Burden of noncommunicable diseases in India: A decomposition analysis by causes of death 1990-2017

Need of the Study

India is facing the dual burden of communicable and noncommunicable diseases since the mid-1990s. Noncommunicable diseases intruded in the later years of life in the backdrop of the declining burden of infectious and parasitic diseases. This adverse development brought many challenges before the existing and running health programmes in India. Given the variations across the regions and administrative boundaries, it is quite challenging to implement pan-Indian programme for degenerative diseases that prevail over a long span of years over a life course. Moreover, the noncommunicable diseases has shown rising morbidity and mortality in adolescent and adult ages. This occurrence is more significant threat for a young and working population. The country needs an overhauling of the circumstances and situation, perhaps, by surveillance of events and its assessments by socio-economic and demographic groups. It is crucial to analyse the role of demographic characteristic such as age and sex to comprehend the burden of diseases by many noncommunicable diseases. This study deals with exploring the demographic view in reference to the pattern of diseases and morbidity and mortality from noncommunicable diseases. The specific objectives of the study are to (1) examine the mortality decline by disease category and (2) to assess the age-specific contributions of noncommunicable diseases to life expectancy at birth (e_0) between 1990 and 2017.

Data

The age-cause-specific death rates (ACSDR) available from Global Burden of Disease (GBD) 2017, Institute for Health Metrics and Evaluation (IHME) are used for the period of 28 years between 1990 and 2017. The cause-specific ASDR by quinquennial age groups up to the age group of 95+ years along with the age groups of 0-1 and 1-4 years were retrieved for India from GBD data. The GBD data provides ACSDR for various categories of diseases. For this study, we have reviewed and analysed ACSDR for noncommunicable diseases, communicable diseases, and injuries for India available at level one and eleven major categories of noncommunicable diseases available at level two in the GBD data.

Amongst noncommunicable diseases, the eleven major categories of diseases are Neoplasms, Cardiovascular diseases, Chronic respiratory diseases, Digestive diseases, Neurological disorders, Mental disorders, Musculoskeletal disorders, Skin and subcutaneous diseases, Substance use disorders, Diabetes and kidney diseases, and Other non-communicable diseases.

Methods

The life tables were constructed using ASDR for India for the years 1990 and 2017, using the conventional methodology recommended by the United Nations. Standard decomposition methods (Arriaga 1984, Shkolnikov 2003) were adopted to compute cause-age-specific contributions to life expectancy at birth (e_0). Decompositions methods are based on the principle of standardisation, and decomposition technique is used for decomposing e_0 by age groups and

causes of death. The results are presented up to the age group of 85+ in concordance with the quinquennial age groups of life table.

Findings

Burden of noncommunicable diseases

The burden of noncommunicable diseases have been dominant in old age groups and programmes are also at its place. However, the expansion of mortality attributable to chronic noncommunicable diseases in adult ages demands more strategic implementation of programmes for age-specific and targeted population. In order to lower the mortality rates of noncommunicable diseases, the middle age group of 30-69 years is crucial and needs more focused cause-specific analysis and assessments. In view of this, the contribution of many major noncommunicable diseases in each of the age groups reveals the vulnerability of population over time (Figure 1).

Figure 2 shows the share of contribution of eleven major categories of noncommunicable diseases to e_0 in each of age groups for India between 1990 and 2017. The contribution of noncommunicable diseases as a whole to e_0 is split into these eleven major noncommunicable diseases. Figure 2 reveals that among noncommunicable diseases, Chronic respiratory diseases in men and women has the largest share of contribution of 12 percent and 9.5 per cent, respectively, to e_0. Chronic respiratory diseases contributed to e_0 in age groups of 55-79 years, slightly more expansion over age in men than in women. The contribution attributable to Chronic respiratory diseases slopes up from adult ages and show significant share in old ages, with the highest share in the age group of 65-69 years. Chronic obstructive pulmonary disease is the main cause of death among Chronic respiratory diseases. Cardiovascular diseases, mainly consist of Heart disease and Stroke, is the second contributor to e_0, among noncommunicable diseases. The contribution to e_0 by Cardiovascular diseases has shown age pattern similar to that of Chronic respiratory diseases. Both these diseases have shown a noticeable contribution to e_0 in young adults and adolescent ages, more in females than in males. The share of contribution to e_0 by Cardiovascular diseases in adult ages of 15-44 years was slightly larger in women than in men. Digestive diseases among noncommunicable diseases shows a sizeable contribution to e_0 in adult and old ages. By gender, men compared to women show a larger contribution of digestive diseases to e_0 in adult ages and old ages.

Other communicable diseases, one of the major categories of noncommunicable diseases, which includes diseases such as congenital birth effects, urinary diseases, hemoglobinopathies and haemolytic anemias, and oral disorders, shows a sizeable contribution to e_0 in infant and child age groups. Neoplasms and Neurological disorders have also shown small contribution to a better e_0 in child, adolescent and adult ages.

However, some noncommunicable diseases such as Diabetes and kidney diseases and Neoplasms that show a negative contribution to e_0 in old age groups. Neoplasms shows the largest negative contribution to e_0. Cancer and Leukemia are the two leading causes of death among Neoplasms, and Chronic kidney disease is the leading cause of death in Diabetes and kidney diseases. By gender, Neoplasms, with rising mortality rates, shows a larger negative contribution in women than in men. On the other hand, both men and women do not show mortality decline for Mental

disorders, Skin and subcutaneous diseases, Musculoskeletal disorders and Substance use disorders. However, these causes of death show low mortality rates during the reference period in comparison to others.

Discussion

Results show that communicable diseases shows a large contribution to e_0 across all ages, confirming a reduction in premature deaths in infant, child and adult ages (Figure 1). However, noncommunicable diseases does not show a significant mortality decline since 1990s, and hence, the age-specific contributions of noncommunicable diseases to e_0 have been small. This straggling is despite the plausibility of lowering mortality rates over wide age range from adult to old ages. Noncommunicable diseases such as Mental disorders, Skin and subcutaneous diseases, Musculoskeletal disorders and Substance use disorders do not show contribution, and Neurological disorders and Digestive diseases show a small positive contribution to e_0. However, noncommunicable diseases such as Neoplasms and Diabetes and kidney diseases showed a negative contribution to e_0 (Figure 2) due to the rise in mortality rates in old ages. Other noncommunicable diseases, mainly consist of congenital birth effects and hemolytic anemia, showed small positive contribution in children age groups but could not make a significant impact on e_0. Chronic respiratory diseases and Cardiovascular diseases are the only two major noncommunicable diseases that showed significant positive contributions to e_0 in old-adult (50-59 years) and old (60 and above years) ages.

The mortality rates are high for Neurological disorders and Diabetes and kidney diseases following Cardiovascular diseases and Chronic respiratory diseases. Kidney diseases may be given priority in government programmes to control morbidity and mortality. GOI has recently included Chronic kidney diseases in the NPCDCS program, and as the results indicate focusing extensively in the age group of 50-59 years would assuage the screening of the target population. Neurological disorders shows a sharp rise in mortality rates in the oldest of old ages (80 and above years). This becomes a major concern in patients suffering from multimorbidity. During the pandemic of COVID-19, it is apparent that the consequences of Mental disorders and depression increase the risk of Hypertension and Diabetes.

While policies and programmes related to noncommunicable diseases have been focusing for the reduction in premature deaths, the programmes such as Pradhan Mantri Jan Arogya Yojana (PM-JAY) and Health and Wellness Centers (HWCs) under the flagship scheme *Ayushman Bharat* tends for ensuring universal health coverage. These programmes are meant to bridge the gaps of affordability and availability of medicine and drugs and accessibility to health systems across the economic classes and social groups. A long-term commitment by the GOI is appreciable to tackle the determinants and risk factors of noncommunicable diseases which requires a lifestyle and behavioural change.

The findings of the study assert that Neurological disorders, Neoplasms and Chronic kidney diseases are upcoming diseases with high severity. The low-priced medicine and drugs and its availability at primary and community -level health centers are needed in India.

Conclusion

The study examines the contribution of noncommunicable diseases to the reduction of premature deaths in India in a period of 28 years between 1990 and 2017. A decomposition analysis reveals that only two NCDs, namely Chronic respiratory diseases and Cardiovascular diseases, show the reduction of the toll of deaths in old-adult and old ages. The rise in mortality and morbidity attributable to Neoplasms and Diabetes and kidney diseases is a major concern for number of deaths in adult and old ages. In addition to these diseases, Neurological disorders is a major concern with rising mortality rates in old ages. Women showed a large, significant reduction in deaths in adult and old ages attributable to communicable diseases and to Chronic respiratory diseases and Cardiovascular diseases among noncommunicable diseases. Compared to women, men show a smaller reduction in premature deaths. Therefore, with respect to noncommunicable diseases as well as communicable diseases, adult men are in need of special programmes and medical interventions especially for the morbidity and mortality rise attributable to Neurological diseases, Neoplasms and Chronic kidney diseases. For different age groups, the specific programmes for noncommunicable diseases are required to lower the mortality rates, especially in the middle age group of 30-69 years.

References

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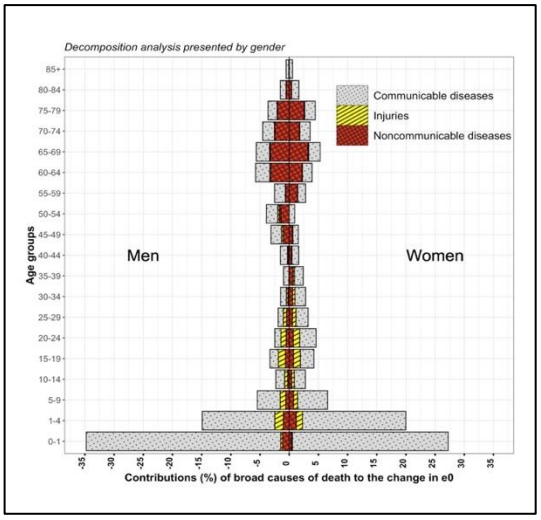

Figure 1: Contribution of three broad categories of diseases to life expectancy at birth (e_0) by age and sex, India,1990 and 2017. Source: Own calculation using data from Global Burden of Disease (2018), IHME.

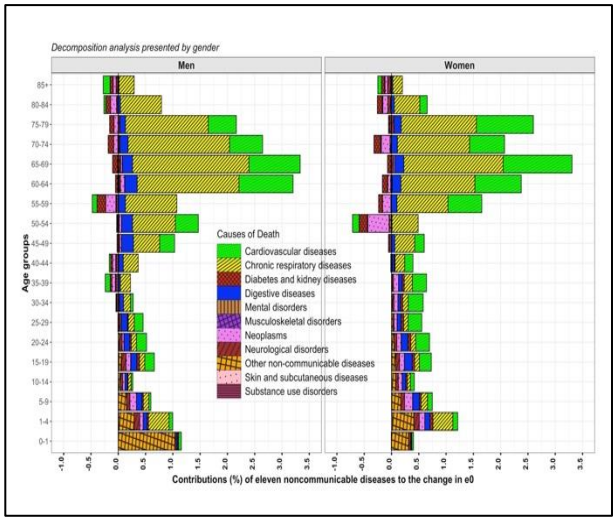

Figure 2: Contribution of eleven major noncommunicable diseases to life expectancy at birth (e_0), India, 1990 and 2017. Source: Own calculation using data from Global Burden of Disease (2018), IHME