combination of qualitative and quantitative data for the development of evidence-based solutions.

Study Population and Sampling

The target population included peer-reviewed articles (in English or Persian), national and international reports (WHO, IDF, Iran Ministry of Health), and semi-structured interviews with 15 Iranian specialists (8 endocrinologists, 5 cardiologists, 2 epidemiologists). Qualitative sampling used a purposive approach, yielding 85 articles (45 international, 40 domestic) and 15 institutional reports. Quantitative data were drawn from 5,000 anonymized medical records via stratified random sampling across 10 Iranian provinces.

Target Population

All Persian and English language studies published in the period 2022-2023 on diabetes and hypertension in Iran, including: - Qualitative sources: - peer reviewed articles (ISI, Scopus, SID, Magiran) - reports from WHO, IDF and the Iranian Ministry of Health - interviews with 15 Iranian experts (epidemiologists, cardiologists, endocrinologists).

Sampling methods

Qualitative sampling: qualitative sampling with an emphasis on research on therapeutic innovation and social determinants. The final sample comprises 15 institutional reports and 85 articles (45 national and 45 international). Quantitative sampling: stratified random sample of 10 provinces (both underprivileged and affluent areas). The sample size is 5 000 medical records from the Iranian e-Health system.

Data Collection and Analysis

Using PubMed, Scopus, ScienceDirect, Google Scholar, SID, and Magiran, a comprehensive literature search was carried out using keywords such as "diabetes," "hypertension," "risk factors," and "epidemiology.". Peer-reviewed, full-text, human studies published between 2022 and 2024 were necessary to meet the inclusion criteria. Thematic coding in NVivo 12 was used to analyze qualitative data, and SPSS 26 and Excel were used to process quantitative data for descriptive and inferential statistics (e.g. G. chi-square tests, logistic regression). For reporting, the PRISMA 2020 guidelines were adhered to (Page et al. 2021).

The informed consent of the interviewees, the anonymization of the medical records and the respect of the Helsinki Declaration were all ethical considerations. The inclusion or exclusion criteria shall include studies that are directly relevant to the subject matter, published in an indexed journal (ISI or ISI) and with readily available quantitative and qualitative data. Excluded were non-originating reviews and studies with a sample size below 100.

Systematic Review

- Database: ISI, Magiran, Google Scholar, ScienceDirect, Metadata, and Scopus. Keywords: diabetes, hypertension, risk factors, disparities, epidemiology - filters: - publication years: 2022-2024 (1401-1403 SH) - peer reviewed and open access articles, human studies, full text availability. 3.2. Fifteen medical experts, including eight endocrinologists, five cardiologists and two epidemiologists, were interviewed in semi-structured interviews. Key issues - How can digital health technologies improve the control of diseases? - What are the main challenges for the management of diabetes and hypertension in Iran? - Each interview will last from 30 to 45 minutes. 3.3 points 3. One source of secondary quantitative data is the database of the National Diabetes Control Programmed of Iran (2023). Ministry of Health Reports for 2022-24. Variables: - Prevalence by age, sex and geographical location. Treatment costs, direct and indirect.

Research Tools

PRISMA protocol on reporting on systematic reviews. Interview questions based on a socio- ecological framework. Software: NVivo 12 for theme coding is qualitatively sound. For analytical and descriptive statistics, use Excel and SPSS 26.

Data Analysis

Five points. Thematic analysis in relation to quality analysis (e.g. Effects of COVEND-19 and health inequalities. NVIVA is used for open and axial encoding for pattern matching (e.g. G. impacts of poverty (impact of poverty). Meta summary that includes the results. 5.2. Descriptive statistics used in quantitative analysis must include the mean, median and standard deviation of disease prevalence. Analysis statistics shall include risk factor logistic regression. Chi-squared tests for association of variables. 5.3. Data integration is the process of matching qualitative information with quantitative trends using a sequential explanation. 6. Validity and reliability: Internal validity is obtained by triangulating the qualitative and quantitative data with sources that are peer-reviewed. It has been peer-reviewed by two scientists. - External validity: - Wide sampling in the whole of Iran. Compliance with World Reports WHO and IDF. Inter-coding agreement (Kappa > 0.80) is a reliable proxy for inter-coding agreement. For quantitative data, a new test shall be required.

Result

More than 422 million people worldwide have diabetes, and 700 million are expected to be affected by 2045 (WHO, 2021). More than 1 in 13 people worldwide have hypertension, which remains the most important modifiable risk factor for cardiovascular death (NCD Collaboration on Risk Factors, 2017). According to a study on lipids and glucose in Tehran (2022), the prevalence of both diseases is 23 percent higher in urban areas in Iran than in rural areas. The increasing trend is confirmed by the national STEP data for the years 2022-2023, for middle-aged adults.

Common modifiable risk factors (Azizi et al.) include sedentary behaviour, poor diet, obesity and physical inactivity. (c) 2022. In addition, there are non-changeable factors such as genetic predisposition (Khardori et al.). (c) 2022. There were significant gender differences: men had a higher incidence of hypertension and women a higher incidence of diabetes (Esteghamati et al. (2023).

According to the surveys, effective management is hindered by unequal access to care, the cost of medicines and lack of public awareness. Professionals underlined that digital health resources (e.g. G. adherence and outcomes are greatly improved by community-based education and the use of glucose and blood pressure monitoring. Improved disease control is consistently linked to small lifestyle changes, such as following a Mediterranean diet and 150 minutes of physical activity a week (American Diabetes Association [ADA], 2023). 18 percent of the Iranian healthcare costs associated with NCDs are due to the combined burden of diabetes and hypertension (Ministry of Health and Medical Education, Iran, 2023). The risk ratio for cardiovascular events increases to 2.3 (95 percent CI: 1.8-2.9) when these conditions coexist, with a significantly increased risk of stroke and renal failure (GWD, 2023).

Quantitative results

Common risk factors for diabetes and hypertension include:

Poor health status, Obesity, Physical inactivity, Poor diet, Genetic predisposition. The Tehran Lipid and Glucose Study shows that urban areas have a higher prevalence of diabetes and hypertension than rural areas, which may be attributed to the sedentary lifestyle and poor diet. Serious complications: diabetes and hypertension are the two leading causes of death and disability in the world according to the Global Burden of Disease study. The following conditions, in isolation or in combination, increase the risk of stroke, renal failure, cardiovascular disease and other conditions: Impact of lifestyle changes: According to the American Diabetes Association, maintaining a healthy weight, eating a balanced diet and exercising often reduce the risk of developing diabetes and hypertension by a great deal. According to the study participants, minor lifestyle changes led to significant improvements in health. The role of pharmacotherapy: According to the World Heart Federation, antihypertensive and antidiabetic medicines help to control disease when used in close supervision. Participants reported that regular glucose and blood pressure monitoring and consistent use of medication improved the management of their disease. The importance of public education is illustrated by WHO studies showing that campaigns to raise awareness of risk factors and preventive measures reduce disease prevalence. Participants acknowledged that having more knowledge allowed them to change their behavior.

Discussion

This study confirms that the convergence of diabetes and hypertension in 2022–2024 reflects broader global shifts toward obesogenic environments and fragmented health systems. The pathophysiological interplay—where insulin resistance promotes hypertension and vice versa—necessitates integrated clinical management (Williams et al., 2023). Our findings align with global evidence showing that lifestyle modification remains the cornerstone of prevention (Knowler et al., 2002).

Our results corroborate WHO and IDF reports on rising NCD burdens in the Middle East and North Africa (MENA) region (IDF, 2023). The gender disparity in disease prevalence mirrors patterns observed in other upper-middle-income countries undergoing rapid urbanization (Mills et al., 2021). Moreover, the economic impact aligns with prior estimates linking uncontrolled NCDs to unsustainable health expenditures (Marmot et al., 2020).

Policy implications Multisectoral action is essential for effective control. Primary prevention: Implement the WHO's best buys, such as sugar and salt reduction policies (WHO, 2023). Reinforcing the health system includes deploying mobile health units in under-served areas, expanding screening, and ensuring affordable

access to medicines. Digital innovation: Extend telehealth platforms and artificial intelligence-driven predictive models for early detection of complications (Klonoff, Ahn and Drincic, 2018).

Risk factors and social determinants: both quantitative and qualitative data support the idea that the prevalence of a disease is driven by both non-modifiable factors (genetics) and modifiable risks (nutrition, activity). The risks are exacerbated by socio-economic inequalities such as poverty, access to health care and educational attainment.

The following prevention and control strategies are backed up by quantitative evidence: Lifestyle interventions (e.g. diet, exercise), G. a Mediterranean diet and 150 minutes of weekly physical activity are very beneficial. Drug adherence increases results. Changing behavior is made possible by public health education. Policy implications: It is essential to use integrated strategies combining community initiatives, clinical care and legislative changes. Priority actions: urban health programmed targeting sedentary lifestyles. Increased screening in high-risk populations. Access to affordable medicines in poor areas. Key messages: Dual-drug management protocols are essential to address synergistic risks. Preventive measures are needed to tackle both individual bad behavior and systemic injustice. Evidence-based interventions can reduce the growing prevalence of NCDs in Iran and worldwide.

The epidemiological patterns of diabetes and hypertension in the last years (2022-2024) demonstrate the important impact of lifestyle changes, social inequalities and inadequate prevention initiatives. The burden of these diseases will become unmanageable for the Iranian health system and for the international health infrastructure unless urgent action is taken. Our results show that three key strategies are needed to reduce this double burden in the coming years: The pathophysiological interaction between diabetes and hypertension is a vicious circle: - Insulin resistance increases blood pressure - oxidative stress induced hypertension damages the function of the pancreatic beta cells - Rapid urbanization trends - Increasing prevalence of obesity.

Health inequalities Iran is facing challenges such as: - Public awareness campaigns to encourage healthier behaviors. - Improved access to healthcare, particularly in deprived areas. Policy guidelines: National Health Strategies 2 should favor initiatives in the field of primary prevention. Initiatives to change lifestyles must focus on three things: managing stress, physical activity and diet. Epidemiological data for the period 2022-24 confirms an alarming increase in double diagnoses, which requires immediate action at the following levels: individual level: education of patients and support for self-management - Community level: environmental changes - Policy level: fiscal measures and reform of the health system - Multidisciplinary care teams - Access to medicines.

Conclusion

The dual epidemic of diabetes and hypertension demands urgent, coordinated responses across individual, community, and policy levels. By integrating evidence-based lifestyle interventions, equitable healthcare access, and digital health solutions, Iran—and similar settings—can mitigate this growing burden and advance progress toward Sustainable Development Goal 3.4 (reducing premature NCD mortality by 2030).

The study's main conclusions are rising rates of disease caused by socioeconomic and lifestyle factors. The negative effects of the COVID-19 pandemic on fewer people having access to screening and treatment services. Uncontrolled disease complications pose a significant financial burden. Strategic recommendations include strengthening the health system, integrating digital health, expanding e-health systems, and ensuring comprehensive insurance coverage for essential medications. National prevention programs should implement salt/sugar reduction initiatives through media campaigns and community education. Technological solutions should be implemented. Digital health tools should be used to prevent complications by using AI-based predictive models and health monitoring apps. International cooperation should be fostered to share financial resources and technical knowledge.

Detailed Analysis, Global and National Prevalence WHO reports show significant increases in the prevalence of diabetes and hypertension in 2022–2024, which can be attributed to: - Sedentary lifestyles in cities - Unhealthy eating habits - Increasing rates of obesity - Iran-specific findings: The Tehran Lipid and Glucose Study found that the prevalence of diabetes and hypertension is 23 percent higher in urban areas than in rural

ones. Common modifiable risks include: Lack of physical activity, Poor nutrition, Genetic predisposition, Gender differences: - Women are more likely to have diabetes than men are to have hypertension, Severe Complications The dual burden increases the risk of cardiovascular diseases (HR: 2.3, 95 percent CI: 1.8-2.9) - Renal failure, Stroke Economic impact: accounts for 18 percent of Iran's NCD-related healthcare expenses. Evidence-based interventions for prevention and control strategies: 1. Modification of lifestyle (ADA Grade A recommendation): - Adoption of a Mediterranean diet - Weekly exercise of 150 minutes, Early detection: Regular screening for groups at high risk. Combination medication and routine blood pressure and glucose checks are two ways to optimize treatment.

Data for 2022-2024 reveal a concerning epidemiological shift, which requires multi-sectoral action. These include critical needs; policy level: implementing WHO best practices on NCD prevention; clinical practice: adopting integrated care models; and community involvement: mobile health units for rural areas. Implementation plan 1. In the short term (one to two years), national awareness campaigns and price controls for the most important medicines should be implemented. Medium term (two to five years): reforms in food policy; expansion of the primary care workforce; Long-term (5+ years): - Urban design for active living - Investing in genomics This study provides a evidence-based framework to address the dual epidemic in Iran through cost-effective and scalable interventions in line with the SDGs 3.4.

Ethical Considerations

Respect for intellectual property rights (with appropriate citations) is strictly enforced. Informal consent of the participants during the interview. Anonymization process for medical records. - Respect for the principles of the Helsinki Declaration.

Limitations

This study is limited by the lack of longitudinal data on complications in Iran, possible publication bias and the bias of the referral of patients. The unique sociopolitical context of Iran may also limit generalizability.

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