

# Research Priorities for Prevention and Control of Noncommunicable Diseases in India

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## ABSTRACT

India is undergoing a demographic and epidemiological transition which is influencing its health. Noncommunicable diseases (NCDs) are posing major health and development threats, while we are grappling with communicable diseases and maternal and child health-related issues. The major NCDs include cardiovascular diseases (including stroke), diabetes, cancer, chronic obstructive pulmonary diseases, mental health, and injuries. Tobacco, alcohol, diet, physical inactivity, high blood pressure, and obesity are the major risk factors common to many chronic diseases. Research on NCDs under the ICMR and through other institutions has resulted in the initiation of some national health programs such as National Cancer Control Program and District Mental Health Program. Important epidemiological descriptions have informed us on the causes and distribution of NCDs and their risk factors, including the non-health determinants (poverty, education, employment, etc) and health systems assessments, have shown the inadequacies in tackling NCDs. Several global efforts and publications have provided guidance in shaping the research agenda. The special UN NCD Summit held on 19-20 September 2011 brought the world leaders to deliberate on ways to address NCDs in a concerted manner through partnerships. In this paper the authors review the present status of NCDs and their risk factors in the country and propose a strategic research agenda to provide adequate thrust to accelerate research towards a useful outcome.

**Keywords:** India, noncommunicable diseases, research

## Introduction

Noncommunicable disease (NCD) refers to those conditions which are chronic, evolve slowly, and progress relentlessly. The World Health Organization (WHO) defines NCDs as including chronic disease (principally cardiovascular disease, diabetes, cancer, and asthma/chronic respiratory disease), injuries, and mental health. This does not include all chronic diseases, such as those of an infectious nature (HIV/AIDS). On the basis of this burden of disease threshold and the availability of cost-effective interventions, they can be grouped as

those that often occur together and that have similar health-system interventions.<sup>(1)</sup> Studies have identified four behavioral risk factors for the major NCDs which cause up to 80% of mortality-tobacco consumption, harmful use of alcohol, inappropriate diet, and physical inactivity. These cause physiological changes in the body manifested as high blood pressure, high blood glucose increased, raised body mass index, and waist circumference. It is known that these risk factors are determined by several determinants in the social, economic, business, cultural, etc which are embedded in the environment and are undergoing rapid transition. India is experiencing a rising burden of NCDs.<sup>(1)</sup> In terms of the number of lives lost due to ill-health, disability, and early death (DALYs), NCDs (inclusive of injuries) account for 62% of the total disease burden while 38% is from communicable diseases, maternal and child health, and nutrition all combined. The scope of NCDs is just beyond health—they inextricably drive the socioeconomic status and overall development of individuals, families, communities, nations, and the

Access this article online	
Quick Response Code:	Website: www.ijcm.org.in
	DOI: 10.4103/0970-0218.94713

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**Received:** 01-12-11, **Accepted:** 14-12-11

world. Achievement of feasible reductions in risk, such as a 2% reduction in NCD death rates per year, is estimated to increase economic growth by 1% per year after a decade.<sup>(2)</sup>

The WHO World Health Report (2012) “No Health without Research” underpins the crucial but under-recognized part of research to play in strengthening health systems, improving the equitable distribution of high quality health services, and advancing human development, as described in the Bamako Call for Action on Health Research, 2008.<sup>(3)</sup> Recognizing the importance of addressing NCDs in global and concerted manner, the United Nations held a special NCD Summit on 19-20 September 2011 in New York to urge the Heads of Governments to take steps to address it.

In this paper, the authors review the current scenario of NCDs in the country and provisions for its prevention and control in order to contextualize the research requirements.

## A Brief Overview of NCDs in India

According to Registrar General of India survey on Causes of Deaths in India (2003-2004), NCDs are the leading causes of death in the country, constituting 42% of all deaths.<sup>(4)</sup> Injuries and ill-defined causes constitute 10% of deaths each. However, a majority of ill-defined causes are at older ages (70 or higher years) and most of ill-defined deaths are likely to be from NCDs. The differential between the Empowered Action Group (EAG) States and the rest is that it is the other States which have a higher proportion (50%) of NCD-related deaths vis-à-vis the EAG states and Assam (33%). The mortality due to injuries is also more in proportion in other States.

In the ICMR study on assessment of burden of NCDs in India,<sup>(5)</sup> the prevalence rates of diabetes varied from 103 per thousand to 124 per thousand in these studies. The overall prevalence rate of diabetes in urban and rural areas combined was estimated as 62.47 per thousand. Projection estimates show that the number of people with diabetes in India is 40.9 million and is expected to rise to 69.9 million by 2025.<sup>(6)</sup> The rise in prevalence of type 2 diabetes was reported in 1980s, which accelerated after 1990s, showing rapid rises in the southern parts of the country.<sup>(7)</sup> Hypertension is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease deaths in India.<sup>(8)</sup> The meta-analysis of eight studies carried out in urban areas gives a pooled prevalence rate of 164.18 per thousand and in rural areas was 157.44 per thousand.<sup>(5)</sup> Pooling of epidemiological studies shows that hypertension is present in 25% urban and 10% rural subjects in India.<sup>(8)</sup> The prevalence of coronary heart disease is reported to be between 6.5% and 13.2% urban

India and 1.6% and 7.4% in rural India.<sup>(9)</sup> Starting from a level of about 380 lakh cases in the year 2005, there may be as many as 641 lakh cases of cardiovascular disease (CVD) in 2015. The rates of prevalence of CVD in rural populations will be lower than in urban populations, but will continue to increase, reaching roughly 13.5% of the rural population in the age group of 60-69 years by 2015. There are wide inter-state variations in CVD-related mortality.<sup>(10)</sup> It is estimated that globally India contributes to nearly 25-50% of newly diagnosed cases, deaths, hospitalisations, and burden of rheumatic heart disease (RHD). Studies done by ICMR across the country have shown a decline, the average reported prevalence of RHD (1972-75: 5.3%; 1984-87: 2.9% and 2002-2005: 0.9%).<sup>(11)</sup> The stroke prevalence is in between 136 and 842/100,000 population in urban areas and 143 and 165/100,000 population in rural areas.<sup>(9)</sup> Projection of National Commission on Macroeconomics and Health (NCMH) report, 2005, shows that asthma is expected to rise from 28.3 million in 2006 to 35.9 million by the year 2016.<sup>(10)</sup> The prevalence of chronic obstructive pulmonary disease among men in India ranges between 2.12% and 9.4% in north India and 1.4% and 4.08% in South India.<sup>(12)</sup> Cancers account for 14% of the overall NCD mortality and 7% of the NCD related DALYs in India.<sup>(13)</sup> In India, cancers account for about of 3.3% of the disease burden and about 9% of all deaths.<sup>(10)</sup> Mental health affects about 6.5% of the Indian population and is expected to increase due to stress on account of frequent disruptions in incomes, unemployment, lack of social support systems, etc.<sup>(10)</sup>

The Global Adult Tobacco Survey (GATS) 2010 report<sup>(14)</sup> revealed that 35% of adults use tobacco in some form or the other (smoking, chewing, application on teeth and gums, sniffing), 21% use only smokeless tobacco, 9% only smoke, and 5% smoke as well as use smokeless tobacco. Thus, the estimated number of tobacco users in India is 274.9 million, of which 163.7 million use only smokeless form, 68.9 million smoke, and 42.3 million use both smoking and smokeless tobacco. The country is experiencing the nutrition transition with an increase in intake of fats, sugars and salt and decreased intake of fruits, vegetables, and dietary fibers. The NCD risk factor study carried out by the Indian Council for Medical Research has shown that work-related sedentariness is high in urban (64.1%) and peri-urban areas (44.8%) as compared to rural areas (39.0%). The figures for leisure time physical inactivity were urban: 84.3%; peri-urban/slum: 87.9%; and rural: 86.0%.<sup>(15)</sup> Almost 30-65% of adult urban Indians are reported to be either overweight (BMI>=25) or obese (BMI>=30) or have central obesity.<sup>(16)</sup> Childhood obesity is a growing concern in the urban populations. Projection studies show that the prevalence of overweight is expected to rise from 12.9% (134.8 million) in 2005 to 27.8% (290.7 million) by the year 2030. Similarly, obesity figures will rise from 4.0% (42.2

million) in 2005 to 5.0% (52.1 million) by the year 2030.<sup>(17)</sup>

More than 20% of the population has at least one chronic disease and more than 10% have more than one. Chronic diseases are widespread in people who are younger than 45 years and in poorer populations. Whereas socioeconomic development tends to be associated with healthy behaviors, rapidly improving socioeconomic status in India is associated with a reduction of physical activity and increased rates of obesity and diabetes.

With losses due to premature deaths due to heart disease, stroke, and diabetes are projected to increase cumulatively, and India stands to lose 237 billion dollars during the decade 2005-2015.<sup>(2)</sup> India also loses a substantial number of lives during the productive years of its citizens. The potentially productive years of life lost (PPYLL) due to CVDs in the age group of 35-64 was 9.2 million in 2000 and is expected to rise to 17.9 million in 2030.<sup>(18)</sup> Considering the high cost of medicines and longer duration of treatment, NCDs constitute a greater financial burden to low income groups. Studies carried out in India have shown that the cost of treating NCDs such as diabetes has doubled from 1998 to 2005 particularly among urban households.<sup>(19)</sup> Low income groups spent a higher proportion of their income on diabetes care (urban poor 34% and rural poor 27%). The World Health Survey has shown that, in India, impoverishment in general is the highest among households in middle expenditure deciles (fifth and sixth), which could be due to treatment cost of NCDs.<sup>(20)</sup> In India, the treatment costs for an individual with diabetes are 15-25% of their household earnings. One in four Indian families in which a family member has heart disease or stroke has catastrophic expenditure, pushing 10% of these families into poverty. Where families have no access to affordable care, they forego care or risk financial ruin; the poor end up suffering the worst.<sup>(21)</sup>

The provision of health care by the public sector is a responsibility shared by state, central, and local governments. The health services delivery is streamlined through a structured set of institutions providing primary, secondary, and tertiary level care. There are several national level programs related to NCDs, and the flagship program being the National Program for Prevention and Control of Cancer, Cardiovascular diseases, Diabetes, and Stroke. Although the public health system is supposed to be frontrunner in providing health care, it is besieged by several impediments in its functioning. The increasing role of private sector in providing health care, especially in the NCDs cannot be ignored. A health information system is in place from the primary level to the central level is suboptimally functioning and utilized, thus making program monitoring, planning, and evaluation inefficient.

Several efforts to revive/reorient it are being made, but are still inadequate in addressing the enormity of the requirement. There is a huge shortage and differences in the availability of trained human resources for health, let alone NCDs.<sup>(22)</sup> They include doctors, paramedical workers, nurses, non-physician health workers. These resources for NCD prevention and control activities are ill-equipped, overworked, and maldistributed between rural and urban areas in different parts of the country. The NMCH estimates that streamlining and putting in place a system of centralized pooled procurement of drugs can save the public health system almost 30-40% of costs.<sup>(10)</sup> It also advocates across the board price control, strengthening the regulatory environment for weeding out poor quality drugs and encouraging indigenous Research and Development.

### Research Priorities for NCDs

It is evident from the above review that India has adequate amount of data to describe epidemiology of NCDs and their risk factors to a great extent, so as to be able to call for programmatic interventions. However, it is time to reflect upon and reposition ourselves to draw up a pragmatic research agenda which is guided by some key principles;

1. Assessment of needs of various stakeholders
2. Generate contextualized evidence for optimal utilization of research outcomes
3. Promote equity in order to facilitate delivery of health care
4. Be resource cognizant to obtain efficient, affordable and practical research outputs
5. Encourage partnerships among various stakeholders of research- academia, health systems, industry, planners, program managers, funding agencies and the community. It is important to involve the aforementioned categories of non-health sector in research activities so as to address the non-health determinants of NCDs and their risk factors.
6. Development of adequate and skilled human resources with equitable distribution across the health sector.

### Domains of Research Prioritization

There have been important research prioritization exercises at the global level which are relevant to our settings.<sup>(23-25)</sup> We now propose some important research domains and some key questions to be addressed, though these are not intended to be exhaustive and complete. The items listed in a domain may influence those in the others. The research priorities listed are overarching and generic so that they may be relevant to more than one NCD.

### Burden and epidemiology

1. Establishment of methods and tools for monitoring trends of NCD morbidity, mortality, and risk factors. There are a few well-developed tools and methods used globally for monitoring NCDs, and they should be validated in our settings and adapted accordingly. This will allow comparisons at global level and tracking changes to global variants.
2. Longitudinal assessments of social, cultural, and economic determinants of behavioral risk factors to characterize their relationship and impact.
3. Quantify personal risk related to phenotypes, genotypes, and multiplicative risks in order to assess present and future risks.
4. Establishment of alternative, low cost and feasible strategies for screening and early diagnosis of NCDs for their optimal use in health system settings.
5. Characterize nutrition transition, physical inactivity and its determinants in the local context and national diversity.
6. Investigate the biological basis of health risks related to poverty for strengthening our understanding of the relationship to burden of disease
7. Examine the influence of poverty on the adoption of high-risk behavior and determine its mechanism in order to provide epidemiological basis for planning interventions
8. Identify adverse impact of economic growth on health through disease burden assessments
9. Establish comprehensive and sustainable databases for NCDs and risk factors (including non-health determinants) for prioritization, planning, resource allocation, and research.

### Interventions for NCD prevention and control

1. Workout cost-effective and sustainable strategies for a comprehensive risk reduction at individual, family, and community level in diverse cultural and socioeconomic settings of the country
2. Develop/adapt interventions for managing specific NCDs and their risk factors (e.g. CVD, diabetes, tobacco) as available globally through operational research.
3. Promote and undertake studies for optimal utilization of AYUSH-based interventions on promotive and curative aspects of NCDs.
4. Establish and evaluate known strategies used in empowering communities for prevention and control of NCDs.
5. Assessment of different strategies, organizational models, interventions, technologies (e.g. IT) for risk reduction and early detection/treatment.
6. Studying behavior management strategies for modifying risky behaviors at individual, family, and community level.
7. Assess influence of economic interventions in risk

reduction of NCDs.

8. Community education and their empowerment through knowledge and providing infrastructure for utilization.

### Health care

1. Innovate/validate models for reorienting health systems in delivering affordable and equitable health care for all.
2. Establish mechanisms for providing structured knowledge for health promotion as part of health care package.
3. Integrated training of health workforce to deliver health care as a package, and not merely individualized items.
4. Identify culturally specific and nationally/sub-nationally appropriate resources for training and skill enhancement of health-care workers.
5. Develop mechanisms for ensuring that disadvantaged communities have adequate resource allocations in health care and in preventative practice.
6. Identify and validate modes of effective public-private partnerships.
7. Establish synergies for effective health care delivery systems that have been established for diseases such as HIV, TB, and MCH-related programs in order to maximize on resources and reach
8. Develop/adapt suitable options for financing equitable health care.
9. Develop mechanisms for equitable use of essential medicines and in health service delivery (accessibility and affordability).
10. Invest in research for affordable diagnostics, drugs (including combined drugs), vaccines, and technologies and evaluate them for suitability of use.

### Multi-sectoral partnerships

1. Undertake self assessment of the problems, provisions for addressing them within the health sector and other sectors so as to establish area of concern
2. Define the role and process of engagement of other sectors with the health sector for a meaningful outcome.
3. Establish a framework to foster common understanding between sectors
4. Evolve mechanisms for engaging Government departments in partnerships for prevention of NCDs;
5. Including those required within the Health sector also
6. Research activities for health that bridge Government departments (e.g., transport, civic planning, health, education, environment)
7. Build strategies for improving awareness and advocacy of NCDs amongst various stakeholders
8. Identify strategies for engaging businesses for health

- Help in creating public forums that sustainably raise awareness of issues relating to NCDs

### NCD surveillance systems

- Establish a unifying framework for setting up NCD surveillance system through
  - indicators, process of collection of data,
  - data analysis and reporting process,
  - process of sharing and utilization of data,
- Develop tools for collection of standardized and complete information from multiple sources within health and outside sectors (e.g. routine reporting, population surveys on diseases/ behaviors, rapid assessment approaches – DLHS/ health facility, disease registries, non-health sector data, policy and program indicators, etc)
- Build capacity and mechanisms for optimal utilization of collected data through timely dissemination of information, linking to policy, planning, and program implementation and providing research impetus.

### Policy and program-related research

- Develop, assess, and use practical tools for monitoring and evaluation of NCD policies and programs.
- Improve the use of scientific evidence in the process of developing and implementing policies and programs for prevention and control of NCDs.
- Monitor capacity development for NCD prevention and control processes.
- Evaluate the health impacts of policy interventions, e.g. agriculture, transport, education, fiscal.
- Quantify impact of NCDs on domestic economies and development.
- Ascertain motivations behind domestic expenditures and how these affect lifestyle choices.
- Investigate the influence of legislation, regulation, and taxation.

There are some cross cutting issues relevant to various research domains mentioned above. They also need to be addressed along with specific research questions.

- Develop methods and capacity for scaling up research for a wider representation and validation.
- Promote translation of research outcomes for public health use.
- Establish tools for community participation in research planning, implementation, and dissemination.
- Developing standards and guidelines of health care towards achieving universal health care.
- Strengthening capacity for developing, implementing, and utilizing epidemiological tools for collection of data, analyses, information generation, planning interventions, and evaluation.

- Promoting use of qualitative research methodology for generating hypothesis, scoping studies, capturing non-physical determinants, and evaluation of interventions.

### Conclusion

There has been considerable progress in research related to noncommunicable diseases in the country. As we take its stock, it is apparent that a strategic direction and thrust is required to maximize research outputs to address the growing burden of chronic noncommunicable diseases. While strengthening efforts to provide universal health care for all citizens, it requires simultaneous galvanizing of monitoring, surveillance, and partnerships efforts.

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**How to cite this article:** Mathur P, Shah B. Research Priorities for Prevention and Control of Noncommunicable Diseases in India. *Indian J Community Med* 2011;36:72-7.

**Source of Support:** Nil, **Conflict of Interest:** None declared.

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