Working Paper 321

Prevention of Chronic Diseases: Reorienting Primary Health Systems in India

Ali Mehdi
Divya Chaudhry
Priyanka Tomar
Pallavi Joshi

May 2016

INDIAN COUNCIL FOR RESEARCH ON INTERNATIONAL ECONOMIC RELATIONS

Table of contents

Abstract

Individuals should be entitled to a 'fair innings', and the primary role of health systems should be the prevention of premature mortality. In India, 66 percent of all deaths are premature. The burden of premature mortality has shifted from child (0-5 years) to adult (30-69 years) level over the years – there are three times more deaths happening at the latter vis-à-vis the former level. Nevertheless, primary health systems continue to focus almost exclusively on child mortality. They need to make a health system transition and get engaged in the prevention of risk factors, morbidity and mortality related to chronic diseases – the biggest determinant of adult mortality – together with their original focus on child mortality. This paper analyzes some of the major challenges in terms of governance, manpower and financing that such a transition will be faced with, and offers a number of actionable policy recommendations. It does so based on desk and field research in four Indian states – Uttar Pradesh, Rajasthan, Kerala and Tamil Nadu (two health-backward and two health-advanced) – and four countries – Japan, Canada, United States and Sri Lanka (with varying probability of premature mortality due to non-communicable diseases) – involving semi-structured interviews with close to 200 stakeholders from policy, industry, international organizations, civil society and the academia. A reorientation of national and state health policies, systems and resources (financial, human and infrastructural) is urgently required to begin addressing the massive burden of premature mortality due to chronic diseases in India – the highest in the world – and prevent human and economic costs associated with them. State governments will have to embrace their legal responsibility of being the primary agents for the survival and health of their population. Their role is also the most critical because prevention of chronic diseases requires a sustained, long-term engagement, which neither the Centre nor international organizations could commit to. There will, however, be macro roles – visionary, regulatory, financial, technical, etc. – that the Centre will have to play towards this end.

JEL classification: I13, I15, I18, J11.

Keywords: premature adult mortality, chronic diseases, prevention, primary health systems.

Acknowledgements

This paper is part of ICRIER's *Research Program on Tackling Chronic Diseases in India*, Health Policy Initiative. It reflects the views of its authors and not that of the institution. Dr Ali Mehdi (amehdi@icrier.res.in) is Fellow and Project Leader, Health Policy Initiative; Ms Divya Chaudhry, Ms Priyanka Tomar are Research Assistants and Ms Pallavi Joshi Research Associate, ICRIER. The authors would like to thank those who helped in conducting national field research, especially Dr William Joe (Assistant Professor, Institute of Economic Growth (IEG), New Delhi), Mr Rahul Mongia (Research Associate, ICRIER), Dr Irudaya Rajan and Dr Udaya Mishra (Professors, Centre for Development Studies, Trivandrum). Rahul also helped with data and biomedical concepts.

Special thanks are due to highly distinguished reviewers of this paper – Dr Michael M Engelgau (Deputy Director at Center for Translation Research and Implementation Science, National Heart, Lung, and Blood Institute, National Institutes of Health, US), Dr Patricio V Marquez (Lead Health Specialist, Health, Nutrition and Population Global Practice, The World Bank, Washington DC) and Dr Sanjay K Mohanty (Professor, International Institute for Population Sciences, Mumbai) – each of whom offered highly valuable comments and suggestions.

Abbreviations

AYUSH	Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy (GOI)
BMI	Body mass index
CDC	Centers for Disease Control and Prevention
CHD	Coronary heart diseases
CVDs	Cardiovascular diseases
DALYs	Disability-adjusted life years
GOI	Government of India
ICMR	Indian Council for Medical Research
IDF	International Diabetes Federation
IGME	Inter-agency Group for Child Mortality Estimation
IHME	Institute for Health Metrics and Evaluation (University of Washington)
IIPS	International Institute for Population Sciences
IMR	Infant mortality rate
LMICs	Low and middle income countries
MDGs	Millennium Development Goals (UN)
MOHFW	Ministry of Health and Family Welfare (GOI)
NACO	National AIDS Control Organization (GOI)
NCDs	Non-communicable diseases
NCMH	National Commission for Macroeconomics and Health
NIMS	National Institute of Medical Statistics
NSS	National Sample Survey (GOI)
OECD	Organisation for Economic Co-operation and Development
OOP	Out-of-pocket (health expenditure)
RCH	Reproductive and child health
SAGE	Study on Global AGEing and Adult Health (WHO)
SDGs	Sustainable Development Goals (UN)
SRS	Sample Registration System (GOI)
TFR	Total fertility rate
UN	United Nations
YLDs	Years lived with disability
WHO	World Health Organization
WPP	World Population Prospects (United Nations Population Division)

There can be little doubt that living long is a much shared aspiration. Even though it is clearly not the only thing we seek, a long life is inter alia fairly universally valued – and valued very strongly. ... big changes in mortality that are continuing to occur across the world does not involve extending lives to unimaginable lengths, but relate to the saving of premature mortality – of infants, children, and young or middle-aged adults.

'Mortality as an indicator of economic success and failure'
(Nobel Laureate Amartya Sen, 1998)

1. Introduction

People should be entitled to a 'fair innings', to use Alan Williams's phrase (1997), if not essentially his approach.[1] Premature mortality,[2] from this perspective, is the first and foremost challenge facing health systems.[3] Of 280 million people who died during 2010-2015, 154 million or 55 percent died prematurely, with 31 million or 20 percent of them – the highest in the world – in India alone. While the total number of deaths in China was slightly higher than India, only 41 percent of deaths in China were premature compared to 66 percent in India.[4] If we look at the age-wise distribution of premature mortality, we observe that as countries undergo health transition, the primary burden of premature mortality shifts from child to adult age groups (as illustrated in figure 1) (WPP 2015).

Being the first points of contact, primary health systems in particular have a central role to play in reducing premature mortality. During initial stages of the health transition, primary health systems in developing countries like India – as well as health policies and resources generally – prioritize reductions in the burden of under5 mortality (henceforth 'child mortality'). On this front, India has been relatively, even if not optimally, successful during the last four decades – child mortality, as a share of total mortality, declined from 48 to 15 percent – the pace of decline accelerating since liberalization, particularly with the coming of MDGs.[5] However, as a result of this transition, the primary burden of premature mortality is now concentrated at 30-69 year level (henceforth 'adult mortality').[6] During 2010-2015, while 22 percent of premature deaths were at the child level, 65 percent of premature or 43 percent of total deaths in India occurred at the adult level (WPP 2015).

---

[1] Apart from health outcomes, we also have to consider procedural fairness – i.e. fairness in distribution of health care – in priority-setting and the allocation of health resources.

[2] WHO and OECD have taken 70 years as the cut-off age to define 'premature mortality', while it is 75 years for CDC. Given that India's life expectancy at birth in 2013 was 67 years (WPP 2015), we have taken 70 years as the cut-off. As India develops and average life expectancy increases, this cut-off should also be revised upwardly. The differentials in development status is one reason why this cut-off should not be universally defined, something which SDG 3 should have taken note of in calling for a one-third reduction of mortality due to NCDs between the ages 30 and 70.

[3] Health is also determined, at times more fundamentally, by several factors outside the health system. If, as Aristotle argued, 'human flourishing' (*eudaimonia*) should be the ultimate aim of all political activity, then improvement in the span and quality of human life would be the ultimate, if not immediate central, goal of not just health, but all systems. Nowhere is this more clear and critical than in the case of chronic diseases where multisectoral action plans have been drawn up by various agencies and governments, including India (see table 8). However, in this paper, we are focused on the specific role of primary health systems in addressing chronic disease-related adult premature mortality.

[4] Internationally, premature mortality ranged from 19 percent in Italy to 91 percent in Angola during 2010-15.

[5] MDG4 called for a reduction in child mortality by two-thirds until 2015, with 1990 as the base year.

[6] Adult mortality is standardly defined as deaths between ages 15 and 60 years, but we use it to refer to deaths between ages 30 and 69 years for the purpose of this paper. Secondly, we have used proportion of deaths by age groups rather than age-specific mortality rates because the former is sensitive to the consideration of proportional prematurity, while

This paper argues that primary health systems in developing countries like India – and with them, health policies as well as the provision of financial, infrastructural and human resources for health – need to make a 'health system transition' and prioritize reductions in premature mortality at the adult level, while continuing to focus on child mortality until it goes down below one percent, as is currently the case in more developed regions of the world (WPP 2015).[7] We have tried to analyze and address some of the major challenges that such a health system transition will be faced with, specifically with reference to governance, manpower and financing. In doing so, we have drawn extensively on the experiences of 4 states in India (Uttar Pradesh, Rajasthan, Kerala, Tamil Nadu) and that of 4 countries (Japan, Canada, United States, Sri Lanka)[8] with the purpose of identifying challenges and good practices and eventually drawing actionable policy lessons for Indian context. Since primary health systems in India have been preoccupied with RCH for several decades now, the remainder of this introduction as well as chapter 2 try to put forward a robust epidemiological and economic justification for focusing on premature adult mortality. Chapter 3 analyzes the nature of prevention required at the level of primary health systems, while chapters 4 to 6 highlight some of the fundamental challenges and propose policy recommendations related to governance, manpower and financing. Finally, we summarize major findings and policy lessons.

Why focus on child mortality?

In countries like India, where child mortality continues to be substantial – India has been world's largest contributor to under5 deaths since 1953 (the year since we have data on it: IGME) – health system transition does not imply a shift away from, or a dilution of, the traditional focus on child mortality. From an ethical perspective too, there should be a prioritization of mortality by level of prematurity – the more premature the mortality, the less tolerable it ought to be. From an efficiency perspective, one could put forth at least three reasons. Firstly, child mortality is linked with levels of fertility and total population, which are huge causes of concern for policymakers in developing countries like India.[a] Secondly, since child mortality vis-à-vis higher levels of premature mortality is *relatively* easier to address – given that causes of death at this level are predominantly acute than chronic (figure 7), which are complex and costly to deal with – reductions in child mortality could contribute to reductions in overall premature mortality much more promptly and with much fewer

the latter seems indifferent to distributional issues and has the potential to undermine the significance of prematurity or its distribution by linking the number of deaths to population sizes of age groups. From a public policy perspective, the former clearly indicates the age groups that should be targeted, while the latter may not necessarily be helpful.

[7] Absolute prevention of mortality at this, or for that matter at any, level is not possible since certain causes of death will always remain beyond our control. The aim should be to prevent all that our capabilities allow us to prevent, and this would vary by country, community and individual.

[8] We selected countries and states at different points in the spectrum of premature mortality (figure 3) so as to review challenges and initiatives in a diverse set of contexts.

resources. For instance, even in high-income countries, while under5 mortality declined from 17.8 to 1.0 percent, as percentage of total deaths, between 1950-55 and 2010-15, mortality in the 40-64 year age group, for instance, went down from 24.8 to 19.2 percent during the same period (WPP 2015). Thirdly, child mortality signifies wastage of early human capital,[b] and does not bode well for future prospects of economic growth if prevalent at a substantial level, as in the case of India.

Why focus on adult mortality?

Not just at the under5 level, India is also world's largest contributor to all other levels of premature mortality.[9] The question is: why should the more premature levels of mortality – 5-14 and 15-29 – not be prioritized over adult mortality, if prematurity is the criterion for prioritization? Before we put forth certain reasons, it needs to be clarified that prioritization does not mean ignoring or denial of health care services to non-priority groups, just that they will arguably come lower down in the order of priority when it comes to the allocation of (limited) resources,[c] and that the approach of health systems towards them would be opportunistic rather than necessarily proactive.[10]

1. Considerations of equity and efficiency have to be balanced while according priority. Mortality at all premature levels, with the sole exception of adult level, has declined over time. Secondly, mortality at the adult level is almost equal to mortality at all other premature levels (0-29 years) taken together, and therefore cannot be ignored in favor of a lower level of premature mortality simply because the latter has priority from an equity perspective. Within the range of premature mortality, prioritization should be based on the respective burden of mortality as well as overall trends, *not just* on the level of prematurity. Thirdly, if causes of mortality at the child and adult levels are proactively addressed, along with a focus on these two age groups, mortality at other premature levels as well as at 70+ level will also be addressed as their causes overlap with the former or latter level of premature mortality (figure 9). The argument for focus on a particular age group is not an argument for an exclusive focus on that age group itself, but on the causes of mortality and morbidity at that level, obviously with a special focus on priority age groups.
2. As far as the 70+ year level is concerned, adult mortality will have priority both from an equity as well as efficiency perspectives. Priority from an equity perspective is obvious (prematurity). Priority from an efficiency perspective can be established on several counts.
    a. The criticality of working-age population compared to dependent population for economic growth at the national, provincial or household level cannot be overemphasized. This holds

[9] In 2013, total number of deaths (10.2 million), as well as at the 0-4 (1.2 m), 5-14 (0.2 m), 15-49 (2.1 m) and 50-69 (3.2 m) year levels were the highest, and second highest (after China) at the 70+ year level (3.5 m) (IHME).

[10] *Proactive* approach here means reaching out to the target population (population- / community-based approach); on the other hand, an *opportunistic* approach means attending to those who visit health facilities (individual approach).

particularly relevant for developing countries like India with substantial household poverty and fewer resources at the disposal of governments to support dependent populations, as a result of which the welfare of dependents is usually tied to the economic status of gainfully employed in the family. Their improved chances of survival, health and productivity would not only enhance their own capabilities and that of their dependents, but also make them contributors rather than mere beneficiaries of wider growth and development, help reduce burden on public welfare and accelerate the process of poverty alleviation. States that perform poorly on health also have higher levels of poverty vis-à-vis better-performing states in our selection (figure 2). If reduction in the burden of adult mortality (which comprises a huge section of the working-age population) is taken as a strategy for poverty alleviation, states in the early stages of health transition – Uttar Pradesh and Rajasthan – would have to focus on reducing mortality at the adult level *simultaneous* with their efforts to reduce the burden of child mortality, which is also quite high in these states (figure 3). They would have to address what we might refer to as the 'double burden of premature mortality'.

b. Those who remain poor until the 30-69 year level will not only be able to spend less on the welfare of the dependents, but also leave the next generation in an impoverished state, with lower human capital and prospects of employability, with serious implications for not just present, but future prospects of economic growth at the national, state and household levels.

c. There is another level of intergenerational transfer of risk involved. Given the potential of intergenerational communicability of at least certain types of chronic diseases, premature mortality due to chronic diseases in adults today means that their children would potentially be at risk of contracting them sooner rather than later. Mortality due to acute diseases, or a chronic disease in 70+ age group, might not necessarily have such implications. However, this should be explored further from a biomedical perspective.

d. Focusing on the 30-69 age group will not only reduce chronic disease-related mortality and morbidity at that level, but also improve life expectancy at age 70 in the future if risk factors are adequately addressed at the 30-69 and earlier levels. The healthier the population at the 70+ year level, the more proactive and productive it can be, and accordingly less dependent on the family, community and the state.

e. At the 70+ year level, even prevention is expensive, given that it would largely be of tertiary nature, involving higher and regular levels of health screening, treatment and care. To what degree should this be *prioritized* in a country where premature mortality is 66 percent, and affects 97 percent of the national population (figure 4) is debatable. Even in states like Kerala and Tamil Nadu, which are at advanced levels of the health transition vis-à-vis most other parts of the country, the burden of premature mortality is 44 and 60 percent respectively, while the 70+ population is 6 and 4 percent respectively.

Given its manifold implications, adult mortality should be a matter of serious concern not just for MOHFW, but also the Ministry of Finance (given the huge costs of adult mortality and morbidity for national, state and household economies), the Ministry of Labour and Employment (which is the nodal ministry to safeguard the interest of the working-age population), the Ministry of Skill Development and Entrepreneurship (given the loss of skilled and trained human capital, which is already in short supply), the Ministry of Corporate Affairs (given the effect of related risk factors on employee productivity and company profitability – see Chadha, Mehdi and Malik 2007, for instance) as well as the Ministries of Housing and Urban Poverty Alleviation, Rural Development and Social Justice and Empowerment (due to impoverishing impact on particularly disadvantaged households – we shall discuss variations in exposure to risk factors by background characteristics in the next chapter; see table 4). As far as multisectoral action on addressing the burden of adult mortality and related risk factors is concerned, one could include several more ministries in this list (see table 8).

Premature mortality in selected countries and states

Child mortality is miniscule in health-advanced countries and states, while it continues to be substantial in Uttar Pradesh and Rajasthan (22 percent each) – states that are still in the intermediate stages of the health transition. However, it is interesting to note that their burden of adult mortality is higher than that of child mortality – 41 and 36 percent respectively – and comparable with that of health-advanced states like Kerala and Tamil Nadu as well as Sri Lanka – 38, 49 and 44 percent respectively.[11] The percent of their populations in the 30-69 year age group vis-à-vis the 0-4 year age group – the respective at-risk populations – is also much higher (figure 4). Primary health systems in even Uttar Pradesh and Rajasthan cannot afford to almost-exclusively focus on mortality in nearly 10 percent of their populations (under5 level), while ignoring it among nearly one-third of their population, where the level of mortality is the highest of all age groups. If we look at the adult at-risk population (30-69 years) in terms of numbers (figure 5), though the percentage of population in this category is higher in health-advanced countries and states (almost half of total population), the size of Uttar Pradesh's adult at-risk population is close to Japan's and that of Rajasthan's more than Canada's. No wonder, then, that India's total at-risk adult population (535 million) is more than double that of other four countries combined (260 million). This clearly implies that even countries and states at intermediate levels of the health transition cannot afford to ignore adult mortality, and there are lessons that they could learn from countries and states which are at a higher level of the transition.

[11] It is interesting to note that in terms of premature adult mortality (figure 3), Kerala seems to be doing better than Sri Lanka, long considered as having the best health indicators and system in South Asia. However, both have a long way to go when we shift the focal variable for the assessment of health systems from premature child to adult mortality.

Primary health systems in India need to make a health system transition following the demographic transition and reorder their priorities. At the same time, we should reconsider the core indicators for resource allocations in the health sector as well as for the evaluation of its efficiency and equity. Child mortality has been widely used as a summary indicator of overall health status in countries where most deaths occur among children. In places where premature mortality is now concentrated at the adult levels, and child mortality also continues to be high, one could argue that both be taken as core indicators to evaluate the performance of health systems, especially that of primary health systems, which have played the most prominent role in addressing child mortality until now. This sort of shift appears to have taken place in international policymaking and agenda-setting. During the MDG period (1990-2015), the focus in the context of health was on child mortality (goal 4). In the SDG period (2016-2030), while that focus has continued (goal 3.2), there has been a general broadening of health focus to 'ensure healthy lives and promote well-being for all at all ages' (goal 3), with an additional focus on premature mortality between ages 30 and 70.

Policymakers in developing countries like India should realign their priorities and ensure this transition at the earliest as reduction in adult mortality is much more complex and costly, and its economic implications much more profound. Policymakers have already signed the SDG agenda, now is the time to act upon it. India has assumed a leadership role on this issue and is the first country to develop specific national targets and indicators to reduce premature deaths due to NCDs by 25 percent by 2025 (WHO 2015). However, so far, its focus has been on tertiary health systems, which is fine, but, given weak chronic disease surveillance and detection rates, that cannot be our prime strategy to prevent adult mortality among those who will enter adulthood in the next few decades – or, for that matter, even among those adults who do not know what they are afflicted with. Public tertiary health systems are already overburdened, and do not have the capacity to detect or patiently follow-up or coordinate care. Primary health systems in most parts of India aren't doing any better either – their inefficiency is one of the major reasons why tertiary facilities are overburdened – but they do have the potential to deliver. The political will to make them deliver is what is needed.

2. The burden of chronic diseases

As nations develop, and as individuals and populations age, chronic diseases[12] become the leading cause of death (figures 6 and 7). That is not of primary concern – people have to die ultimately, no matter what the cause. What is of foremost concern is premature mortality and its causes. Chronic diseases become a cause of primary and foremost concern from that perspective – as nations develop, chronic diseases become a major, if not the leading, cause of death even at the under5 level (figure 8).[13] Sixteen million people died prematurely due to NCDs in 2012 – 82 percent in LMICs, with 21 percent or 3.4 million in India alone, the highest in any country. While total mortality due to NCDs was much higher in China – 8.6 vis-à-vis India's 5.9 million – only 36 percent was premature compared to 58 percent in India[14] (WHO 2014). It is only a matter of decade or so when the burden of chronic diseases in India is going to overwhelm health systems – as per medium variant estimates of United Nations Population Division, 89 percent of total mortality will be concentrated at the 30+ year level in India by 2025-2030 (WPP 2015) – more than three-fourths of mortality at that level, even at India's current stage of development, is due to chronic diseases (figure 9). Even if development is slow, the proportion of chronic disease-related mortality in younger age groups will still increase, albeit slowly. Development will, for sure, be slow if health systems in India do not prepare themselves for the present – and the greater imminent – challenge of chronic diseases.

Let us discuss in some detail the present burden of chronic diseases in India. Table 1 tells us how the number of deaths due to chronic diseases in general as well as due to top 8 chronic diseases in the Indian context has shifted since 1990, and with them India's global rank on each of them. Even if we ignore the future trajectory, the present burden of chronic diseases in India is truly staggering. Only the communicable among the top 8 chronic diseases – tuberculosis and HIV/AIDS – recorded a downward trend, though Indian continues to have highest number of tuberculosis-related deaths. The burden of chronic disease-related mortality overall as well as that of major non-communicable chronic diseases has risen over time, making India the first or second largest contributor globally. Figure 10 shows that the share of deaths due to communicable, maternal, neonatal and nutritional causes declined from 50 to 28 percent between 1990 and 2013, while the share of NCD mortality increased from 41 to 60 percent, raising India's share of global NCD mortality from 14.5 to 16.2

[12] 'Chronic' in this paper includes all non-communicable diseases (NCDs) plus HIV/AIDS and tuberculosis from the communicable, maternal, perinatal and nutritional category (CDs). 'Acute' means all CDs minus the latter two. CDs, NCDs and injuries are as per WHO classification (International Classification of Diseases (ICD)-10).

[13] However, cause of death at the 70+ year level does not vary so sharply by development status – 92 percent of deaths in the developed and 87 percent in the developing world at that level were due to chronic diseases (IHME 2013).

[14] In 2013, 59 percent of premature deaths in India were due to chronic diseases, while 27 and 15 percent were due to acute diseases and injuries respectively (IHME).

percent. Figure 11 shows how the burden of these 8 chronic diseases evolved in percentage terms. These 8 also appear among the top 10 killers in our focus adult age-group (figure 12), and together accounted for 74 percent of total mortality at this level in 2013 – 12 percentage points higher than their overall mortality burden, hence the need to take them even more seriously. A number of them have a more serious bearing on the quality rather than the quantity of life – for e.g. diabetes, chronic respiratory and digestive diseases among NCDs and tuberculosis among CDs – and cause mortality due to other causes, usually CVDs, which explains its extraordinarily higher burden of mortality.[15]

Figure 13 shows that the burden of disability caused by chronic diseases, particularly in higher age groups, is much more enormous than their burden of mortality. Mental health emerges as the biggest concern here, with musculoskeletal and neurological disorders, diabetes and CRDs having a much bigger impact than CVD or cancer. Figure 14 shows that the numerical burden of YLDs due to chronic diseases in India increased dramatically from 63 million in 1990 to 103 million in 2013 – diabetes (6.2 to 9.8 million during this period), CRDs (4.9 to 8.3), CVDs (1.3 to 2.9), digestive diseases (1.3 to 1.6), HIV/AIDS and TB (0.9 to 1), cancer (0.3 to 0.5) and cirrhosis (0.08 to 0.1). We are only behind China overall as well as vis-à-vis individual chronic diseases mentioned above, with the exception of CRDs and HIV/AIDS and TB, as far as YLD numbers in 2013 are concerned. However, if we look at the number of DALYs[16] due to chronic diseases, we are again at the top – 280 million in India, followed closely by China at 273 million – with 18 percent of the global total.

Three points before we move on to outline the economic impact of chronic diseases.

One, SDGs in particular, and international discussions in general, have focused on 4 major NCDs – CVDs, cancer, CRDs and diabetes – in the context of chronic diseases and reduction of premature mortality between ages 30 and 70. While these are top NCD killers at the global level, their contribution varies by country, and therefore focus on specific chronic diseases should be locally defined. For India overall, as well as for the specific adult age-group, 8 major chronic diseases have been shortlisted, and in the rest of the paper, we will largely focus on them.

Two, though health systems should be concerned with both the span and quality of human life, the former should have precedence from the perspective of the burden of premature mortality – more years were lost due to deaths (170 million) than disability (103 million) caused by chronic diseases in India in 2013. This is why we have taken the former rather than the latter set of priority diseases.

---

[15] In developed countries, with better quality of life and chronic disease management, it is usually cancer rather than CVDs which is the biggest killer.

[16] DALYs combine the burden of both premature mortality and disability. DALYs are calculated as the sum of Years of Life Lost (YLL) due to premature mortality in the population and YLDs for people living with the health condition or its consequences. One DALY can be thought of as one lost year of 'healthy' life. The sum of DALYs across the population, or the burden of disease, can be thought of as a measurement of the gap between current health status and an ideal health situation where the entire population lives to an advanced age, free of disease and disability (WHO).

Nevertheless, at the second level, our priorities should be developed based on disability burden of selected 8 chronic diseases since, as mentioned earlier, the mortality burden of CVDs, for instance, also derives from diseases like diabetes and CRDs (which have the highest burden of disability). Not only do they lead to CVDs, they also reduce the quality of life, hence a greater focus on them is justifiable. Even globally, the DALY / YLD / YLL burden of CRDs is the highest in India.

Three, figure 9 tells us that, in the Indian context, at least for now, acute diseases are predominant cause of child mortality and chronic diseases for the 30+ age group. Proportion of child mortality can, very broadly, be considered as a proxy indicator for prevalence of acute diseases in states for which data on causes of death is not available or reliable (for instance, Uttar Pradesh). Similarly, to get an idea of the overall burden of mortality due to chronic diseases, we could look at proportion of deaths at 30+ year level. However, these would only be broad estimates, relatively more reliable in cases where respective share of child or 30+ level mortality is quite substantial. Uttar Pradesh, for example, has a substantial burden of both child and 30+ mortality – a double burden of diseases is plausible, and the state should focus on both simultaneously.

Prevalence of chronic disease morbidity

To some degree by their very nature, and to some due to low health awareness and weak surveillance systems, chronic diseases tend to remain asymptomatic in developing countries like India. Consequently, not only does the data on chronic disease-related morbidity suffer from several limitations, progression rates from risk factors to morbidity, and from morbidity to mortality, are high – hence high burden of chronic disease-related mortality. In such contexts, data on causes of death, despite its own set of limitations,[17] could be used, together with age-specific mortality patterns, is a better bet to estimate the prevalence of chronic diseases. In developed countries, with advanced surveillance, prevention and treatment regimens, morbidity data is not only more reliable, but also more valuable since progression rates from risk factors to morbidity, and then to mortality, are also lower, and mortality data would therefore not afford us an accurate picture on their prevalence.

Nevertheless, let us quickly discuss the most representative and reliable data available on chronic disease morbidity for India. Table 2 tells us that prevalence of diabetes and CVDs are the highest. From table 1, we know that, even in terms of mortality, India has been the world's diabetes capital. Two things need to be taken into consideration here. One, diabetes is easiest to detect among major chronic diseases,[18] and this could be one of the explanatory factors for the (known) high prevalence

[17] In India, only 67 percent of deaths were registered (CRS 2010), and merely 20 percent of such deaths had a medically certified cause of death (MCCD 2013).

[18] This, however, in no way means that it is frequently detected in actual practice. Even in advanced countries like UK, 56 percent of the people diagnosed with type 2 diabetes in 2009 did not even suspect that they were affected, and most cases of detection were rather accidental (Diabetes UK).

of diabetes – other major chronic diseases, especially cancers and CVDs, need more sophisticated level of screening, and for reasons discussed above, what we know about these diseases *could* just be the tip of the iceberg. With the exception of HIV/AIDS, which has witnessed targeted reductions over the years, cancers and CVDs are the only other major chronic diseases on which India is not at the top (table 1). This *may* have to do with lower possibilities of detection than actual prevalence. Two, a possible reason why there is a much higher prevalence of diabetes vis-à-vis deaths caused by it is that diabetes raises vulnerability to morbidity and mortality due to other diseases and in the medical certification of deaths, the ultimate cause of death is recorded, hence the impact of diabetes is largely missed out in existing mortality data. In no country is diabetes a major cause of mortality. Prevalence of co-morbidities vindicates GOI's approach embodied in its National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Disease and Stroke (NPCDCS) – it aims at addressing the risk factors of major NCDs horizontally rather than vertically.[d]

Figure 15 provides estimates of CHD prevalence from 2000 to 2015. CHDs account for 96 percent of the CVD burden – out of the 64 million CVD cases, 62 million related to CHDs. And given that CVDs have been the topmost killer in India since 1995, it is worthwhile to discuss CHD-related morbidity in some detail to derive some policy lessons. CHD prevalence was estimated to be higher in rural areas until 2005, but urban areas were estimated to surpass them with a three-fold increase (from 12.3 to 36.1 million) during this period. The most disturbing aspect of this urban trend is an even higher increase in the 20-29 year age group – from 2.7 to 8.2 million, while the corresponding increase in rural areas is 1.8 to 2.3 million – despite this age group not formally considered at-risk. In the light of this estimate, screening for, at least, the CHD risk factors should be done even among the 20-29 year-olds in urban areas, and relevant preventive measures taken accordingly. Estimated prevalence at 30-69 year level was five times higher than among 20-29 year olds – 22.5 vis-à-vis 4.5 million in 2000, 10.5 and 51 million in 2015 respectively. Figure 16 shows prevalence not only higher in urban areas, but also more premature vis-à-vis rural areas in 2015 (as well as earlier). This trend could be, to some degree, due to better early detection rates in urban areas, but also due to a higher prevalence of risk factors, not least due to rising socioeconomic aspirations among this population segment in particular (20-29 year olds) compared to their counterparts in rural areas.

Risk factors

Table 3 tells us about major risk factors of selected 8 chronic diseases in the Indian context,[19] which are in line with international findings in most cases, especially behavioral. Although the metabolic risk factors seem directly linked with the behavioral, it would be wise to deal with them separately since the former *could* be due to causes beyond the modifiable behavioral, which would

[19] Even chronic diseases like diabetes should be treated as risk factors since they render one vulnerable to other chronic (for e.g., CVDs) and acute diseases (for e.g., tuberculosis).

imply that individuals cannot *necessarily* be held responsible for the former. This is a problematic dimension of the international, especially American, discourse on prevention of chronic diseases – the focus is primarily on the individual / behavioral rather than its structural determinants[20] or *potentially* limited consequences in terms of the metabolic. In cases, one may work on behavioral risk factors and still suffer from the metabolic risk factors that the former are supposed to prevent or mitigate. This does not, at all, undermine the significance of focusing on modifiable behavioral risk factors, just that relying excessively on them may not necessarily be very helpful in dealing with the burden of morbidity or mortality due to chronic diseases, especially in contexts where structural determinants of risk factors have not been taken care of (as in India) and the disease is at advanced stage. We are talking of dealing with a huge burden of mortality here – addressing behavioral risk factors would be a complementary rather than the primary strategy, which it is made out to be by Indian and international policymakers. From the perspective of primary health systems as well, metabolic risk factors should be of prime significance and focus, while there is immense need and scope for multisectoral action vis-à-vis behavioral and environmental risk factors. We need to keep in mind that we cannot simply be concerned with primary prevention of risk factors – given our existing burden, we have to be concerned primarily with the prevention of chronic disease morbidity and mortality, which would entail a focus on metabolic risk factors.

Table 4 tells us that tobacco consumption, which is not just linked with certain forms of cancers, but also other chronic diseases and conditions, is probably the biggest cause of concern among the risk factors. However, it is also possible that detection and data for other risk factors is relatively under-represented vis-à-vis actual prevalence. The interesting thing to note is that its consumption is much higher in the two states in our sample which are said to be in the early stages of the health transition. This further highlights why these states need a strong focus even in terms of risk factors related to chronic diseases and premature adult mortality, and not just issues related to RCH. Age-wise data for Tamil Nadu and Kerala shows how tobacco consumption goes up in the at-risk groups and is strongly linked with type of residence and level of schooling in the former – the rural and less schooled are at higher risk of consumption. These trends are also visible at the national level. Alcohol consumption is high in Kerala, and even higher in Uttar Pradesh, and follows more or less similar patterns as tobacco consumption by background characteristics. Low consumption of fruit and vegetables, which is one of the top ten NCD risk factors as well in the Indian context, is overall low, but particularly alarming in Tamil Nadu and Uttar Pradesh. Prevalence of all metabolic risk factors is higher in health-advanced states, which might actually be due to higher detection rather than higher prevalence necessarily. If this is true, it shows that primary health systems in these two

[20] A look at level 3 behavioral dietary risk factors reveals that they are not just behavioral / cultural (1, 4-6), but also structural (2-3: these two can also be behavioral / cultural, as in relatively richer provinces like Jammu and Kashmir where people can afford them, but do not out of local dietary preference).

states are focusing on chronic diseases relatively more than states like Uttar Pradesh and Rajasthan. However, in the case of BMI, it could also be that these two states are also poorer, and so it is quite likely that their main nutritional problem is under- rather than over-nutrition.

Economic impact of chronic diseases

Economic impact of chronic diseases is higher among rich countries and households for a number of reasons, epidemiological as well as economic. One, proportionate prevalence of chronic disease morbidity is much higher in high vis-à-vis LMI countries and households. Given that chronic diseases are quite expensive to treat and manage, slow progression from morbidity to mortality – as in the case of the former – translates into higher economic burden. In LMICs, duration of morbidity is lower, mortality higher, thus treatment duration and economic burden due to that is lower. Rich countries and households have higher levels of awareness and affordability, and therefore higher incidence of detection and treatment of chronic disease risk factors and morbidity, higher life expectancy, prolonged duration of treatment and care, and therefore higher economic costs as well.

Two, because both present and prospective economic value of rich is higher, therefore both direct as well as indirect economic costs of chronic diseases among them is also higher. In contrast, in the spectrum of chronic diseases, prevalence at the point of beginning (risk factors) and the point of end (mortality in general as well as premature mortality) tend to be higher among lower income countries and households because low awareness and affordability at the beginning implies that progression rate on the spectrum is higher, and therefore opportunities for prevention and treatment lower. For this segment of population, loss due to chronic diseases is more human than economic, and, thus, it is the human rather than economic costs that should motivate policymakers and health systems in LMICs to prioritize tackling the burden of chronic diseases.[21]

With this background, let us share some prominent estimates that have been put forth for economic losses imposed by chronic diseases. Figure 17 shows that while LMICs shared only 45 percent of world's economic losses due to NCDs, their share of NCD mortality was 86 percent. This contrast was particularly stark in low income countries (their shares of world total being 43 and 2 percent respectively). Figure 18 depicts economic losses in absolute numbers and how they are graded by income level. In most cases, the highest losses were due to CVDs, followed by cancers, CRDs and diabetes. While in relative terms, economic losses of low and lower-middle income countries were miniscule, in absolute terms, such relatively 'miniscule' losses mean a lot in their own context. An economic loss of USD 0.9 trillion is a lot for a low income country, even if in comparison to higher income countries, it is insignificant. In the case of LMICs, we should primarily be concerned with absolute rather than relative economic losses. Another important thing to note here is that, even if

[21] There are other factors as well for higher economic losses due to chronic diseases among the rich, for e.g. general medical inflation and higher costs of high quality health care which they tend to avail.

diabetes imposes lower economic costs, its impact in terms of quality of life and propensity to lead to other health conditions and diseases are huge, and as a higher order risk factor, it should not be undervalued. There are lessons to be drawn from disease aetiologies in developing priorities. Another interesting fact is that, while China's loss is way above its income group (UMI) – closer to high income group in terms of total burden – India's is lower vis-à-vis its income group (LMI).

Several estimates have been provided regarding the economic impact of chronic diseases in India. Its average loss of income was estimated at 23 billion dollars a year (constant 1998 international dollars), which was 0.4 percent of GDP in 2005 and 1.3 percent in 2015, higher than that of China's 0.3 and 1.2 percent respectively. If India would have achieved 2 percent annual reduction in deaths due to chronic diseases between 2005 and 2015, it would have not only led to substantial gains in labor supply, but also saved India 15 billion dollars (Abegunde and Stanciole 2006). More recently, Bloom et al (2014) have estimated that 4 major chronic diseases – CVDs, CRDs, cancer and diabetes – will impose an economic loss of 3.6 trillion dollars (2010) in India between 2012 and 2030. Instead of being a productive investment, OOP health expenditure in India has been impoverishing 8 percent of the country's population a year (Kumar et al 2015). Share of NCDs in OOP health expenditure increased from 32 to 47 percent between 1995-96 and 2004, with income and savings being the most important source of financing (Engelgau, Karan and Mahal 2012). This has serious implications for the capacity of households to save for, or spend on, productive capital formation.

The burden of chronic diseases in LMICs is higher in terms of foregone demographic dividend – and thereby potential economic growth – rather than in relative actual or projected loss in comparison to high-income countries. The loss of demographic dividend and human capital in the case of India is not difficult to fathom, given that the highest number of premature deaths worldwide, generally as well as due to chronic diseases, happen in the country. These deaths not only indicate massive loss of human capital, but also the quality of human capital – extremely poor health status of the country's working-age population – and as such are a major challenge for not only the *Make in India* and *Skill India* campaigns of the Central government, but also for broader goals of poverty alleviation and development through employment creation and employability. People in the working age group have to live and be healthy before they can be expected to contribute to the country's economy and take care of their families – their premature death / ill-health would only add to the welfare burden on the government rather than contribute to its revenues.

From a preventive perspective, policymakers in India – as well as their counterparts in LMICs – should see this as an opportunity to avoid the scale of losses that China and higher income countries are incurring by drawing policy lessons from what has worked and what hasn't in these countries. Prevention in India, and LMICs generally, is critical since only 18 percent of urban and 14 percent of rural Indians have any form of health insurance coverage (figure 19). And with low public health care allocations, rising medical costs, especially vis-à-vis chronic diseases, direct economic burden

in the form of OOP expenditure is also high and graded by economic class (table 5). Low OOP in the case of lower quintiles should be interpreted in the light of lower awareness and affordability with respect to prevention and treatment of chronic diseases, not necessarily as a lower economic burden, which translates into a higher burden of premature mortality for them. However, it is interesting to note that OOP health spending as a proportion of per capita household income is similar across quintiles – higher for NCDs in higher quintiles and higher for non-NCDs among lower quintiles, which is not just reflective of their respective disease burdens, but also the differentials in awareness and economic capacity to afford prevention or treatment vis-à-vis NCDs. Table 6 shows that not only has OOP spending for NCD-related hospitalizations increased almost five-fold between 1995-96 and 2004 – total NCD-related OOP spending increased from 85 to 347 billion or 27 to 41 percent of all OOP spending during this period – it was relatively less managed through income or savings and more through borrowings in 2004, with catastrophic consequences.

In LMIC contexts like India's, the economic burden of chronic diseases has to be seen with respect to actual catastrophic OOP spending and potential income / productivity losses to the country and households. To invoke the counterfactual, how much would have India grown further or reduction in poverty achieved if we had a lower burden of chronic diseases, if citizens had the opportunity to utilize their limited resources for more productive purposes?

3. Prevention at the level of primary health systems

The human and economic costs of chronic diseases are unbearable. Their indirect impact on households and economies as well as direct costs of treatment are difficult to afford even for high income countries. The US uses 86 percent of its health care expenditure,[e] the highest in the world,[f] for the treatment of NCDs. Despite severe political ramifications, the Japanese health system, the epitome of its social security, is set for a major overhaul to reduce health care costs and make it sustainable. Similar concerns have been raised in Canada – interestingly, a professor in Canada argued that not just from a cost perspective, the ideal of health policy should be to reduce the need for health care (i.e. keep people healthy). Prevention has been widely regarded as the most cost-effective strategy for tackling chronic diseases (for e.g., WHO 2005; NCMH 2005), but dealing with the catastrophic human implications of chronic diseases (prevention of premature mortality) in LMICs, at the scale prevalent there, would be very expensive as it would require substantial investments not just at the primary (risk factors), but also secondary (screening) and tertiary (treatment, rehabilitation) levels of prevention. Even primary prevention – which is what people generally have in mind when they refer to the cost-effective nature of prevention – at the level of environmental risk factors especially is going to be quite cumbersome and costly in countries like India, given the burden of air pollution (both indoor and outdoor) as well as occupational risks. Therefore, countries like India should take up the challenge of prevention not from the perspective of saving treatment costs in the immediate term, but the prevention of direct human and indirect economic implications of chronic diseases.

Having said that, if LMICs focus on the prevention of risk factors, morbidity and mortality (RMM) of chronic diseases proactively, without further delay, they will be able to mitigate not only a great deal of the current human, but future economic costs too, both direct and indirect. The international community should provide both financial and technical assistance to them for prevention of RMM, both of which are meagre at the moment (WHO 2010). The Government of India (GOI) has taken up a leadership role on WHO's 'Global Action Plan for the Prevention and Control of NCDs 2013-2020', being the first country to develop national targets and indicators to reduce premature deaths due to NCDs by 10 percent by 2020, and by 25 percent by 2025 (table 7). A National Multisectoral Action Plan, highlighting actions by various sectors in addition to the health sector, to reduce the burden of NCDs and their risk factors is in the final stage of development (table 8).[g] Even earlier, in 2010 itself, it had initiated National Program for Prevention and Control of Cancers, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS), with a package of services to be offered at various levels of health facilities (table 9). The NPCDCS aims at integration of NCD interventions within the framework of National Health Mission (NHM) for optimization of scarce resources, provision of seamless services to patients and to ensure the sustainability of interventions. Such convergence will also create a wider knowledge base for effective prevention, detection, referral and treatment.

Prevention of what?

However, a number of issues need to be highlighted here. One, we need to be clear about the role that health systems in general, and primary health systems in particular, can play in the prevention of chronic diseases. Despite the international and national focus on *modifiable* behavioral risk factors, health systems in developing countries – facing a double or triple burden of death and disease – can largely address the metabolic risk factors (table 3), and can at best inspire and coordinate (in health-advanced states where the burden of child mortality and acute diseases is less) action on the behavioral. In the context of national targets for NCD prevention and control, they can address target numbers 1, 3 (diabetes), 5, 8 and 9 (table 7).[22] Two, multisectoral action is required for both behavioral and environmental risk factors, not just the former (as outlined in table 8). Ministries of Health should motivate and coordinate such multisectoral action, but health systems cannot be expected to directly address or be held accountable for behavioral and environmental risk factors. Three, individuals can be held responsible (as the predominant focus on *modifiable* behavioral risk factors seems to suggest) only when structural opportunities for making choices exist.

Two clarifications are called for here. One, without implying structural determinism, we argue that a focus on behavioral risk factors could be prioritized over other risk factors in countries and states where governments have developed proper spaces for physical activity and ensured that people are able to afford healthy diets (have sufficient resources and information for that), for instance. These are structural challenges even for developed countries, let alone the developing, so the predominant focus on *modifiable* behavioral risk factors is conceptually myopic, if not empirically unworkable. Even within people's given circumstances, policymakers can try to *nudge* – to use Richard Thaler and Cass Sunstein's notion – and provide as optimal an architecture for healthy choices as possible. Two, though a number of metabolic risk factors can be prevented and addressed through behavioral change, the former cannot be attributed to and prevented with a focus on the latter in all cases. For instance, high BMI *could* sometimes be genetic and *may* not be addressed through physical activity

[22] An argument in favor of health systems focusing on metabolic rather than behavioral risk factors is institutional, and does not imply that the latter are less relevant for tackling chronic diseases. There should be parallel mechanisms and institutions to address them effectively. The government should have robust national campaigns which percolate down to local levels, potentially financed and operationalized through PPPPs (People, Public, Private Partnerships). Recent electoral campaigns in India involved high-tech PR/ad agencies and reaped perceptible dividends. Such agencies could also be engaged for promoting healthy behaviors, and they should be held *accountable* for clearly defined outcomes. The issue, eventually, is about responsibility and accountability – given that they are already burdened, health systems should focus on their core competencies, on what their personnel are best trained for, and then be held responsible and accountable for them. This, however, does not mean that they cannot engage in opportunistic IEC activities, so to say, in best possible ways. Since behavioral change is critical for addressing both metabolic and environmental risk factors – people's cooperation with Delhi government's odd-even car formula to curb outdoor air pollution being an example – health ministries should be the nodal organizations for IEC activities and institutions focused on behavioral change. Nevertheless, since this paper is concerned with the role of primary health systems, we will not deal with this further.

or healthy diet, and one may have to undergo bariatric surgery (tertiary prevention) for a low BMI. Health systems, preventive strategies and insurance reimbursements should be aetiology-specific, and should hold individuals responsible and accountable where they have had real choices to make. Health systems should treat everyone with a metabolic risk factor at face value, and try to address them with a mix of primary, secondary and tertiary prevention strategies, as the case may demand.

If primary health systems take prevention and treatment of metabolic risk factors as their mandate, they can stay focused.[23] With focused secondary and tertiary preventive interventions, they should:

1) Undertake surveillance – of the focus age group (30-69) proactively, others opportunistically;
2) Treat borderline cases of metabolic risk factors and conduct follow-up screening periodically;
3) Cases with early to advanced levels of metabolic risk factors should be referred for secondary or tertiary screening and treatment;
4) As the anchor of prevention and treatment of metabolic risk factors as well as related morbidity, primary health systems should coordinate continuum of care by a systematic follow-up of cases referred by them for secondary and tertiary screening and treatment (3), with the co-operation of households and communities wherever required;
5) Since engagement with primary health systems is supposed to start at the pre-birth level, they should also try to ensure continuum of care horizontally – from birth till end of life – in which case, risk factors can be addressed and prospective human and economic costs avoided in time.

---

[23] Given the emphasis laid on primary prevention by one of the reviewers of the paper too, we are quoting him anonymously, despite continuing to argue that health systems should focus on the metabolic and coordinate action on other risk factors. "The population-based strategy aims to change disease related lifestyle choices, environmental factors, and their social and economic determinants in an entire population (e.g., information and communication programs addressing the risks of smoking and the value of smoking avoidance, excise and other taxes to reduce smoking, and restrictions on smoking in public places and on tobacco advertising). The main argument for this strategy is that it targets a high proportion of NCD morbidity and mortality: 5 percent of a population have very low exposure to risk factors and 25 percent have very high exposure. By targeting those with average levels of exposure, 70 percent of the population can learn to avoid risk. Furthermore, interventions for this large group are far less expensive than the intensive interventions needed by the high-risk group. In the "high-risk strategy," individuals at high risk of developing selected diseases are identified, and actions are planned to reduce their disease burden through provider based interventions (e.g., clinical interventions to treat and counsel individuals about risk factors for CVD—smoking, excessive alcohol consumption, hypertension, hyperlipidemia, diabetes and obesity—management of patients at high risk according to established clinical practice guidelines; and therapy for individuals once overt CVD has occurred). High-risk strategies pose a major task for health services, and their per-person costs can be high... cost-effective policy options exist for a comprehensive multisectoral response to the NCD epidemic. With improved political commitment at the highest levels of Government, many of the key challenges for implementing these options can be overcome so that (a) policies and investments in other sectors contribute to the control of the social determinants and risk factors associated with the onset of NCDs and (b) health care organization, financing and service delivery systems anchored on a strong primary care orientation are redesigned to generate better health outcomes." We support such actions, but the discussion here is more about the role of primary health systems. A high risk strategy cannot be ignored in LMICs, given levels of premature mortality. They should simultaneously pursue a more general, population-based strategy.

4. Governance

The primacy of primary health systems in mitigating health risks and keeping people healthy is as relevant today as it was at the time of the Sir Joseph Bhore Committee Report (1946) and the Alma Ata Declaration (1978),[h] despite a significant shift in the burden of disease and mortality. Primary health systems are at the center of health care systems – they are not only the first point of contact for the sick, they proactively deliver core medical and preventive care, and coordinate and integrate care with higher or complimentary health systems. When they function well, they not only improve aggregate health outcomes, they reduce health care costs as well as inequalities in access to health care and health outcomes (Schoen et al 2004). While evidence on their performance at the level of primary prevention is weak, they are considered highly effective in terms of secondary and tertiary prevention as well as coordination with other levels of care (Macinko, Dourado and Guanais 2011). Health policymakers in several countries feel that primary health systems could provide a sense of direction and unity in the prevalent context of fragmentation and short-term nature of health care (WHO 2008), and as such, could keep and make people feel healthy before they actually fall sick. Primary health systems also serve as gatekeepers of tertiary health systems – lack of a vibrant and functional primary health system in most parts of India has led to overburdening of tertiary health systems, and given low public health financing and insurance coverage, to high adult mortality.

In India, primary health systems have largely been confined to rural areas, comprising Sub-Centres (SCs), Primary Health Centres (PHCs) and Community Health Centres (CHCs), which are established as per existing norms (table 10). The effort of making quality and affordable healthcare available to India's rural population was reinforced by means of the National Rural Health Mission (NRHM) in 2005. NRHM aimed at a functional, community-owned, decentralized health delivery system with inter-sectoral convergence at various levels. Although the structure of primary health system is in place in rural areas, it is usually beset with several governance issues. Urban primary health care has broadly shifted from general / family physician-centric to a hospital-centric system. The inadequacy of public health services in urban areas was highlighted in National Health Policy 2002, which led to the launch of the National Urban Health Mission (NUHM)[i] in 2013 to provide primary health care to the urban population, particularly the poor, and strengthen health delivery by means of coordination with schemes facilitating clean drinking water, sanitation, etc. However, access to primary health system for urban population still seems distant as public health facilities are overcrowded due to urbanization (Draft National Health Policy 2015). Government-sponsored health insurance schemes like the Central Government Health Scheme (CGHS) have their primary health systems (dispensaries), but the beneficiary base of these schemes is miniscule.[24] Therefore,

[24] CGHS (3.67 million), ESIS (75.8 million) and RSBY (40 million).

in terms of health care delivery, the role of primary health system is critical as provider of a safety net for poor and underserved populations. However, in absence of a well-functional primary health system, a large section of the population has to use health care services provided by the unregulated private sector, which is prone to varying standards of diagnostic tests, over-prescription, exorbitant fees, etc. From a policy perspective, enhancing health care access with clearly defined responsibilities and accountability at each level is required to cater to rising OOP expenditures and disease progression. India's National Health Mission (NHM) encompasses broad national priorities within which states have flexibility to develop their specific strategies, plans and budgetary requirements through the state Programme Implementation Plans (PIPs). To supplement coverage, NHM-Free Drugs Service Initiative and NHM-Free Diagnostic Service Initiative have been rolled out. However, such programs, including NPCDCS, are largely focused on the rural primary health systems, while the urban primary health system is still in a nascent stage.

Major challenges and recommendations

A. Broad institutional challenges

There is an inherent anomaly in the Indian public health system, to begin with, which has a critical bearing on issues related to responsibility and accountability, essential pillars of any effectively governed entity. Legally, health is a state subject as per Seventh Schedule, Article 246 of the Indian Constitution. However, the Central government not only frames the National Health Policy and a number of national health programs – in the light of which states are expected to design their priorities, policies and programs – central contribution in state health expenditures has been high.[25] Without such support from the Centre, many backward states would not have been able to achieve the progress that they have at the moment. However, from a governance perspective, it has led to certain challenges which need to be addressed if primary health systems need to prevent the dual or triple burden of disease and mortality effectively and resiliently in the long-term. Several states have already begun taking steps to address the burden of chronic diseases, but those steps have to become and be taken as part of a sustainable framework. Following are certain broad institutional challenges that we think need to be addressed to make the prevention of chronic diseases effective and sustainable at the level of primary health systems in particular, health systems more generally.

1. *Decentralization*: Despite certain shared characteristics, Indian states are at different levels of health and developmental transition, and therefore their local requirements also differ. States are expected to have their own health policies within the ambit of the National Health Policy. A section of policymakers and academics argue that there should be no national but only state health policies, developed according to their local requirements. To ensure local responsibility

[25] Ratio of Centre to state health expenditure was around 35:65 between 2004 and 2011 (Choudhury and Nath 2012).

and accountability as well as develop a sense of ownership among local health systems and the community, decentralized planning and priority-setting is the first step in a democratic country. Given behavioral challenges – not just of individuals, but institutions as well, not least primary health systems – a bottom-up approach to priority-setting and accountability is indispensable. People's Plan Campaign of Kerala is often cited as an example of effective decentralization of power and resources, wherein overhauling reforms in the system of governance were observed since 1996. However, such devolution of power, it is said, can be counter-intuitive if priorities of state governments and local units do not match (Varghese et al. 2007). Devolution of power in the health sector has been especially difficult due to many reasons, including but not limited to: a) lack of technical guidance at local levels of governance; b) lack of clarity on functions, duties and responsibilities due to non-uniform implementation of standards of health facilities, lack of integration between various systems of medicines and multiplicity of bodies managing health budgets (NCMH 2005). Long-term care, medical care and prevention are linked to each other, but highly fragmented in terms of service delivery. It was observed in our discussions in Japan that, in the coming decade, it will make efforts to integrate them at the community level. Unless states and primary health systems have adequate powers and resources, and are in sync with local communities on a regular basis, such efforts cannot be imagined, let alone bear fruit.

2. *Weak local technical capacity*: This is a hindrance for decentralization in the health sector. An interesting model that can be considered for replication is a collaborative model between Uttar Pradesh government and the Bill and Melinda Gates Foundation (2012), under which the latter has contracted the University of Manitoba and India Health Action Trust to set up a Technical Support Unit (TSU). The TSU, directly reporting to Principal Secretary (Health), Government of Uttar Pradesh, supports the government to increase the efficiency, effectiveness and equity of reproductive and child health programs in the state. The TSU advises and supports state and local government structures and frontline workers (FLWs). It collaborates with ten prominent NGOs, under the guidance of a civil servant, who connects them to the Health Secretary, acting as a bridge between a multidisciplinary health research think-tank on one side, and the health department on the other. Every member NGO has niche capacities and is proficient in different levels of health care management.

3. *Delineation of responsibility*: The Centre should largely confine itself to the overall monitoring of the performance of state health systems, and continue to provide both financial and technical support and *nudge* to them. However, it should be *publicly* clear that the ultimate responsibility and accountability is that of state and local units. For this, access to health care or health itself – whatever is agreed upon through consensus – should be made a legal right and individuals should be able to claim it. However, even provision of this right has suffered due to avoidance of clear-cut responsibility on the part of both the Centre and states. Such a right would reinforce enforcement of responsibility at various levels through proactive accountability by community.

Neither the traditional nor the proposed health focus is going to work efficiently without clear-cut allocation and enforcement of responsibility among various units, followed by appropriate accountability. In Sri Lanka, we were told, if a doctor does not turn up at a local health facility for a few days, people turn up at his / her house to inquire about the reasons. This level of accountability has also enabled the country to take the bold step, unthinkable in most Indian contexts at the moment, of allowing public doctors and other medical staff to practice privately after 4 pm, which in turn, is considered as the most important reason for their local retention, a major challenge in India (which we will discuss in detail in the chapter on manpower). China is the only country among the top five contributors to child deaths in the world (2013) whose constitution categorically makes child protection and development responsibility of the State (Articles 46 and 49) – it experienced 86 percent decline in such deaths between 1990 and 2013. Even from a moral perspective, governments derive their moral sovereignty by protecting their citizens; a clear-cut demarcation of responsibility for preventing premature deaths is part of it. While states / UTs have to play a central role, the Central government should not only increase its spending on health care, but also create an enabling policy environment so that the former operate accountably and effectively. It should provide support to state / UT governments that are weak in financial / technical capacity as per their requirements to achieve desired outcomes.

4. *Corruption*: For a starter, as per Lokayukta,[j] around 25 percent of health budget was siphoned off due to corruption in Karnataka involving activities like procurement of non-essential drugs, irregularities in the procurement of medical equipment, recruitment issues, etc. (Sudarshan and Prashanth 2011). Rampant corruption at various levels of governance is not only an obstacle in the strengthening of health systems, but also erodes people's trust in governments and health systems in particular (BMJ 2014). As a corrective, Karnataka started people's participation in planning under the initiative, Community Planning and Monitoring of Health Systems, which was piloted in some districts. It was initiated as a pilot project under NRHM in 2007, covering Assam, Chhattisgarh, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Rajasthan and Tamil Nadu. Decentralization and delineation of responsibility, as discussed above, would go a long way in addressing the perennial problem of corruption, at least in the health systems.

B. Secondary prevention: identification and outreach

Secondary prevention involves screening and early diagnosis of metabolic risk factors – blood pressure, blood glucose, body mass index, cholesterol, etc. Primary health systems should conduct surveillance for prevalence of risk factors and morbidity with the aim of checking disease progression. This will not only help them know the burden of risk factors and morbidity among the target group (30-69 years) in their coverage area, but deal with them through a mix of prevention strategies as well as generate awareness about them in the public, and hopefully, induce electoral demand for effective and accountable public health care. At present, screening is supposed to be done

at NCD clinics as part of NPCDCS at CHCs and district hospitals. The challenge, here, is to identify and reach out proactively to the target group in the coverage area.

In India, the Central Government has an Annual Medical Examination Scheme for central government group 'A' officers above 40 years of age, under CGHS. Our research on the scheme had shown that this section had a higher prevalence of chronic diseases (ICRIER working paper 198). Under the scheme, empaneled hospitals conduct a comprehensive set of medical tests for INR 2,000 for male and INR 2,200 for female officers. Before this, the government should have preliminary tests done for above-mentioned metabolic risk factors at CGHS dispensaries itself, and then refer borderline and above cases for higher screening or treatment in empaneled hospitals. This would also put CGHS dispensaries in an anchor position to coordinate the health of Central government employees and their dependents. Secondly, they should lower the age to 30 years, and have a primary level of screening done for all Central employees. To avoid inconvenience to them, these basic tests could also be done in their offices since the equipment required for them is quite handy. The same should be done for all government employees (Centre and state) as well as those in the private sector, in which case the employers should either be provided incentives or the government should pay for the screening. This is how Japan started its universal health care – high-risk individuals currently undergo annual check-ups at the workplace itself.

For target population outside the formal workforce, which is huge in India, a community-based approach should be adopted. Kerala is doing this under NPCDCS by engaging community health workers or *ASHAs* for mobilization. Screening is done for all individuals aged 30 years and above by organizing detection camps at ward, SC and block levels. As a means of monitoring, monthly follow-up camps are organized at SCs by junior public health nurses and ASHAs.[26] In Rajasthan, proactive screening of the entire rural population was announced over a period of 3 months under the *Aarogya Rajasthan Abhiyan*, wherein ASHAs will screen individuals for 27 symptoms / risk factors and issue e-health cards to all. This information would be used to develop an innovative health insurance policy, while these cards would help in further treatment and follow-up. Another technological means to be considered for reliable record-keeping is the *Swasthya Slate*[k], which is being used as a pilot for such screening in the state of Uttar Pradesh. Efforts in the direction of e-governance (Digital India Initiative) by the Central government could be utilized for strengthening health systems as well. Proactive workplace- / community-based screening would ensure wider

[26] In Kerala, *Amrutham Aarogyam*, was introduced in 2013 by the state government to create awareness about lifestyle diseases and screen all people above the age of 30 years. For this purpose, diagnostic kits (glucometer, BP apparatus, stadiometer and weighing machine) were distributed to SCs, PHCs and CHCs. The state government issued guidelines for organizing screening camps. Additionally, in a joint initiative of the NRHM and the state departments of health and education, Lifestyle Disease Education and Awareness Programme (LEAP) was launched in the state, which aims to control and prevent occurrence and prevalence of chronic diseases among school children through health education, lifestyle modification and regular screening.

coverage of the target population through physical and psychological comfort – physical because people would not have to travel to health centers, which is also a psychological barrier for many. Another psychological obstacle is that staff at primary health centers, especially in the north Indian states, tends to be from dominant groups and marginalized sections of society are not comfortable visiting them, among other usual factors related to quality and efficacy. Screening involving local community health workers will have local legitimacy and support, and will be more responsive to the needs of local communities, help local community assume ownership of interventions, and not least, generate trust in primary health systems in particular and, by implication, in the State itself. Given the crisis of legitimacy that many governments in India are beset with, this is an opportunity.

C. Tertiary prevention

Referral system

However, before proactive population-based screening is undertaken, it will be important to ensure that there is provision for tertiary prevention as numerous cases would require to be treated. Beyond the primary health system, this could either be publicly or privately delivered, but has to be publicly funded for sure, as happens under government health insurance schemes like CGHS.

For an effective primary health system, catering to cases requiring varying levels of care, a robust referral and monitoring system is critical. It is particularly important in situations where health awareness is low and patients are not aware which specialty / doctor they should visit. For several regular ailments or symptoms as well, it is difficult even for the educated to decide on this, and therefore visiting a GP in the first instance is desirable. Regular collaboration between various levels of care is essential to ensure that patients receive continuum of care by utilizing various levels of care in a streamlined way. In India, as in several parts of the world, referral mechanisms are either missing due to provider choice provided to patients or weak due to casual enforcement. Bypassing primary care for higher levels is associated with several factors, with perceived quality measures being the most pressing (Cervantes et al 2003). The focus, therefore, should not only be on developing and enforcing an appropriate system of referral and coordination between health systems, but also on addressing the causes which tend to render such a system ineffectual.

At the same time, thoughtless referral to a higher health facility should be prevented and penalized. In Canada, access to specialist care requires a formal referral from a family physician, and several provinces disincentivize direct specialist consultation through refusal of payment. For the Indian context, one policy recommendation could be to refuse treatment in public secondary or tertiary health facilities without a proper primary health system referral, as in the case of government health insurance schemes. This is actually being implemented at specialist institutions like the prestigious

All India Institute of Medical Science (AIIMS), New Delhi. In Japan, though patients have a choice to visit any provider, they are charged a premium if they visit a specialist without referral.

Primary health systems can also coordinate referral downstream, with families and communities, for various levels of prevention. This could be done with the help of a parallel ASHA-type network, if not necessarily by them in cases where they are overburdened. Alternatively, there could also be an agency on PPP lines for such coordination. In both United States and Canada, representatives of public health agencies pointed out that India can be the leader in IT-enabled referral systems, given its technological capability. Policymakers should leverage India's IT potential towards this end. Several IT companies have already made great strides in this direction. They should be further encouraged and duly incentivized.

Drug procurement process

Since an essential component of prevention of premature mortality would involve treatment at a massive scale, and given that medicines are a major component of treatment expenses and a source of impoverishment, universal access to essential medicines is crucial. The Central government has already started the *Jan Aushadhi* Scheme to make quality generic medicines available at affordable prices through special outlets. However, to keep it functional sustainably as well as scale it up at the national level, strategies for procurement of drugs in various jurisdictions should be considered. Two states in our selection, Tamil Nadu and Rajasthan, have taken some initiatives in this regard. Rajasthan's model is based on Tamil Nadu's model, aimed at providing free drugs in public sector facilities through Tamil Nadu Medical Supplies Corporation (TNMSC). However, the latter is said to be more successful. TNMSC facilitates a centralized procurement of drugs directly from manufacturers through a tender process. The drugs are procured based on an essential list of generic medicines, thus ensuring rational usage of drugs within public facilities. These drugs are supplied by manufacturers directly to district warehouses, and from there to different facilities as per their requirement. There is a passbook system by which each facility is entitled to a certain amount of drugs based on patient-load and usage patterns in previous years. In addition to providing regular supply of drugs and ensuring rational use, TNMSC has also instituted monitoring mechanisms, including review by external independent agencies to ensure the quality of supplied drugs. However, regular procurement and availability of drugs in another state in our selection, Uttar Pradesh, appears as a major concern, particularly for primary health systems. Often, drugs prescribed are not part of essential drugs list. Regular prescription audits can help address such a problem. Most fundamentally, governments need to substantially drive up their health sector spending and health insurance coverage so that major OOP expenditures on medicines can be averted.

5. Manpower

Among essential characteristics of effective primary health systems are comprehensive availability of resources for prevention and early treatment, wide accessibility to these resources, coordination within and with higher levels of health care systems, continuity of care and accountability of funds, functions and functionaries.[l] None of this is achievable without adequate and duly trained, skilled and motivated health workforce. As discussed in the previous chapters, the shift of global disease burden from acute to chronic diseases requires a reorientation in health systems, and as such, poses new demands on them vis-à-vis the human resources for health (HRH). There is global imbalance in HRH and, in particular, a shortage of healthcare workers in developing countries (WHO 2003). For example, while Canada and United States share only 10 percent of the global burden of disease, almost 37 percent of the world's health workforce practices in these countries. On the other hand, Africa faces more than 24 percent of the global disease burden, but has access to only 3 percent of the world's health workforce (WHO 2006). The health sector in developing countries is one of the critical areas which has been seriously affected by the international migration of professionals – figure 20 shows that the number of Indian-born doctors is the highest and that of nurses the second highest of foreign-born doctors and nurses in OECD countries. Shortage of public health staff is particularly felt in poor, rural and remote localities, where the burden of premature mortality due to chronic diseases tends to be the highest, and should, therefore, be addressed on a priority basis.[m]

Little is known about India's health workforce – their numbers, types, qualifications, location, etc. (Sheikh and George 2010; Rao, Bhatnagar and Berman 2012). The first recommendation that we would like to put forth is that there should be a nationwide periodic census of public health workers – which can be financed by the Central government as part of its technical health support for states, and it would also facilitate its supervisory role – covering workers in various systems of medicine, their characteristics, respective work-loads, etc. Such a census would help in not only knowing the status of existing workforce, but also shortages vis-à-vis traditional and emerging health concerns (prevention of chronic diseases in our case), skilling and upskilling requirements, etc. Anyone paid from the public purse should mandatorily provide verified information for this purpose. Also, post-recruitment, there should regular track-and-trace of the health workforce, which could also help in their redeployment in underserved areas. Such initiatives would be particularly helpful for health-backward states like Uttar Pradesh and Rajasthan where the combined health workforce density per 1,000 population is 0.54 and 1.32 respectively, lower than the national average (2.08), not to talk of health-advanced states like Kerala (4.61) and Tamil Nadu (4.57) (Hazarika 2013). Clearly, there are linkages with the number, not to deny the role of quality and commitment, of health staff in terms of health outcomes. While the proposed census would be a long-term measure, the Centre should try to address the gap in health workforce density in health-backward states on top priority.

Type of workforce for prevention of chronic diseases at the primary health level

Historically, in developing countries especially, health workforces have been structured to provide services based largely on an acute medical model, focused on the treatment of discrete episodes of diseases (Dubois, Singh and Jiwani 2008). Prevention of chronic diseases, on the other hand, will involve continuum of care at multiple nodes, and will necessitate a shift in health systems that rely largely on physicians to one in which health professionals from multidisciplinary backgrounds will play a contributory role. Such teams will include wide range of healthcare professionals, including community health workers and social workers, physicians, therapists, etc. Secondary prevention, in particular, at the primary health level would require greater involvement of the non-specialist health staff. In India's rural health care settings, the AAA network – comprising Auxiliary Nurse Midwives (ANMs), Accredited Social Health Activists (ASHAs),[n] Anganwadi Workers (AWWs) – are crucial ground-level workers who directly interact with the community, and act as a bridge between the community and primary health care providers. The question is, whether present AAA network can also effectively address chronic diseases along with their existing workload, or is there a need to create a dedicated workforce for this purpose?

Presently, the AAA network in Rajasthan and Uttar Pradesh is largely focused on Reproductive and Child Health (RCH) issues. In contrast, in Kerala and Tamil Nadu, ASHA workers, along with RCH and other activities, support in mobilizing people to attend the NCD clinics and assist Junior Public Health Nurses (JPHN) in the assessment of metabolic risk factors. In Kerala, one ASHA is supposed to cover 250 to 300 houses for collecting details of all persons above 30 years of age. ASHAs are also responsible for follow-up on patients diagnosed as diabetic or hypertensive, at least four times a year. Incentives are defined as per services given – they receive INR 2 for every personal details form, INR 10 for each person brought to the medical camp and INR 20 for every follow-up visit done by them (Maya 2009). However, during our consultations in these states, there was no clear consensus among stakeholders about the role that ASHAs could play in the prevention of chronic diseases. Most respondents felt that ASHAs could help community members in making informed choices, related to primary as well as other levels of prevention. And a separate cadre of community workers should be deployed which will work in tandem with ASHAs for profiling and assessing metabolic risk factors through population-wide screening, at least for targeted age-group. Nevertheless, before arriving at any conclusion on this issue, there is a need for more evidence-based research at the local level to assess AAA network's workload and its additional capacity.[o]

For opportunistic secondary prevention of non-focus age groups, AYUSH doctors can be engaged at the level of primary health systems. In view of the acute shortage of doctors in India, most of the respondents were of the view that AYUSH doctors have a great role to play in chronic disease prevention and management at the level of primary health systems. Reservations, however, were expressed by the mainstream allopathic doctors, that AYUSH practitioners should not be allowed

to prescribe allopathic medicines and they should recommend medicines from their respective systems of medicine. On the other hand, AYUSH doctors, in general, complained that medicines for their system are unavailable at government hospitals and that they can play an active role in addressing risk factors if patients come to them during the early onset of their conditions. But, in practice, patients choose to visit them, whenever they do, only when they have tried the allopathic system, and by that time, the symptoms and severity of diseases have progressed. As per the norms laid down in Indian Public Health Standards (IPHS), one AYUSH medical officer and one AYUSH pharmacist is *desirable* at the PHC level. At the CHC level, they are under essential list (table 10). To facilitate user choice and reduce the workload on mainstream health staff, AYUSH staff should be considered for inclusion under the essential list of staff at all levels of the primary health system.

Challenges

A number of challenges related to health workforce need to be addressed if they are to be fruitfully engaged for the additional responsibility of prevention of chronic diseases.

a) **Orientation of medical education towards treatment based paradigm:** The significance and cost-effectiveness of primary health systems arise from their population-wide approach. Secondary and tertiary health systems, on the other hand, focus on individual 'patients'. With the exception of departments of community / preventive and social medicine, the mainstream system of medical education in India, as in several parts of the world, tends to rather curative than preventive in its orientation, and disposes medical graduates toward curative secondary and tertiary care. 'With India's low life expectancy largely reflecting deaths from preventable diseases, the most significant gains in health would come from population-wide preventive measures' (Joumard and Kumar 2015). Curricula for medical education have not kept pace with the changing dynamics of public health and demographics (Frenk et al. 2010). Demand for specialized diagnostic and therapeutic options has influenced the career choices of medical students. This was also evident in Canada, where despite a recognition that family physicians and general practitioners form the cornerstone of primary health systems, family medicine is fast losing traction across medical colleges, and this is most starkly revealed during admission processes – every year, a fair number of family medicine positions are vacant. The knowledge and expertise of a family doctor is often considered 'inferior' to that of a specialist (Wright et al. 2004; Dhillon 2005). Various reports[p] have suggested that health professionals should be adequately prepared to address challenges related to chronic diseases and that the focus should shift from relying on knowledge and facts to core competencies, including patient-centered care, civic professionalism[q] – a culture in which physicians feel not only individual obligation to their patients, rather collective obligation to local communities – integration of a preventive approach toward disease management, etc.

b) **Role of medical training for prevention of chronic disease:** Training specific to prevention and management of NCDs at the primary health level is not included in the *Human Resources Qualification Standards*, established by Medical Council of India, Pharmacy Council of India and the India Nursing Council (Engelgau et al 2011). A good initiative taken up by one of the Urban Health Training Centres (UHTCs)[r] in Lucknow, the capital of Uttar Pradesh, is that medical interns are engaged in a comprehensive exercise of capturing socioeconomic data and assessing risk factors and disease profiles of 500 families living nearby. Along with that, the faculty, who are practitioners as well, are engaged in providing treatment and counseling to patients who visit such centres. There should be more of these institutions, which can also serve as local hubs of secondary and tertiary prevention, and also generate sample data for decentralized policymaking and planning. One drawback, highlighted during our interaction at the above-mentioned UHTC in Lucknow, is that interns only come for a short duration and the data generated by them is not collated for broader analysis. If this system is regularized, and there is a systematic framework under which interns are recruited and work, such a concern could be addressed. However, once there are a few more centers on a pilot basis, there would be more experience and improvement on the concept.

c) **Issues related to recruitment:** Lack of well-defined recruitment policy for HRH leads to irrational deployment and distributional imbalance. For instance, doctors with specialized skills in Rampur District Hospital were given administrative and desk work instead of allowing them to practice and this was leading to extra workload on the existing workforce. The other issue noticed was the lack of timely recruitment in Jaipur district. One of the stakeholders reported that even after six months of official announcement of the NPCDCS programme in Jaipur, there was no workforce in place due to which all the activities were delayed. Also, most of the time, unfilled posts mean extra burden to other available health professionals and this inevitably leads to reduced efficiency and doctor-patient interaction time.

d) **Incentive structure**: Monetary compensation (combined along with other incentives) is considered as one of the most effective strategy for retaining workforce in underserved areas. Fifteen states in India, including Rajasthan and Kerala, have reported that monthly financial incentives are given to doctors in addition to salaries that they receive. Also, five of these states[s] have similar incentive structure for staff nurses and ANMs (Sundararaman and Gupta 2011). However, a cursory look at the monetary incentives in NPCDCS programme for doctors and other posts show that rural postings are not adequately compensated vis-à-vis urban postings. The proposed PIP budget estimates for NPCDCS show that doctors at NCD clinics (at the CHC level) are paid less than doctors at district NCD clinics.[t] Other than insufficient monetary incentives, professional isolation, excessive workload, lower prospects for career progression, lack of training opportunities, unavailability of support staff and weak administrative staff are identified as major reasons for health professionals choosing urban over rural

postings. Also, there are factors outside the formal architecture of the health system that influence willingness and performance of health professionals to work in rural / remote / slum areas. Lack of infrastructural facilities for living (like housing, electricity, water, access to markets, transport availability), lack of opportunities for family's well-being (good schools, entertainment facilities, future career opportunities for children), physical security concerns, etc. are major concerns.

e) **Conflicts in role:** Doctors at PHCs and CHCs have reported that they have little time and too many patients. With long queues, physicians are only left with the option of a quick diagnosis and prescription. This has led to the transformation of patients as 'cases', with importance given to dealing with as many cases as possible. The entire system is oriented towards curative approach and doctors perceive themselves exclusively in the roles of clinical service provision. Before that of the general population, we must consider behavioral change of the health workforce in order to orient the system towards a preventive approach and prepare a dedicated workforce towards that end. Also, there are conflicts between administrative and clinical role of providers, as discussed in the previous section.

f) **Challenges specific to community health workers:** Although the major focus of ASHAs and ANMs in Uttar Pradesh and Rajasthan, for instance, is on RCH, during our discussions with them in these states, they were willing to work for prevention of chronic disease as well, if proper training and appropriate incentive structures are built around these programs. Also, logistic issues like unavailability of supplies were reported as a major problem. For example, ANMs in these states reported absence of timely supply of glucose strips. Usually, they receive these glucose strips very close to their expiry dates. Some of these challenges can be addressed when issues related to governance, as addressed in the previous section, are dealt with effectively.

Good practices from selected states and countries

a) TRIO network to support home based care for diabetic patients in Jodhpur, Rajasthan: Under Diabetes Community Care and Support Project of Humana People to People India (HPPI), an intervention was undertaken in Jodhpur (in Mandore block, including 74 villages, in December 2012) to detect diabetic cases and refer them for clinical management to PHCs / CHCs. For this intervention, there was a clear-cut delineation of responsibility between various health workers, including household members. The project hired and trained field officers (12th pass / graduates) who worked in collaboration with ASHAs / ANMs and other community members. The activities of field officers were supervised by project staff members. Field officers (FOs) visited households multiple times in a planned manner to not only create awareness about diabetes, but conducted verbal screening to detect people at risk and referred them to PHCs / CHCs. Adherence to the

advised lifestyle changes / medication was ensured by forming a **TRIO** – a group constituted of a diabetic patient, a Local Passionate (local-level care-givers who play a key role in providing home-based care in the long run) and a family member of the patient. TRIO formation was found to be very effective in motivating patients to adhere to anti-diabetic medicines and dietary control. FOs also sensitized Village Health Sanitation and Nutrition Committees (VHSNCs)[u] on the disease, and assisted them to develop diabetes action plans as part of their village health action plans. Further, implementation of the project has built capacity for local community volunteers and ASHAs with respect to supporting people in the prevention of diabetes. Such a model could be scaled up not just geographically, but also epidemiologically, to cover other chronic diseases.

b) Healthcare Sector Skill Council (HSSC), India: The newly formed Healthcare Sector Skill Council (HSSC),[v] a not-for-profit organization, has committed to skill 4.8 million people in the paramedics and allied healthcare services over the next 10 years. The Council is working towards identifying skill gaps in various allied healthcare job roles through market surveys, functional analysis and occupational mapping to develop a catalogue of industry occupations. On this basis, the National Occupational Standards and qualification packs are designed according to job roles. It also facilitates development of curriculum and has established certification mechanisms for training institutions and trainers, as also for accreditation and assessment.[w] Eleven job categories have been launched so far – job roles like diabetes educator, dietician assistant, cardiac care technician and home health aide will reduce the supply gap for chronic care professionals in India.

c) Workforce retention strategy in Sri Lanka: In order to reduce regional imbalance in availability of doctors in Sri Lanka, there is a centrally managed rotational system that works to relocate doctors every four years. This system ensures that doctors have to work in most backward areas as well. However, flexibility is also ensured keeping in mind physicians' interests as after two years of practice at a particular place, they can also apply for transfers. And then, through this rotational system, it is ensured that a new doctor fills the vacancy created by the one who has opted for a transfer. Also, the practice of relocating doctors is compensated by a package of incentives that not only benefits doctors but is also rewarding to their families.

Medical education in Sri Lanka is free up to the level of post-graduation which inculcates a sense of commitment in doctors towards their work. The problem of internal as well as international migration is solved to a greater extent by allowing dual practice. This ensures that, during public service hours (8 am to 4 pm), doctors entirely focus on patients who come to public hospitals and may not be able to afford treatment in private clinics. Also, an added incentive is that doctors in the public sector are allowed to conduct teaching, research, evaluations and collaborative work with international organizations. Literature on the implications of dual practice suggests that the possible impact on quality of health services can be positive or negative (Kiwanuka et al. 2011; Hipgrave and Hort 2013). Some countries completely prohibit this practice, while others regulate

it in various ways. In India, some states introduced a Non-Practicing Allowance (NPA), whereby public doctors were given an allowance in addition to their salaries to discourage them from private practice. In Tamil Nadu, NPA is given to certain cadres, varying from INR 600 to 2,000 per month. Strong regulation is needed to ensure that public doctors do not practice privately after receiving the NPA. This could be ensured through public accountability, as in Sri Lanka.

d) Subsidization of medical education in Japan: Medical colleges funded by the Japanese government subsidize the MBBS degree, and in lieu of it, the government mandates a nine year bond period of compulsory posting in the suburbs, with an incentive structure commensurate with the hardships borne by the doctor.

e) Family Health Team in Brazil: Brazil has deployed interdisciplinary teams known as "Family Health Teams" that help in providing primary health care to communities, including primary care for chronic diseases. Each team has been assigned households and has defined roles and responsibilities. Members from these teams visit each household within their area at least once a month not only to conduct health promotion and basic clinical services, but to collect individual and household level data as well. They help in ensuring adherence to treatment plans and follow-up visits. Family Health Teams also help in ensuring coordinated care by including a team from diverse backgrounds and involve schools and other community-based organizations (Macinko and Harris 2015).

Further policy recommendations

1) A new cadre which can work in coordination with the AAA network for prevention of chronic diseases should be considered. A similar cadre should be designed for urban areas. This should be followed by a more comprehensive and formal recruitment procedure for health workers at the local level. The criteria for selecting the new cadre should be based on their education level and willingness to work in primary health systems in their own localities. Such individuals can be entrusted with the task of profiling and screening risk factors for individuals through door-to-door surveys (on priority basis for target 30-69 years age group) with the help of a 'chronic disease prevention kit', and should help in ensuring effective referrals and coordination with other levels of providers. Such a team of health workers should be trained in skills and strategies required for these tasks after their recruitment.

2) Existing departments of community / preventive and social medicine should be strengthened, and more developed in the public sphere or through incentives to private medical institutions, which in any case should be promoted. In a state as large as Uttar Pradesh, there were only 14 public and 16 private medical institutions. On the other side, Tamil Nadu had 21 public and 20 private medical institutions (Hazarika 2013). However, given the high costs of private medical education, the possibility of their graduates serving in rural areas can be quite low. At the same

time, given the state of regulation of even those who have received subsidized public medical education, the expectations from them are not any better. Education in community / preventive and social medicine in public as well as private medical institutions should be substantially, if not totally, publicly subsidized[27] and service for a number of years in primary / public health centers be made mandatory through legal bonds, etc. Simultaneously, there should be adequate incentives for them and their families (not just financial, not just to health workers). As part of incentives, there should be clear-cut career progression path for health professionals. To ensure equity in access to health care, aspiring health workers from various communities should be promoted through professional coaching, skilling, etc. so that they can serve their communities in a culturally competent manner. This aspect is significant as chronic diseases are long-term, and require long-term engagement with health providers, especially at the primary health level.

3) Strengthening of teaching and training institutions for medical and managerial staff is required. Also, such training institutions can ensure that standardized protocols are being followed for screening of risk factors by community health workers. Establishing regional training centres and linking these with medical universities and colleges becomes crucial for capacity-building at the state level. Under this, scope of Rural Health Training Centres (RHTC) and Urban Health Training Centres (UHTC) could be further looked into.

4) Technology is usually considered to play a negative role as far as jobs are concerned, rendering workers disposable as a result of automation. However, in contexts as primary health systems in rural India, technology can literally be a life-saver and perform a number of functions which are usually expected of certain categories of health workers. From this perspective, technology can potentially play a constructive role where workers are not willing to take up jobs. However, the underserved areas are also the ones with the least access to technology. Without appropriate incentives to the IT, mobile app and medical equipment industry, such mismatches would be difficult to address. Especially in terms of analyzing patient records, facilitating referrals and continuum of care, technology would have to play a key role. Given India's growing app and well-established IT industry as well as rising number of social entrepreneurs, this may not be too difficult. A proper incentive structure would go a long way.

5) The preventive approach to chronic diseases requires that individuals are treated as partners in managing their own conditions. People-centered care involving self-management will help in reducing extra burden on healthcare professionals. But this will require that HRH be trained in these behavioral self-management skills so they can pass it on to patients as part of their routine

[27] Rao et al (2011) have argued that PSM departments suffer from 'low prestige, poor quality of staff, and inadequate facilities', and are 'the least popular specialization for medical students' (588). If there are proper incentives for these departments and their faculty and students – competitive payscale, work and research facilities, opportunities for travel to participate in national and international conferences, career progression path, etc. – they can also be made attractive.

care. In order to assure adherence, the target groups can be trained to do some simple diagnostic assessments by themselves (like measuring blood pressure and blood glucose). Interventions to improve health literacy among masses should be undertaken from this perspective as well.

6) There needs to be greater emphasis on the capacity-building and skill development of AYUSH practitioners, and they should be involved in opportunistic screening of metabolic risk factors, establishing and following up on referrals and further care at the level of primary health system.

7) A comprehensive real-time database for all public health care professionals should be created to facilitate timely and systematic recruitment, training and capacity-building.

6. Financing

Primary health systems have an extraordinary potential of containing both direct and indirect costs related to chronic diseases, given the scope for prevention at their level. While primary prevention is the *ideal* form of prevention, relying excessively on it – especially in developing countries where such prevention is usually dependent on structural variables (as pointed out in chapter 3) – will not only be more expensive, to begin with, but also not very helpful in addressing the existing burden of morbidity and premature mortality due to chronic diseases. It is contradictory on the part of the international health community to try to gain traction for chronic diseases in developing countries by highlighting the concentration of premature mortality in them, and when it comes to real action, predominantly focus on a level of prevention (primary / modifiable behavioural) which can at best play a supporting rather than the leading role in addressing their burden of morbidity and premature mortality. Secondary and tertiary preventions are, therefore, not only more effective, but also cost-effective in resource-constrained settings like India. Related interventions, if adequately financed at the level of primary health systems, hold the potential of addressing both human and economic costs related to chronic diseases. From a long-term perspective, however, we should not forsake the *ideal*, and should simultaneously work to create conditions that make healthy choices possible, and prevent the onset of risk factors in the first place.[28]

However, despite increasingly growing consensus on the efficacy of prevention-oriented strategies to tackle chronic diseases, there has been little traction for non-communicable chronic diseases in the international donor community, which has largely remained concerned with traditional health concerns (figure 21), perhaps because they are seen as health problems of the poor. We now know that majority of premature deaths – and by implication, the early onset of risk factors and morbidity – due to chronic diseases is also among the poor. Acute diseases probably kill the poor earlier than chronic diseases, but this does not mean that we ignore those who survive the former. It has become critical that the international donor community, national and provincial policymakers in particular, acknowledge the epidemiological transition and reorient their funding priorities accordingly. Until the international health community continues to emphasize the role of primary over other levels of prevention, the shift in funding patterns will also be difficult since primary prevention is premised on the responsibility of individuals rather than the ecosystem, which is the responsibility of states. Obviously, governments in most parts of the world find it convenient to shift the primary focus of responsibility from themselves on to individuals, and international health and donor communities

[28] The same holds true for developing pockets in developed countries – African Americans, for instance, in the United States, who are not only more susceptible to risk factors, but also premature mortality related to chronic diseases. It would be unwise on the part of federal and provincial governments in the United States to wait for structural conditions to improve before chronic diseases can be addressed among them. Likewise for governments in developing countries.

have acquiesced with such an approach to have traction for themselves with national governments. However, it is firstly the provincial, then national and international financing patterns which would matter in the prevention of chronic diseases since they would require long-term commitment and may not always yield quick and measurable results, as preferred by international donor community. And this is how the health financing patterns have been in India – as per National Health Accounts 2004-05, external flows only accounted for 2.3 percent of health expenditure in India, while state and central governments accounted for 12.0 and 6.8 percent respectively (figure 25).

Challenges and recommendations

A. Sources of financing

Noting that public health investment had declined from 1.3 percent of GDP in 1990 to 0.9 percent in 1999, India's second National Health Policy (2002) recommended that it should be increased to 2 percent by 2010. Figure 22 shows that it stood at 1.2 percent in 2010. In 2005, NRHM called for a commitment to increase it to 2 to 3 percent by the end of the 11th Five Year Plan (2012). It stood at the same level. In 2010, the High Level Expert Group (HLEG) constituted by erstwhile Planning Commission recommended it to be raised to 2.5 percent during the 12th Five Year Plan (2012-17), and up to a minimum of 3 percent by 2022. Acknowledging that none of these fiscal targets have been met so far, the draft National Health Policy 2015 has called for a *potentially achievable target* of 2.5 percent and contended that 'the failure to attain minimum levels of public health expenditure remains the single most important constraint'. India is the only country among top ten economies[29] that spends more on its military than health (public) – its military expenditure is third highest (2.4) among them, more than China's (2.1), while its government health expenditure is the lowest (1.3).

In countries where health care affordability among ordinary citizens is much higher than in India, governments spend much higher percentage of their GDP on health (Japan, Canada, United States). Sri Lanka, on the other hand, is able to manage universal health support with comparable levels of public health allocation due to its relatively high degree of efficiency in public health expenditures. Secondly, its public health system is still largely focused on traditional maternal and child health concerns and has only begun to deal with the burden of chronic diseases in a dedicated manner. It is likely that public health allocation in Sri Lanka would increase substantially – and become less sustainable – as it scales up its public system to address the burden of chronic diseases. If India is to avoid the level of fiscal stress that chronic diseases are imposing on developed countries, or are going to impose on developing countries like Sri Lanka, it needs to acknowledge and address their burden immediately rather than ignore it and continue to operate within the traditional framework of reproductive and child health. For developing countries like India and Sri Lanka, it may not be

[29] In 2013, by GDP constant USD 2005. Military and health expenditures are as percentage of GDP (WDI).

feasible due to aggregate fiscal constraints to keep OOP expenditure under 20 percent, as has been the case in developed countries, so prevention of chronic diseases is even more urgent in their case.

Low public expenditure on health (as percent of GDP) has meant low *public* per capita expenditure on health (figure 23) and high out-of-pocket health expenditure (figure 24) in India. While public expenditure on health as percent of GDP has hovered around 1 percent over several decades, public per capita health expenditure did register a dramatic increase – from INR 32 in 1974-75 to INR 63 in 1990-91,[30] and eventually to INR 1,280 in 2014-15 (NHP 2015). Although this increase has led to reductions in OOP health expenditures over the years, they continue to be high. As per National Health Accounts 2004-05, the latest that we have, households financed 71 percent of India's health expenditure, while the share of the public sector (state and central governments, local bodies) was 19.7 percent. Although the MOHFW and National Health Policies have largely focused on the first indicator, policymakers should actually consider all three – together, they provide a fuller picture of the burden of health expenditure on government agencies and citizens respectively. For instance, despite the fact that Sri Lanka spends a similar level as percent of GDP, its per capita public health spending is 2.5 times higher and OOP expenditures lower than India's.[31] At the state level, although Uttar Pradesh and Rajasthan had the highest share of government health expenditure in the country during 2014-15 – 13 and 7.8 percent respectively; it was 6.2 and 4.1 percent in case of Tamil Nadu and Kerala (NHP 2015) – as well as higher health expenditure as a percentage of GSDP, per capita public expenditure on health and monthly OOP medical expenditure per capita was lower in these two states vis-à-vis the better states (table 11). It seems from the case of both Sri Lanka and Kerala that if public allocation to health care as percent of GDP is low, OOP would likely be higher.[32] To deal with the burden of adult and child mortality together, public expenditure on health and tax exemptions for private health expenditures (as we shall discuss later) would have to increase.

---

[30] In real terms (Reddy and Selvaraju 1994: 23).

[31] OOP is high in Sri Lanka largely because people voluntarily seek private health care to save time and avail better quality health care than is publicly available. This also helps in reducing the state's financial and infrastructural burden.

[32] This could be because, in a scenario of low economic growth and public affordability of health care, public facilities, especially if widely and equitably available, would not be able to provide high quality care, and be overcrowded with long waiting times, as a result of which those who can afford will prefer to move out of public system and spend OOP. However, we need to make a distinction between OOP out-of-choice (as appears in the case of Sri Lanka and Kerala) and OOP out-of-compulsion (where public provision is abysmal and people are forced to make OOP expenditures). In the case of states like Uttar Pradesh, where corruption is high, technical and absorptive capacity and general health awareness low, higher government health allocations / expenditures may not necessarily lead to high OOP expenditure. In other words, low public demand for health care may make it convenient for corruption in health sector to happen. In such cases, procedural indicators such as coverage and utilization as well as outcome indicators such as prevalence of chronic disease risk factors, morbidity and mortality become more important than financial indicators in other cases.

As far as public expenditure on health is concerned, certain clarifications are called for here. When we talk of low government health expenditure, we tend to think of the Central Ministry of Health and Family Welfare (MOHFW), or at best the Central Ministry of Finance (MOF), as main actors. The latter can potentially be, as we shall discuss. However, as far as expenditures are concerned, given that health is a state subject, share of MOHFW in total government health expenditure has been lower than that of state governments. Centre's share in India's government health expenditure as percent of GDP in 1990-91 (1.03 percent) was 0.09, while that of the states and union territories was 0.94 (Reddy and Selvaraju 1994); by 2004-05, Centre's share rose to 0.29, while that of states and UTs got reduced to 0.69 percent (Berman and Ahuja 2008). In 2012-13, as percentage of total government expenditure on health, MOHFW's share was 26 percent, of other Central government ministries 7 percent, and that of states and UTs 67 percent. However, over recent years, Centre's share has declined – from 36 to 30 percent between 2009-10 and 2014-15 (NHP 2015) – even as the shares of states in central taxes increased up to 42 percent (as per the recommendations of the Fourteenth Finance Commission). Therefore, when we talk of increasing government contribution to the health sector, from a technical perspective, we should primarily focus on state governments rather than MOHFW or other Central ministries. For chronic diseases particularly, given the long-term commitment that they require, states would have to bear primary fiscal responsibility as far as government contribution is concerned. At the moment, even health-advanced states like Kerala and Tamil Nadu spend not only less than the national average, but also vis-à-vis health-backward states like Uttar Pradesh, as a percentage of GSDP (table 11).[33]

Having said that, one could put forth several justifications for interventions by Central government in general, MOHFW and MOF in particular, in addressing the burden of premature adult mortality and chronic diseases in the country.

1) India, as a country, has an international commitment under the SDGs.[34] The Central government has adopted a leadership role on this at the international level. It has an additional responsibility given that most number of premature deaths generally as well as due to chronic diseases happen in India. The Central government cannot simply cite legal reasons – that health is a state subject – and ignore its responsibility as the country's representative and its international commitment.

[33] Some may argue that, for this to happen, the state GDP needs to grow first. Average GDP growth (at 2004-05 prices) between 2005-06 and 2011-12 was higher in Tamil Nadu (9.7) and Rajasthan (8.7) than national average (8.5), while it was slightly lower in Kerala (8.4) and substantially in Uttar Pradesh (7.2) (Economic Freedom of the States of India 2013). The Centre, first of all, should provide a push to economically laggard states like Uttar Pradesh, and until they catch up, should continue to provide substantial fiscal support to core areas like health. Citizens should not be punished for the performance of the state.

[34] SDG Goal 3 – Reduce premature mortality due to NCDs through prevention and treatment by 1/3rd by the year 2030.

2) The Centre cannot justify spending almost 8 times higher on military (as a percentage of GDP), to save citizens from external threats, while a much higher number continue to die prematurely due to chronic diseases – the highest in the world – within the country. Prioritizing the survival and welfare of citizens does not need too much of a justification.

3) State health systems, including Kerala's, have historically focused on RCH and acute diseases, and given the leadership and visionary role that the Central government has traditionally played within the country as well – formulating national health policy, etc. – it should provide the first big push to states in dealing with premature adult mortality and chronic diseases. This should be visionary, technical as well as financial. It has a huge scope for doing this within the context of National Health Mission (we will shortly discuss the issue of priority-setting in financing).

4) Premature adult mortality due to chronic diseases tends to be concentrated among poor. States like Uttar Pradesh and Kerala which are not doing well economically – especially former, with a population of 66 million in the at-risk 30-69 year age group (figure 5) – should receive special assistance from the Centre to deal with the burden of chronic diseases, particularly premature mortality due to them. Kerala also deserves a special focus because it is probably at the highest stage of the epidemiological transition among Indian states, and, therefore, would have a higher proportionate burden of chronic disease morbidity, if not high premature mortality due to them. At a general level, the Centre should provide financial and technical support to states that are not able to address their burden of prevent premature mortality in particular, precisely what it has been doing traditionally in the context of child and maternal mortality.

5) The Central government should try to address major inter-state disparities in health outcomes so that there is some level of national sense and convergence in this sphere as well.

6) Premature adult mortality, in particular, has grave implications for the national economy at the aggregate level, in addition to their economic impact on households, communities and the state. Even if such implications were more or less local, it would have been important for the Centre to address wide economic disparities at the household and state level. Addressing premature mortality at the adult level should actually be a strategy for poverty reduction at the household and aggregate levels (for reasons discussed earlier).

We could accordingly put forth certain policy recommendations, for the Union Ministry of Finance in particular.

1) **Universal health coverage / tax exemptions:** Ensuring survival and health of citizens are core functions of the State, and in a situation where neither Central nor state governments are providing comprehensive, universal health coverage, there should be for:

a. *Partially / completely uninsured taxpayers*: There should be income tax exemption for all eligible[35] health expenditure incurred by individuals on themselves and their families in cases where they are not / partially covered by other sources of financing. This would not only reduce direct and indirect economic burden of chronic diseases on households, but also raise the per capita expenditure on health, which is extremely low in India vis-à-vis even other lower middle income countries like Sri Lanka, let alone the developed. If the government is not able to raise public per capita expenditure on health, it should provide tax exemptions for the same. At the same time, there should be a push to extend health insurance coverage to the highest levels of preventive and curative care, even if that means an increase in insurance premium, which should also be completely covered through tax exemptions for the publicly / employer uninsured. The Central Ministry of Finance can pass on / share these tax deduction liabilities with states since it is primarily their responsibility to provide / exempt universal health care.

b. *The publicly / employer insured*: A number of recommendations could be made here due to various categories of insurance coverage.

    i. It is actually quite awkward that there is a cap on coverage for a health scheme meant for the poor (RSBY) – INR 30,000 for a family of five, or INR 6,000 per person – but none for those covered under CGHS or ESIS, who are much better-off, at least in a relative sense. The government should expand coverage under RSBY, demographically and financially, as much as possible, even if gradually.

    ii. As far as ESIS is concerned, the existing wage limit for coverage under ESI Act – INR 15,000 per month (wef 1st May 2010) – should be increased since this is miniscule and leaves out a huge proportion of the workforce that cannot afford appropriate curative, let alone preventive, care on its own, or with catastrophic financial implications.

    iii. In the case of employer-insured, the government should offer at least some tax incentives to employers providing partial or complete insurance to employees.

c. *Unemployed / uninsured*: The first strategy in their case should be to cover them under some form of health insurance, and until that happens, they should have the first right over public resources for health, preventive and curative, by degree of unaffordability.

[35] Expenditures of a non-essential nature (for e.g. cosmetic surgeries) should be left out of the ambit of tax exemption. As far as prevention is concerned, tax exemption should not be restricted to preventive health checkups (as is presently the case), but also cover major risk factors (table 3), especially metabolic. To enable individuals address the behavioral risk factors, the MOF could have a set of structural and individual incentives and disincentives. For instance, balanced nutrition, particularly fruits and vegetables (low intake of which are the 2nd and 3rd highest dietary risk factor), should be made as widely affordable as possible. Raising sources of revenue to finance such activities will be discussed later.

The unemployed deserve public support even more generally (but which most citizens do not get from the government). In their case, health coverage could either be part of unemployment insurance / allowance, etc.

2) **Alternative financing sources:** Should be considered to expand the pool of current resources.

   a. *Additional surcharges on alcohol and tobacco products:* This is increasingly gaining traction in many parts of the world and is being used to fund chronic disease prevention. In Thailand, for instance, such taxes on are used to finance *ThaiHealth*, an autonomous state agency founded by Health Promotion Foundation Act (2001), which is mandated to promote healthy behaviours, environments and societies. In South Korea, tobacco cessation initiatives are funded through Health Promotion Fund, which was exclusively established from the progressively increasing surcharges imposed on tobacco products. Jamaica's National Health Fund is partially financed through tobacco taxes, and is used to fund chronic disease prevention. The current base of excise revenue could be further expanded if unfiltered cigarettes, bidis, chewing tobacco and like are brought under the standard purview of tobacco taxation.

   b. *Sin taxes:* France, United States and Mexico have levied 'soda taxes' on aerated drinks to curtail demand for these products. Food items containing excessive fats are subject to 'fat taxes' in Denmark, Hungary, Finland and Norway. Indian policymakers too have responded to the rising obesity burden in the country by imposing excise taxes on fizzy drinks, recently going up to 18 percent. Recently, a proposal to subject aerated drinks to a 40 percent sin tax met with strong opposition from the beverage industry in India. Proposals to subject alcohol and tobacco to a sin tax under the prospective Goods and Services Tax (GST) regime are also underway.[x]

   c. *Additional health tax:* Other industries too should be incentivized or disincentivized as per their health impact. Those which have a negative impact on any of the risk factors (table 3) should be taxed, while those which have a positive impact on them should be given some sort of tax exemptions. A Health Impact Assessment Index (HIAI) should be created to determine level of impact and concomitant level of tax liability / incentive.

   d. *Earmarking health-related taxes:* Until taxes related to chronic diseases are earmarked for their prevention and treatment – as was the case for health cess on tobacco products to fund NRHM, and more recently the *Swachh Bharat* cess, the proceeds of which fund activities under the Clean India Drive – such taxes will neither help the cause of chronic diseases nor carry legitimacy among related taxpayers and the general public. However, it is debatable whether imposing health cess on the public is a justifiable measure since health is a core function of the State and should be paid for from general taxes, as has been recommended in the draft National Health Policy 2015 as well.

e. *Corporate Social Responsibility (CSR):* The Companies Act, 2013 requires companies to spend at least 2 percent of their average net profits earned during the past three years on CSR initiatives. They can spend on a range of activities, including 'promoting and preventive healthcare'. Firstly, a certain percentage of these funds should be earmarked for prevention of chronic diseases since their impact is huge on working age population as a whole, as well as specifically on employee productivity and company profitability. Such earmarked funds should be allowed to be utilized in several ways. One, companies should be allowed to use such funds for funding preventive activities of their own staff. Two, companies should have the option to fund Central / state / local interventions for the prevention of chronic diseases. Gates Foundation, for instance, funds several health initiatives at the Central and state levels in India. Why can't CSR funds be allowed for this purpose? This would incentivize governments to improve governance and compete for such funds, especially if pooled and managed centrally, for instance by associations.

3) **Ensuring affordability of essential medicines:** Recently, the Union Ministry of Finance withdrew customs duty exemption on more than 70 life-saving medicines, mainly used in the treatment of chronic diseases such as cancer, CVDs, diabetes, neurological and renal disorders. The strategy is expected to strengthen domestic pharmaceutical manufacturing capacity in line with the Centre's *Make in India* campaign. However, imposition of import duties on active pharmaceutical ingredients, which are vital for manufacturing essential medicines locally, is expected to raise manufacturing costs of locally produced medicines as well, which in turn will be passed on to consumers, with further implications for OOP health expenditures, nearly half of which go into buying medicines. And what about the choice of medicines in terms of quality for those who can afford? Why make quality health care choices more difficult when the government is not putting adequate resources in health sector, let alone providing universal health coverage? As tariffs are levied irrespective of the health / economic status of those who are liable to bear their burden, the Central government should consider eliminating them.

B. Budgetary inefficiencies

Another critical problem area in countries like India is the inefficiency of financial allocations and expenditures. Efficiency in this context is linked to sound governance and monitoring mechanisms.

1) **Budget shrinkages:** Table 12 illustrates how the main NHM budget for dealing with chronic diseases, the NPCDCS, shrinks in phases – from the proposal to the approval stage and then in terms of actual expenditure – in the selected states. The approval rates range from 7 percent in a health-advanced state like Tamil Nadu to 35 percent in the case of another, Kerala. Spending rate was the highest in Uttar Pradesh – it is quite possible that a substantial portion of this was inefficient due to corruption, lack of institutional capacity, etc. Following are some issues that

need to be considered together with this particular challenge. However, what needs to be noted here that more than complete or higher utilization of approved budgets, their efficiency should be a matter of greater concern. Institutional capacity-building – in terms of governance norms, manpower / skill development, infrastructure – are critical to reduce budgetary inefficiencies.

2) **Lack of data for budgetary planning:** Often inadequate or surplus approval of funds may be the result of insufficient or total lack of data on actual departmental requirements. For instance, our field visits indicated that funds for higher order medical equipment is approved for PHCs and SCs while their legitimate use at their level is suspect. Since program requirements have to be appropriately ascertained before the demand for grants is made, programs may either fail due to shortage of resources, or funds in successive stages might suffer cutbacks on account of being left unutilised.

3) **Uncertainty in budgetary procedures:** Health departments effectively have a duration of not more than six months to utilise their allocated budgets. Even after they are approved between April and June, the timely release of funds does not take place immediately thereafter, delaying / disrupting ongoing activities. Further, funds are made available in instalments, and the initial instalment is many a time insufficient to perform critical tasks, and they are made to wait until further instalments are received. Despite the delay in receipt of funds, budgetary authorizations demand that sanctioned funds be accounted for within a single financial year (NCMH 2005).

4) **Under-utilisation of funds:** Even though public health spending in India is one of the lowest in the world, an ironic reality is that many health systems are unable to utilize budgets allocated to them (table 12). A major proportion of these finances remain unutilized not because they are in excess, but due to the skill shortage of health personnel and infrastructural inadequacies. Not only do health departments have to give up unused funds, their allocations in consecutive years are determined in accordance with the funds actually spent in the last year (Berman et al. 2010; NCMH 2005). By the end of a financial year, health-backward states like Uttar Pradesh and Rajasthan are able to utilize only about eighty percent of allocated funds. The corrective measure should be to enhance the technical and absorptive capacity of such health systems and not to punish the beneficiaries through reduced spending, while they are already suffering due to mis-prioritized funding.

5) **The state of public and private health insurance:** The Central and certain state governments have introduced health insurance schemes for BPL and low income households to offer financial security against catastrophic health expenditures and impoverishment. Some of them have also collaborated with NGOs to offer improved access and affordable healthcare, especially in the Southern states. The Central government offers comprehensive health insurance schemes to retired / serving employees of Union ministries and their dependants, serving and ex-army

personnel along with their families, retired and serving employees of Indian railways, etc. Table 14 provides a detailed account of some of the most prominent centrally sponsored and state / community health insurance schemes in the country. In addition to publicly-sponsored health insurance schemes, private voluntary health insurance has two forms of markets, a group market that caters to employers and a retail market which consists of individuals and family plans (La Forgia and Nagpal 2012). Out of total health insured population during 2014-15, non-life / standalone commercial health insurers covered 73.7 million people through group / family / individual insurance plans, while government-sponsored schemes insured 214.3 million individuals in the country (IRDA 2015). As discussed before, a substantial majority of Indian population still lacks insurance coverage which renders it vulnerable to the impoverishing effects of health care. Moreover, it is often argued that most of the publicly-sponsored health insurance plans are *target specific* and meant to address *low frequency, high-value hospitalization cases*. It has also been observed that hospitalization expenses, especially of the poor and economically vulnerable sections, account for about one-third, while expenses on outpatient visits and drugs account for two-thirds of aggregate OOP spending of households (Selvaraj and Karan 2012). The latter is not covered by most Indian health insurance schemes, especially commercial ones. The Union government should create an enabling policy environment to promote private health insurers by simplifying regulatory and administrative procedures. PPPs can offer immense opportunities in widening the reach of health insurance to poor and economically vulnerable sections. Community health insurance scheme of Karuna Trust (Karnataka), for instance, is a successful model of public-private collaboration to offer affordable health coverage to poor families. Incorporating preventive and outpatient care components in such PPP-based schemes – not to mention medicines which inflict a severe economic burden on Indian households – can help contain ambulatory, hospitalization and surgical costs, and thereby the burden of DALYs.

C. Prioritization of health expenditures

The problem in India is not just about low priority to health among citizens and governments alike, but about lower priority to chronic diseases and prevention within miniscule health expenditures. Figure 26 highlights that more than three-quarter of health expenditure has been curative in nature. Part of the problem is low sensitization towards them, but partly because curative expenditure has itself has been difficult to afford for households and governments that prevention has been ignored. Households are already so burdened by health care expenditures, not least due to high health care inflation, that they are actually scared to go for screening, lest some unpleasant results emerge. As far as priority for chronic diseases is concerned, figure 27 shows that, despite some improvements recently, share of NCD expenditure in NHM was only 2.6 percent. Approved outlay for the current financial year wasn't much different either (figure 28). Further, it should be noted that NHM NCD budget also includes outlays for health conditions like blindness, deafness, burns, mental and oral

health, elderly and palliative care and tobacco control, and only 42 percent of the approved outlay under it in 2015-16 went for NPCDCDS (figure 29), the main program that focuses on core chronic diseases in the NHM framework. And if we were to evaluate allocation within NPCDCS in a state which received the highest share of it (table 13), we find budgets for primary health systems were even meagre. So, basically, this is where we presently stand in terms of addressing chronic diseases at the level of primary health systems in a state which has the highest allocation for it, as also the highest burden of premature adult mortality in the country.

The first policy recommendation here is that the 27 percent meant for health system strengthening (figure 28) should also be utilized from the perspective of chronic diseases rather than only RCH, which his presently the case. This initiative alone might provide a great impetus for reorientation of primary health systems toward chronic diseases. Institutional capacity-building from a chronic disease prevention perspective would have long-lasting impact than fragmented strategies for their management. Secondly, allocation under NHM should be made based on the respective burden of premature mortality (child and adult) in various states. Thirdly, since households have been leading sources of health care financing in India, they should be sensitized and incentivized for prevention of chronic diseases.[36] Prioritized tax exemptions for prevention might help. Fourthly, the Central government should consider leaving curative expenditures to states and insurance coverage, and itself focus its financing for the prevention of premature child and adult mortality in various states. Finally, not only in primary health systems for general public, but prevention of chronic diseases at the level of CGHS, ESIS and other dispensary levels should be strengthened. Prevention should also be structured in RSBY as well as other health insurances, public as well as private.

[36] Section 80D of Income Tax Act allows for deductions on account of health insurance premiums paid up to INR 15,000 per family (self, spouse and two children). A further relaxation of INR 5,000 is permissible if parents of the taxpayer are senior citizens (aged 60 or above). If a health policy is bought by taxpayers in the name of their parents, an additional deduction of INR 15,000 can be secured. From financial year 2013-14, a deduction of up to INR 5,000 has been allowed on expenses incurred on preventive health check-ups within the existing limit of tax exemption. Under Section 80DDB, deductions of up to INR 40,000 can be claimed by individuals on medical expenditures incurred for treatment of neurological disorders, cancers, HIV/AIDS, chronic renal failure and haematological disorders (self and dependents). The limit is raised up to INR 60,000 if dependents include one or more senior citizens.

7. Conclusions

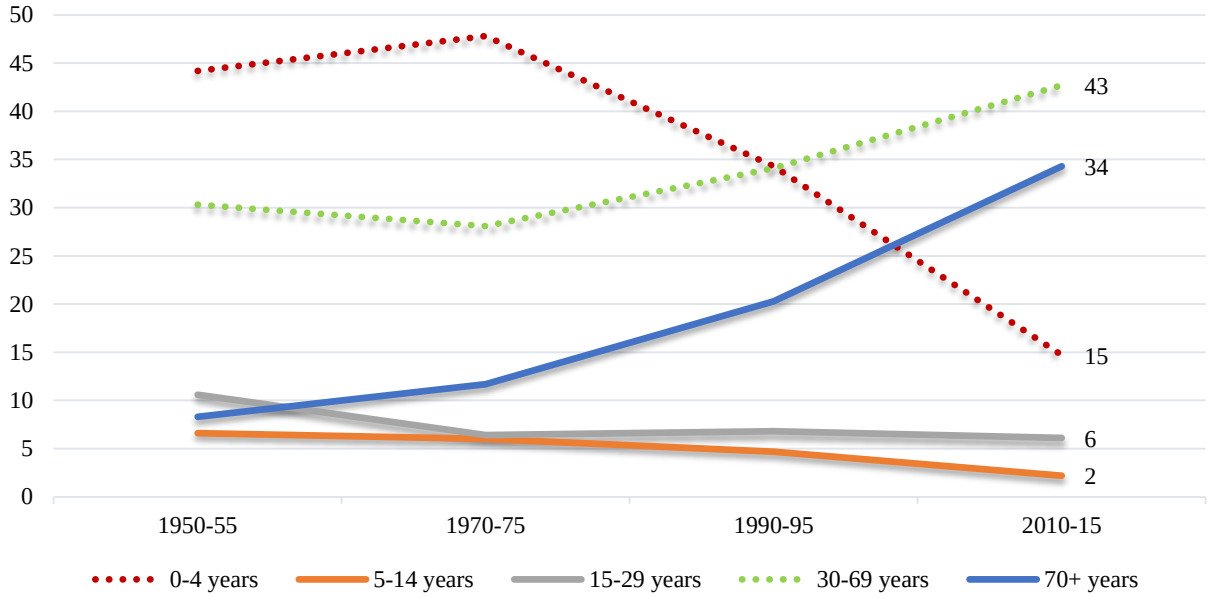
India continues to be the world's largest contributor to all levels of premature deaths. However, it has witnessed a dramatic shift in the burden of premature mortality from child (0-5 years) to adult (30-69 years) levels over the years. During 2010-2015, there were almost three times more deaths happening at the adult vis-à-vis the child level. Primary health systems in India – and with them, patterns of governance, manpower and financing – are in urgent need to reorient their priorities in line with the changed demographic and epidemiological realities of the country. This applies, more or less, to primary health systems in all parts of the country since even health-advanced states like Kerala and Tamil Nadu are preoccupied with the traditional RCH framework and are not tackling the burden of chronic diseases with the level of focus that they deserve. There are massive human and economic costs attached to this lack of transition in primary health systems in particular, since they hold immense promise in the prevention of risk factors, morbidity and mortality due to chronic diseases. The present paper discussed a number of major challenges and offered actionable policy recommendations vis-à-vis governance, manpower and financing aimed at primary health systems.

Although primary prevention is being widely advocated as the most effective strategy – in terms of costs as well as impact – we have argued that health systems should focus on their core functions and do what they do best – diagnose (secondary prevention) and treat (tertiary prevention). Primary prevention is the ideal strategy for dealing with chronic diseases in the long-run, and governments should invest in it through PPP models. However, it is neither cost-effective, nor quick in terms of impact in a situation where millions of people are dying prematurely every year and a much higher number requiring treatment / rehabilitation in order to prevent disease progression and early death. Primary health systems should organize or coordinate workplace- and community-based screening to detect metabolic risk factors and morbidity and address them at the earliest, ensuring continuum of care. This may seem overwhelming, but is achievable with improved governance and utilization of human and financial resources. Governments, Union and states, need to prioritize their policies, strategies and funding, provide income tax breaks for prevention of chronic diseases to those who can afford it, universal health coverage to those who cannot – fund / tax-exempt universal health.

Given that: a) health is a state subject, b) there are wide variations in the health profile and needs of states, c) chronic diseases require a long-term local commitment, state governments shall have to play a major role even as the Union government in general, and MOHFW in particular, can play visionary and leadership roles in giving the first big push to the states, monitor their performance regularly, try to address wide interstate disparities and prioritize their resources, both technical and financial, for health-backward states. The Central government should also play a major role at the macro level – extend health insurance coverage across the country, have the prevention of chronic diseases included in their ambit, incentivize / disincentivize the industry based on its health impact.

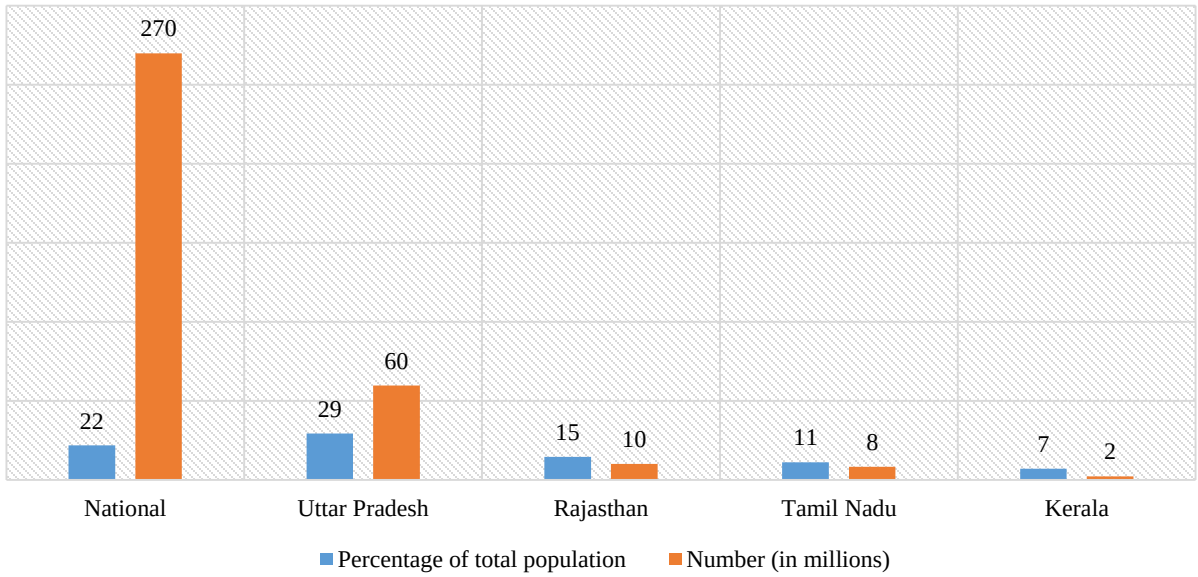
Figures and tables

Figure 1: Distribution of deaths by broad age groups (as percentage of total deaths), India, 1950-2015



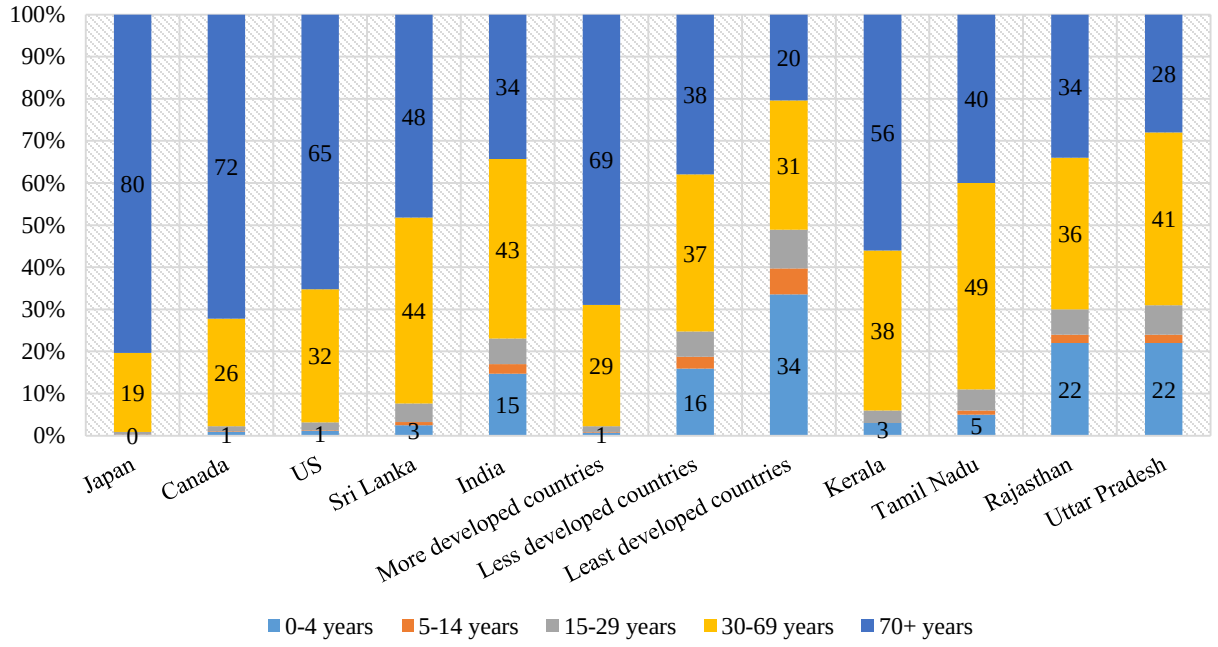
Source: WPP 2015.

Figure 2: Number and percent of persons below poverty line in selected states and at the national level in India, 2011-12 (based on Tendulkar methodology)



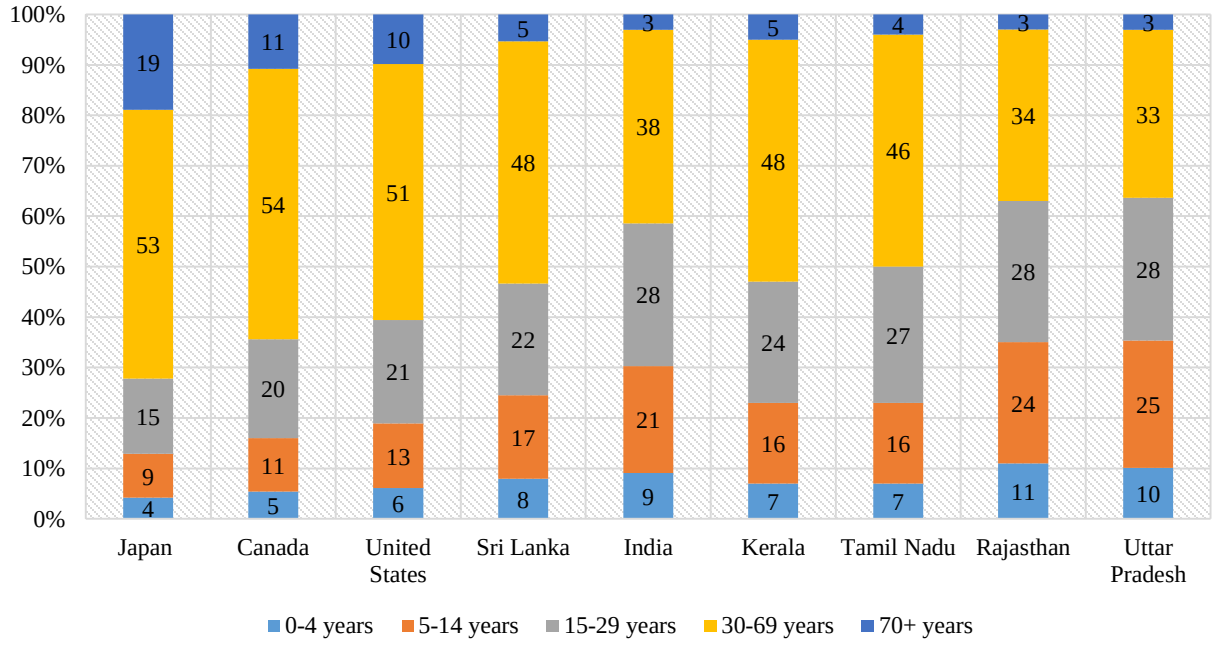
Source: Planning Commission 2014 (based on NSS 68th round), GOI.

Figure 3: Percentage distribution of deaths by broad age groups in selected countries (2010-15), countries by development status and Indian states (2013)



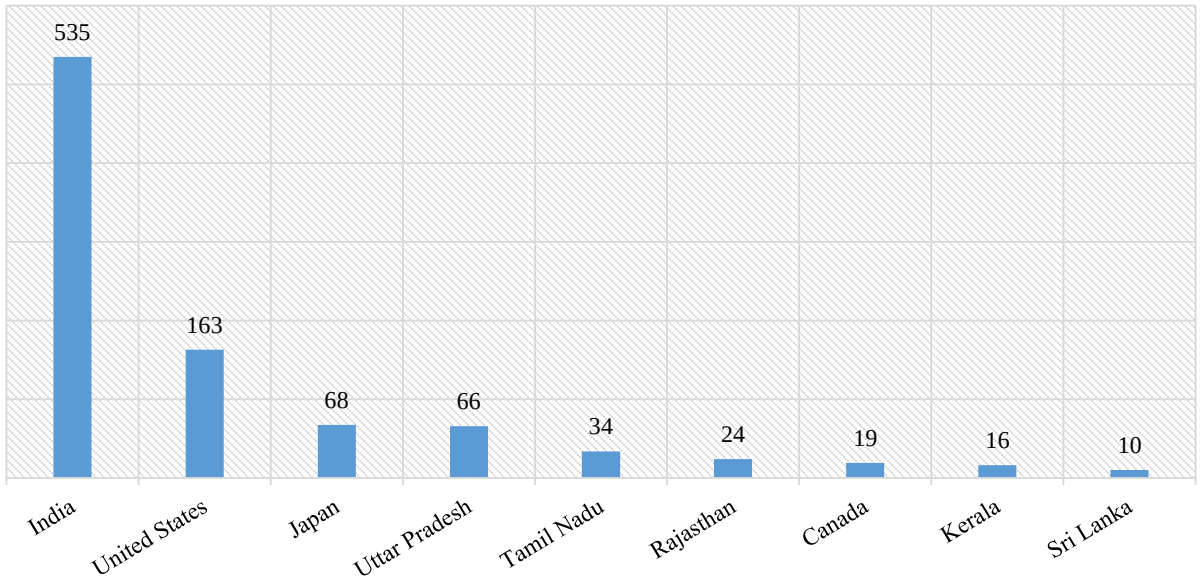
Source: WPP 2015 (countries) and SRS 2013 (states).

Figure 4: Percentage distribution of population by broad age groups in selected countries (2010-15), India and selected states (2011)



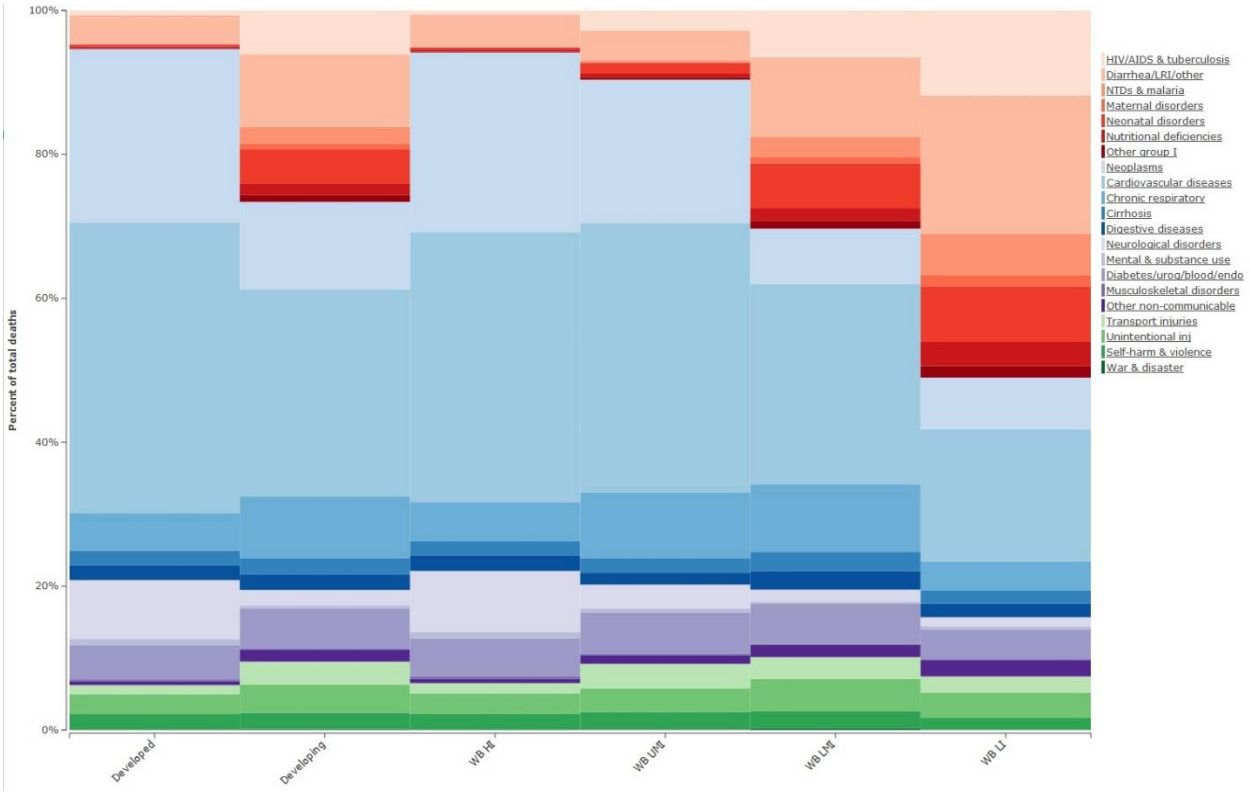
Source: WPP 2015 (countries) and Census of India 2011 (India and states).

Figure 5: Population aged 30-69 years (millions) in selected countries (2015) and states (2011)



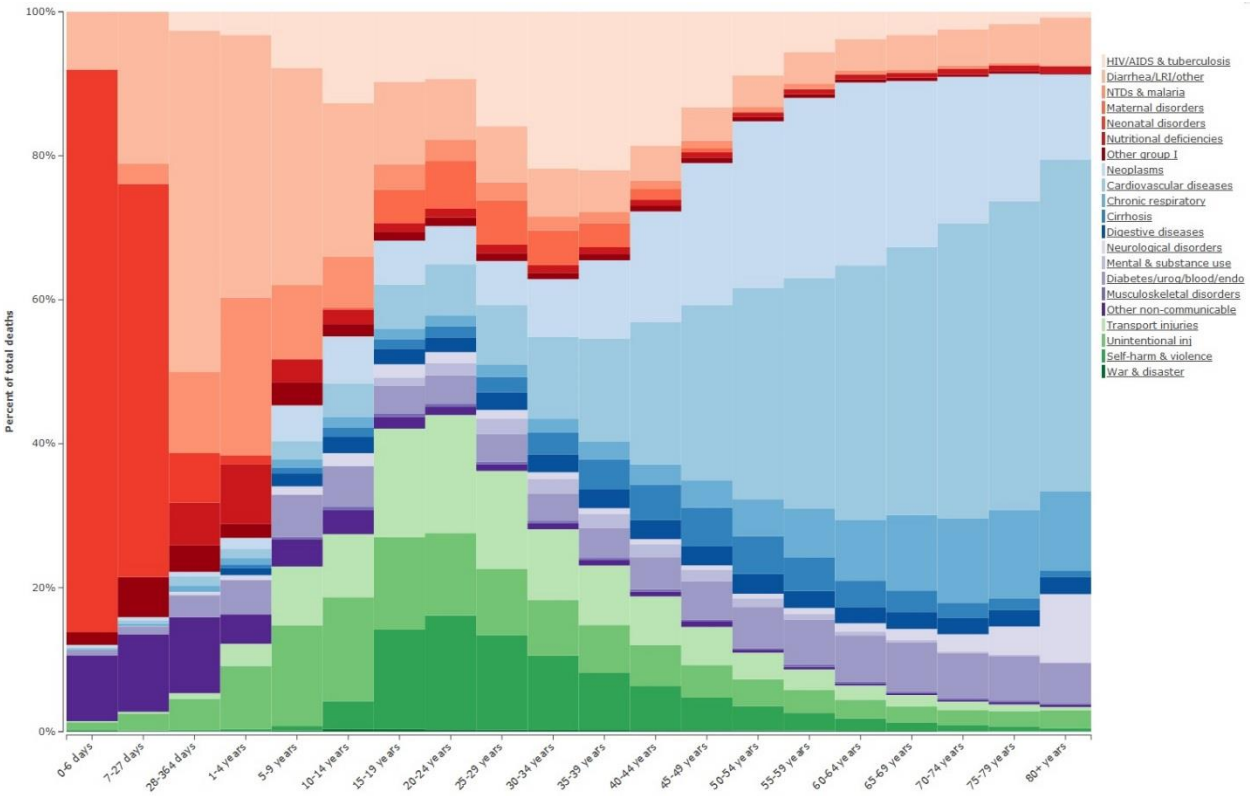
Source: WPP 2015 (countries) and Census of India 2011 (states).

Figure 6: Causes of death by development status and World Bank income groups, global, 2013



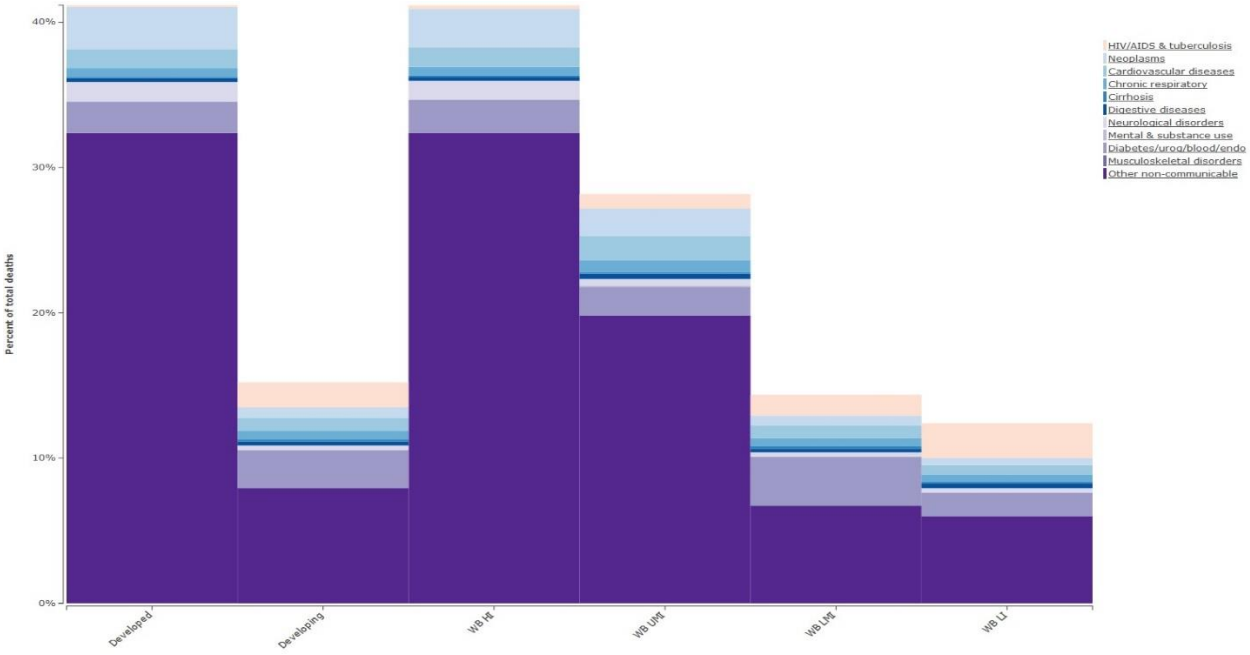
Source: IHME.

Figure 7: Causes of death by age, global, 2013



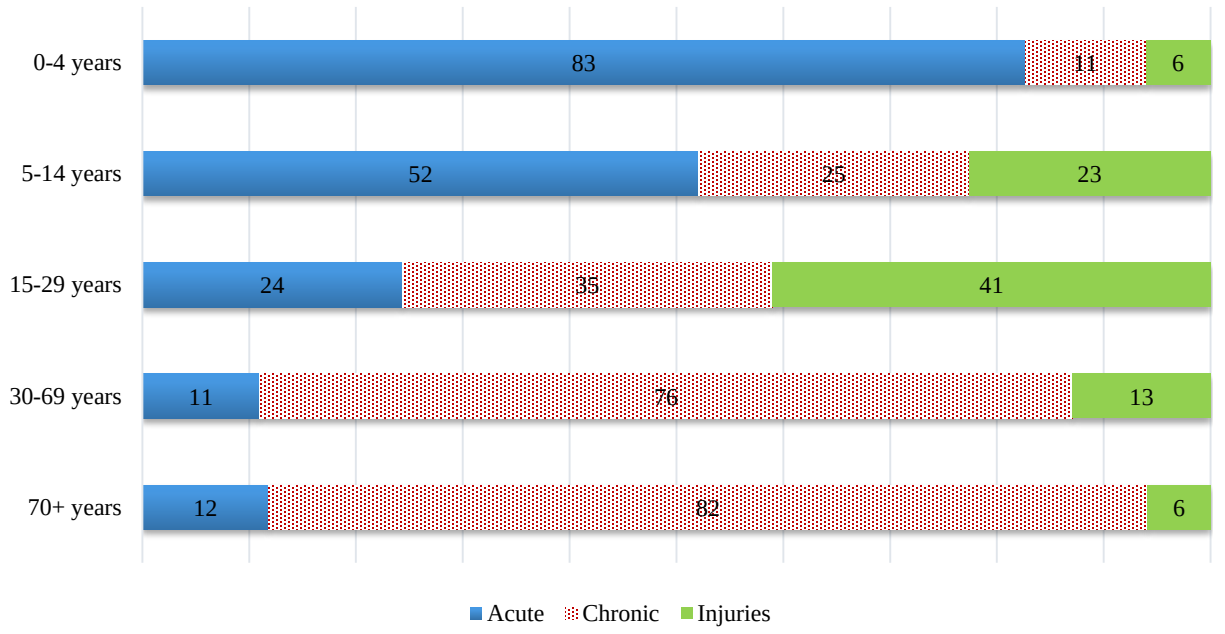
Source: IHME.

Figure 8: Chronic disease-related mortality at the child level by development and income level, 2013



Source: IHME.

Figure 9: Causes of death by age groups (percent of total deaths), India, 2013



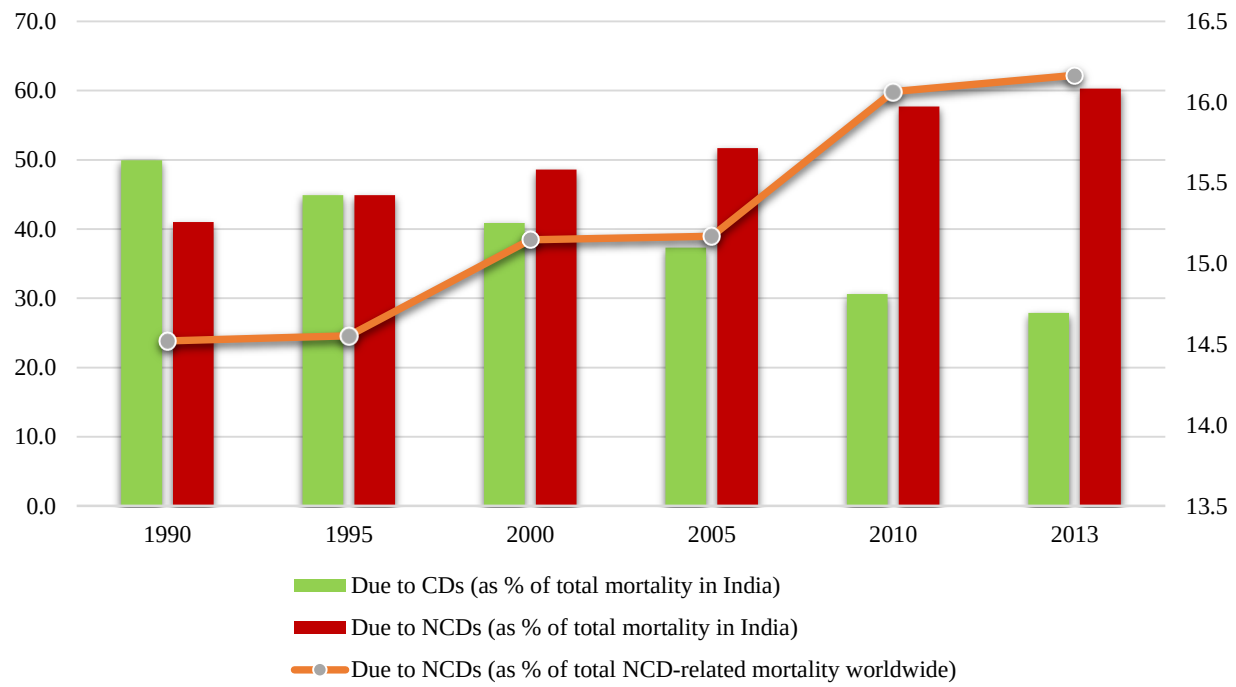
Source: IHME.[y]

Table 1: Deaths due to all and 8 major chronic diseases in India and its global rank, 1990-2013

Disease type	Number of deaths			India's global rank		
	1990	2000	2013	1990	2000	2013
Chronic diseases	4,835,057	5,716,656	6,810,313	2	2	2
Cardiovascular diseases	1,507,858	2,034,752	2,760,755	2	2	2
Chronic respiratory disorders	1,096,746	1,146,030	1,395,760	1	1	1
Cancers	427,285	515,824	677,241	3	3	2
Tuberculosis	850,914	660,529	545,516	1	1	1
Digestive diseases	316,664	306,678	324,482	1	1	1
Cirrhosis	125,514	185,926	262,180	2	1	1
Diabetes mellitus	134,783	179,768	237,774	1	1	1
HIV/AIDS	64,125	281,202	78,662	1	1	3

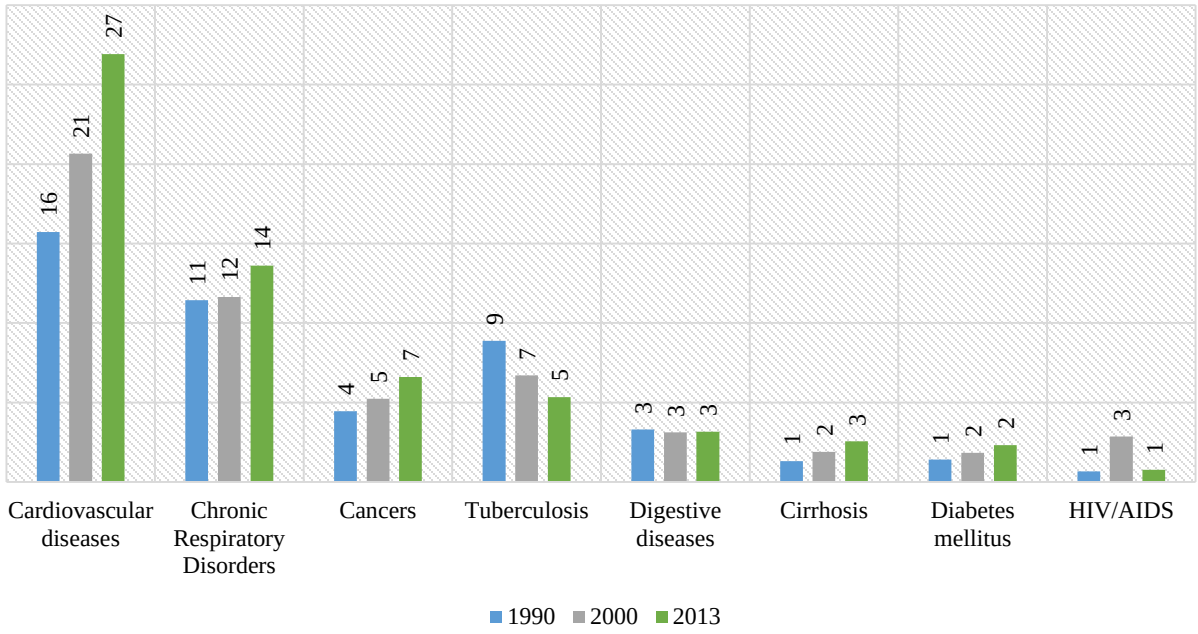
Source: IHME.

Figure 10: Mortality burden in India by major cause, 1990-2013



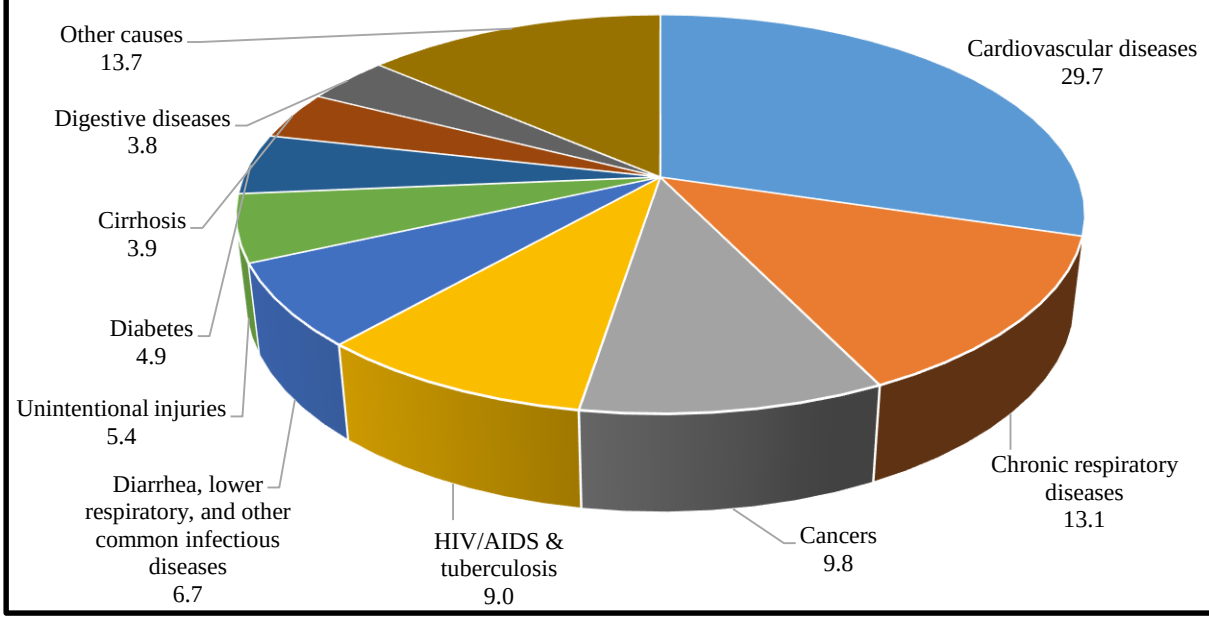
Source: IHME.

Figure 11: Mortality (as percent of total mortality) due to 8 major chronic diseases in India, 1990-2013



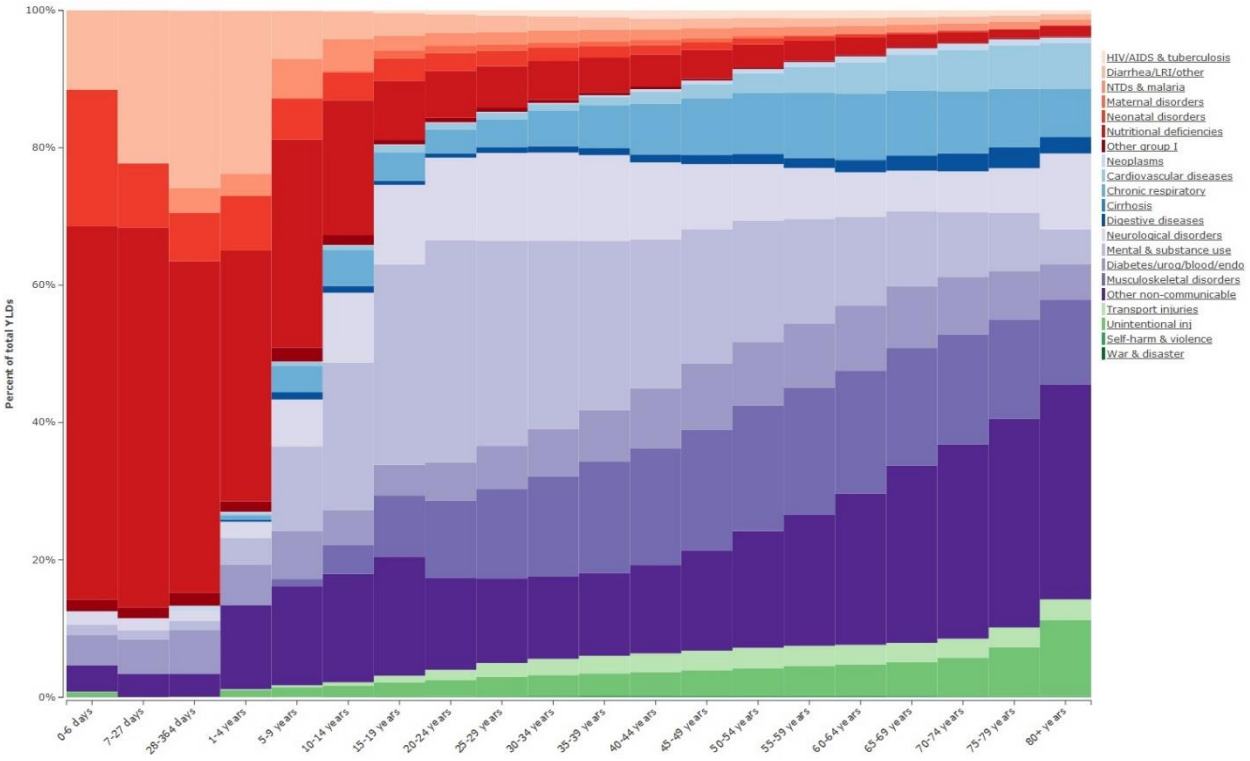
Source: IHME.

Figure 12: Top 10 causes of death at 30-69 year level (as percent of total deaths), India, 2013



Source: IHME.

Figure 13: Years lived with disability (YLDs) by age, India, 2013



Source: IHME.

Figure 14: YLDs due to chronic diseases (in millions), India, 1990-2013

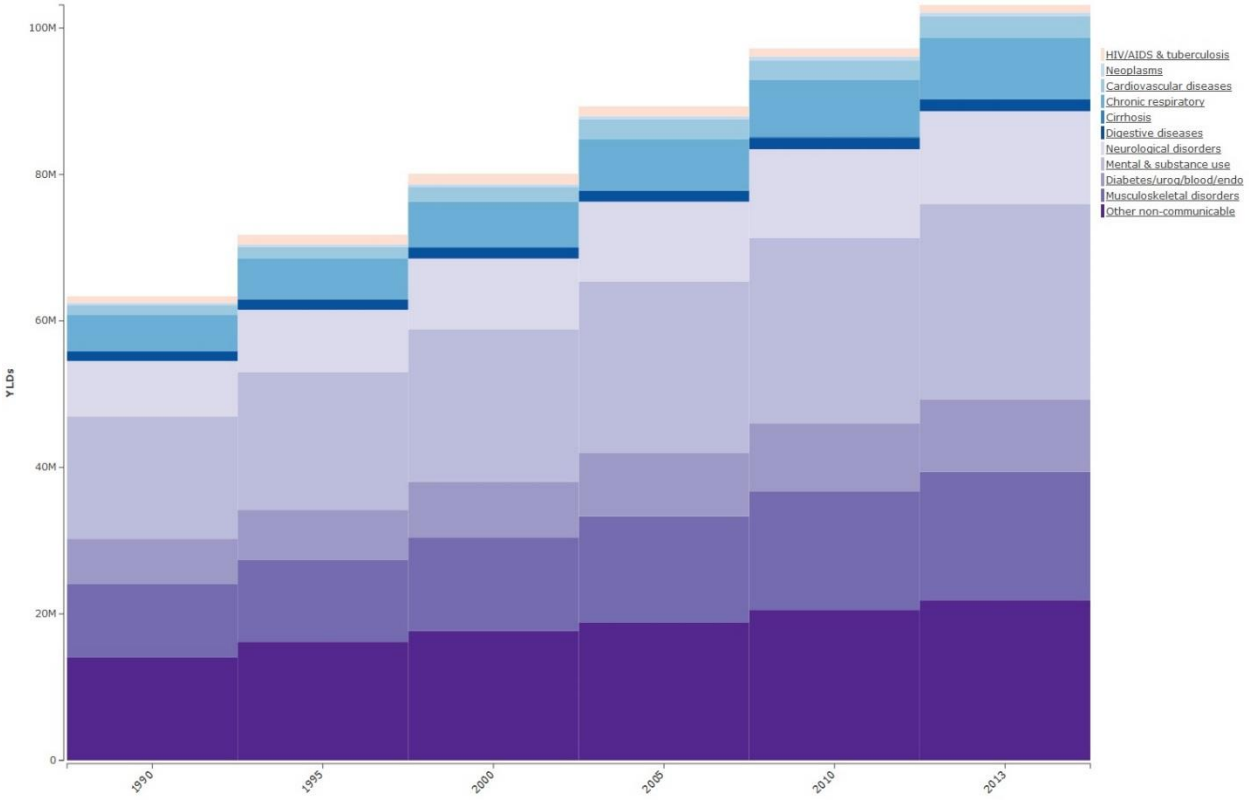
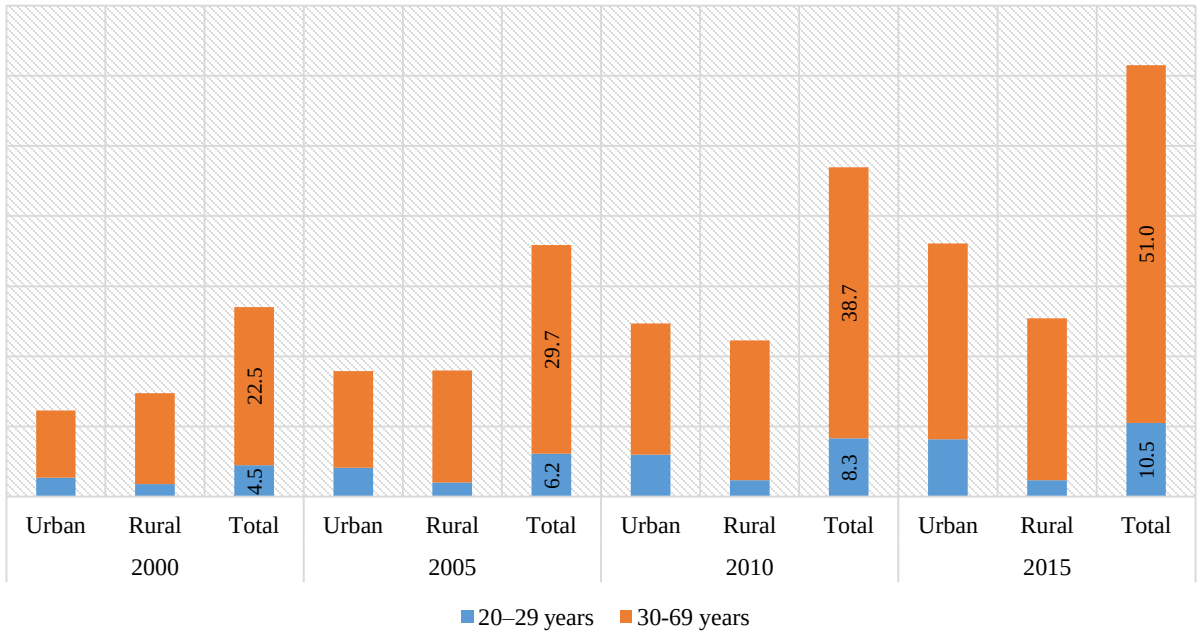


Table 2: Estimated / projected prevalence (in millions) of major chronic diseases in India, 2005-16

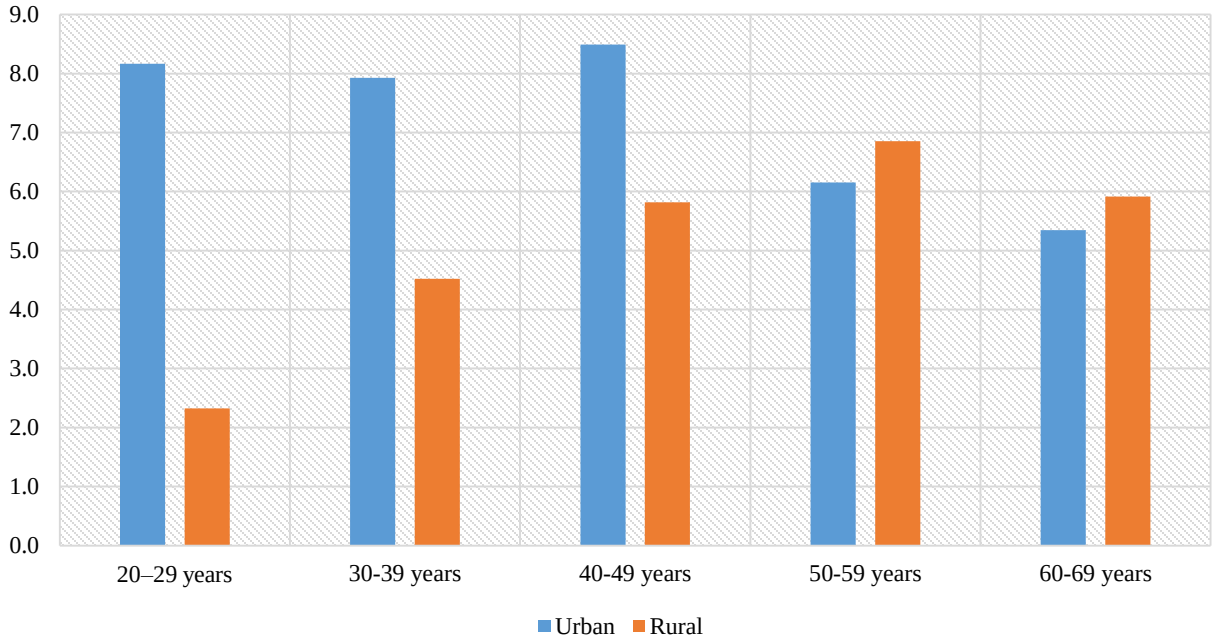
Disease		Year	Prevalence	Source
CVDs		2005	38	NCMH (2010 figures for asthma and COPD are from INSEARCH)
		2015	64	
CRDs	**Asthma**	2006	28.2	
		2010	13	
		2016	35.1	
	COPD	2006	17	
		2010	11	
		2016	22.2	
Cancers		2004	2	Globocan
		2015	2.5	
		2007-12	1.8	
Diabetes		2014	66.8	IDF Diabetes Atlas
		2015	69.2	
HIV/AIDS		2007	2.2	NACO-NIMS
		2015	2.1	
Tuberculosis		2012	2.8	Global TB reports
		2014	2.5	

Figure 15: Estimates (in millions) of coronary heart disease prevalence in India by type of residence and selected age groups, 2000-15



Source: NCMH 2005: 204.

Figure 16: Estimated CHD prevalence (in millions) in India by type of residence and selected age groups, 2015



Source: NCMH 2005: 204.

Table 3: Risk factors of selected 8 chronic diseases (in order of influence), India, 2013

Type of risk factors	1) Behavioural 1990 - 35% of total deaths 2013 - 40% of total deaths	1) Dietary risks	1) High sodium 2) Low fruit 3) Low vegetables 4) Low whole grains 5) Low omega 3 6) Low fibre
		2) Tobacco	1) Smoking 2) Second hand smoke
		3) Low physical activity	
		4) Alcohol and drug use	
		5) Unsafe sex	
	2) Metabolic 1990 - 30% of total deaths 2013 - 39% of total deaths	1) High blood pressure	
		2) High fasting plasma glucose	
		3) High total cholestrol	
		4) High body mass index	
		5) Low glomerular filtration	
	3) Environmental 1990 - 22% of total deaths 2013 - 23% of total deaths	1) Air pollution	1) Household air pollution 2) Ambient particulate matter 3) Ozone
		2) Occupational risks	1) Occupational particulates 2) Occupational asthmagens 3) Occupational carcinogens
		Other environmental risks	1) Lead 2) Radon

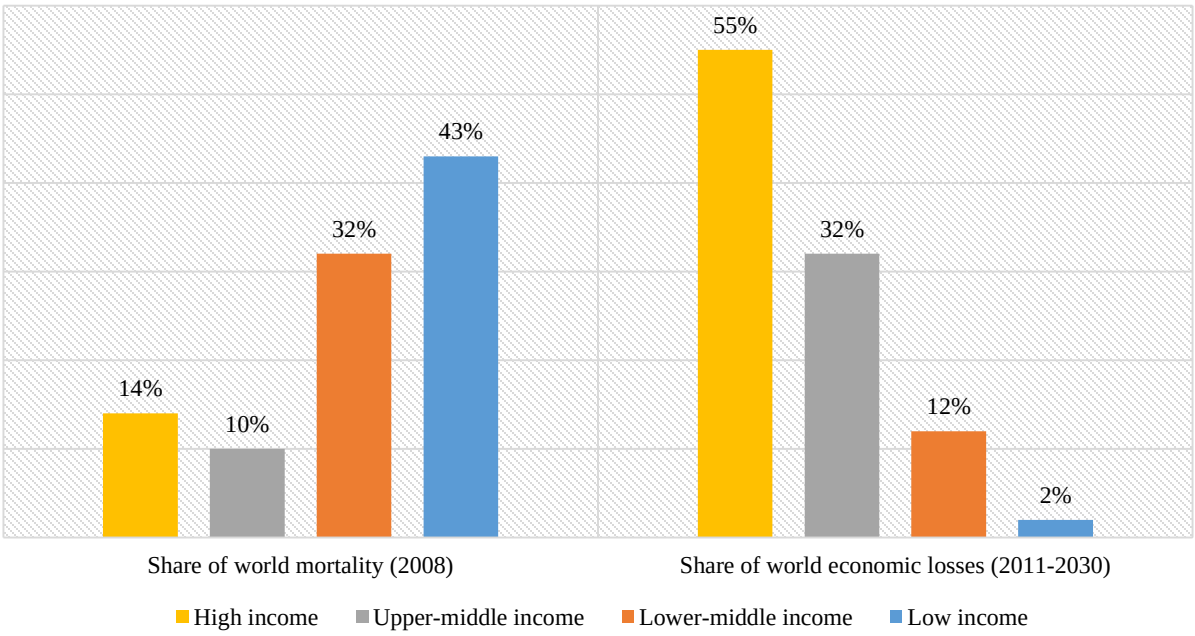
Source: Developed by authors with data from IHME.

Table 4: Prevalence (percentage of population) of chronic disease risk factors, India and selected states

Risk Factor	Indicators	Tamil Nadu	Kerala	Rajasthan	Uttar Pradesh	India (pooled)
Behavioral	**Tobacco consumption**	**21.4**	**23.6**	**39.7**	**54.6**	**46**
	Age 15-29 years	20.4	23.2			21.8
	Age 30-39 years	40.8	51.6			41.6
	Age 40-49 years	54.6	61.1			57
	Age 50+ years	31	27.2			50.6
	Rural residence	25.2	24.4			50.6
	Urban residence	17.6	22.6			34.5
	No schooling (literates and illiterates)	30.7	27			47.8
	Less than 5 years of schooling	33	26.5			54.1
	5-9 years of schooling	24.2	23.6			50.1
	10+ years of schooling	12.1	22.9			38.4
	Alcohol consumption	**9**	**13.4**	**10.3**	**14.1**	**16.4**
	Age 15-29 years	12.2	23.2			8.4
	Age 30-39 years	21.6	51.6			20.6
	Age 40-49 years	23.1	61.1			22.7
	Age 50+ years	9.9	27.2			15.7
	Rural residence	10.1	24.4			18.2
	Urban residence	7.8	22.6			12
	No schooling (literates and illiterates)	8.4	27			14.3
	Less than 5 years of schooling	12.2	26.5			22.2
	5-9 years of schooling	11.3	23.6			18.3
	10+ years of schooling	7.2	22.9			16.1
	People with sufficient fruit and vegetable intake	**1**	**13**	**10.8**	**7.4**	**10**
Metabolic	**Blood pressure**	**22.3**	**34.5**	**9.1**	**10.8**	
	Blood sugar	**13**	**24.7**	**3.4**	**3.5**	
	BMI 25+, women aged 15-49 years	**20.9**	**28.1**	**8.9**	**9.2**	**12.6**
	BMI 25+, men aged 15-49 years	**14.5**	**17.8**	**6.2**	**7.3**	**9.3**

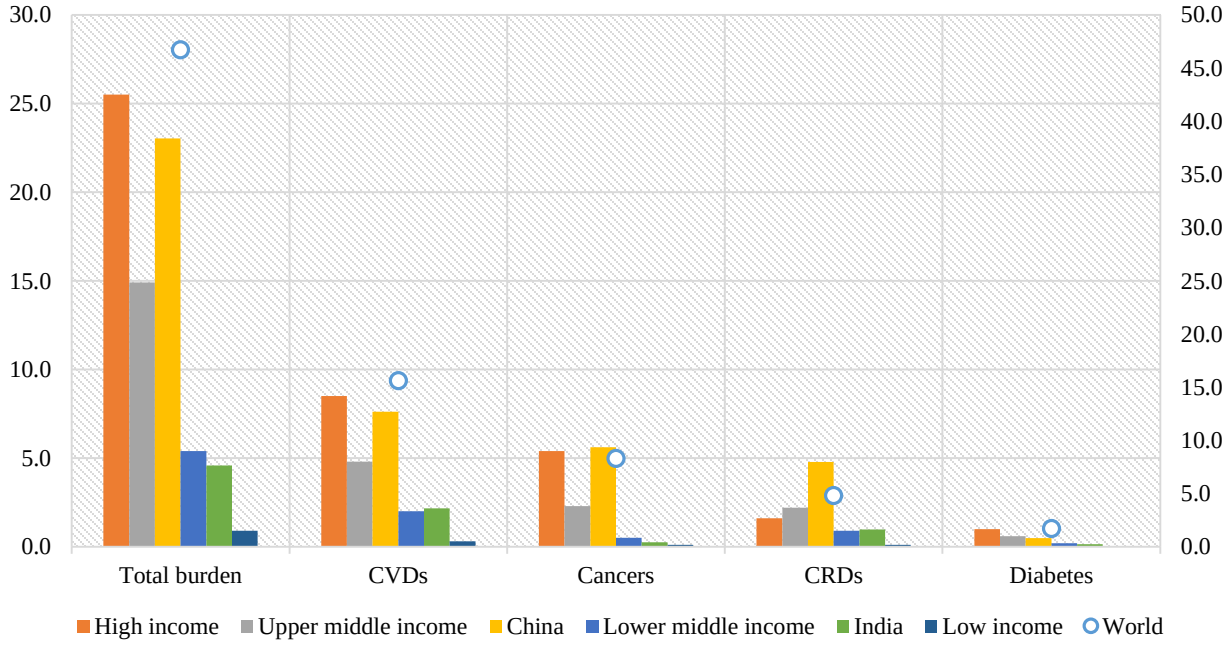
Sources: AHS CAB (2014), DLHS-4 (2012-13), IDSP NCD Risk Factor Survey (2007-08), SAGE (2007), NFHS-3 (2005-06).[z]

Figure 17: Burden of NCDs in terms of mortality and economic losses (as a percentage of total loss due to NCDs), countries by income classification



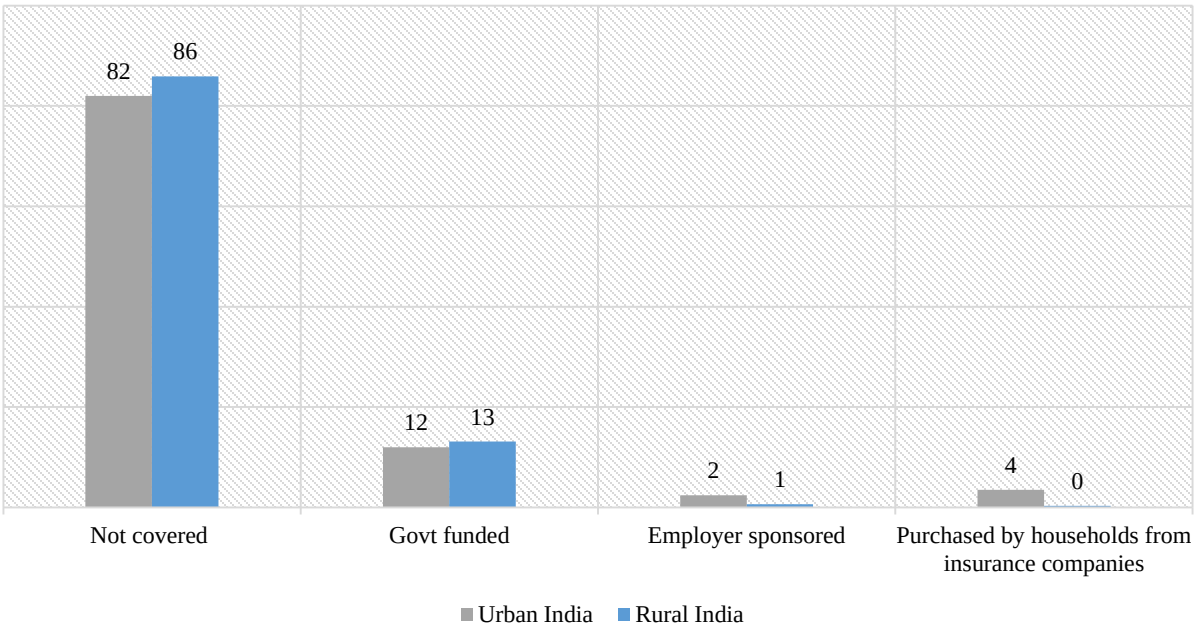
Source: Jha et al (2012).

Figure 18: Projected economic loss between 2012-2030 (trillions, USD 2010), based on EPIC model



Source: Jha et al (2012) and Bloom et al (2014).

Figure 19: Percentage distribution of persons by coverage of health expenditure support, rural and urban India, 2014



Source: NSS 2014.

Table 5: OOP health expenditure per capita (by disease) across expenditure quintiles for India, 2004

Expenditure quintile	Per capita OOP spending (INR) on			Proportion of per capita HH income (%)		
	Heart dis-eases	Cancers	All NCDs	All NCDs	Non-NCDs	Health spending
I (poorest)	13.6	9.0	126.5	3.5	7.0	10.6
II	20.8	14.1	200.9	3.8	6.2	9.9
III	41.6	17.5	347.9	5.1	5.8	10.9
IV	63.3	25.3	429.7	5.0	5.4	10.4
V (richest)	173.8	72.8	981.9	6.7	5.2	11.9
Combined	53.9	23.6	371.4	5.2	5.8	10.9

Source: Mahal et al 2010.

Table 6: Sources of funds for OOP spending on inpatient care in India by major chronic diseases, 1995-96 and 2004

Disease	OOP spending on hospital stays (INR billion)		Household income or savings (% share)		Borrowing (% share)		Other sources (including sale of assets) (% share)	
	1995-96	2004	1995-96	2004	1995-96	2004	1995-96	2004
Heart diseases	6.2	28.4	65.1	49.5	17.5	26.6	17.4	23.9
Cancers	3	16.1	44	43.4	31.7	35.4	24.3	21.2
Diabetes	0.5	4.1	51.1	54.7	34.9	33.4	14	11.8
Asthma	0.5	4.1	46.7	44.9	29.7	39.2	23.5	15.9
Other respiratory diseases	0.6	4.1	55.9	56.8	30.3	29.8	13.8	13.3
NCDs	19.2	95.8	49.8	47.2	28.3	32.1	21.9	20.7

Source: Mahal et al 2010.

Table 7: Targets for NCD prevention and control in India

Sn.	Framework elements	Targets		
		Outcomes	2020	2025
1.	Premature mortality from NCDs	Relative reduction in overall mortality from cardiovascular disease, cancer, diabetes, or chronic respiratory disease	10%	25%
2.	Alcohol use	Relative reduction in alcohol use	5%	10%
3.	Obesity and diabetes	Halt the rise in obesity and diabetes prevalence	No mid-term target set	Halt the rise in obesity and diabetes prevalence
4.	Physical inactivity	Relative reduction in prevalence of insufficient physical activity	5%	10%
5.	Raised blood pressure	Relative reduction in prevalence of raised blood pressure	10%	25%
6.	Salt/sodium intake	Relative reduction in mean population intake of salt, with aim of achieving recommended level of less than 5gms per day	20%	30%
7.	Tobacco use	Relative reduction in prevalence of current tobacco use	15%	30%
8.	Drug therapy to prevent heart attacks and strokes	Eligible people receiving drug therapy and counseling (including glycemic control) to prevent heart attacks and strokes	30%	50%
9.	Essential NCD medicines and basic technologies to treat major NCDs	Availability and affordability of quality, safe and efficacious essential NCD medicines including generics, and basic technologies in both public and private facilities	60%	80%
10.	Household indoor air pollution	Relative reduction in household use of solid fuels as a primary source of energy for cooking	25%	50%

Source: MOHFW 2013 (National Action Plan and Monitoring Framework for Prevention and Control of NCDs).

Table 8: Multisectoral Action Plan to address NCDs

Sector	Tobacco	Physical inactivity	Harmful use of alcohol	Unhealthy diet
Health	√	√	√	√
Agriculture	√		√	√
Food processing			√	√
Finance, tax and revenue	√	√	√	√
Law and justice	√		√	√
Information and broadcasting	√	√	√	√
Consumer affairs	√		√	√
Women and child development	√	√	√	√
Commerce and industry	√		√	√
Human resource development	√	√	√	√
Youth affairs and sports	√	√	√	√
Road transport and highways			√	
Labour	√	√	√	√
Urban and rural development	√	√	√	√
Social justice and empowerment	√	√	√	√
Environment	√	√	√	√

Source: MOHFW 2013.

Table 9: Package of services at various levels of health systems

Health facility	Package of services
Sub-center	• Health promotion for behavior change and counseling • 'Opportunistic' screening using B.P. measurement and blood glucose by glucostrip method • Identification of early warning signals of common cancer and referral • Referral of suspected cases to CHC / nearby health facility
Primary Health Center (PHC)	• Health promotion for behavior change and counseling • 'Opportunistic' screening using B.P. measurement and blood glucose by glucostrip method • Clinical diagnosis and treatment of simple cases of hypertension, diabetes • Identification of early warning signals of common cancer and referral • Referral of suspected cases to CHC
Community Health Center (CHC) / First Referral Unit (FRU)	• Prevention and health promotion including counseling • Early diagnosis through clinical and laboratory investigation (common lab investigations, blood sugar, lipid profile, ECG, ultrasound, X-ray, etc. – if not available, may be outsourced) • Management of common CVD, diabetes and stroke cases • 'Opportunistic' screening of common cancers (oral, breast, cervix, prostate) • Referral of difficult cases to district hospital / higher healthcare facility
District Hospital	• Early diagnosis of diabetes, CVDs and cancer • Investigations: blood sugar, lipid profile, kidney functions tests (KFT), liver function tests (LFT), ECG, Ultrasound, X-ray, mammography, etc. – if not available, will be outsourced • Medical management of cases (outpatient, inpatient and intensive care) • 'Opportunistic' screening of common cancers (oral, breast, cervix, prostate) • Referral of difficult cases to higher healthcare facility • Health promotion for behavior change and counseling • Follow up chemotherapy in cancer cases • Rehabilitation and physiotherapy services
Medical College	• Mentoring of district hospital • Early diagnosis and management of diabetes, CVDs and other associated illness • Training of health personnel • Operational research
Tertiary Cancer Centre	• Mentoring of district hospital and outreach activities • Comprehensive cancer care including prevention, early detection, diagnosis, treatment, minimal access surgery, after care, palliative care and rehabilitation • Training of health personnel • Operational research

Source: Annual Report 2014-15, Ministry of Health & Family Welfare (MOHFW), Government of India (GOI).

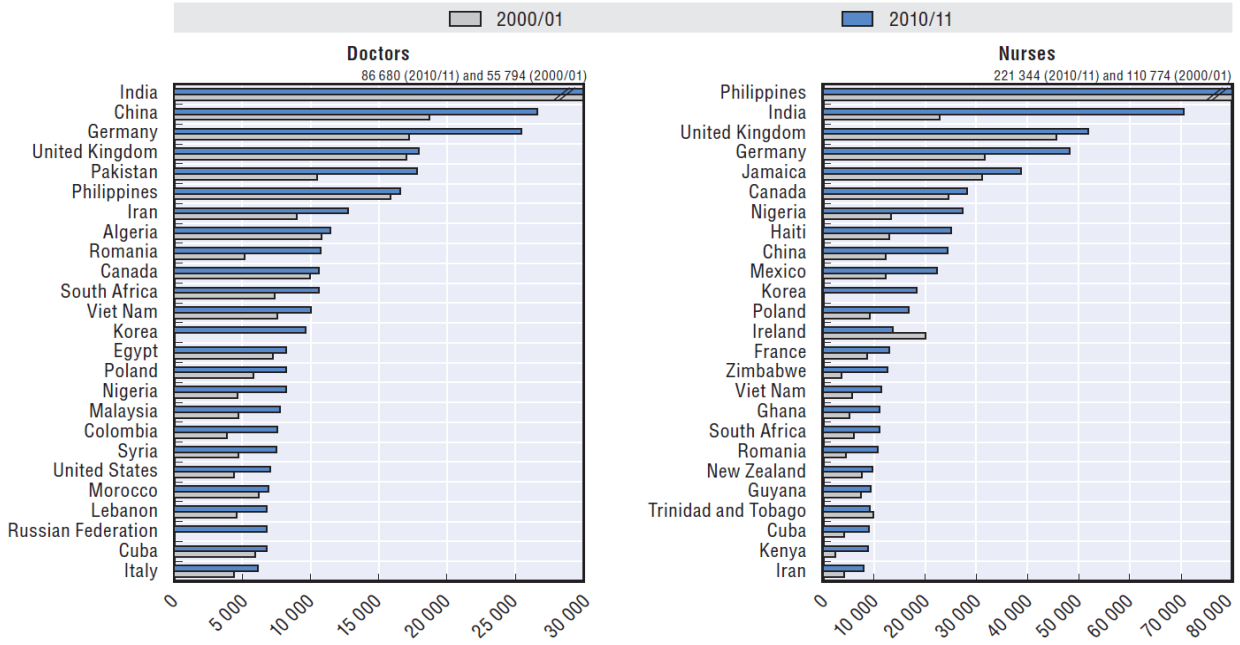
Table 10: Designated workforce for the primary health system in India and their functions for prevention of chronic diseases

Health facility	Population norm	Objective	Key human resource requirement*	Services oriented towards prevention of chronic diseases	Referral system
Sub Centre	1 SC established for every 5000 population in plain areas and for every 3000 population in hilly/tribal/desert areas	First contact point between primary health care system and community	**TYPE A** **Essential** One ANM One Health Worker (Male) or **TYPE B** **Essential** Two ANM One Health Worker (Male) Sanitation services - outsourcing on part time basis	**Health Promotion** Aim: Behaviour and lifestyle changes Organizing camps, using interpersonal communication (IPC), posters, banners to educate people **Opportunistic Screening** Aim: Early screening and diagnosis Designated camp days ANM and (or) Male health worker examine at and above 30 years old persons for alcohol and tobacco intake, physical activity, blood sugar and blood pressure etc. carry out the measurement of weight, height, and Body Mass Index (BMI) **Referral** and Data recording and reporting ANM and (or) Male Health refer suspected cases to higher health facilities or to the CHC and maintain records **Surveillance** ANM and (or) Male Health Worker at the health facility will maintain records in prescribed format and will submit the report monthly to CHC.	
Primary Health Centre	1 PHC for every 30,000 rural populations in the plains and for every 20,000 population in hilly/tribal/desert areas	Quality oriented and sensitive to the needs of the community **Type A**: PHC with delivery load of less than 20 deliveries in a month **Type B**: PHC with delivery load of 20 or more deliveries in a month	**Essential** Medical Officer- MBBS (1) Accountant cum Data Entry Operator (1) Pharmacist (1) Nurse-midwife (Staff-Nurse) (3) Health worker (Female) 1 Health Assistant. (Male) 1 Health Assistant. (Female)/Lady Health Visitor (1) Laboratory Technician (1) Other support staff (3) **Desirable** Medical Officer –AYUSH (1) Pharmacist AYUSH (1) Health Educator (1)		Referral unit for 6 SCs, and refer out cases to CHC
Community Health Centre	1 CHC for around 1,20,000 population for plain areas and 80,000 populations in tribal/hilly/desert areas	designed to provide referral health care for cases from the Sub Centres and Primary Health Centres level and for cases in	**Essential** **Block Public Health Unit** Block Medical Officer/Medical Superintendent (1) Public Health Specialist (1) Public Health Nurse (1) **Specialty Services** General Surgeon (1)	**Services at NCD Clinic –** **Screening and laboratory investigation** Aim: Identification of high risk individuals Opportunistic screening (investigations including Blood Sugar, lipid profile, ECG, Ultrasound, X-ray	Referral unit for 4 PHCs

		need of special-ist care ap-proaching the centre directly.	Physician (1) Obstetrician & Gynaecologist (1) Paediatrician (1) Anaesthetist (1) **General Duty Officers** Dental Surgeon (1) General Duty Medical Officer (2) Medical Officer – AYUSH (1) **Nurses and Paramedical** Staff Nurse (10) Pharmacist (1) Pharmacist – AYUSH (1) Lab. Technician (2) Radiographer (1) Dietician (1) – (Desirable) Ophthalmic Assistant (1) Dental Assistant (1) Cold Chain & Vaccine Logistic Assistant (1) OT Technician (1) Multi Rehabilitation/ Community Based Rehabilitation worker (1) Counsellor (1) **Administrative Staff** Registration Clerk (2) Statistical Assistant/ Data Entry Operator (2) Account Assistant (1) Administrative Assistant (1) Others (dresser, ward boy, etc.): **6** **Human Resources for CHC NCD services** (appointed on contract basis by the State Government): Doctor (1) Nurses (2) Counselor (1) Data Entry Operator (1)	etc) of persons above the age of 30 years shall be car-ried out at CHC by the appointed doctor along with relevant inquiry about diet, alcohol and tobacco con-sumption, etc. **Prevention and Health promotion** Aim: Prevention and health promotion including counseling Medical officer and a nurse shall impart the health ed-ucation during the OPD as well as to the Inpatients Counsellor appointed under the programme shall counsel on diet, nutrition and tobacco, alcohol, warn-ing signs of cancer, etc **Home based care** A Nurse appointed under the NPCDCS shall under-take home visits for bedridden cases. Expected visit number - 4 times in a month **Surveillance** NCD Clinic at CHC - individual diagnosis, treatment and referral records on the patient chronic disease card, with verbal and pictorial advice for the patient, shall be send monthly to the District NCD Cell	
* Depending upon the catchment area, health seeking behavior, case load, location of other facilities (PHCs, CHCs, Hospitals)					

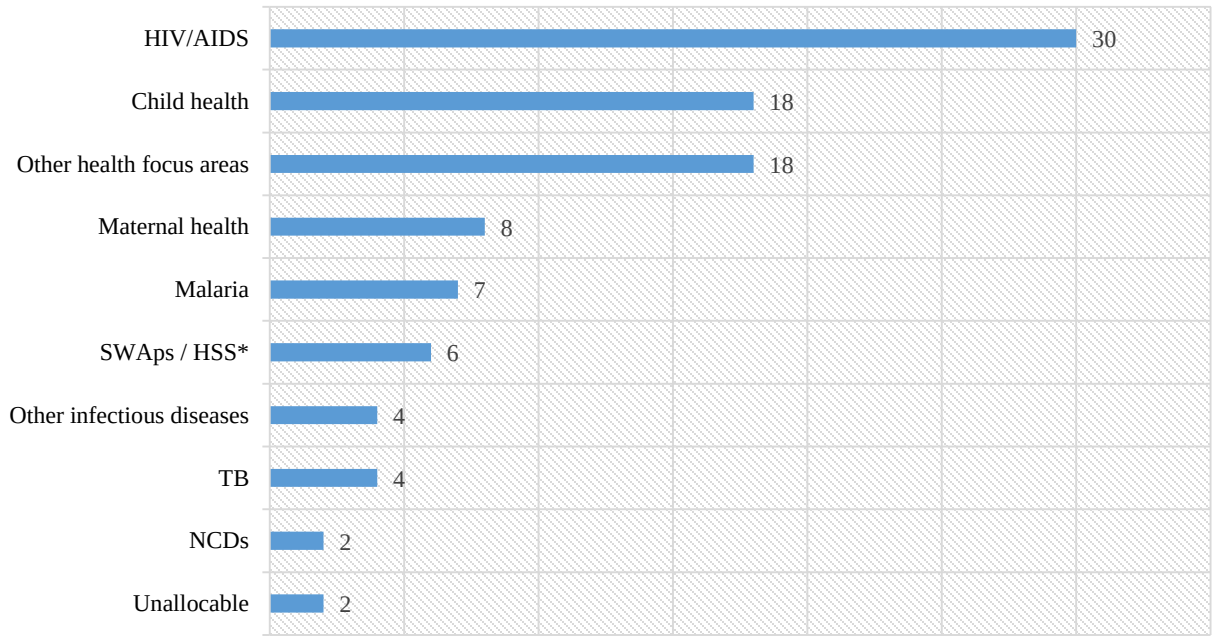
Source: Indian Public Health Standards (IPHS) Guidelines and Annual Report of the Ministry of Health and Family Welfare (2014-15).

Figure 20: Indian-born doctors and nurses in OECD countries vis-à-vis 24 other main countries of origin, 2000/01 to 2010/11



Source: International Migration Outlook 2015, OECD.

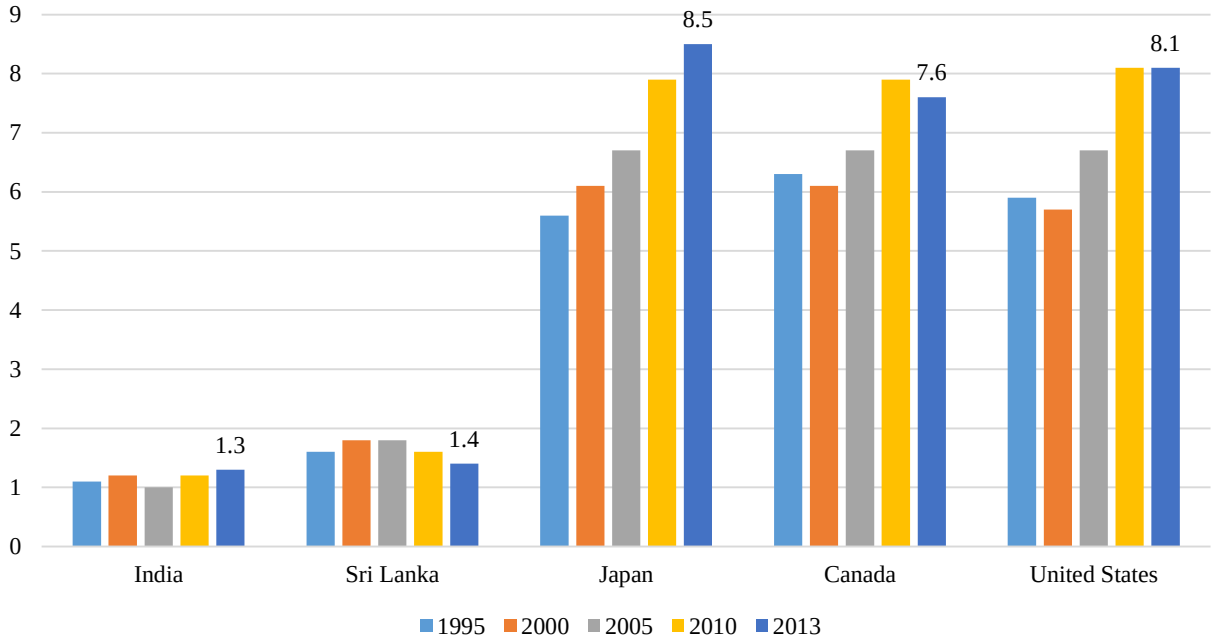
Figure 21: Percentage distribution of international donor funds allocated to each health focus area, 2014



* System-wide approaches / Health System Strengthening

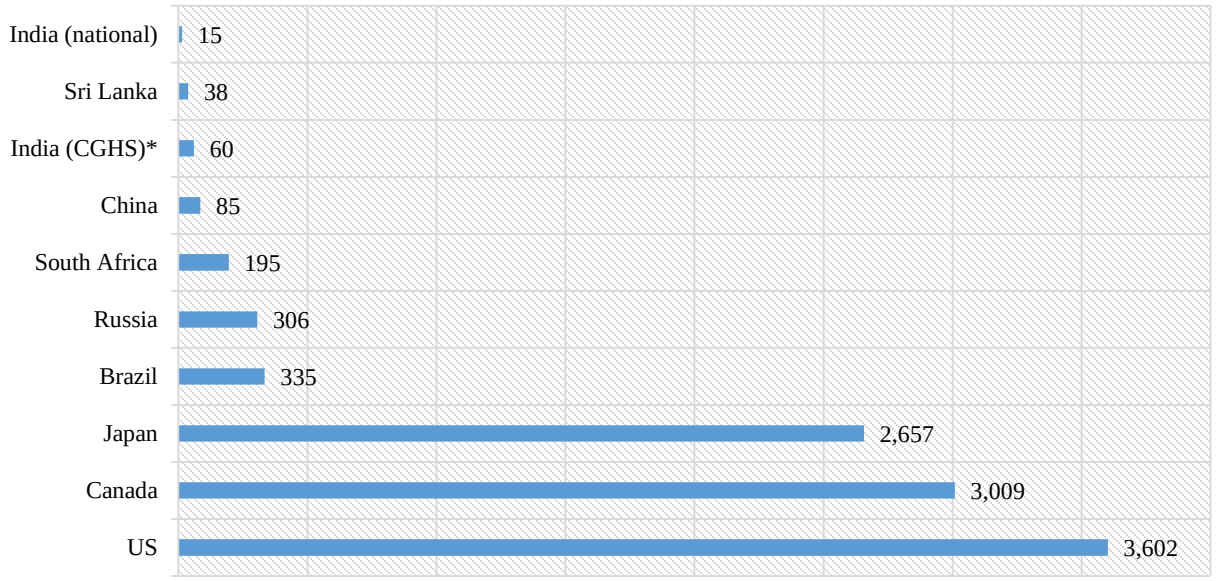
Source: IHME.

Figure 22: Health expenditure, public (as percentage of GDP), India vis-a-vis selected countries, 1995-2013



Source: WDI.

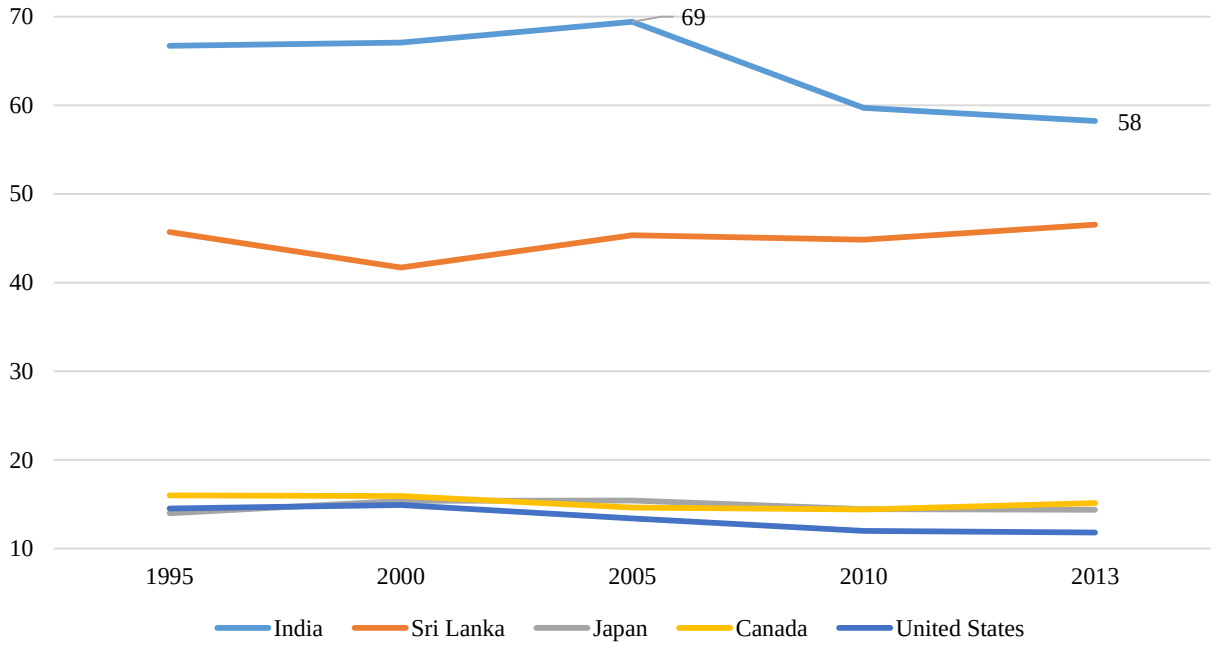
Figure 23: Per capita public expenditure on health (US$), India vis-a-vis selected countries (2009) and CGHS beneficiaries (2010-11)



Source: Population Research Bureau (PRB).

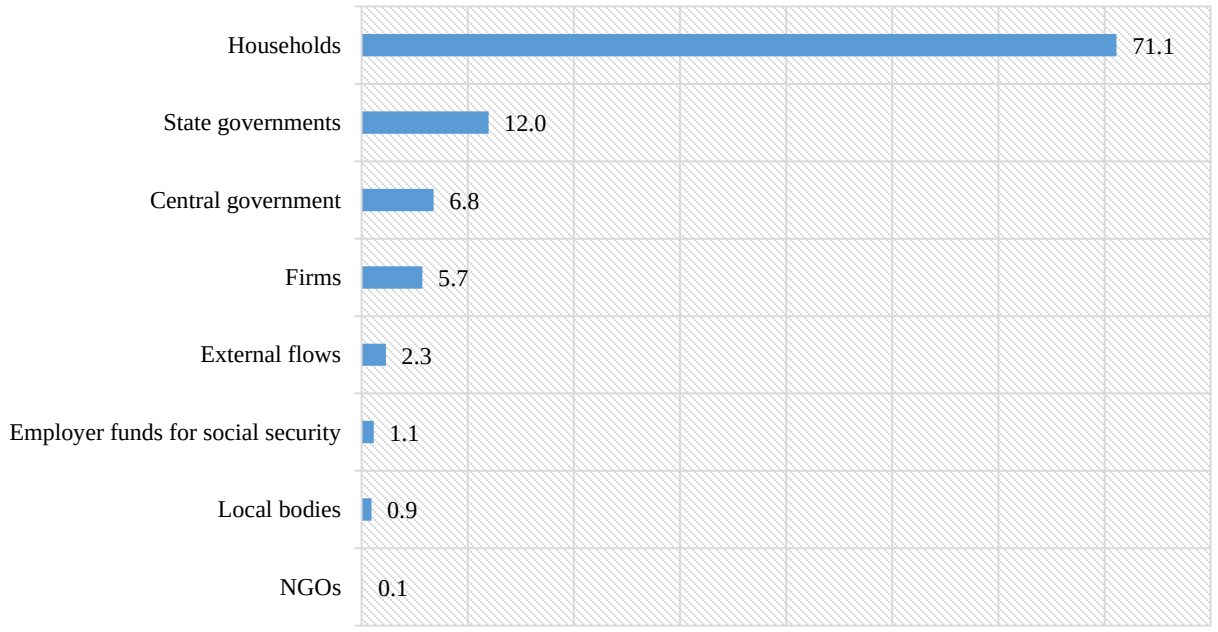
* Pertains to year 2010-11 (INR 4,049).

Figure 24: Out-of-pocket health expenditure (as percentage of total expenditure on health) in selected countries, 1995-2013



Source: WDI.

Figure 25: Health expenditure by financing source (percentage of total), India, 2004-05



Source: National Health Accounts 2004-05 (taken from Manual on Health Statistics in India 2015, MOSPI, GOI).

Table 11: Health expenditures in selected states of India

States	State expenditure on health (2012-13)				Monthly OOP medical expenditure (2011-12)			
	In INR billions	As % of GSDP	As % of state expenditure	Per capita public exp. on health (INR)*	Per capita (INR)		As % of consumption expenditure	
					Rural	Urban	Rural	Urban
Uttar Pradesh	88	1.1	5	373	106	127	9.1	6.2
Rajasthan	39	0.9	5	457	92	92	5.8	3.8
Tamil Nadu	55	0.7	5	580	99	149	5.8	5.7
Kerala	32	0.9	6	580	244	275	9.2	8.1

Source: National Health Profile 2015, MOHFW (NHP 2015). * For 2009-10 from Chowdhury and Amar Nath (2012).

Table 12: Proposed, approved and spent amounts under NPCDCS in selected states, 2014-15

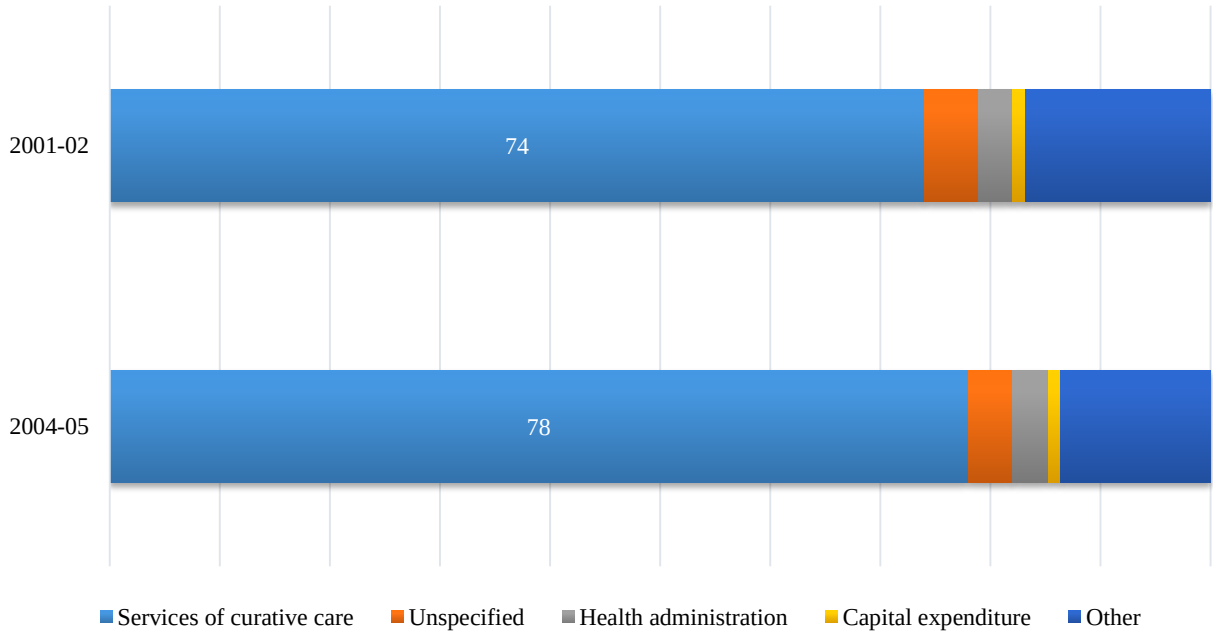
State	Proposed (INR millions)	Approved (INR millions)	Percent approved	Approved as percent of NHM budget*	Spent (INR millions)**	Percent spent
Uttar Pradesh	1543.9	309.8	20.1	0.8	245.3	79.2
Rajasthan	896.0	211.6	23.6	1.1	9.2	4.3
Tamil Nadu	611.1	42.3	6.9	0.3	Nil	Nil
Kerala	318.0	111.6	35.1	2.0	63.9	57.3

* Total NHM state PIP budget approved (INR billions) for 2014-15 was 38.3 for Uttar Pradesh, 19.3 for Rajasthan, 12.4 for Tamil Nadu and 5.7 for Kerala.

** Till February 2015 for Uttar Pradesh and December 2014 in the cases of Rajasthan, Tamil Nadu and Kerala.

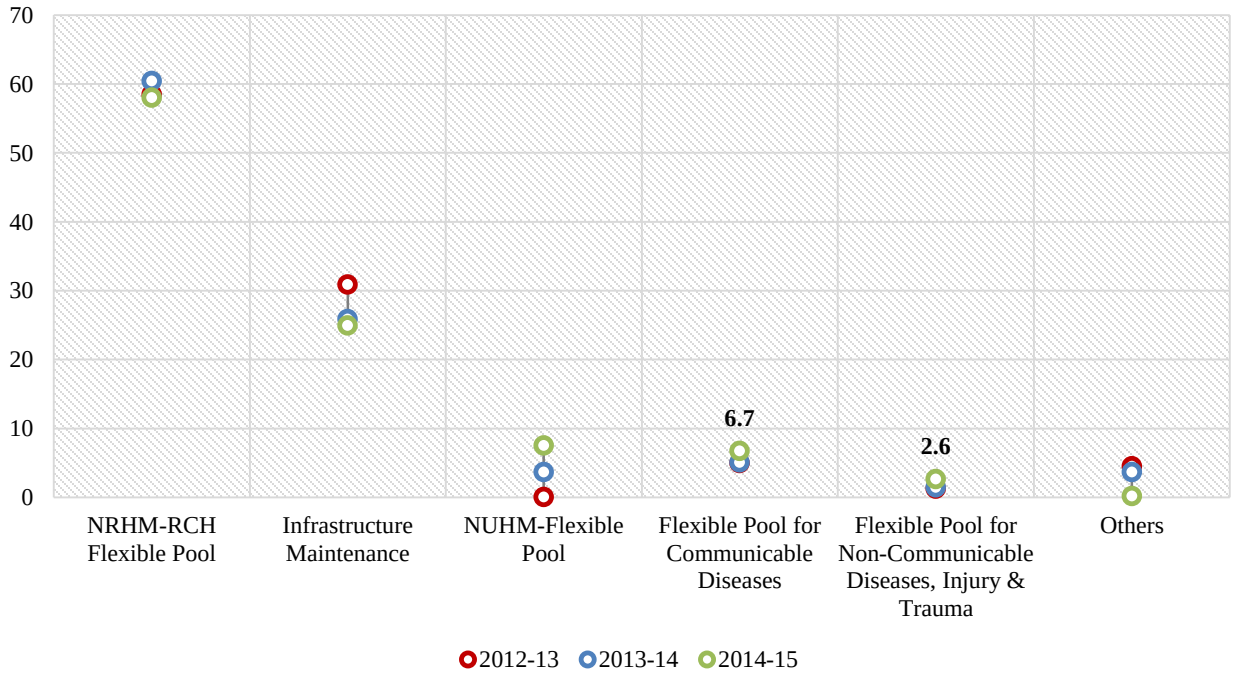
Source: Main and Supplementary state PIPs, 2014-15 and 2015-16.

Figure 26: Distribution of total health expenditure (percentage) by functions, India, 2001-02 and 2004-05



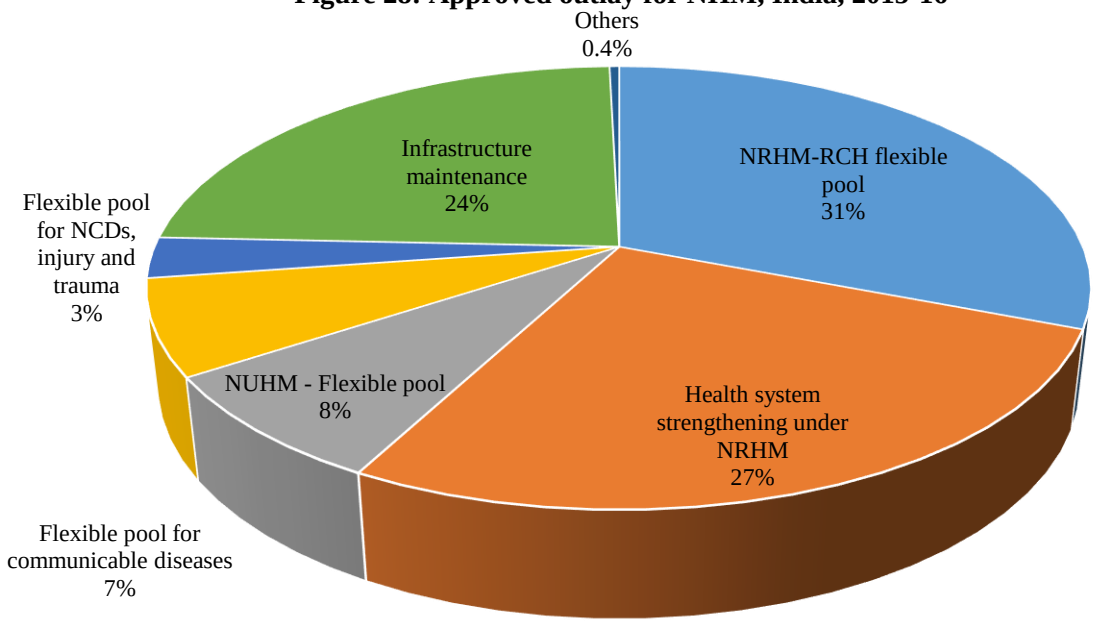
Source: National Health Accounts.

Figure 27: Break-up of annual NHM expenditure, India, 2012-13 to 2014-15



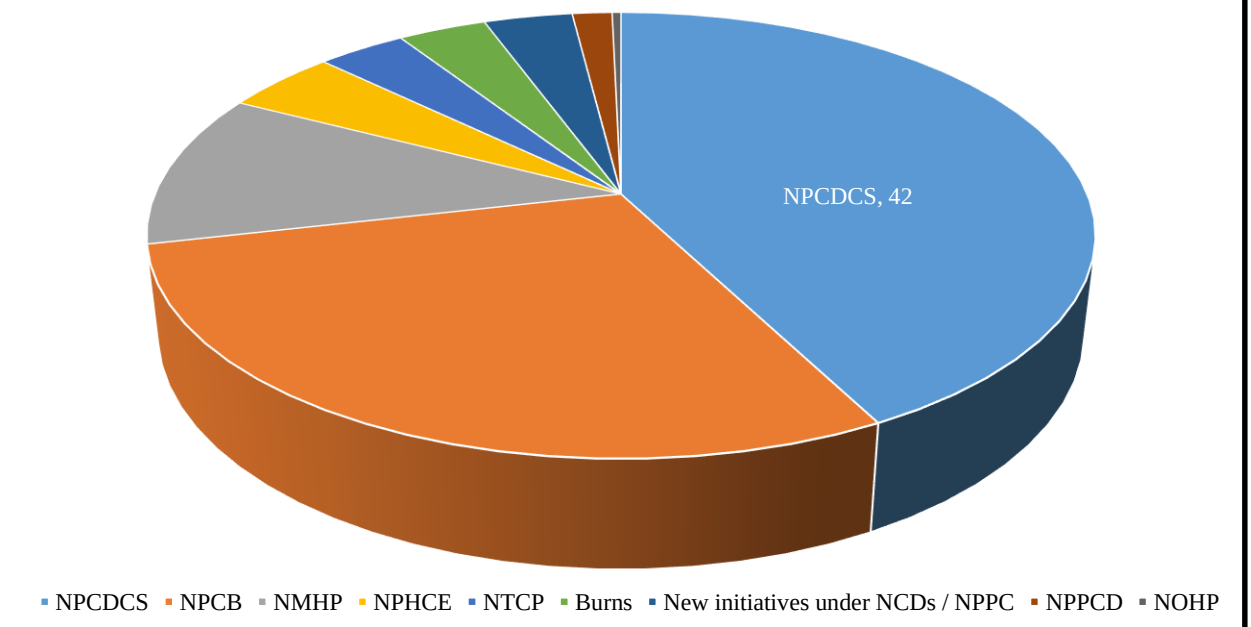
Source: Financial outlays and outcome budget, MOHFW.

Figure 28: Approved outlay for NHM, India, 2015-16



Source: NHP 2015.

Figure 29: Approved outlay under components of the Flexible Pool for NCDs, injury and trauma (as percentage of the total Flexible Pool), India, 2015-16



Source: Financial outlays and outcome budget 2015-16, MOHFW.

Table 13: Budget (in INR crores) under NPCDCS components overall and at the level of primary health systems, Uttar Pradesh, 2014-15 to 2015-16

NPCDCDS components	Proposed (2014-15)+	Approved (2014-15)	Spent (Apr 2014-Feb 2015)	Proposed (2015-16)	Percentage (Proposed 2015-16)$	Details
NPCDCS (total)	**154.4**	**30.9**	**24.5**	**64.8**		
Infrastructure*		**9.1**	**3.8**	**11.2**	**17.3**	
At CHC level		6.5	1.6	Nil	Nil	
Human Resources**		**9.9**	**3.4**	**27.9**	**43.1**	
At CHC level**		4.1	2.1	12.3	19.0	
Laboratories, Drugs & Consumables		**2.2**	**14.3**	**16.4**	**25.3**	
At CHC level		1	3.2	1.8	2.8	INR 2 lakhs per CHC
At PHC level		Nil	2.1	1.7	2.6	Glucostrips, lancets and swabs @ INR 10 per person
At SC level		Nil	8.4	10.2	15.7	Glucostrips, lancets and swabs @ INR 10 per person
Patient referral cards		**Nil**	**0.2**	**1.2**	**1.9**	
At PHC level		Nil	Nil	0.2	0.3	INR 5 per patient for 500 patients / PHC
At SC level		Nil	0.2	1	1.5	INR 5 per patient for 500 patients / SC
Other activities		**Nil**	**1.9**	**1**	**1.5**	
Transport of referred / serious patient to DNCD		Nil	Nil	Nil	Nil	INR 2.5 lakhs per District NCD Clinic
Lab equipment at CHC		Nil	Nil	Nil	Nil	
Miscellaneous***		**2.1**	**1.2**	**6.3**	**9.7**	
At CHC level		0.9	0.3	0.9	1.4	
At PHC level		Nil	Nil	1	1.5	
At SC level		Nil	0.1	Nil	Nil	
Transport of referred cases (incl. home based care)		Nil	0.0007	0.3	0.5	
Information, education, communication, training#		**7.7**	**0.01**	**2.1**	**3.2**	
Outreach activities		**Nil**	**Nil**	**Nil**	**Nil**	

* Renovation and furnishing, furniture, computers, office equipments (fax, phone, photocopier, etc.)
** 1 doctor (INR 50,000 per month), nurse (20,000), technician (20,000), counsellor (12,000) and data entry operator (12,000) each.
*** Communication, monitoring, TA,DA, POL, contingency, etc.
# No CHC / PHC / SC component mentioned separately.

Source: + Compiled from main and supplementary PIPs. $ Compiled from main PIP only as supplementary PIP as on 21st January 2016 does not propose any additional requirement of funds for NPCDCS.

Table 14: Prominent publicly-sponsored health insurance schemes in India

Scheme	Year of launch	Coverage, implementing agency and number of beneficiaries	Target population	Unit of enrollment	Benefit package	Financing sources
Rashtriya Swasthya Bima Yojana (RSBY)	2008	Pan India (being implemented in 19 states / UTs) MOHFW, GOI Enrolled families – 36,836,005 (December 2015)	BPL families and 11 occupational groups in the unorganized sector	Families – up to 5 members	Low cost secondary inpatient care Provides hospitalization coverage up to INR 30,000 on a floater basis. Transportation expenses up to a maximum of INR 1,000 with INR 100 per visit.	The Union Government pays 75% of the annual premium (which cannot exceed INR 565 per family) and bears the cost of a smart card issued to each BPL family. State governments pay the residual premium along with administrative expenses. State governments select lowest bid insurance company through open tender processes Annual registration fee of INR 30 per BPL family is mandatory.
Central Government Health Scheme (CGHS)	1954	Pan India MOHFW, GOI Coverage in 25 states while those residing outside are reimbursed for medical expenses Total number of beneficiaries – 3,667,795 (March 2015)	Serving and retired Central Government employees and their dependents, Members of Parliament, former Prime Ministers, former judges of the Supreme Court and High Courts, former governors and vice - presidents, freedom fighters, etc.	Families	Comprehensive and unlimited preventive and medical care at all levels. Dispensaries refer patients to empaneled hospitals. Members can benefit from a range of services delivered through CGHS wellness centers that operate under allopathic and AYUSH systems of medicines.	Serving employees contribute through payroll deductions while retired employees are required to either make a yearly payment or pay their contribution for 10 years at the time of retirement. The scheme is substantially backed by funds of the Central government.
Ex-servicemen Contributory Health Scheme (ECHS)	2003	Pan India Ministry of Defence, GOI Total beneficiaries- 43,52,094 (September 2013)	Ex-army personnel and their dependents	Families	Comprehensive outpatient and inpatient care ECHS polyclinics refer patients for advanced consultations and treatment to empaneled hospitals.	Ex-army personnel are required to make a one-time contribution on retirement. The scheme is substantially backed by funds of the Central government.

Employee's State Insurance Scheme (ESIS)	1952	Pan India Ministry of Labour and Employment, GOI Total beneficiaries – Over 75 million (December 2015)	Employees working in establishments using power and employing more than 10 employees who earn up to INR 15,000 per month along with their dependents	Families	Comprehensive coverage including primary, secondary and tertiary care. Cash benefits for loss of wages due to sickness, maternity, injury, occupational hazards, disability and death caused onsite. Dependents of workers are also covered	Follows the following contribution criterion: 1.75 percent of employees' wages and 4.75 percent of employers' wages. One-eighth of medical costs are borne by state governments via direct subsidies. A nominal contribution of INR 10 is required from retired and permanently disabled individuals – who suffer occupational injury and hence become a part of uninsured pool of workers.
Rajiv Aarogyasri Scheme	2007	Telangana and Andhra Pradesh While Government of Telangana is administering the scheme in its original name, Government of Andhra Pradesh modified and re-launched the scheme as *NTR Vaidya Sewa* in 2014 Patients treated - 6,579,658 (from April 2007 to January 2013)	All families with a BPL 'ration card' (annual income below INR 75,000) or health card issued by the scheme. Individuals with pre-existing medical conditions are automatically enrolled	Individuals and families	Outpatient and inpatient tertiary and secondary care (after receiving referrals from PHCs) Telangana – INR 150,000 per family per year with additional buffer of INR 50,000 Andhra Pradesh – INR 250,000 per family per year 938 medical and surgical procedures are provided along with associated investigations, food, transport and medicines for 10 days following discharge. One year follow-up packages including consultation, medicines and diagnostics are also available for 125 procedures requiring longer periods of follow up. *NTR Vaidya Sewa* has added 100 more procedures to the former list	Fully sponsored by state governments.
Chief Minister's Comprehensive Health Insurance Scheme[aa]	2009	Entire state of Tamil Nadu Health and Family Welfare	Rural and urban households whose annual income is less than or equivalent to INR 72,000 and also those	Families	Secondary and inpatient tertiary care Insured families can avail enlisted services up to a maximum value of INR 100,000 per family every year. In certain cases, the	Fully financed by the Government of Tamil Nadu through the United India Insurance Company Ltd.

		Department, Government of Tamil Nadu From January 2012 to April 2016, the scheme benefitted 1,451,020 patients and has approved waivers amounting to over INR 30 billion	associated with informal labour boards		maximum exemption limit is raised up to INR 1.5 lakh per year. Scheme also guarantees access to 1,016 medical and surgical procedures, 113 follow-up procedures and 23 diagnostic procedures on a cashless basis at empaneled public and private hospitals.	
RSBY-Comprehensive Health Insurance Scheme (CHIS)	2008	Entire state of Kerala Labour and Rehabilitation Department, Health and Family Welfare Department and Local Self Government Department, Government of Kerala Enrollment status - 3,192,917 (2014-15)	Population of Kerala which is not covered by RSBY. Non-RSBY population has been distributed into BPL families (as per the list defined by Kerala state government) and APL families (which fall neither in the prescribed list by state government nor the guidelines of erstwhile Planning Commission	Individuals and families – up to 5 members	Inpatient tertiary care In addition to the sum of INR 30,000 assured in the national RSBY scheme, CHIS guarantees an additional sum of INR 70,000 for inpatient allopathic treatment of critical illnesses. Transportation allowance of INR 100 per day (conditional on an annual ceiling of INR 1,000) and pre (up to 1 day) and post (up to 5 days after discharge) hospitalization charges are integrated in the benefit package.	BPL families are eligible to benefit on payment of a yearly registration fee of INR 30 per family. Premiums and other costs are borne by the state government. APL families are required to pay an annual premium of INR 1,274 in addition to registration fee.
Yeshasvini Cooperative Farmers Health Scheme	2003	Entire state of Karnataka Department of Cooperation, Government of Karnataka Enrollment status – 3,872,000 (2014-15)	Members of rural and urban cooperatives (APL+BPL) and their families	Individuals	Cashless medical coverage up to INR 200,000 (rural cooperatives) and INR 250,000 (urban cooperatives) for medicines, diagnostics, hospitalization, etc. linked with a specified range of surgeries.	Rural cooperatives – INR 250 for general category and INR 50 for SC / ST members. Urban cooperatives – INR 710 for general category and INR 110 for SC / ST members. Heavily subsidized through government grants.

Universal Health Insurance Scheme (UHIS)	2003	Being implemented nationwide by 4 public sector insurance companies. The scheme has negligible coverage and is losing prominence in presence of RSBY	BPL families	Individuals and families	Low cost inpatient care and compensation for accidental death / loss of man-days. Reimburses hospitalization expenses up to INR 30,000 on a floater basis, provides compensation of INR 25,000 in the event of an accidental death of the earning head of the family and compensation of INR 50 per day (up to 15 days) on account of loss of livelihood of a family's earning head.	GOI partially subsidizes the premium Annual premium is INR 300 for individuals (of which GOI subsidizes 200), INR 450 for a family of 5 members (of which GOI sponsors 300) and INR 600 for a family of 7 members (of which GOI finances 400). No expenses are borne by state governments.
Apka Swasthya Bima Yojana (ASBY)	Proposed for launch	Entire NCT of Delhi Estimated coverage - 0.65 million	BPL and vulnerable population	Families	Will act as 'top-up' scheme to cover tertiary care services (up to INR 150,000) not covered under RSBY.	Fully financed by state government.

Source: Compiled from official websites and performance documents of insurance schemes covered above.

Endnotes

[a] It was with the explicit goal of fertility and population control that Dr S Chandrasekhar, the Union Minister of Health and Family Planning in the Indira Gandhi government during the 1960s, undertook the first study on child mortality in the 1970s (Chandrasekhar 1972: 10).

[b] For further discussion on this, for instance, refer to our paper, 'Human capital potential of India's future workforce' (ICRIER working paper no. 308, September 2015).

[c] Allocation to health care has traditionally been extremely low in India, but that is another discussion, which we will take up in the section on financing. Nevertheless, no matter how high the overall allocation to the health sector is, we would always need to prioritize as resources will never be unlimited (unless one is covered under insurance schemes like India's Central Government Health Scheme (CGHS), in which there is no limit on the coverage).

[d] India's new NITI Aayog has argued that 'Health System Strengthening approach is the solution to bridging the gap between our current performance and potential' (NITI Aayog 2015: 4).

[e] http://www.cdc.gov/chronicdisease/ (accessed on 21/11/2015 at 7:38 hours).

[f] Its health expenditure per capita, PPP (constant 2011 international dollars) in 2013 was 9,146 (WDI). Its total health expenditure (% of GDP) was 17.1 in the same year, which was the second highest after Tuvalu (an island nation with a total population of 9,876 in 2013).

[g] http://www.who.int/features/2015/ncd-india/en/ (accessed on 28 December 2015, 11:31 hours).

[h] With a clear emphasis on continuing health care process, the Alma Ata Declaration stated primary health care as *the first level of contact of individuals, the family, and community with the national health system bringing health care as close as possible to where people live and work*. Encompassing a vision to curb the mounting healthcare expenditure midst various issues competing for scarce resources, primary healthcare was highlighted as a means to attain health outcomes at a cost that the countries can afford to maintain at every stage of their development, perpetuating the virtuous circle of self-reliance and self-determination. However, this approach to strengthen primary health system, which has gained traction in the present times, was read as 'utopian' and 'radical' in the medical establishment (Chan, 2008). In India, the vision of strengthening primary health system dates back to the Health Survey and Development Committee (also known as Bhore Committee) in 1946. It clearly underlined the need for an integrated preventive and curative measures at all levels of care.

[i] Under NUHM, the following is proposed: 1 PHC for every 50-60,000 population, 1 CHC for 5-6 PHCs in big cities, 1 ANM for 10,000 population, 1 ASHA for 200-500 households. http://pib.nic.in/newsite/erelease.aspx?relid=95385

[j] *Lokayukta*, an ombudsman-like statutory authority, was set up in 1984 to address complaints against administrative inefficiencies and improve the standards of public administration.

[k] *Swasthya Slate* is a bluetooth-enabled integrated diagnostic kit, developed by the Public Health Foundation of India (PHFI), which works with an android-based mobile system to perform 33 diagnostics tests. The scalability of such an effort should be evaluated rigorously after the pilot.

[l] WHO Report "Preparing a healthcare workforce for the 21st century: The challenge of chronic conditions" says that abilities and skills of HRH delivering care to people with chronic conditions is reflected in five core competencies: patient-centered care, partnering, quality improvement, use of information and communication technology and public health perspective.

[m] In order to address global inequity in availability of healthcare workforce, WHO's sixty-third assembly has adopted a resolution on "Global code of practice on the international recruitment of health personnel" to create a global architecture for continuing dialogue on critical issues of health workforce migration. The resolution has helped in establishing a framework for the ethical recruitment of health personnel and guiding its member states in the development of national framework for such recruitments. In recent years, Government of India has also taken a step in this direction by signing bilateral agreements with key destination countries including European nations to protect the interests of expatriate health professionals (Bhattacharyya et al. 2011; Bhattacharjee 2013). From a long-term perspective, providing the right kind of choice architecture to the healthcare professionals is the most sustainable policy option for policymakers in developing countries.

[n] ASHA is a health activist in the community responsible for creating awareness on health and its social determinants. She also mobilizes the community towards local health planning, increased utilization and accountability of existing health services.

[o] For assessment of workload on health workers, tools like Workload Indicators of Staffing Needs Process (WISN) developed by WHO can be used. www.apps.who.int/iris/bitstream/10665/44414/1/9789241500197_users_eng.pdf.

[p] Revisiting the Medical School Educational Mission at a Time of Expansion. Charleston: Josiah Macy Jr Foundation, 2008, Tomorrow's doctors: outcomes and standards for undergraduate medical education, General Medical Council.

[q] The future of medical education in Canada (FMEC): a collective vision for MD education. Ottawa: The Association of Faculties of Medicine of Canada, 2010.

[r] According to MCI norm, every medical college has to operate one Urban Health Training Centre and three Rural Health Centres. For details, please refer to:

http://www.mciindia.org/for-colleges/Minimum%20Standard%20Requirements%20for%20150%20Admissions.pdf.

[s] Haryana, Jharkhand, Maharashtra, Rajasthan and Tripura.

[t] State Programme Implementation Plan (PIP) for NPCDCS 2014-15 for all the four states indicate that pay scale for doctor at district NCD clinic is INR 60,000-70,000 per month and for doctors at CHC NCD clinics INR 40,000-50,000 per month. Also, Program Coordinator and Finance cum logistics consultant at the district level are paid less than their counterparts at the state level.

[u] VHSNCs are committees at the village level (under NRHM) to take collective actions on issues related to health and its social determinants.

[v] The council has been promoted by Confederation of Indian Industry (CII), National Skills Development Corporation (NSDC) and healthcare industry leaders representing both public and private sector.

[w] The Council is also implementing Standards, Training, Accreditation and Reward (STAR) scheme of Government of India. Under the STAR Scheme, HSSC has introduced the training programme in affiliated institutes and completed the assessment and certification of approximately 1200 trainees / students.

[x] The Financial Express, online edition, 25 October 2015.

[y] IHME's *Global Burden of Diseases, Injuries, and Risk Factors Study* (GBD) is the largest and most comprehensive effort to-date to measure epidemiological levels and trends worldwide.

[z] Data for Tamil Nadu and Kerala is taken from DLHS-4 state factsheets (except for fruit and vegetable intake and physical activity). For Tamil Nadu and Kerala persons who consume alcohol include usual drinker (at least once every week) and occasional drinker. Data for behavioral risk factors for Rajasthan and UP is calculated from SAGE (Study on Global AGEing and adult health) Wave 1, India national report, 2007. For UP and Rajasthan, persons who consume alcohol include non-heavy drinkers, frequent drinkers and infrequent drinkers. Non-heavy drinkers (social drinkers) = no days in last year/less than once a month/1-3 days per month with fewer than five standard drinks in the last seven days; infrequent heavy drinker = 1-3 days per week with fewer than five standard drinks in the last seven days; frequent heavy drinker = five or more days per week with five or more standard drinks in the last seven days. Data for metabolic risk factors for Rajasthan and UP is taken from Annual Health Survey's CAB factsheet 2014. Persons who consume tobacco and alcohol include (15 years & above for Kerala and Tamil Nadu, 18 years & above for Rajasthan and Uttar Pradesh). Data for India is also calculated from SAGE and it included six states: Assam, Karnataka, Maharashtra, Rajasthan, Uttar Pradesh and West Bengal. Fruit & vegetable intake and physical activity data for Rajasthan and Uttar Pradesh is calculated from SAGE (Study on Global AGEing and adult health) wave 1, India national report, 2007. Sufficient nutrition implies five or more servings of fruit/vegetables in a typical day on average in the last seven days. For Kerala and Tamil Nadu, data for these indicators is cited from IDSP, NCD risk factor survey, 2007-08. In SAGE, sufficient physical activity was defined as spending more than 150 minutes per week (in the last seven days) on light, moderate or vigorous activity. IDSP classify it into three categories low, medium and high based on WHO Global Physical Activity Questionnaire Analysis Guidelines (figures mentioned in brackets). Under metabolic risk factors, Blood Sugar Level represents >140 mg/dl for Tamil Nadu and Kerala, >=130 mg/dl for Rajasthan and Uttar Pradesh. Blood Pressure Level represents Systolic >140 mm Hg & Diastolic > 90 mm Hg.

[aa] Chief Minister Kalaignar's insurance scheme for life-saving treatments was modified and re-launched in 2012 as Chief Minister's Comprehensive Health Insurance Scheme.

Bibliography

Abegunde, Dele; Stanciole, Anderson (2006): An estimation of the economic impact of chronic noncommunicable diseases in selected countries: World Health Organization.

AFMC (2010): The future of medical education in Canada (FMEC): A collective vision for MD education. The Association of Faculties of Medicine of Canada.

Berger, David (2014): Corruption ruins the doctor-patient relationship in India. In *BMJ* g3169 (348).

Berman, Peter; Ahuja, Rajeev (2008): Government health spending in India. In *Economic and Political Weekly*, pp. 209–216.

Berman, Peter; Ahuja, Rajeev; Tandon, Ajay; Sparkes, Susan; Gottret, Pablo (2010): Government health financing in India: Challenges in achieving ambitious goals. Health, Nutrition and Population Discussion Paper. Washington, D.C.: The World Bank.

Bloom, David; Cafiero-Fonseca E.T.; Candeias V, Adashi E; Bloom, L.; Gurfein L; Jané-Llopis E et al. (2014): Economics of non-communicable diseases in India. Harvard School of Public Health and World Economic Forum. Geneva.

C. Maya (2009): Community intervention model for NCD surveillance. In *The Hindu*, 2/9/2009.

Cervantes, Kim; Salgado, René; Choi, Misun; Kalter, Henry (2003): Rapid assessment of referral care systems. A guide for program managers. With assistance of United States Agency for International Development. Arlington, Virginia: Basic Support for Institutionalizing Child Survival Project (BASICS II).

Chadha, Alka; Mehdi, Ali; Malik, Garima (2007): Impact of preventive health care on Indian industry and economy. ICRIER working paper no. 198, pp. 1–23.

Chandrasekhar, S. (1972): Infant mortality, population growth, and family planning in India. London, New York: Routledge (Routledge library editions. Development, vol. 19).

Choudhury, Mita; Amar Nath, H. K. (2012): An estimate of public expenditure on health in India. NIPFP, New Delhi.

CSO (2015): Manual on Health Statistics in India. New Delhi: Central Statistical Office, Ministry of Statistics and Programme Implementation, Government of India.

Debroy, Bibek; Bhandari, Laveesh; Aiyar, Swaminathan S. Anklesaria (2014): Economic freedom of the states of India, 2013. New Delhi: Academic Foundation and Friedrich-Naumann-Stiftung für die Freiheit (FNST).

Dhillon, Paul (2005): Pride and prejudice: The future of general practice in Canada. In *BCMJ* 47 (2), pp. 89–92.

Dubois, Carl Ardy; Singh Debbie; Jiwani Izzat (2008): The human resource challenge in chronic care. In Ellen Nolte, Martin McKee (Eds.): Caring for people with chronic conditions. A health system perspective, pp. 143–171.

Engelgau, Michael; El-Saharty, Sameh; Kudesia, Preeti; Rajan, Vikram; Rosenhouse, Sandra; Okamoto, Kyoko (2011): Capitalizing on the demographic transition. Tackling noncommunicable diseases in India. The World Bank. Washington, D.C.

Engelgau, Michael M.; Karan, Anup; Mahal, Ajay (2012): The economic impact of non-communicable diseases on households in India. In *Global Health* 8 (1), p. 9.

Frenk, Julio; Chen, Lincoln; Bhutta, Zulfiqar A.; Cohen, Jordan et al (2010): Health professionals for a new century: Transforming education to strengthen health systems in an interdependent world. In *The Lancet* 376.

General Medical Council (2009): Tomorrow's doctors: Outcomes and standards for undergraduate medical education. General Medical Council. Manchester.

Hager, Mary; Russell, Sue (Eds.) (2008): Revisiting the medical school educational mission at a time of expansion. Josiah Macy Jr Foundation.

Hazarika, Indrajit (2013): Health workforce in India. Assessment of availability, production and distribution. In *WHO South-East Asia Journal of Public Health* 2 (2), p. 106.

Hipgrave, David Barry; Hort, Krishna (2013): Dual practice by doctors working in South and East Asia: A review of its origins, scope and impact, and the options for regulation. In *Oxford University Press in association with The London School of Hygiene and Tropical Medicine*.

Jha, Prabhat; Nugent, Rachel; Verguet, Stéphane; Bloom, David; Hum, Ryan (2012): Copenhagen Consensus 2012 Challenge Paper. Chronic disease prevention and control. In *Copenhagen consensus 2012: Solving the world's challenges.* Version 3.

Joumard, Isabelle; Kumar, Ankit (2015): Improving health outcomes and health care in India. OECD Working Paper No. 1184. OECD. Paris.

Kiwanuka SN; Kinengyere AA; Rutebemberwa E; Nalwadda C; Ssengooba F; Olico-Okui; Pariyo GW (2011): Dual practice regulatory mechanisms in the health sector. A systematic review of approaches and implementation. In *London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London*.

Kumar, Kaushalendra; Singh, Ashish; Kumar, Santosh; Ram, Faujdar; Singh, Abhishek; Ram, Usha et al. (2015): Socio-economic differentials in impoverishment effects of out-of-pocket health expenditure in China and India: Evidence from WHO SAGE. In *PloS one* 10 (8), pp. 1–19.

Macinko, James; Harris, Matthew J (2015): Brazil's family health strategy — delivering community-based primary care in a universal health. In *The New England Journal of Medicine* 372 (23), pp. 2177–2181.

Mahal, Ajay; Karan, Anup; Engelgau, Michael (2010): The economic implications of non-communicable disease for India. The World Bank. Washington, D.C.

Mehdi, Ali; Chaudhry, Divya (2015): Human capital potential of India's future workforce, pp. 1–35.

MOHFW (2002): National Health Policy. Ministry of Health & Family Welfare (MOHFW), Government of India. New Delhi.

MOHFW (2014): National Health Policy 2015 Draft. Ministry of Health & Family Welfare (MOHFW), Government of India. New Delhi.

MOHFW (2015): National Health Profile 2015. Central Bureau of Health Intelligence (CBHI), Ministry of Health & Family Welfare (MOHFW), Government of India. New Delhi.

MOF (2015): Report of the Fourteenth Finance Commission. Finance Commission, Ministry of Finance (MOF), Government of India. New Delhi.

NCMH (2005): Report of the National Commission on Macroeconomics and Health. National Commission on Macroeconomics and Health (NCMH), Ministry of Health & Family Welfare, Government of India. New Delhi.

NITI Aayog (2015): Health system in India. Bridging the gap between current performance and potential. Working Paper Series 1, Paper No. 1/2015. Health Division, National Institute for Transforming India. New Delhi.

NSS (2015): Key indicators of social consumption in India. NSS 71st Round. January-June 2014. Ministry of Statistics and Programme Implementation, Government of India. New Delhi.

ORGI (2013): Vital statistics of India based on the civil registration system. Office of the Registrar General, Ministry of Home Affairs, Government of India. New Delhi.

ORGI (2015): Report on medical certification of causes of death 2013. Office of the Registrar General, Ministry of Home Affairs, Government of India. New Delhi.

Planning Commission (2011): High Level Expert Group Report on Universal Health Coverage for India. New Delhi: Government of India.

Rao, Krishna D.; Bhatnagar, Aarushi; Berman, Peter (2012): So many, yet few: Human resources for health in India. In *Human Resources for Health* 10 (1), pp. 1–9.

Rao, Mohan; Rao, Krishna D.; Kumar, A. ShivaK; Chatterjee, Mirai; Sundararaman, Thiagarajan (2011): Human resources for health in India. In *The Lancet* 377 (9765), pp. 587–598.

Reddy, K. N.; Selvaraju, V. (1994): Health care expenditure by government in India, 1974-75 to 1990-91. NIPFP. New Delhi.

Sen, Amartya (1998): Mortality as an indicator of economic success and failure. In *The Economic Journal* 108 (446), pp. 1–25.

Sheikh, Kabir; George, Asha (2010): Health providers in India. On the frontlines of change. New Delhi: Routledge.

Sudarshan, Hanumappa; Prashanth, N. S. (2011): Good governance in health care: The Karnataka experience. In *The Lancet* 377 (9768), pp. 790–792.

Sundararaman, Thiagarajan; Gupta, Garima (2011): Indian approaches to retaining skilled health workers in rural areas. In *Bulletin of the World Health Organization* 89 (1), pp. 73–77.

Thaler, Richard H.; Sunstein, Cass R. (2009): Nudge. Improving decisions about health, wealth and happiness. London: Penguin Books.

Varghese, Joe; Varatharajan, D.; Thankappan, K. (2007): Local factors influencing resource allocation to health under the decentralized planning process in Kerala. In *Journal of Health and Development* 3 (1 and 2), pp. 217–226.

WHO (2003): The World Health Report. Shaping the future. Geneva: World Health Organization.

WHO (2005): Preparing a healthcare workforce for the 21st century: The challenge of chronic conditions. Geneva: Noncommunicable Diseases and Mental Health Cluster, Chronic Diseases and Health Promotion Department, World Health Organization.

WHO (2005): Preventing chronic diseases: A vital investment. Geneva: World Health Organization.

WHO (2006): Working together for health. The World Health Report. Geneva: World Health Organization.

WHO (2008): World Malaria Report. Switzerland: World Health Organization.

WHO (2010): The World Health Report. Health systems financing: The path to universal coverage. Geneva: World Health Organization.

WHO (2014): Global status report on noncommunicable diseases 2014. Geneva: World Health Organization.

Williams, Alan (1997): Intergenerational equity: An exploration of the 'Fair Innings' argument. In *Health Economics* 6 (2), pp. 117–132.

Wright, Bruce; Scott, Ian; Woloschuk, Wayne; Brenneis, Fraser (2004): Career choice of new medical students at three Canadian universities: Family medicine versus specialty medicine. In *Canadian Medical Association Journal* 170 (13), pp. 1920–1924.

ICRIER'S LATEST WORKING PAPERS

NO.	TITLE	AUTHOR	YEAR
320	INNOVATION (AND UPGRADING) IN THE AUTOMOBILE INDUSTRY: THE CASE OF INDIA	SAON RAY SMITA MIGLANI	MAY 2016
319	THE IMPACT OF GLOBAL LABOUR STANDARDS ON EXPORT PERFORMANCE	KUNTALA BANDYOPADHYAY	MAY 2016
318	FACILITATING INDIA-PAKISTAN TRADE THROUGH THE LAND ROUTE	NISHA TANEJA ISHA DAYAL SAMRIDHI BIMAL	MAY 2016
317	ESTABLISHING INDIA'S NATIONAL TRADE FACILITATION COMMITTEE-A PROPOSAL	NISHA TANEJA SHRAVANI PRAKASH SAMRIDHI BIMAL	MARCH 2016
316	AN ANALYSIS OF NEPAL'S TRANSIT THROUGH INDIA	NISHA TANEJA SAMRIDHI BIMAL ISHA DAYAL	MARCH 2016
315	EFFECTS OF GOVERNMENT INVESTMENT SHOCKS ON PRIVATE INVESTMENT AND INCOME IN INDIA	JAGANNATH MALLICK	FEBRUARY 2016
314	IMPOSITION OF MAT ON SEZS: CONCERNS AND THE WAY FORWARD	ARPITA MUKHERJEE BHAVOOK BHARDWAJ	FEBRUARY 2016
313	TECHNOLOGY, JOBS AND INEQUALITY EVIDENCE FROM INDIA'S MANUFACTURING SECTOR	RADHICKA KAPOOR	FEBRUARY 2016
312	DIVERSIFYING INDIA'S SERVICES EXPORTS THROUGH SEZS: STATUS, ISSUES AND THE WAY FORWARD	ARPITA MUKHERJEE SAUBHIK DEB SHREYA DEORA TANU M. GOYAL BHAVOOK BHARDWAJ	DECEMBER 2015
311	TRENDS AND ECONOMIC DYNAMICS OF GUAR IN INDIA	DURGESH K. RAI	OCTOBER 2015
310	DRUG QUALITY AND SAFETY ISSUES IN INDIA	MAULIK CHOKSHI RAHUL MONGIA VASUDHA WATTAL	SEPTEMBER 2015
309	ADMINISTRATIVE STRUCTURE AND FUNCTIONS OF DRUG REGULATORY AUTHORITIES IN INDIA	NUPUR CHOWDHURY PALLAVI JOSHI ARPITA PATNAIK BEENA SARASWATHY	SEPTEMBER 2015
308	HUMAN CAPITAL POTENTIAL OF INDIA'S FUTURE WORKFORCE	ALI MEHDI DIVYA CHAUDHRY	SEPTEMBER 2015

About ICRIER

Established in August 1981, ICRIER is an autonomous, policy-oriented, not-for-profit, economic policy think tank. ICRIER's main focus is to enhance the knowledge content of policy making by undertaking analytical research that is targeted at informing India's policy makers and also at improving the interface with the global economy. ICRIER's office is located in the institutional complex of India Habitat Centre, New Delhi.

ICRIER's Board of Governors includes leading academicians, policymakers, and representatives from the private sector. Dr. Isher Ahluwalia is ICRIER's chairperson. Dr. Rajat Kathuria is Director and Chief Executive.

ICRIER conducts thematic research in the following eight thrust areas:

- Macro Management Financial Liberalization and Regulation
- Global Competitiveness of the Indian Economy
- Multilateral Trade Negotiations and FTAs
- Challenges and Opportunities of Urbanization
- Climate Change and Sustainable Development
- Physical Infrastructure including Telecom, Transport and Energy
- Asian Economic Integration with focus on South Asia
- Promoting Entrepreneurship and Skill Development

To effectively disseminate research findings, ICRIER organises workshops, seminars and conferences to bring together academicians, policymakers, representatives from industry and media to create a more informed understanding on issues of major policy interest. ICRIER routinely invites distinguished scholars and policymakers from around the world to deliver public lectures and give seminars on economic themes of interest to contemporary India.