

Analyzing the Changes in Certain Infectious and Parasitic Diseases in Urban Population of India By Using Medical Certification of Cause of Death Data

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Abstract

Background: Infectious diseases are important causes of morbidity and mortality globally. At least 25% of about 60 million deaths that occur worldwide each year are estimated to be due to infectious diseases. In India, the burden of infectious diseases is enormous; although it has decreased as a result of overall socioeconomic progress and use of vaccines and antimicrobials, it is still a major health-care burden. Studying a disease trend over a certain time period is important in a country's public health system as it guides agencies to prioritize funds and other measures for its control. **Objectives:** The present study tries to understand its transition in an urban population of India. **Materials and Methods:** "Medical Certification of Cause of Death" data for the period from 1989 to 2015 have been used. Deaths under the head "age not stated" have been distributed in all age groups in proportion to total deaths at those age groups for all the years, and the percentage of the cause of death to total deaths has been calculated. Three years' moving average of these percentages have been calculated. **Results:** The overall age group analysis showed a downward trend in both males and females. However, age-segregated analysis showed that mortality is declining among children and youth population, specifically showing a steep decline among infants and under-five population. **Conclusion:** Infectious diseases are still a major public health problem in India.

Keywords: Infectious diseases, Medical Certification of Cause of Death, transition, trend

INTRODUCTION

Infectious diseases are diseases in which normal functioning of the host's organs and/or systems is impaired by invasion of a foreign agent.^[1-3] These account for one-fourth of the global burden of disease (GBD).^[4-6] People in developing countries suffer heavily from the burden of ill health and death caused by infectious diseases, with infants and children being the most affected.^[7-9]

Infectious diseases remain a major cause of morbidity and mortality in many countries despite great advances in vaccines, diagnostics, therapeutics, and infection control measures. These are the second major cause of death, the leading cause of disability-adjusted life years (DALYs) worldwide (One DALYs is one lost year of healthy life), and the third major cause of death in the United States.^[10,11] The GBD Study 2017 found that of the 2.5 billion DALYs caused by all diseases in 2017 worldwide, 550 million were attributable to infectious diseases. The following four infectious diseases were among the top

ten causes of disease burden globally: lower respiratory tract infections (106 million DALYs), diarrheal disease (81 million), HIV/AIDS (54 million), and malaria (45 million).^[12]

In India, the burden of infectious diseases is enormous; although it has decreased as a result of overall socioeconomic progress and use of vaccines and antimicrobials, it is still a major health-care burden. It is generally known that in developing countries mortality from infectious and parasitic diseases is higher than that in developed areas. In the context of an epidemiological transition, when infectious diseases tend to be replaced by degenerative diseases, mortality

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from infectious and parasitic diseases is significantly decreased. Studying a disease trend over a certain time period is important in a country's public health system as it guides agencies to prioritize funds and other measures for its management.

The aim of the study is to evaluate mortality from a group of causes of death called Certain Infectious and Parasitic Diseases (A00-B99) defined by The International Classification of Diseases and Related Health Problems-Tenth Revision^[13] in urban India and to find out its transition during the period of 1989–2015. This cause of death group includes intestinal infectious diseases (A00–A09), tuberculosis (A15–A19), other bacterial diseases (A20–A49), infections with a predominantly sexual mode of transmission (A50–A64), viral diseases (A70–A74 and A80–B34), protozoal diseases (B50–B64), and other certain infections and parasitic diseases and late effects of infection and parasitic diseases (A65–A69 and A75–A79 and B35–B49, B65–B99, respectively).

MATERIALS AND METHODS

The study has used the publications presenting statistics on the causes of death obtained through the Civil Registration System under the Registration of Births and Deaths Act, 1969. The data are compiled for a period of 26 years, 1989–2015, to understand the trend of infectious diseases in India over time.^[14] At present, the Medical Certification of Cause of Death (MCCD) scheme has been made operational at varying levels of efficiency across the states/union territories in the country, ranging from 1% in Jharkhand to 100% in Goa. Therefore, the number of deaths reported therein may lack the representative character in the strict sense. However, it may be sufficient to throw some valuable insights into deaths by various cause groups and their gravity. More detailed information is available elsewhere.^[15]

The number of death cases in which age is not stated (1.9% in 2015) has been distributed in all the age groups in proportion to total deaths in those age groups, and the percentage of the cause of death to total deaths has been calculated for each year from 1989 to 2015. For getting the smooth trend line, 3 years' moving average has been calculated. To examine the age-specific trends, age categories are merged to form six age groups as follows – 0–1 year, 1–4 years, 5–14 years, 15–24 years, 25–64 years, and ≥ 65 years. The trend of infectious diseases has been analyzed based on the overall age group and age-segregated data.

RESULTS

The results of age-segregated data analysis are shown in Figures 1–6, and the outcome of overall age group analysis is displayed in Figure 7.

Figure 1 depicts that there is a considerable decline in the proportion of deaths due to infectious diseases among infants

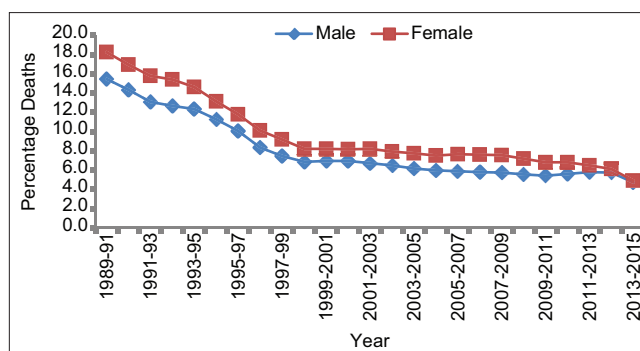


Figure 1: Trend of deaths due to certain infectious and parasitic diseases in 0–1-year-old infants in urban India (1989–2015)

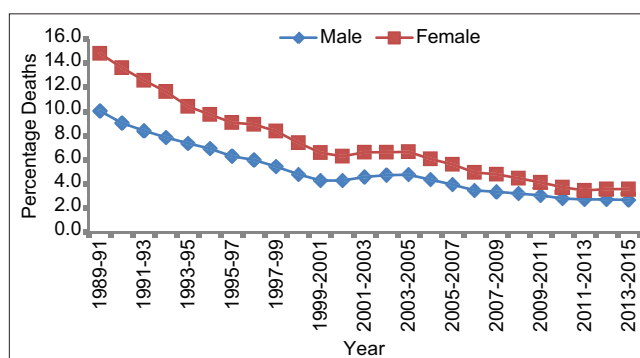


Figure 2: Trend of deaths due to certain infectious and parasitic diseases in 1–4-year-old children in urban India (1989–2015)

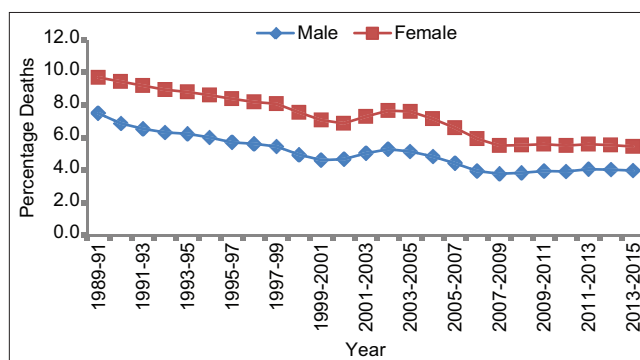


Figure 3: Trend of deaths due to certain infectious and parasitic diseases in 5–14-year-old children in urban India (1989–2015)

up to the year 2000 and almost plateaued and remained unchanged till 2011–2013. A similar trend is observed in 1–4 years' age group also [Figure 2].

In children of 5–14 years' age group, the major group of infectious diseases plateaued and remained unchanged till 2015 in both sexes [Figure 3].

Figure 4 clearly shows that the infectious group of diseases have marginally declined over the years among the youth population, and the percentage of deaths is comparatively higher among females as compared to males.

The overall share of major infectious disease groups among the adult population has remained constant over the years ranging

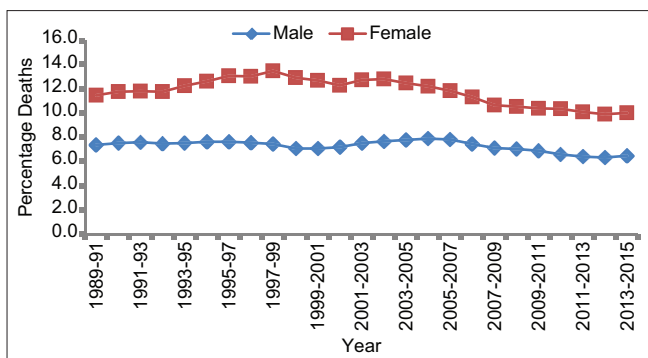


Figure 4: Trend of deaths due to certain infectious and parasitic diseases in 15–24-year-old youths in urban India (1989–2015)

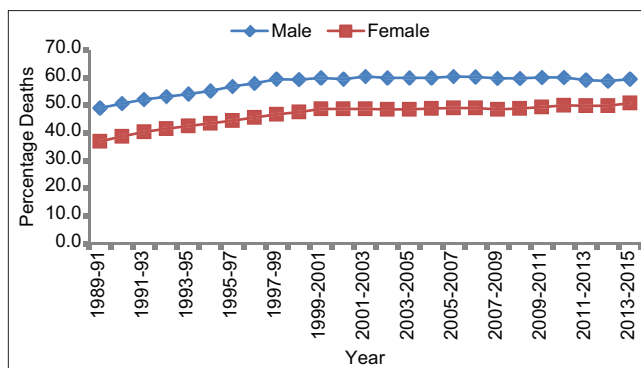


Figure 5: Trend of deaths due to certain infectious and parasitic diseases in 25–64-year-old adults in urban India (1989–2015)

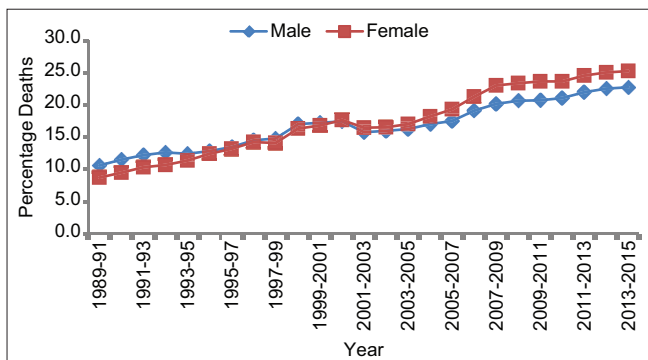


Figure 6: Trend of deaths due to certain infectious and parasitic diseases in elderly aged 65+ years in urban India (1989–2015)

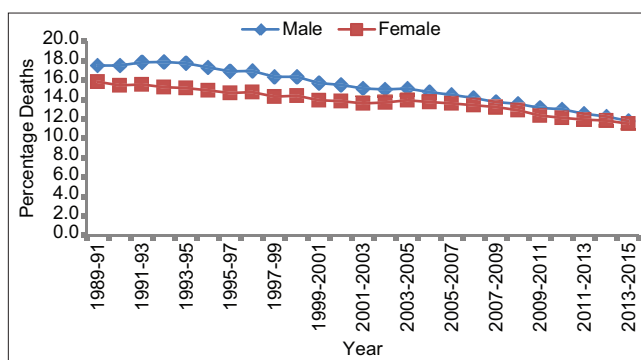


Figure 7: The overall trend of deaths due to certain infectious and parasitic diseases in urban India (1989–2015)

from >59% among males to around 45% among females after the year 2000 [Figure 5].

The share of major infectious disease groups among the older population is showing an increasing trend over the years [Figure 6].

The graph in Figure 7 clearly shows that there is a steady decline in the share of infectious and parasitic diseases in both the sexes. The percentage share has declined from 17% in 1989–1991 to 11% in 2013–2015.

DISCUSSION

During the year 2015, a total of 1,183,052 medically certified deaths were reported, of which 736,882 (62.3%) and 446,170 (37.7%) pertained to males and females, respectively, with a sex ratio of female deaths to male deaths to be 605/thousand. Among the leading cause groups, diseases of the circulatory system contributed to around one-third (33.2%) of the medically certified deaths followed by certain infectious and parasitic diseases (11%) with percentages of male deaths (11.1%) and female deaths (10.8%).^[16]

As per Indian state-level Disease Burden Initiative estimates 2016, India is experiencing an epidemiological transition with an increase in the proportion of noncommunicable disease burden and decrease in the infectious diseases.^[17]

Over the study period (1989–2015), it has been found that trends of the overall age group analysis portray a similar picture that mortality from certain infectious and parasitic diseases show a downward trend in both males and females in India. However, the age-segregated analysis shows that mortality from this group of diseases is declining among children and youth population, specifically showing a steep decline among infants and under-five populations. Similar trends have been observed among under-five and infant mortality rates in India, which have decreased from 114/1000 live births in 1990 to 39 in 2016 and from 81 in 1990 to 34 in 2016 per 1000 live births, respectively.^[18] This decline can be attributed to various national health programs targeting maternal and child health, childhood immunization, and nutrition. However, there is still a huge burden of communicable diseases such as respiratory infections, diarrhea, and tuberculosis, which still needs to be addressed. The proportion of deaths due to infectious diseases among adults has remained fairly constant with about half of the deaths attributed to infectious causes including tuberculosis, malaria, and diarrheal diseases. The MCCD report 2015 states that septicemia individually contributes to about 4.1% of the medically certified deaths among adults. However, the overall trends among adults in our analysis are not in line with the epidemiological transition witnessed in India, which may partly be due to the low percentage of medically certified

deaths (22%) with a huge interstate variation that may not be correctly representative of the population.

The burden of most infectious and associated diseases reduced in India from 1990 to 2016, but five of the ten individual leading causes of disease burden in India in 2016 still belong to this group: diarrheal diseases, lower respiratory infections, iron-deficiency anemia, preterm birth complications, and tuberculosis. The burden also differed between sexes, with diarrheal disease, iron-deficiency anemia, and lower respiratory infections being higher among females and tuberculosis being higher among males. The proportion of total disease burden caused by infectious and associated diseases was highest among children, which contributed to the disproportionately higher overall disease burden suffered by the under-5-year age group.^[17]

As per the GBD report, between 1990 and 2017, there were more number of deaths of children due to pneumonia than of older adults. In adults of >70 years of age, deaths due to pneumococcal pneumonia fallen by less than half as much as those of children. Deaths due to influenza and respiratory syncytial virus pneumonia have changed only minimally. Similar patterns are seen for deaths due to enteric infections. Evidence-based health policies are needed to consider whether large increases in the use of antibiotics are leading to meaningful reductions in adult infections.^[19]

CONCLUSION

The findings show that over the years, major groups, i.e., certain infectious and parasitic diseases, are showing a declining trend among children and youth population, and India is facing the double burden of both communicable and noncommunicable diseases among the adult population. This decline can be attributed to several factors including better health-care services, vaccination, and other major preventive public health programs. However, infectious diseases are still a major public health problem in India, which is further compounded by the emergence of antimicrobial resistance and new pathogens which were earlier unknown to humans. Public health measures, including mechanisms for regional surveillance and reporting, as well as collaborative research, are recommended to address these challenges. Mortality due to infectious diseases has fallen dramatically in the past centuries as a result of sanitary and food safety development along with vaccines, antibiotics, and other advances in societal conditions and medical sciences.

Limitation

The percentage of medically certified deaths to total registered deaths was only 22% in 2015, thus it may not be really representative of the population. Mortality statistics are only as accurate as the data provided by physicians who fill out death certificates.

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Conflicts of interest

There are no conflicts of interest.

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