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The burden of non-communicable diseases: A scoping review focus on the context of India

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Abstract:

The mortality rate of non-communicable diseases (NCDs) contributes more in low-income and middle-income countries, also among individuals with lower socioeconomic status in high-income countries, making NCDs a big hurdle to minimizing global and national health disparities. Among 55 million fatalities worldwide in 2019, NCDs accounted for about 41 million (71%) deaths. The purpose of this scoping review was to comprehend the available literature on the burden of NCDs in India. This review included the studies that have been published between the period of 2009–2020. For this review, 18 full-text articles have been selected. A preliminary search was done to obtain articles from the search engines such as PubMed, Google Scholar, web of science, and Scopus. Our scoping review was focused on five major NCDs which are cardiovascular, hypertension, diabetes, cancer, and stroke. In 2019, around 17.9 million individuals died from cardiovascular disease (CVD), which is accounting for 32% of all deaths. As compared to Chandigarh and Jharkhand (0.12 million and 0.96 million, respectively) Tamil Nadu and Maharashtra (4.8 million and 9.2 million, respectively) have a higher percentage of the population affected by diabetes. In India, stroke is the fifth-significant cause of disability and the fourth-leading cause of fatality, which is accounting for 3.5 percent of all disabilities. India should construct a higher-level coordinating framework and devise an overarching policy or strategy tailored to NCDs. To limit risk factor exposure, it is necessary to emphasize health promotion and preventive actions.

Keywords:

Burden, disability, policy

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Introduction

Non-communicable diseases (NCDs) are a huge group of illnesses that comprise chronic respiratory illnesses (asthma, COPD), malignant growth, diabetes, and cardiovascular ailments (including stroke and respiratory failures). The mortality rate of NCDs is considerably higher in low-income and middle-income countries (LICs and MICs), which makes NCDs a tremendous barrier to reducing developing and developed nations' health disparities.[1] Overall, in the world, NCDs are the prime determinant of disability and mortality. Out of 55 million fatalities in the world in 2019, about 41 million (around 71%) were caused by NCDs.[2] Over 5.8 million Indians lose their lives each year to NCDs like diabetes, cancer, heart disease, and stroke (WHO report, 2015). In other words, one out of four Indians has the highest probability of dying from NCDs before reaching the age of 70 years.[2] Because of the harm, they do to the nation's socioeconomic development and even the human anguish they bring, NCDs are a significant public health problem in the twenty-first century.[3] Long-term development is in danger due to the global non-communicable disease pandemic. NCDs are also encompassed by Sustainable Development Goal (SDG) 3.4, which aims to reduce non-communicable disease-related

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premature death by one-third by 2030, as well as seeks to promote mental health and well-being through the use of prevention and treatment.[4] Furthermore, NCDs are addressed in three of the SDG's nine health targets. World Health Organization (WHO) presented a Global Strategy for the Prevention and Control of NCDs Action Plan at the World Health Assembly. Chronic diseases such as chronic respiratory disease, malignant growth, CDV, and cancer are the four diseases that account for more than 80% of all early NCD fatalities (According to World Health Organization 2021). Following the adoption of Resolution 66.10 of the World Health Assembly, India was the first country in the world to create its National NCD Monitoring Framework, which includes country-specific key performance indicators, and has pledged to achieve 10 goals and 21 bench markers by 2025. NCDs are perceived as ailments in which microbial interference is alienated in favor of lifestyle factors, and environmental genetical factors, with a few accompanied risk factor consequences, such as increased industrialization and urbanization, changes in lifestyle habits, and longer life expectancy, the prevalence of the non-communicable disease is predicted to be raised in the coming years.[5,6] Tobacco use and alcoholism, sedentary behavior, being overweight or obese, intake of fruits, and vegetables insufficient, having higher blood pressure (BP), blood glucose, and cholesterol levels, and consuming excessive fat and sodium, seem to be biological and behavioral risk factors that are contributing to the development of NCDs.[7] Non-communicable illnesses (NCDs) such as diabetes mellitus, hypertension, pulmonary (COPD/bronchial asthma), and heart disease have been known to enhance susceptibility to Covid-19 disease among individuals.[8] The Government of India has begun "Population-based screening of major NCDs" at the community and primary healthcare level to battle diabetes, hypertension, and the three most prevalent cancers—oral, breast, and cervical cancers.[9]

Study novelty

The included paper has been adequately verified and of them were evaluated guidelines. Scoping review method has been adapted to summarize the burden of NCDs. By the application of text and descriptive result extraction method, we overlooked all the possible previous research. Recent epidemiological data show that NCDs and multimorbidity were significantly prevalent and it is increasingly the norm for patients in high-income contexts. Even though there is literature on NCDs and their numerous risk factors, to alleviate the burden of NCDs, a comprehensive understanding of the disease burden is required, which will aid in the development of effective intervention strategies. Hence this scoping review aims to comprehend the available literature on the burden of NCDs.

Materials and Methods

A preliminary search of PubMed, Google Scholar, web of science, and Scopus revealed that there was no review on the current state of the NCD burden in India. A scoping review technique has been used to assess the magnitude of evidence in this area in India. This analysis adhered to a predetermined structure and set of guidelines. Systematic searches were carried out utilizing electronic information databases, namely, Google Scholar, Scopus, MEDLINE, Embase, Web of Science, and PsycINFO. These search libraries were used because they were most likely to focus on providing relevant and highly effective coverage of the subject, while also limiting the probability of missing publications. The search terms were decided upon collectively by the authors and were generated from keywords associated with the research objective. The studies that have been selected for this review were published between the period of 2009–2020. In each database, the following search string/MESH terms was used: Keywords: Non communicable disease [Title/Abstract] AND ("India" [MeSH Terms] ***OR*** "Cardiovascular" [Title/Abstract] ***OR*** "NCD's" [All Fields]) ***AND*** ("India" [MeSH Terms] ***OR*** "hypertension" [Title/Abstract] ***OR*** "comorbidity" [MeSH Terms] ***OR*** "morbidities" [All Fields]) ***AND*** ("Household" [Title/Abstract] ***OR*** "India" [All Fields] ***OR*** "community" [All Fields]) ***AND*** ("India" [MeSH Terms] ***AND*** "Diabetes" [Title/Abstract] ***OR*** "blood sugar" [MeSH Terms] ***OR*** "morbidities" [All Fields]) ***AND*** ("Household" [Title/Abstract] ***AND*** "Cancer" [Title/Abstract] ***OR*** "morbidities" [All Fields]) ***AND*** ("Stroke" [Title/Abstract] ***OR*** "India" [All Fields].

The inclusion criteria of studies were based on NCDs, Comorbidities, and NCDs. This review included the disease that is most prevalent in NCDs. The studies that are done among communities and the prevalence rate. Initial searches of electronic databases yielded only a few studies. Eligibility criteria were used to choose papers for inclusion in the review. The first choice was picked based on the title, then the abstract, and finally the whole content. The search for and application of inclusion criteria are in Figure 1. **Exclusion criteria:** Studies of mixed populations (e.g., Hypertension and depression) were excluded unless separate results for people with hypertension could be isolated. We excluded studies that are done on qualitative assessment, review articles, retrospective studies, randomized control trials, etc.,

Results

Overall, 18 articles were screened for the final review process. These 18 articles concentrated majorly on five NCDs which accounted for the high disease burden. This review explains the burden of cardiovascular,

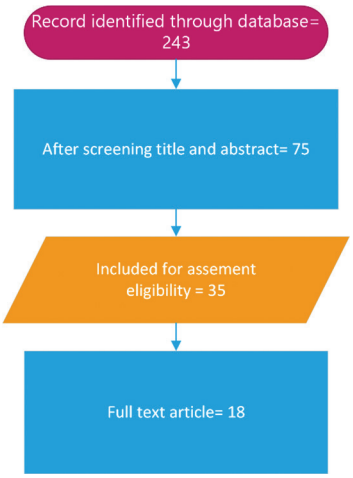

Figure 1: Flowchart (Using Visio software) for review items (Data source: Secondary data) Documenting NCDs in India: A Strategy for Finding articles

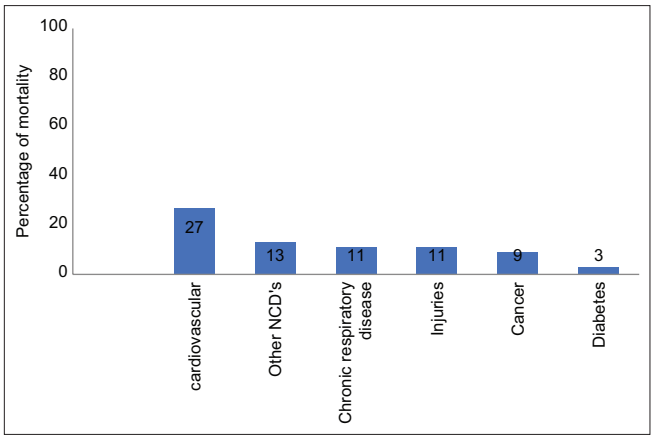

Figure 2: Percentage of NCDs mortality in India in 2016 (*Source: WHO Non-communicable disease India profile 2018*)

Table 1: Prevalence of CVD in India 2009-2019

Measure	Percent		Number	
	2009	2019	2009	2019
Death				
Male	0.23386	0.28511	1124779	1427542
Female	0.20119	0.26113	773860	1146867
YLLs (Years of Life Lost)				
Male	0.15294	0.21281	30411969	35849607
Female	0.11616	0.18334	18873574	25680328
DALYs (Disability-Adjusted Life Years)				
Male	0.15574	0.12096	31563163	37466406
Female	0.12163	0.08604	20133820	27480063
YLDs (Years Lived with Disability)				
Male	0.01895	0.02241	1151194	1616798
Female	0.01758	0.02062	1260246	1799735
Prevalence				
Male	0.04399	0.05377	26631881	37084040
Female	0.04145	0.05096	24020119	34046289

Source: GHDx healthdata.org

hypertension, diabetes, cancer, and stroke. The burden of each non-communicable disease has been explained henceforth.

Non-communicable diseases

Cardiovascular

Currently, CVD has emerged as one of the most prominent and preferred fields globally. From Figure 2 all over the world, CVD is the foremost leading cause of death across the world, followed by other NCDs, namely, injuries, chronic respiratory diseases, cancer, and diabetes. In 2019, worldwide 17.9 million people died as a result of CVD, which is accounting for 32% of all deaths. In 2019, out of these 17 million premature fatalities (before reaching the age of 70) owing to NCDs, 85% of these deaths were caused by strokes and heart attacks, and 38% were related to CVD.[10] In India, the estimated annual number of deaths due to CVD is predicted to increase from 2.26 million (1990) to 4.77 million (2020).[11] In India, the mortality rate of CVD increased by 34% from 1990 to 2016.[12] A study by Dosi *et al*. revealed that the prevalence of coronary artery disease was 38% among postmenopausal women.[13] Across India, Punjab, Kerala, and Tamil Nadu are having the highest rate of CVD, besides that, these states also have the highest prevalence of high cholesterol and raised BP.[12] Evidence from LASI wave 1 shows that the overall self-reported prevalence of CVD was 29.4% among older adults who are aged 45 and above. The prevalence rate was increased among ages from 22% among 45–54 years to 38% among 70 years and above, and the study also shows that the prevalence of CVD is higher among women when compared with men and it is also higher among individuals who are residing in urban areas when compared to rural areas. The increasing trend of cardiovascular risk factors among Indians has been attributed to urbanization and higher living conditions. As can be seen from Table 1, there is a rise in the prevalence rate, death, disability-adjusted life year (DALY), years of life lost, and years lived with disabilities, as well as when compared to both gender prevalence and death are increased among males when compared to females. CVD is both extremely debilitating and proactive, with numerous external and internal factors influencing its exacerbation and improvement, and these characteristics also have an impact on patients quality of life and impose enormous costs on the healthcare systems of a country.[14] A significant portion of CVD conditions can be mitigated by addressing behavioral risk factors such as the usage of tobacco, alcohol abuse, inappropriate eating habit, obesity, and inadequate physical inactivity. CVD and their consequences are generally preventable, however, a lack of patient knowledge, attitude, and practice can be significant factors influencing the selection and adoption of health-promoting behavior to achieve a

healthy lifestyle.[15] It is indeed extremely important to diagnose cardiovascular illness as soon as possible so that counseling and medication therapies can be started to treat the illness.

Hypertension

In India as well as globally, hypertension has emerged to be the most important cause of death and disability. Heart failure, ischemic heart disease, chronic renal disease, and stroke are all linked to the development of hypertension. According to estimates, hypertension is attributed to 57% of strokes and 24% of coronary artery disease fatalities.[16,17] In 2017, according to the global burden of disease report, about 1.54 million deaths were because by hypertension in India and worldwide hypertension has caused 10.4 million fatalities; global hypertension has led to 220.0 million disability-adjusted life years, whereas in India it is 38.1 million disability-adjusted life. The global burden of hypertension climbed from 594 million people in 1975 to 1.13 billion in 2015. According to the recent report of the national family health survey-5 elevated BP (Systolic ≥140 mm of Hg and/or Diastolic ≥90 mm of Hg) or under medication for the control of hypertension was about 21.3% among women and 24.0% among men. In south Asian regions, hypertension is regarded as the third-most significant risk factor for the burden of disease.[15] The prevalence of hypertension was about 31.5% in urban areas and 26.2% in rural areas as shown in the ICMR INDIAB study. A study by Geevar, Zachariah, *et al*. conducted in Kerala among young adults aged 20–39 years shows that the prevalence of hypertension was about 11.2% and it also showed a prehypertension prevalence of 33.3%.[18] Evidence from the literature shows that the prevalence of hypertension in the urban areas in India is about 20% to 40% and 13% to 17% in rural areas. Due to a wide range of factors, hypertension is progressively very prevalent in both advanced countries and developing countries and is attributed to a sudden transition in lifestyle behaviors and patterns in developing countries like India, in addition, there is an increase in the older population due to a rise in life expectancy.[19] uncontrolled hypertension is a significant risk factor for CVD complications, which is accounting for 70% of the Asian-Pacific region's CVD burden.[20] Likewise, a higher BMI, alcohol consumption, poor eating habits, and a sedentary lifestyle are all key contributors to India's increased prevalence of hypertension. The potential for community-based preventative interventions that concentrate on both healthcare and lifestyle-related issues, such as medical counseling, suitable dietary habits, and cultural perceptions of healthy lives. To track the progress of interventions, high-prevalence districts from available national-level data should have universal BP screening. When it comes to interventions, the focus should be on hypertension prevention at primary levels and policy measures should be done to ameliorate the poor's hazardous working circumstances and the growing social constraints of survival responsible for "lifestyle" modifications like high-calorie eating and alcohol usage.

Diabetes

The threat that diabetes poses to both public health and socioeconomic development makes it one of the most severe public health crises in the world.[21] It is considered to be one of the leading causes of mortality.[22] Diabetes mellitus had long been seen to be a disease of the privileged, but current epidemiological evidence reveals that diabetes mellitus is becoming most significant among both urban India's middle and working classes and rural communities, By 2025, a globally agreed target is to halt the rise in diabetes and obesity. According to the International Diabetes Federation, in 2017 it is estimated that approximately 451 million adults worldwide have diabetes, and that number is anticipated to rise to 693 million by 2045 if effective prevention strategies are not adopted.[23] With more than 74 million people diagnosed with diabetes in India, the disease is quickly becoming an epidemic.[24] There are regional disparities in diabetes prevalence within India. The disparity across regions ranges from 3.85% to 21%.[14,25] According to baseline study findings of a huge community survey performed by the Indian Council of Medical Research (ICMR), which is a phase 1 survey from these survey the Northern Indian states of Chandigarh and Jharkhand are affected with 0.12 and 0.96 million populations affected with diabetes, which has a lower portion of the population affected by diabetes when compared with the southern Indian states of Tamil Nadu and Maharashtra (which accounts for 9.2 million and 4.8 million, respectively).[26,27] According to the National family health survey-5, the overall percentage of glucose levels—high or very high (>140 mg/dl) or under medication to control glucose levels was 13.5% among women and 15.6% among men. Because of these startling levels, the economic effect of diabetes mellitus throughout India is ranked among the highest in the world.[28] The outbreak of diabetes mellitus proportion has been increasing in India, with this rise the prevalence of diabetes is shifting from urban to rural areas, from wealthy to the less privileged, and from older persons to younger persons, and physical activities have decreased as a result of increased wealth, a less rigorous lifestyle and sophisticated facilities.[29] In comparison to HICs, metropolitan Indians have an unacceptably high risk of developing diabetes at any age and BMI.[30,31] Greater availability of the food like fast foods and junk foods adds fire to the fuel of diabetes.

Cancer

Cancer is a wide concept that would encircle a wide range of ailments that could impact any portion of the human

body. A few other terminologies that are used to specify cancer were neoplasms and malignant tumors. Globally, cancer is the significant underlying cause of fatalities, by 2030 approximately 10 million mortalities were expected.[32] Even though there are several types of cancer that have been defined, colorectal, liver, stomach, lungs, gastric, esophagus, cervix, and breasts were the prime sites of cancer tumors in the human body in 2020.[32,33] Over 70% of cancer fatalities were accounted from LICs and MICs.[34] Use of tobacco, a high BMI, consumption of alcohol and drug usage, a lack of fruit and vegetable intake, and a lack of physical activity are accounted for almost one-third of cancer-related deaths.[33] With rising life expectancy and changes in lifestyles linked with economic growth, India's cancer burden is already high (about 1 million new cases in 2012) and is predicted to rise even more.[35] The number of individuals living with the disease is estimated to be over 2.25 million. In India, there have been 7,84,821 cancer-related deaths.[36,37] From 1990 to 2016, India's cancer mortality rate more than doubled.[38] Cancer's estimated burden is enormous, and it has been steadily rising at an alarming frequency of 93.0% among men in India.[39] According to the ICMR, Indians who are suffering from cancer is projected to increase from 26.7 million in 2021 to 29.8 million in 2025 and it also shows the seven cancers which are accounted for more than 40% of the total disease burden, the report indicated the percentage of different cancer rate, lung (10.6%), breast (10.5%), esophagus (5.8%), mouth (5.7%), stomach (5.2%), liver (4.6%), and cervix (4.3%). In India, one woman dies of cervical cancer every 8 min, one woman dies from breast cancer for every two newly diagnosed women and the death rate from tobacco usage is estimated to be around 3500 people per day.[32] According to the population-based cancer registry of 2012–2014, Delhi (19746), Thiruvananthapuram district (15640), Mumbai (13357), Chennai (11659), and Kollam (11012) were the top five PBCRs with the most cases.[40] Treatment for pediatric cancers is still minimal, and overall survival in India is lower than in more developed nations.[41] At the time of diagnosis, over 75–80% of individuals had advanced disease (Stage 3–4).[40,42] In various parts of the country, a lifestyle shift has occurred that is reflecting a rising incidence of various associated cancers such as prostate, breast, colon-rectum, and corpus-uteri. The most concerning factor in India is, that there is rising in the critical risk factors which are contributing to the development of various malignant tumors, the factors such as obesity or overweight, physically inactive, and consumption of alcohol.[37]

Stroke

In countries all over the world, stroke is a primary cause of disability and mortality, over 13 million new cases per year have been registered and post-stroke treatment, it had significant financial implications.[43,44] According to GBD, global burden of disease, injuries, and risk factors study 2017, as estimated by DALYs stroke was the third-most prominent reason for disability and mortality, and it is the second most prime factor of mortality around the world. Stroke is the fourth foremost cause of fatalities and in addition, stroke is the fifth contributing factor of morbidity, which is accounting for 3.5% of DALY.[45] According to the study evidence, in India, the incidence rate of stroke ranges from 116 to 163 per 100,000 people. A stroke is a life-altering event that impacts not only the disabled individual but also their family and careers.[46] Rural India has a greater rate of stroke-related mortality than urban India. Stroke claimed the lives of an estimated 375,000 Indians aged 30 to 69 years old in 2015. About 66 percent of the population resides in the rural areas of India, among those rural inhabitants, about 71% of stroke deaths have occurred, which is indicating disproportionately high numbers of moralities.[47] The prevalence rate ranged between 44.54 and 150 per 100,000.[48] Studies that included people of all ages showed that the stroke prevalence rates in urban regions ranged from 45 to 487 per 100,000 people, according to research that included people of all ages. Stroke prevalence rates in urban regions ranged from 45 to 487 per 100,000 people.[49,50] The prevalence rates of stroke in rural India were found in studies that included people of all ages, and the rates ranged from 55 to 388.4 per 100,000 people,[49] In terms of DALYs, gradual changes in demography, economy, and lifestyle have pushed the disease from 12th place in 1990 to 5th place in 2016.[51] India's solution to the uphill task offered by NCDs was the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke (NPCDCS), which was established in the year 2010, Health promotion, referral, screening, and treatment for early diagnosis are all included in the program.[52]

Discussion

The paper reviews the magnitude of NCDs in a detailed way. The global epidemic of NCDs offers a challenge to all countries' health systems, while the challenges differ. The burden of disease in India has changed through the years, with a relatively big decline in communicable diseases and an increase in non-communicable disorders (NCDs). To control the rising magnitude of NCDs in LICs and MICs, proper monitoring systems must be established, and the data gathered must be used to enhance or implement control plans, although NCDs are complicated diseases, the majority of them may be controlled.[53] In addition, the majority of the efforts are focused on discovering cures. NCDs are the primary cause of disability, illness, and mortality, and across the countries, the prevalence rate is anticipated

to rise unless interventions are implemented on a wide range.[54] A high level of coordinating framework and devising an overarching policy or strategy tailored to NCDs should be constructed in India. Non-health sectors such as agronomics, regional development, education, and trade have underlying indicators of NCDs. To build an enabling environment that supports healthy lifestyles, cross-sectoral coordination is required. To limit risk factor exposure, it is necessary to emphasize health promotion and preventive actions. The National Multisectoral Action Plan for the Prevention and Control of Common NCDs (2017–2022) is the nationwide conceptual model which will guide the nation's initiatives to deal with the rising magnitude of NCDs in the aspect of the country's healthcare systems, cultural and socioeconomic status. The lack of reliable NCD surveillance and research data is a major impediment to effective NCD prevention and control planning and implementation. It is necessary to build a robust surveillance system capable of providing precise and timely facts on NCD problems, quality of healthcare, and healthcare costs. Because of their limited scope of implementation, currently deployed NCD programs have not been able to alleviate the burden.

Conclusion

The government should consider strategic investments and efforts to prevent and regulate NCDs and their risk factors, and also concrete actions at the individual and community levels, primary prevention through screening and enhanced diagnostic facilities, improved management capacities, and universal access to health services. Integrated management, a solid surveillance system, and a public awareness campaign are required for the program to be successful and for services to be extensively available across the country.

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Conflicts of interest

There are no conflicts of interest.

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