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Communicable or noncommunicable diseases? Building strong primary health care systems to address double burden of disease in India

ABSTRACT

Between 1990 and 2016, India has seen an epidemiological transition in disease burden and deaths, with a steady rise in noncommunicable disease (NCD) burden. This has led to a tussle for policy attention and resources between proponents of communicable diseases such as tuberculosis, and of NCDs, such as cardiovascular diseases and diabetes. Review of evidence from global burden of diseases studies and from our own field data from rural south Rajasthan reveals that communicable-malnutrition- maternal-newborn diseases (CMNND), injuries, and NCDs are major causes of disease burden and deaths in childhood, youth and older age group, respectively. Risk factors related to diet, nutrition, and air pollution contribute significantly to communicable as well as NCDs. Many NCDs in adults have origins in malnutrition during pregnancy and early childhood; similarly, certain NCDs are caused by a communicable disease. We argue that the binary of communicable and NCD is incorrect, and that resources and policy attention be focused on strengthening primary health care systems that address CMMNDs as well as NCDs; and reduce the underlying risk factors.

Keywords: Communicable diseases, noncommunicable diseases, primary health care

Many scientific publications and popular articles report that in India, the burden of noncommunicable diseases (NCDs) is rising steadily, and that these cause many more deaths than communicable diseases.^[1]

According to the Lancet Global Burden of Disease Study in 2016,^[2] NCDs contributed to 61.8% of all deaths, while the communicable diseases contributed to 27.5% of all the deaths. A state makes an epidemiological transition when the disease burden due to NCDs (including injuries) is greater than that due to communicable diseases (including maternal-newborn). By 2016, all states in India had made this epidemiological transition. In contrast, by 1990, only two states - Kerala and Goa and union territories other than Delhi had made the transition.

Further, in 1990, the top five individual causes of disease burden in the country were all communicable diseases: Diarrheal diseases, lower respiratory infections, neonatal preterm birth, tuberculosis, and measles. In 2016, three of the top five causes were NCDs (ischemic heart disease, chronic obstructive pulmonary diseases, cerebrovascular disease), while communicable disease (diarrhea and lower respiratory infections) were responsible for the remaining two. As an inference, many of the authors suggest that health systems should prioritize NCDs for allocating resources. On the other hand, some others argue that communicable diseases are highly prevalent and are apprehensive that any undue focus on NCDs will dilute the unfinished agenda of addressing disease burden and deaths due to infectious diseases such as tuberculosis and diarrhea. Sometimes, these inferences are based on one's own specialization and area of interest.

Results from several large studies on the burden of disease and their trends have formed the basis of mapping the epidemiological transition.^[3] However, a simplified segregation of diseases in neat categories undermine several important considerations. If one wishes to draw objective inferences from these results, we need to first understand as to what different conditions are lumped together under the broad groups of communicable disease and NCD. Then, we need to carefully examine distribution of causes of deaths across geographies, age groups, and economic groups. Finally, we have to understand the risk factors for these group of conditions and find out which are most critical and amenable to change. Recommendations for health systems can be made recognizing this critical information.

In the following paragraphs, we will examine some of the above issues and try to draw objective inferences for allocating resources by a state.

What Conditions are Included Under the Categories of Communicable Diseases, NCDs and Injuries?

Global burden of diseases study examines 333 health conditions and 84 risk factors. This, and other similar studies, classify the burden of diseases in three broad groups: Communicable, noncommunicable, and injuries. Within communicable diseases are included the following conditions: Diseases of infectious etiology (diarrhea, pneumonia, tuberculosis, HIV being the most common ones), all maternal and neonatal deaths (irrespective of

the cause), and all deaths due to nutritional deficiencies (deaths due to under-nutrition). Within the broad group of NCDs are included the following conditions: Cardiac conditions, diabetes, cancers, chronic pulmonary diseases, mental health conditions, and many others. Injuries include injuries due to trauma, drowning, poisoning, and bites.

While interpreting or drawing inference on relative contribution of these groups on burden of diseases or deaths, some of the following considerations, need to be kept in mind.

First, the group of communicable diseases is not infectious diseases alone, but include those due to nutritional deficiencies and all maternal-neonatal conditions. Also, the group “noncommunicable diseases” does not mean cardiac conditions and diabetes alone, but includes conditions, such as chronic lung disease, carcinomas, and those relating to mental health.

Second, while for purposes of an epidemiological study, it is useful to bucket the conditions in manageable entities, it is important to understand that these are not neat groups. For example, origins of adult diseases such as hypertension and diabetes often lie in maternal, fetal, and early childhood malnutrition. Also, it is being now realized that many of the so called NCD such as cancer cervix and hepatocellular cancers are caused by infectious agents, which primarily cause communicable diseases. Chronic Obstructive Pulmonary Diseases (COPDs) are also often a result of or are exacerbated by chest infections such as bacterial pneumonias and past tuberculosis. Similarly, rheumatic heart disease is classified as NCD, but it has its origins in streptococcal throat infection, a infectious disease.

Third, while nutrition-related conditions are included in the communicable disease group, many of the NCDs are also related to nutrition or dietary disorders. For example, obesity, a nutritional disorder predisposes to heart disease and hypertension.

Finally, there are risk factors that predispose to both communicable disease and NCDs. We will discuss this more in the later section on risk factors.

Distribution of Causes of Deaths Across Age Groups

Keynes had famously said that in the long run, everyone is dead. As the life expectancy increases in a society, more and more people will be exposed to the conditions that affect the elderly, and many of them will ultimately succumb to one of these conditions. In order to better understand the relative contribution of communicable and noncommunicable conditions to the disease burden/deaths in India, it is helpful to segregate the causes by age group.

When thus seen, it is clear that while elderly population disproportionately suffer and die from NCDs, the younger populations continue to suffer and die from communicable diseases- in the age group 0–14 years, 81% of all deaths are due to

communicable causes, while in the age group 40–69 years, 73% of all deaths are due to NCDs. The middle age group, i.e., 15–40 years being the age of most physical activity, injuries contribute to almost 1/3rd of all deaths while communicable and noncommunicable conditions contribute roughly equally to the remaining deaths.

Our own clinic data from primary health care settings in rural South Rajasthan suggest that while communicable diseases (diarrhea, TB, and pneumonia) and maternal–neonatal conditions (antenatal care, contraception) are major reasons for seeking care for people up to 49 years of age, noncommunicable conditions become the major reason for those 50 and above. An analysis of the clinic footfall across a spread of 4 years showed that 57% of the patients (50 years and above) seeking care were for NCDs like COPD, hypertension, diabetes, and skin diseases.

So it is clear that contribution of communicable, noncommunicable and injuries to disease burden differs significantly by age. We need to consider these age specific patterns while designing response strategies.

Distribution of Causes of Deaths by Geographies

The paper that published Indian findings from the Global Burden of Disease Studies is aptly titled ‘Nations within a Nation’. In India, any epidemiological pattern cannot be generalized. So, when drawing inferences, it is important to understand the regional differences in causes of death and disease burden. The paper lumps some states together based on their level of development. It is clear that NCD cause much lower proportion (55%) of deaths in the states with poor levels of development (Jharkhand, Rajasthan, Orissa, UP, MP, Bihar, and Chattisgarh), than in those with higher levels of development (TN, Goa, Himachal, and Kerala), where they contribute to as much as 72% of all deaths.

Not only do NCDs cause lower proportion of deaths in less developed states, the pattern of cause of deaths is also different. While in more developed states, cardiovascular causes and diabetes contribute to most deaths attributable to noncommunicable group, in less developed states, chronic pulmonary conditions cause a larger burden. As we mentioned earlier, many of chronic pulmonary conditions also have their origin in infectious causes such as lower respiratory infections and tuberculosis. They are also often exacerbated by superadded infections.

Unfortunately, we do not have data segregated by rural: urban, limiting our ability to interpret the information on burden of diseases and deaths, and to design response strategies. However, the data from other studies suggest that prevalence of communicable as well as NCDs are high in rural and urban areas.

A recently released study suggests that NCDs are increasing in prevalence among adults in rural as well as urban areas. In Rajasthan, for example, though prevalence of diabetes and

hypertension is higher in urban population, prevalence in rural population is also high: 8% of surveyed people above 18 years of age, were detected to have hypertension and similar proportion also had high blood sugar. Similarly a study in rural Tamil Nadu suggested very high rates of diabetes and hypertension.^[4]

While incidence of tuberculosis was estimated to be higher in urban areas as compared to rural areas (188 vs 139 per 100,000 population) in both settings, it remains alarmingly high and a significant public health problem. In Brazil, another high incidence country the incidence of TB is around 38 cases per 100,000 populations per year, 4–5 times lower than in urban and rural India.^[5]

Unfortunately, we do not have much data on disease burden or cause of death across different economic groups.

Risk Factors for Deaths and Disabilities

Prevention of a condition is caused by altering or eliminating the risk factor. One risk factor is often responsible for more than one condition and therefore, addressing this risk factor can decrease the prevalence and mortality of more than one condition with these conditions. The top five risk factors of mortality and disability in India are:

1. Child and maternal undernutrition: 14.6%
2. Air pollution: 9.8%
3. Dietary risks: 8.9%
4. High systolic blood pressure: 8.5%
5. High fasting glucose.

In addition to that, high Body Mass Index (BMI) is the ninth largest risk factor.

If we combine maternal and child undernutrition, dietary risks, and high BMI, they add up accounting for more than 25% of mortality and disability, and as we can see they increase the risk of deaths due to communicable diseases as well as NCDs. Ensuring adequate and nutritious diet can therefore lead to a significant decrease in prevalence and deaths due to both communicable and noncommunicable disorders.

The Correctable Burden of Mortality in India

Based on social and demographic profile, every country has an “expected” burden for a given disease. When the actual burden of the disease in that country exceeds the expected burden, it signifies that the health systems have failed to adequately address this disease-greater the difference, greater the failure.

In India, actual burden of most disease conditions; far exceeds the expected burden, based on its social development levels and demographics. Even more worrying is the fact that decline in mortality due to these diseases, irrespective of whether they are communicable or noncommunicable is much slower in India

than most other countries. For illustration, we present below a comparison of decline in mortality due to communicable disease and NCD between India, Bhutan, and Iraq in three 5-year periods from 2003 to 2017 [Table 1].^[6]

Lessons for Program Design and Prioritizing Resources

Communicable disease and NCDs both contribute significantly to disease burden as well as deaths in India. One group of conditions assumes more importance than others at different stages of life, across different geographies, and across distinct social and economic groups. Some common risk factors, such as poor nutrition, predispose to occurrence as well as deaths due to both communicable disease and NCDs.

We should not see these sets of conditions as competing for resources, but should try to create strong and decentralized health systems that are able to address all common cause of disease and deaths. In an Opinion Editorial in *Every Woman Every Child*, experts recommended building resilient health systems that are able to screen and manage communicable as well as noncommunicable diseases, especially for addressing avoidable morbidity and mortality in children.^[7] A recent commentary in the *Lancet*, reiterated “that maternal and child health is inextricably linked with noncommunicable diseases and their risk factors” and advocated “inclusion of noncommunicable disease prevention and control within sexual and reproductive health and maternal and child health programs, especially at the primary health care level...”^[8]

Such integrated health care systems will aim at prevention, screening, and early management of communicable disease as well as NCDs to prevent their severity and progression. For example, such a system will be able to screen hypertension as well as detect tuberculosis promptly; and manage both. It may not be able to provide advanced care for either (such as cardiac surgery or treatment of multidrug resistance tuberculosis), but

Table 1: Decline in mortality due to communicable diseases and NCDs for India, Bhutan, and Iraq from 2003 to 2017

	Decline in mortality (%) due to communicable diseases		
	India	Bhutan	Iraq
2003-07	-11.8	-20.1	-14.7
2008-12	-14.4	-22.8	-22.9
2013-17	-11.7	-14.1	-18.4
	Mortality due to NCDs		
	India	Bhutan	Iraq
2003-07	-4.9	-5.6	-19.7
2008-12	0.7	-5.1	-22.5
2013-17	0.7	-4.7	-18.1

Note: Reprinted from ‘GBD 2017 Causes of Death Collaborators’. Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980–2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet* 2018; 392: 1736–88

will have functional linkages with secondary and tertiary facilities whenever such a care is required.

In collaboration with other systems, such a health system will also address the risk factors that often transcend these binaries. Promoting adequate dietary intake and reducing air pollution are two such risk factors that will prevent the occurrence as well as mortality due to both communicable disease and NCD. By necessity, this system will be based on principles of primary health care. We should remember that strong primary care systems are capable of addressing the existing and emerging conditions, and a weak system is not able to address either.

India has a large network of primary health care services in the public domain; however, the quality that they provide is far from desirable. They suffer from lack of resources and accountability. The government now needs to infuse significant additional resources and attention to enable them to address the unacceptable burden of communicable disease as well as NCDs.

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**Pavitra Mohan¹,
Sanjana Brahmawar Mohan²,
Manisha Dutta³**

¹Secretary, ²Director, ³Executive (Programs), Basic Health Care Services, Udaipur, Rajasthan, India

Address for correspondence: Dr. Pavitra Mohan,
Basic Health Care Services, 39, Krishna Colony Bedla Road,
Udaipur - 313 011, Rajasthan, India.
E-mail: pavitra@bhs.org.in

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