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Review Article

Non-communicable diseases' risk factors in India: a review of the current situation

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ABSTRACT

Non-communicable diseases (NCDs) are responsible for considerable morbidity and mortality, leading to a significant burden on the health care systems in developing countries like India. Despite heavy burden, there is no regular system of collection of good quality representative data on NCDs or their risk factors in India. The published review articles show the trends of risk factors, however only for one or few more risk factors, thereby rendering them non comprehensive. This paper examines the updated data and epidemiology of all the NCD risk factors, to provide the summary estimates of their prevalence at national level. A thorough knowledge on current status of risk factors is required to formulate the policies and programmes, so that the rising burden of NCDs can be tackled.

Keywords: NCD, Risk factors, Burden, India

INTRODUCTION

Noncommunicable diseases (NCDs) mainly heart disease, cancer, diabetes, stroke and chronic lung disease are responsible for almost 70% of all deaths worldwide. About three fourth of all NCD related deaths, and majority (82%) of the people who die prematurely, or before reaching 70 years of age, occur in the developing countries.[1] The age of onset for NCDs is generally more than 55 years, however in India, they present almost a decade earlier.[2] Another concern is the late diagnosis, due to lack of awareness and health care access. Moreover, patients usually present with complications or multiple chronic conditions, which further exacerbates the problem. India is still fighting the menace of infectious diseases, with various diseases like tuberculosis and measles yet to be eliminated. Hence dealing with the dual burden of communicable and NCD pose considerable challenges to the public health system of country. India's commitment to the sustainable development goals is reflected in adopting World Health Organization's (WHO's) global action plan for the prevention and control of NCDs (2013-2020). India is also the first country to develop specific national targets and indicators aimed at reducing the number of premature deaths from NCDs by 2025.[3] The rising burden of NCDs necessitates the availability of data on burden and risk factors for research purpose and policy making. For conducting this review, we searched the PubMed, Scopus, and Google Scholar databases for the following keywords: NCD; risk factor; prevention; India; and epidemiology, through all types of articles, without a language and time restriction.

REVIEW OF THE MAJOR RISK FACTORS

Obesity

Obesity is a considerable public health problem, and its increasing prevalence in many developing and developed nations has led to a global challenge. Obesity and

overweight are classified as metabolic risk factors for diseases and are defined by high body mass index (BMI). WHO categorizes BMI (in kg/m^2) of 25-29.9 as overweight and BMI of ≥30 as obesity (with BMI of 30-34.9 as class I obesity, BMI of 35-39.9 as class II obesity and BMI of ≥40 as class III obesity).[4] However, there has been the debate about interpretation of BMI cut-off points for determining obesity among Asian populations. Hence in 1993, a WHO expert consultation reviewed relevant scientific evidence and suggested that Asians have different associations between percentage of body fat, BMI, and health risks than do European or Western populations. The expert consultation concluded that proportion of Asians with high risk of diabetes (type 2) and cardiovascular disease is substantial at lower BMI values than the existing WHO standards.[5] So, different cut off values for Asian population were suggested: For men- waist circumference (WC) ≥85 cm; waist hip ratio (WHR) ≥0.90; and for women- WC ≥80 cm; WHR ≥0.80. Proposed BMI (in kg/m^2) cut offs for Asian people: underweight ≤18.5, normal=18.5-22.9; overweight=23.0-24.9; obesity I=25.0-29.9; obesity II ≥30.0.[6] Literature shows that persistent increase in BMI, leads to higher rates of diabetes, CVDs and cancers.[7] Obesity also has strong associations with behavioural risk factors like high-calorie consumption and physical inactivity.[8] According to latest 'national non-communicable disease monitoring survey (NNMS), which is the largest comprehensive national survey on risk factors and health systems preparedness of NCDs in India, more than one in every four adults i.e., 26.1% were overweight and 6.2% were obese. Survey also revealed that about 6.2% adolescents in India were overweight and 1.8% were obese.[9]

National family health survey-5 (NFHS-5, 2019-20) also revealed that obesity is rising in India and it is not limited to urban areas, but also increasing faster in rural parts of the country. The data showed that in most of the states, about one third of population has been classified as obese, which is significant increase in just a few years. Women's obesity rates in major states representing the eastern, western, northern and southern parts of the country show a high rise in women classified as obese. Regarding the rural and urban distribution, in almost all these states, the gap between rural and urban obesity among women has narrowed because of the considerable rise in obesity among rural populations. NFHS 5 data showed that women who were overweight or obese (BMI ≥25.0 kg/m^2) were 41.7% in urban and 35.7% in rural, with overall percentage of 38.1% as compared to 31.8% in previous survey (NFHS 4). About 72% women in urban area and 80.7% in rural area had high risk waist-to-hip ratio (≥0.85). Among men, overweight and obesity percentage was 37% in urban and 50.6% in rural areas, with overall percentage of 45.3%, which is considerably higher than previous 38.2% NFHS 4. NFHS-5 data showed that obesity is now increasing faster in rural parts of the country. Men who had high risk waist-to-hip ratio (≥0.90) were 61% and 53.7% in urban and rural areas respectively. The distribution of obesity varies widely among the different population groups across the world including India.[7] In Indian subcontinent, diversity exists at every level, the prevalence of obesity and overweight varies in different populations.[11] The differences in the distribution of obesity and overweight can be attributed to genetic predisposition in addition to lifestyle factors.[12] In India, obesity has been reported to be as low as 1.5% to as high as 46% among few populations.[13] Thus, it can be conveniently said that obesity results from a complex interplay of genetic and environmental factors (culture and lifestyle). Mishra et al conducted a study among Bhil tribal population (a mendelian population with the common gene pool and same sociocultural attributes), living in two different environmental settings to understand the association of specific gene polymorphism with cardiometabolic risk factors.[14] The study revealed that the urban Bhil population were at higher risk of obesity as compared to rural population. Ningombam et al also studied the specific genetic factors among tribal population and reported high risk of obesity.[15]

The Indian council of medical research-India diabetes (ICMR–INDIAB) study reported high obesity rate in Chandigarh and lowest in Jharkhand.[11] A study conducted by Das et al in West Bengal revealed high prevalence of obesity (>40%) among Marwari community which is a socioeconomically well-established trader community.[16]

NCD risk factor surveillance in India reported that the prevalence of obesity in South India was higher (27.2%) followed by North India (23.8%) and lowest in West India (15%).[17] The literature also indicates that women are prime victim of obesity as compared to men.

Diet

A systematic analysis done by Afshin et al to study the health effects of diet in 195 countries from 1990-2017 revealed that in 2017, 11 million deaths and 255 million DALYs (Disability adjusted life years) were due to poor diet. In this study, researchers explored the food habits of adults (>25 years) across multiple countries between 1990 and 2017 and calculated the death rates from NCD among the populations. Authors also calculated the number of deaths and disability adjusted life years (DALYs) attributable to diet for each disease. The study revealed that out of all the dietary factors, high intake of sodium was found to be associated with the most fatalities as well as DALYs, followed by low intake of whole grains and fruits. In India, type II diabetes was found to be the cause of death in people whose diet was low in whole grains and fruits. Among the dietary habits, low intake of whole grains was the primary risk for deaths and DALYs among adults (25-50 years), while high salt intake was found to be the leading risk factor among old people (>70 years). The authors concluded that high sodium intake, diet low in whole grain, low in fruits & vegetables are the main dietary risk factors for the mortality.[18] NNMS found that average daily intake of salt by adolescents in India was 8

grams, which is quite high than the recommended quantity.[9] Unhealthy diet as one of the subcategories of behavioural risk factors is one of the important risk factors of NCDs and is accountable for many chronic diseases and associated mortality. A suboptimal diet has unfavourable effects on the physical as well as psychological aspects of the body. It can lead to significant morbidity and mortality associated with the diseases and also because of defected body recovery systems. Evidence suggests that people in India and other South Asian countries eat inadequate levels of most nutrients, specifically- fruits, vegetables, fibre, whole grains, nuts and seeds, calcium, milk, omega 3 fatty acids (found in fish) and polyunsaturated fatty acids (found in safflower oil, soyabean oil etc). Also, levels of trans fats (found in hydrogenated vegetable oil) and sodium are very high in daily diet.[18] As per the recent findings of the NNMS, most (men 98% and women 98.8%) of adults have an inadequate consumption of fruits and vegetables in India. The recommended number of minimum servings of fruits and/or vegetables per day is five, the survey revealed that the mean serving of fruits and/or vegetables was 1.7. About 48.3% adolescents had skipped eating breakfast on at least one day in past one month.[9] In India, food habits are quite discriminatory towards women. Most women in India consume suboptimal nutrients in their diet. In addition to that due to recent market trends towards publicising junk foods, more and more young women are eating unhealthy food. NFHS-4 survey (2015-16) revealed that more than half (>54%) of women do not eat fruits even once a week. A very little number of women consume non vegetarian foods (egg, chicken, meat or fish) on daily basis. On the other hand, about 10% women consume fried foods daily and 36% eat it almost every week.[19]

Blood pressure

Hypertension is considered to be the most important risk factor for cardiovascular morbidity and mortality. Apart from being significantly associated with either ischemic heart disease or heart failure, hypertension is also consistently related to the development of stroke and chronic kidney disease. About 57% of stroke related deaths are due to hypertension.[20] Global burden of diseases study (2015) reported that it is the most important cause of mortality as well as the disability-adjusted life years. The study revealed that high systolic BP was the main risk factor which was responsible for about 10.2 million deaths across the globe.[21] Evidence shows that Indians are more susceptible to hypertension and are affected at a younger age than the European and Western populations. Many studies have reported that hypertension is a leading cause of heart diseases and stroke in India.[22] The multicentric studies done in India reveal a high prevalence of hypertension in Indian urban populations, however it is increasing more rapidly in the Indian rural populations and there is an urban rural convergence in hypertension prevalence. Current studies have shown that hypertension is present in 25% of urban and 10% of rural subjects in India.[23] As per latest guidelines, blood pressure (BP) is categorized as normal, elevated, or stage 1 or 2 hypertension. Normal BP is defined as <120/<80 mm Hg (Systolic BP/diastolic BP); elevated BP is 120-129/<80 mm Hg; hypertension stage 1 is 130-139- or 80-89-mm Hg; and hypertension stage 2 is ≥140 or ≥90 mm Hg.[29] In a study done by Ramakrishnan et al done in 2019, it was reported that almost one in three Indian adults have hypertension, which means that out of about 762 million Indians (>18 years of age), 234 million adults have hypertension.[25] This study reported high prevalence (22.4%) of hypertension among young population (20 to 44 years), which is almost twice the prevalence in the same age group in Western countries.[26] In India, the data about important health issues is provided via NFHS, which is a large-scale, multi-round survey conducted in a representative sample of households throughout the country. The fourth NFHS-4; 2015-16, for the first time provided data on noncommunicable diseases such as obesity and hypertension, according to which prevalence of hypertension was found to be 11.3%.[19] However experts believed that due to the overrepresentation of women (87.2%) and a younger study population (15-49 years), NFHS-4 has reported lower prevalence as compared to other studies. The subsequent survey, NFHS-5 (2019-20) has recorded the hypertension related data based on three criteria: (1) Mildly elevated blood pressure (Systolic 140-159 mm of Hg and/or diastolic 90-99 mm of Hg) (%); (2) Moderately or severely elevated blood pressure (Systolic ≥160 mm of Hg and/or Diastolic ≥100 mm of Hg) (%); (3) Taking medicine to control blood pressure. The phase I of the survey, which covered 22 states/union territories, has been completed and fact sheets have been released. The survey revealed that the proportion of men suffering from hypertension was higher compared to the proportion of women across most of states. About 5% and 6% of women and men suffering from hypertension respectively were reported to have moderate or severe elevated blood pressure. The survey reported hypertension to be more prevalent in urban areas compared to that in rural areas.[10] NNMS reported that almost three out of ten adults in India had raised blood pressure. Among those with raised blood pressure (30-69 years), 29.2% reported being aware of their condition, 16.0% were currently on allopathic treatment and 12.3% had their blood pressure under control. Almost three out of ten adults (28.5%) had raised blood pressure especially urban areas. 17% respondents were in stage I hypertension and 7.9% were in stage II hypertension.[9]

Blood glucose

High fasting plasma glucose is one of the leading metabolic risk factors responsible for many NCDs, out of which the most important one is diabetes mellitus. High blood glucose and diabetes are the important causes of mortality and morbidity worldwide, through both direct clinical outcome and increased mortality from complications in the form of cardiovascular and kidney

diseases.[27] With the rise of other risk factors such as overweight and obesity, there is risk of global diabetes epidemic, leading to adverse effects on life expectancy and health-care costs.[28] Elevated blood glucose, is a common effect of uncontrolled diabetes and over a period of time it can lead to serious damage to many of the body's organs, especially the nerves and blood vessels. According to prediction by international diabetes federation, by 2040 there will be 642 million people with diabetes. People with diabetes mellitus II are increasing in every country, but more than 80% live in low- and middle-income countries. India being called diabetes capital of the world, with 69.2 million people with diabetes and another 36.5 million with prediabetes.[29] WHO defines diabetes as fasting plasma glucose ≥7 mmol/l (126 mg/dl) or 2-h plasma glucose ≥11.1 mmol/l (200 mg/dl). According to American diabetes association, diabetes is defined as a FBG >125 mg/dL or post prandial blood glucose (PBG) >200 mg/dL or glycosylated haemoglobin (HbA1c) of ≥6.5%. Pre-diabetes is defined as FBG of 100 mg/dL-125 mg/dL or PBG of 140 mg/dL-200 mg/dL or HbA1c of 5.7-6.4%.[30] The studies conducted by Indian council of medical research (ICMR) over the years, have revealed that the prevalence of diabetes and prediabetes is increasing in the country and there are inter-state variations too. A recently reported Indian council of medical research-India diabetes (ICMR-INDIAB) study conducted in 15 states of India, revealed the overall prevalence of diabetes to be 7.3% (95% CI 7-7.5). The inter-state variations in prevalence, ranging from 4·3% in Bihar (95% CI 3.7-5.0) to 10% ((95% CI 8.7-11.2) in Punjab were found. Also, the prevalence was higher in urban areas (11.2%, (95% CI 10.6-11.8) than in rural areas (5·2%, (95% CI 4.9-5.4; p<0.01). The study also revealed that the prevalence of prediabetes in the 15 states was 10.3% (10-10.6). The prevalence of prediabetes varied from 6% (5.1-6.8) in Mizoram to 14.7% (13.6-15.9) in Tripura, and it was also revealed that the prevalence of impaired fasting glucose was higher than the prevalence of impaired glucose tolerance.[31] A more recent NNMS found that In India, 9.3% adults (14.4% in urban areas and 6.9% in rural areas) had elevated blood glucose levels. Among those with high blood glucose levels (30-69 years), 47.6 % reported being aware of their condition, 38.5% were currently on treatment and 16.3% had their blood glucose levels under control. 9.3% had raised blood glucose-14.4% in urban areas and 6.9% in rural areas.[9]

Physical activity

Insufficient physical activity is one of the leading risk factors for various NCDs and premature mortality worldwide. The eruptive increase in the prevalence of type 2 diabetes and other NCD is due to the adoption of unhealthy lifestyle practices by individuals at risk. Insufficient physical activity is one of the most important modifiable risk factors for chronic non communicable diseases like diabetes and cardiovascular diseases. According to WHO, about 23% of adults and 81% of adolescents in the age group of 11-17 years, across the whole world do not meet the recommendations on physical activity for healthy life style. The prevalence of inactivity varies considerably within and between countries, and can be as high as 80% in some adult subpopulations. Physical inactivity is more common among wealthier countries and among women and elderly individuals. However, it has been found that as countries develop economically, levels of inactivity increase because of urbanization, use of technology and changing patterns of transportation. For interpreting physical activity, WHO recommends use of global physical activity questionnaire (GPAQ). According to GPAQ, individuals are classified as active if, throughout a week (including their activity during work, transport or leisure time), they were involved in any of these three activities: at least 150 minutes of moderate-intensity physical activity; or 75 minutes of vigorous-intensity physical activity; or an equivalent combination of moderate- and vigorous intensity physical activity achieving at least 600 Metabolic equivalents (MET) minutes.[33] Metabolic equivalents (MET) MET is the ratio of a person's working metabolic rate and the resting metabolic rate. One MET is defined as the energy cost of sitting quietly and is taken as equivalent to a caloric consumption of 1 kcal/kg/hour.[34] When a person's overall energy expenditure is calculated using GPAQ, 4 METs are assigned to the time spent in moderate activities, and 8 METs to the time spent in vigorous activities. The recently reported national level survey reported that in India, that 41.3% adults did not meet WHO recommendations on physical activity of 600 Metabolic equivalents (METS) per week; urban and rural (51.7% and 36.1%); men and women (30.9% and 52.4%). About 25.2% of adolescents were found to be insufficiently physically active. Only 10.5% of all adults were engaged in doing any form of voluntary physical activity during recreational time for urban areas 14.8% and rural areas 8.3%-men 17.2% and women 3.4%.[9]

Dyslipidemia

According to national cholesterol education programme (NCEP) guidelines, dyslipidemia is defined as one of the following/combination of these: Hypercholesterolemia-serum cholesterol levels≥200 mg/dl; hypertriglyceridemia-serum triglyceride levels ≥150 mg/dl; Low HDL cholesterol - HDL cholesterol levels <40 mg/dl for men and <50 mg/dl for women; High LDL cholesterol-LDL cholesterol levels ≥130 mg/dl; high total cholesterol to HDL-cholesterol ratio- ≥4.5.[35] Dyslipidemia is a very important risk factor for coronary artery disease and stroke. Many prospective epidemiologic studies have shown that persons with healthy lifestyles and favourable lipid profiles have reduced incidence of coronary heart disease. Literature shows that raised LDL cholesterol levels are associated with initiation and progression of coronary atherosclerosis. Hence the prevention and timely management of dyslipidaemia can regress and stabilize

atherosclerotic vascular disease and prevent cardiovascular morbidity and mortality.[36] In India there are very few studies about epidemiology of cholesterol and other lipoprotein lipids conducted with large representative samples. In a review done by Gupta et al, the prevalence of hypercholesterolemia in India was found to be varying from 10-15% in rural to 25-30% in urban areas. Studies have reported that Indians tend to have lower total cholesterol levels but higher triglyceride levels and lower HDL cholesterol as compared to western populations.[347] This finding is also supported by various migrant cross-sectional studies, which compared the prevalence of various lipid levels among Caucasians and migrant south Asians.[38] Studies done in India have demonstrated greater triglyceride levels in both rural and urban populations associated with low HDL cholesterol levels.[39] The research also shows that there is a significant association of state-level human development index (HDI) with prevalence of various dyslipidemias. More developed Indian states were found to have greater prevalence of cholesterol related dyslipidemias such as hypercholesterolemia and high LDL cholesterol while states with lower human development index had greater prevalence of hypertriglyceridemia.[40] ICMR-INDIAB study revealed that there is regional disparity in prevalence of hypercholesterolemia in India. Also, in most states, urban population has the highest prevalence of lipid abnormalities compared to rural residents. This study also found that the common risk factors significantly associated with dyslipidemia were obesity, diabetes and abnormal blood glucose levels.[41]

Tobacco

Tobacco use is responsible for a large burden of NCDs like lung cancer, chronic obstructive pulmonary disease and ischemic heart disease. In India, tobacco consumption is responsible for almost half of all the cancers in men and a quarter of all cancers in women.[42] It is also an important risk factor for chronic obstructive pulmonary diseases and cardiovascular diseases. India has high burden of oral cancer because of the high prevalence of tobacco chewing. The various forms of tobacco chewing include pan (betel leaf filled with lime, sliced areca nut and other spices chewed with or without tobacco), Gutkha or Paan masala (a chewable tobacco containing areca/ betel nut). The global adult tobacco survey (GATS) is considered the global standard for systematically monitoring adult tobacco (including smokeless tobacco) use and also tracking important tobacco control indicators. According to the latest, 2016 GATS report, there is an overall decline in the tobacco consumption from 34.6 to 28.6% in India from 2010. The report emphasized the reduction in tobacco use is the result of implementation of regulations under "the cigarettes and other tobacco products (prohibition of advertisement and regulation of trade and commerce, production, supply and distribution) act. The most obvious decline in tobacco use was found to be among the young users aged 15-24 years: decline from 9.6% (in 2010) to 4.4% (in 2016) among age group of 15-17 years; from 21.4% (in 2010) to 15.4% (in 2016) among 18-24 years old age group. Exposure to second hand smoke also reduced in public spaces from 29% to 23% and at home from 52% to 39%, however there was a small rise in exposure to smoke in work places from 29.9% to 30.2%. report also shows that about 20% of adults use some form of smokeless tobacco (khaini, jarda, pan masala) and 10% adults smoke tobacco in form of bidi or cigarette.[43] Apart from GATS survey, another nationwide survey on noncommunicable disease monitoring, revealed that one in every three adults and more than one-fourth proportion of men in India used any form of tobacco in past 12 months.[9]

Alcohol

The harmful use of alcohol can lead to various non communicable diseases like liver disorder, cancer, heart disease and behavioural disorders as well as injuries. Global status report on alcohol and health revealed that about 5.1% of the global burden of disease as measured in disability-adjusted life-years (DALYs) were attributed to harmful alcohol consumption.[44] Alcohol use has been found to be the seventh leading risk factor for global deaths and DALYs in 2016, responsible for 2·2% of age-standardised female deaths and 6·8% of age standardised male deaths. Alcohol use accounted for 2.3% of DALYs among females (15-49 years) and 8.9% of DALYS among males in the same age group. For older people (50 years and more), cancers accounted for a large part of total alcohol-attributable deaths, representing about 27% of total alcohol-attributable mortality among females and 18·9% of mortality among males.[45] In 2015, the estimated alcohol consumption in the world was estimated to be 6.3 litres pure alcohol per person (aged 15 years and above).[44] According to a systematic analysis for the global burden of disease study, the amount of alcohol consumed globally per year has risen by 70% since 1990. The total volume of alcohol intake has remained stable in developed countries; however, intake is growing in low- and middle-income countries. In India, the annual alcohol intake has increased by 38% between 2010 and 2017.[45]

NNMS, a cross-sectional survey undertaken by ICMR-NCDIR in 2017-18 revealed that about 12.6% adults (18-69 years) consumed alcohol in last 30 days, out of which 44.4% reported drinking more than or equal to 6 standard drinks (60 gm) in one drinking occasion. One standard drink was defined as amount of ethanol in a standard glass (with net pure alcohol content of 10 grams) of beer, wine, fortified wine such as sherry and spirits. The survey also reported that about 3.5% of adolescents (15-17 years) have consumed alcohol, with the mean age of 13 years at initiation.[9] As per estimates by systematic analysis for the global burden of disease study, by 2030, almost half of all adults will drink alcohol, and almost a quarter (23%) will binge drink at least once a month; also, the estimated alcohol consumption is estimated to increase to 7.6 litres pure alcohol per person in 2030.[45]

NATIONAL LEVEL PROGRAMME FOR PREVENTION AND CONTROL OF NCDS IN INDIA

With the objectives of risk reduction for prevention of NCDs (Diabetes, CVD and Stroke) in India, pilot phase of the national programme for prevention and control of diabetes, cardiovascular diseases and stroke (NPDCS) was launched on 4th Jan 2008. However, during 2010-11, keeping in view that there are common preventable risk factors for diabetes, CVD, stroke and cancer, government of India integrated the national cancer control programme (NCCP) with NPDCS and initiated a NPCDCS. The focus of NPCDCS is on promotion of healthy life styles, early diagnosis and management of diabetes, hypertension, cardiovascular diseases and common cancers.[46] India accounts for only 2.4% of the surface area and yet it supports and sustains about 17% of the world population.[47] Being a diverse country with overpopulation, the distribution and determinants of the diseases vary among the states and subsequently affects the control interventions designed at national level. Experts believe that health system reforms are required to establish new mechanisms to control the burden of NCDs and needs a push, as baseline estimates of risk factors level in populations across different states remains unknown for many states. NITI (National institution for transforming India) Aayog, a premier policy think tank of the government of India, which provides the directional and policy inputs, lamented upon the lack of availability of acceptable quality data to address the growing burden of NCDs and governance in a health index for its states.[48] Reducing the major risk factors for NCDs is the key focus of MOHFW to prevent deaths from NCDs. Tackling the risk factors will therefore not only save lives; it will also provide a huge boost for the economic development of the country.

CONCLUSION

India has performed various periodic surveys both at the national and subnational levels, which were directly or indirectly related to NCDs and their risk factors. Few examples of these surveys are the NFHS, global adult tobacco survey (GATS), national sample survey organization-NSSO etc. However, these were associated with a number of shortcomings, which were addressed in subsequent surveys, in order to improvise NCD control in India. The recent, national NCD monitoring survey (NNMS) was specifically designed to provide national level data for evaluating the NCD monitoring framework in India. It also provided standardised tools and methods for future NCD surveillance activities. The current situation of NCD risk factors in this review suggests that it's time to accelerate actions to halt the NCD epidemic in India. Surveillance of NCDs and their risk factors as an integral part of health system functioning is the need of the hour. In addition to that evidence-based interventions and appropriate use of technologies should be promoted at all levels of health care.

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