Chapter 3

Levels, Trends and Patterns of Mortality in India
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3.1 Introduction

The potential to live a healthy long life is a fundamental aspect of human development. Later half of 20th century was witnessed enormous advancement in improving health and survival around the world. According to the United Nations 2010 Revision of the World Population Prospects, life expectancy at birth (LEB) has increased from 48 years in 1950-55 to 68 years in 2005-10 all over the world. However, wide disparities in the level of mortality across regions and countries are observed. Disparities accounted for the inequality in access to food, safe drinking water, sanitation, access of medical facilities and care, lifestyle factors and also societal and individual factors affecting their survival chances (United Nations, 2012). Mortality conditions are improving all over the world. A knocking feature is that while more than 100 years were needed for extending life expectancy by 30 years in the developed countries, whereas the same has been achieved in a few decades in those countries where the improvement began early in this century (Benjamin, 1966).

Historically, there is a shift in populations from high level of fertility and mortality to low level of fertility and mortality over time. This process is known as the Demographic Transition. Mortality decline that have emerged from the demographic transition is partially presented in Figure 3.1 through the levels and trends in life expectancy at birth over the past 60 years for the selected regions and world as a whole.
Figure 3.1 shows that while all regions of the world have attained the gain in survival, the pace of betterment varies among the less developed regions than that of high developed regions. By 2005-10, life expectancy at birth in highly developed regions like Australia/New Zealand had crossed the 80 years while the average length of life was about 28.7 and 12.2 years lesser in Sub-Saharan Africa and Asia respectively.

The inequalities in survival across the regions of the world are suggestive of differential progress through the demographic transition. In a similar way, India is also experiencing the disparities in survival across the states and within states. The mortality development in India is truly remarkable one. Mortality was observed very high during the 19th century and started...
declining from the beginning of the 20th century, doubling the life expectancy at birth in the course of 20th century (Navneetham and Krishnakumar, 2011). LEB has reached 64.6 years for men and 67.7 years for women by 2006-10 (ORGI, 2010). During the post-independence period, substantial reduction in mortality at younger ages had been the major factor in the development of life expectancy at birth. Maternal and child health interventions, improvement in education, better health services and development in medical technology acted as a catalyst in the reduction of mortality at young ages.

Few studies have analyzed the trends and pattern of mortality across time and regions in India (Preston and Bhatt, 1984; Jain, Visaria and Visaria, 1985; Bhatt and Navaneetham, 1991; Krishnaji and James, 2002; Visaria, 2004, Chaurasia, 2006). There is ample evidence to suggest that mortality decline had slowed down considerably during the 1970s. Moreover, despite the fact that there has been a secular decline in mortality, but very less is known about the structure of mortality change. Nevertheless, there has been some attempt to analyze the age pattern of mortality in India (Roy and Lahiri, 1987; Parasuraman, 1990; Chaurasia, 1993), but the focus and approach was quite different. Roy and Lahiri (1987) have limited the study to the levels and trends of mortality within the India. However, Parasuraman (1990) made an effort to identify the most suitable model life tables for capturing the mortality in India and states. Chaurasia (1993) studied the mortality change in India and states for time 1970-85 using the SRS based abridged life table of India. In this study, he concluded that yet the mortality is declining over time but it is not uniform either in different age groups or subpopulations.
Therefore, aforementioned communication shows that very little exercise is made to know how the different age group mortality is interlinked and how the different ages are affecting the mortality variation in India and its states. Thus, the present chapter in particular looks into the trends and differential patterns of mortality across different stages of the life course (i.e. from infancy to childhood, adult mortality to mortality at older ages) since 1970 to 2010. This would disclose the process of mortality change over the life span and will be useful for policy intervention for sustainable development in health of people.

3.2 Levels, Trends and Changes in mortality in India, 1970s to 2010

India has a series of SRS statistical report which can be used to throw some light on trend and patterns in different mortality measures since 1970s. India had a high level of mortality rates, but during the last few decades there has been a substantial decline in mortality rates. This decline in mortality explains the increase of the life expectancy at birth in the successive decades. The primary factor responsible for the high mortality during 1920s was the scarcity of food due to droughts and floods in larger part of the country. The level of mortality reached at the peak in the decade 1911-21 because of an influenza pandemic in year 1918 (Kohli, 1977). After the 1920s, rapid decline in mortality rates were observed. Again, because of the partition in the India in 1947, higher mortality rates was noticed. In spite of these events, there was a steady decline in mortality rates after that (Navaneetham and Krisnakumar, 2011).
There has been an overall advancement in the level of mortality in India and states during the period 1970 to 2010. Over time, all indicators of mortality, indicated the decline in trend for the whole nation and within the nation with the place of residence (i.e. rural or urban) and sex. However, mortality declines among the different stages of life and the states were not uniform. State like Karnataka and Odisha registered the fastest and slowest reduction of mortality rates respectively. Mortality rate reduction in adults were relatively faster than among the other age groups (Bhatt, 1987). Thus, in this setting, the present section will be examining the levels and trend of mortality in India with the help of SRS data over the period 1970-2010. In addition, variation in the pattern of mortality between states and among different ages will also be dealt.

3.2.1 Levels, Trends and Changes in the crude death rates

The trend of crude death rate (CDR - averaged for 5 years) during the last four decades for India and states is presented below graphically according to the place of residence (rural and urban) and sex (male and female) in Figure 3.2. The variation in estimated crude death rate by sex for India and major states except Jammu & Kashmir over the period 1971-2010 is shown below. The figure reveals a sharp decline in the crude death rate of India for male, female and total combined over the period 1971-2010. Crude death rate for India as a whole has come down from 14.9 in 1971 to 7.2 in 2010. Along with this, due to the advancement in general health facilities, there has been considerable reduction in mortality of India and states after 1986-90 for both males and females.
Figure 3.2: Trends in Crude Death Rate by sex, India and major states 1971-2010

Source: ORGI (1971-2010)
Figure 3.2: Trends in Crude Death Rate by sex, India and major states 1971-2010 (Continued)

Source: ORGI (1971-2010)
Figure 3.2: Trends in Crude Death Rate by sex, India and major states 1971-2010 (Continued)

Source: ORGI (1971-2010)
During 1970s, death rate was lower among male than female in India; however during 2006-10, death rate surpasses male to female. Similar pattern of decline of death rate is observed for states like Bihar, Gujarat, Haryana, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Odisha, Punjab, Rajasthan and Uttar Pradesh for both males and females. For states Assam, Andhra Pradesh, Himachal Pradesh, Tamil Nadu and West Bengal, death rates were always more for males than females.

India as a whole and states like Andhra Pradesh, Assam, Gujarat, Madhya Pradesh, Odisha, Rajasthan, Tamil Nadu and Uttar Pradesh were indicating very high overall mortality during 1971-75. Above figure also points out the high gender differentials in overall mortality of Bihar, Karnataka, Maharashtra, Punjab and Tamil Nadu whereas, India as a whole shows fewer gender gaps in overall mortality. In most of the cases, mortality was lower among females as compared to males. It may in part reflect the variations in biological buildup of the two sexes. However, in some of the societies (like Uttar Pradesh and Bihar) women in particular experience higher death rates as compared to their counterparts.

Indian society is pre-dominantly rural; according to census 2011, more than 68 percent of the population of the country lives in a rural area. Moreover, mortality has always been higher in rural region than urban region due to the high concentration of health care facilities, education, etc. in an urban area. So, from a policy perspective, it becomes important to analyze the mortality transition in rural and urban India separately. Figure 3.3 present the trends and patterns of crude death rate over the period 1971-2010 by place of residence for India and states.
Figure 3.3: Trends in Crude Death Rate by residence, India and major states, 1971-2010

Source: ORGI (1971-2010)
Figure 3.3: Trends in Crude Death Rate by residence, India and major states, 1971-2010 (Continued)

Source: ORGI (1971-2010)
Figure 3.3: Trends in Crude Death Rate by residence, India and major states, 1971-2010 (Continued)

Source: ORGI (1971-2010)
Graph shows that during 1971-75 crude death rates for the rural area was almost twice (17.1 per 1000) that of urban area (9.8 per 1000). It indicates a huge difference in availability and access of health care facilities in rural and urban area at that time. The sharp reduction was seen in overall mortality of rural and urban India. The mortality rates were declined from 17.1 in 1971-75 to 7.9 in 2006-10 in rural area, and from 9.8 in 1971-75 to 5.9 in 2006-10 in an urban area. The gap between rural and urban mortality rates has been reduced up 2 point (per 1000) in year 2006-10.

For states like Assam, Bihar, Gujarat, Kerala and Odisha rural mortality rate is very close to total mortality over the study period. However, high variation is noticed in rural and urban death rates in all states during 1971-1975. All states except Kerala are displaying the declining pattern in the death rate for both rural and urban area as well as for total. In Kerala, decline in mortality rate is seen up to 1991-95, afterward slight rise is observed for all areas. Perhaps, this may be indicative of the increasing old age mortality in the recent past. Along with this, another interesting finding for Kerala depicts that mortality rate is observed high in urban than the rural area during 1981-90. With regard to mortality, it is observed that due to equal availability and accessibility of health care facilities, it is almost impossible to differentiate to rural and urban area.
3.2.2 Levels, Trends and changes in the Age-specific death rates

In this study two methods are mainly used to examine the mortality pattern; the first is the use of crude death rates and age-specific death rates and second includes the analysis of life table functions. Each method has its own advantage and disadvantages, so the consideration of characteristics of each method can provide an adequate reply of the questions like how fast the mortality is declining and in what way the mortality pattern is changing in a given population (United Nations, 1955). When focus of the study is limited to within a national frame and narrow period, crude death rate and age-specific death rate are used to observe the changing mortality pattern. However, the levels and trend analysis of crude death rate is already presented in the previous section. The main limitation of crude death rates is that it considers the same rate of mortality decline for each age. Nevertheless, in practice it is not possible as mortality structure is changing across the age. In addition, in a situation of two populations having different age structure, crude death rate fails to demonstrate the true difference in the mortality risk and pattern of the considered population. Moreover, the age-specific death rates of the population look for the different age structure as well as the death rates. Thus, the use of age-specific death rates is more satisfactory and can be utilized as to investigate the changing mortality pattern in a better way over the period.

The present section analyzes the trend of age-specific death rate (ASDR) over the period 1970-2010 for male and female as reported from SRS. Figure 3.4 and 3.5 discusses the trends of age-specific death rate over the period 1970-2010 for male and female respectively. All the major states, as well as country as a whole, displays the same pattern of ASDRs, but the levels are different as shown by the results.
Figure 3.4: Trends in Age-Specific Death Rates, Males, India and major states, 1971-2010

Source: Derived by the researcher
Figure 3.4: Trends in Age-Specific Death Rates, Males, India and major states, 1971-2010

(Continued)

Source: Derived by the researcher
Figure 3.5: Trends in Age Specific Death Rates, Females, India and major states, 1971-2010

Source: Derived by the researcher
Figure 3.5: Trends in Age Specific Death Rates, Females, India and major states, 1971-2010 (Continued)

Source: Derived by the researcher
Some states like Andhra Pradesh, Haryana, Himachal Pradesh, Jammu & Kashmir, Maharashtra, Odisha and Uttar Pradesh are displaying fluctuation in male ASDR. In female ASDRs, variation is observed in the states like Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Maharashtra, Odisha, Punjab and Rajasthan. The pattern of ASDR is showing high mortality during the initial period of life, comparatively low mortality during middle ages and high death rates of older ages. The pattern is quite obvious.

Results indicate that all the states for both males and females are presenting the same pattern, but the levels are different. The increase in the death rate, from middle age to older ages, is faster in states of Andhra Pradesh, Assam, Bihar, Himachal Pradesh, Tamil Nadu and West Bengal among males and for female it is observed rapid in states like Bihar, Himachal Pradesh, Tamil Nadu and Uttar Pradesh. Among females of Assam, Himachal Pradesh and Jammu & Kashmir, high irregularity is seen in reported ASDRs value over the period 1970-2010.

3.2.3 Levels, Trends and Changes in the probability of dying between age 0 and 1

Infant (or probability of dying between age 0 and 1) and child mortality (or probability of dying between age 1 and 4) have also traditionally been considered as the indicators of overall socio-economic well-being, child health and mortality condition of a region or country (Chandrasekhar, 1972; Jain, 1985; Saha and Roy, 2002). Thus, it reveals the quality of life of the family and specially the quality of mother’s life, access to health services, nutritional status, and inequality in deprived group of the population, etc. (Martiner, 2013).
Figure 3.6: Trends in probability of dying between age 0 and 1, by sex, India and major states, 1971-2010

Source: Derived by the researcher
Figure 3.6: Trends in probability of dying between age 0 and 1, by sex, India and major states, 1971-2010 (Continued)

Source: Derived by the researcher
Figure 3.6: Trends in probability of dying between age 0 and 1, by sex, India and major states, 1971-2010 (Continued)

Source: Derived by the researcher
The fourth Millennium development Goal set by the Government of India set out the reduction of under-five mortality rate by two-thirds between 1990 and 2015. The under-five mortality also includes the infant mortality rate which is assumed as a key public health indicator at global, country and regional level. Here, researcher used the \( iq_0 \) values derived from using ASDRs reported in SRS.

Infant mortality rate depends on several factors such as health infrastructure and services, education, environment, and so on. India has experienced a magnificent decline in infant mortality since the 1970s. However, the absolute levels of infant and child mortality are still too high. Thus, the present section tries to capture the trends of infant mortality of India and major states over the period of 1971-2010 by sex and place of residence.

Figure 3.6 is explaining the levels and trends of infant mortality in India and bigger states over the period 1971-2010 by sex. Infant mortality rate for India as a whole declined from as high as 134 per 1000 live births in 1971-75 to low as 52.4 per 1000 live births in 2006-10 for the total population; from 116 to 52 for males and 118 to 54 for females. From the figure, it is very much clear that there is no much difference in infant mortality rates by sex for India. The same result is also suggested by Singh and Ram (2003).
Figure 3.7: Trends in probability of dying between age 0 and 1, by Residence, India and major states, 1971-2010

Source: Derived by the researcher
Figure 3.7: Trends in probability of dying between age 0 and 1, by Residence, India and major states, 1971-2010 (Continued)

Source: Derived by the researcher
Figure 3.7: Trends in probability of dying between age 0 and 1, by Residence, India and major states, 1971-2010 (Continued)

Source: ORGI (1971-2010)
Trend of infant mortality in each state and also for both sexes of each state is in line with the India as a whole and showing a continuous fall. Nevertheless, the extent of the fall varies from state to state. Figure also brings out that the states with high infant deaths initially, have quicker decline in infant deaths. The decline in infant deaths over the period of 40 years altered from 138 to 63 in Assam, 139 to 49 in Gujarat, 149 to 69 in Madhya Pradesh, 140 to 69 in Odisha, 137 to 62 in Rajasthan and 183 to 66 in Uttar Pradesh. The highest fall of 117 points is remarked in the state of Uttar Pradesh for the total population. For states Haryana, Karnataka, Punjab, Rajasthan and Tamil Nadu, fluctuation in female infant deaths is found.

Figure 3.7 points out the infant deaths trend in India and each state and also for both urban and rural areas of each state. Figure indicates a huge difference in urban and rural infant deaths for each state. India as a whole showed the fall in infant mortality rate from 134 to 52 over the period of 40 years. India experienced the decline of 144 to 57 infant deaths in rural area and 83 to 25 in urban India. The states like Assam (76 and 53), Gujarat (93 and 70), Madhya Pradesh (79 and 45), Maharashtra (71 and 55) and Uttar Pradesh (121 and 73) witnessed more than 50 point fall in infant deaths of rural area and urban area respectively.

Some other states like Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan and Tamil Nadu also went through remarkable decline in both areas. In Kerala, during the period 1996-2000 the urban mortality slightly surpasses the rural mortality. Gap between rural and urban mortality is reducing almost in each state of India over the period; the rural-urban gap in mortality is seen minimum (3 point) in Kerala, followed by Tamil Nadu (5.2) during 2006-
10. The highest rural-urban gap is observed in state Rajasthan (31.2 points) for the same period 2006-10. For state Jammu & Kashmir, the infant death rates are available from 1996-2000 onwards and showing the decline during 2001-05 and then increase in IMR by 2006-10 for all areas.

3.2.4 Levels, Trends and Changes in the probability of dying between age 1 and 4

While declining trend of infant death is well known; trends in death rates in other ages did not receive much attention. In 2008, approximately 1.8 million children died in India, accounting for about 21% of child deaths worldwide (Black et. al., 2010). As stated in the previous section too, Millennium Development Goal 4 (MDG 4) also aims to reduce the under-five mortality rate by two third between year 1990 to 2015 (UNICEF, 2012).

It is found that in developing countries like India, children of poor families and rural areas are at greater risk of diseases and malnutrition and hence deaths. Thus in this context, research is needed to identify the inequalities in child mortality (probability of dying in age 1-4). Therefore in the present section, thesis assessed the national and state level trends in probability of dying of children in age 1-4 over the period 1971-2010 by sex and place of residence. Here, researcher used the \(4q_1\) values derived from using ASDRs reported in SRS.
Figure 3.8: Trends in probability of dying between age 1 and 4 ($q_{1}$), by sex, India and major states, 1971-2010

Source: Derived by the researcher
Figure 3.8: Trends in probability of dying between age 1 and 4 ($4q_1$), by sex, India and major states, 1971-2010 (Continued)

Source: Derived by the researcher
Figure 3.8: Trends in probability of dying between age 1 and 4 ($q_1$), by sex, India and major states, 1971-2010 (Continued)

Source: Derived by the researcher
Figure 3.8 presents the trends in probability of dying in ages 1 to 4 ($a_{q1}$), by sex, for India and its states. Figure points out that at national level, child mortality declined from 89 to 16 per thousand live births. For male, it is declined from 76 to 13 and for female 103 to 19. Female are always experiencing the high risk of death than their counterpart in India and major state. Initially, the difference in male and female child death was very high (around 27 points), but with the advancement in technology and medical facilities it has been reduced up to only six points. The states like Gujarat, Madhya Pradesh, Rajasthan and Uttar Pradesh, are holding very prominent child death for male and female both during 1971-2010 but have experienced the fastest decline over the period of 40 years. In Karnataka, female child death was always approximately same as the death rate of the total population. Kerala is having equal child death rate for both sexes after the time 1981-85.

Figure 3.9 demonstrate the levels and trends of child mortality ($a_{q1}$) by place of residence in India and states. Figure is exposing the remarkable decline in child death for both urban and rural area. India was experiencing very high (98) child death rate in a rural area than the urban area (38) during 1971-75 which has decreased 19 and 8 per 1000 live births respectively in 2006-10. Uttar Pradesh has shown the highest (137 points) decline in rural child death followed by Rajasthan (113 points), Madhya Pradesh (105 points) and Tamil Nadu (104 points) over the period 1971-2010.
Figure 3.9: Trends in probability of dying between age 1 and 4 ($q_1$), by residence, India and major states, 1971-2010

Source: Derived by the researcher
Figure 3.9: Trends in probability of dying between age 1 and 4 ($q_1$), by residence, India and major states, 1971-2010 (Continued)

Source: Derived by the researcher
Figure 3.9: Trends in probability of dying between age 1 and 4 ($a_{q1}$), by residence, India and major states, 1971-2010 (Continued)

Source: Derived by the researcher
Similarly, Uttar Pradesh experienced the maximum (76 points) fall in urban child mortality rate followed by Gujarat (75 points), Rajasthan (51 points) and Odisha (49 points) over the period of 40 years. The states, which have a high level of child mortality in both the areas, witnessed a sharp decline over the period of 1971-2010. Rural child deaths are always lower than the urban child death; but, in case of Kerala, rural and urban child death is almost equal. The states having low demographic profile like Assam, Bihar, Himachal Pradesh, Odisha and Uttar Pradesh are disclosing the nearly same mortality rate for rural and total areas.

### 3.2.5 Levels, Trends and Changes in the probability of dying between age 15 and 60

The people of age group 15 to 60, who establish the most of the working force, have importance for the social and economic development of any society (Feachem et al., 1992). Additionally, proportion of the adult population in the total population is increasing substantially as the country is passing through the demographic transition process (Saikia and Bhat, 2008).
Figure 3.10: Trends in Probability of dying between age 15 and 60, by sex, India and major states, 1971-2010

Source: Derived by the researcher
Figure 3.10: Trends in Probability of dying between age 15 and 60, by sex, India and major states, 1971-2010 (Continued)

Source: Derived by the researcher
Figure 3.10: Trends in Probability of dying between age 15 and 60, by sex, India and major states, 1971-2010 (Continued)

Source: Derived by the researcher
According to the United Nation’s Population Division, contribution of the population below age 15 has been declined from 37 percent in 1960 to 28 percent in 2005 world-wide. It implies that the proportion of the grayer population in the total population is enhancing. However, the pattern and levels of this contribution is varying across states of India due to the different lifestyle factors, literacy, standard of living and morbidity pattern, and so on. Thus, with the foregoing discussion present section explores the changing levels and trends of mortality of the population aged 15-60.

Figure 3.10 demonstrates the trend of probability of death in age 15-60 for India and states over the period of 40 years 1971-2010 by sex. In early 1970s, mortality in India for both sexes, as well as total population, was too high, but at the end of 2006-10, India experienced noticeable decline. Total population of age 15-60 went through the decline of the death rate from 0.330 in 1971-75 to 0.191 in 2006-10. Male and female witnessed the decline of 110 and 160 points respectively over the time period of 1971-2010. It also indicates that women witnessed more decline than their counterpart. An important finding for India is that the gender gap in the death rate has been increased from 0.027 to 0.77 over the period of 40 years.

State wise results show that there was no much difference in male and female death rate in states Assam and Bihar. State like Andhra Pradesh, Gujarat, Kerala, Madhya Pradesh, Rajasthan, Uttar Pradesh and West Bengal has witnessed the smooth decline in mortality rate of the population of age 15-60 for both male and female.
Figure 3.11: Trends in Probability of dying between age 15 and 60 by place of residence, India and major states, 1971-2010

Source: Derived by the researcher
Figure 3.11: Trends in Probability of dying between age 15 and 60 by place of residence, India and major states, 1971-2010 (Continued)

Source: Derived by the researcher
Figure 3.11: Trends in Probability of dying between age 15 and 60 by place of residence, India and major states, 1971-2010 (Continued)

Source: Derived by the researcher
In state Assam, Bihar, Gujarat, Madhya Pradesh, Odisha, Rajasthan, Tamil Nadu and Uttar Pradesh, decline in the death rate is found quite steeper. In Assam, Haryana and Tamil Nadu male and female death rate was almost alike up to 1980s and afterward found the large difference. Himachal Pradesh, Haryana, Jammu & Kashmir and Punjab are showing the fluctuation in probability of dying in age 15-60.

Figure 3.11 depicts the mortality trend of age 15-60 over the period 1971-2010 by place of residence. There was smooth decline in the death rate of both rural and urban population of India. However, throughout the period of 40 years, the difference in rural and urban death rate is quite high. Almost for all states except for Kerala and Punjab, rural mortality is higher as compared to urban. In Kerala till 1991-95 and Punjab till 1981-85, rural mortality was lower than that of urban and after that situation got reverse. In Haryana, Himachal Pradesh, Karnataka, Kerala, Punjab, Rajasthan, Uttar Pradesh and West Bengal, there was prominent fluctuation in the probability of dying of population of age 15-60.

3.3 Levels, Trends and Changes in Life Expectancy at Birth in India: 1971-2010

The present section attempts to study the changes in mortality in India and its major states during 1971-2010 in terms of the overall summary index i.e. Life Expectancy at Birth (LEB or e₀). According to the life table prepared by the researcher, life expectancy at birth (LEB) in India during 1971-75 was 49.8 years, which increased up to 66.1 years during the period 2006-10; this shows an increase of about 16.3 years over the period of 40 years. In other
words, the expectation of life at birth in India increased on average by about 0.41 years per year between 1971 and 2010; although, this increase is not uniform throughout the study period.

Table 3.1 indicates that, across the major states of the country, levels of life expectancy at birth varied widely. Nevertheless, the state with the highest expectation of life at birth (which is Kerala) remained unchanged throughout the study period. The state with the lowest life expectancy at birth (Uttar Pradesh) while 1971-75 is replaced by the state Assam during 2006-10. Other states like Karnataka, Haryana, Tamil Nadu, West Bengal, Maharashtra, Jammu & Kashmir and Himachal Pradesh improved more their rank on a scale of life expectancy at birth than other remaining states. The state Andhra Pradesh does not seem to change in its ranking.
## Table 3.1: Changes in Life expectancy at birth, India 1971-2010

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3.4 Contribution of age-specific mortality decline to the change in Life expectancy at birth between 1971 to 2010

Figure 3.12 shows the result of decomposition of life expectancy at birth by age for India and its major states for the total population for period 1971 to 2010. However, analysis is performed by considering some particular age groups say 0-1, 1-4, 5-14, 15-49, 50-70 and 70+. At national level, more than 50 percent total increase in Life expectancy at birth (LEB) in each period is attributed to the improvement in infant and child mortality. Differentials in the mortality age pattern contribution across the period are still remarkable. The increase in LEB during 1971-75 to 1981-85 was mainly due to the improvement in survivorship of infants. The percentage contribution of mortality of age 0-1 and 1-4 in improvement in LEB, was about alike during 1981-2001. During the period 2001-10, more than 50 percent of gained in LEB is mainly due to the advancement in infant survivors. During the period 1971-75 to 1981-85, the percentage share of the adulthood (15-49 ages) mortality in LEB was about 18.0 and declined up to 14.6 during 2001-05 to 2006-10.

Regional variations are also observed in percentage share of different age mortality in LEB. From 1971-75 to 1981-85 for state Assam, Kerala and Punjab the improvement in contribution of infant (age 0-1) deaths as compared to the child (age 1-4) deaths prevailed contributions to LEB. For most of the remaining states, the advancement in survivorship of child dominated share to LEB. In addition, from 1991-95 to 2006-10, in state Andhra Pradesh, Assam, Gujarat, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Odisha, Punjab,
Rajasthan, Uttar Pradesh and West Bengal gain in LEB was commanded by the gain in infant survivors.

Figure 3.12: Percentage contribution of age-specific mortality decline for a change in LEB over period 1971-2010, Total, India and major states
Figure 3.13: Percentage contribution of age-specific mortality decline for a change in LEB over period 1971-2010, male, India and major states
Unlike the Figure 3.12, Figure 3.13 and 3.14 are presenting the percentage contribution of different age mortality for an increase in life expectancy at birth for male and female respectively. For male, almost for all states the contribution of infant deaths for a change in
life expectancy at birth over time is higher than mortality of other age groups. At national level, results reveal that contribution of male infant for a change in LEB has been increased over the period; whereas in case of females, it is almost same. Andhra Pradesh has experienced a significant increase in contribution of male infant deaths over the period 1971-2010. While females initially experienced the increase in share of infant mortality, and it has been decreased during 1991-2010. Majority of the states practiced the decline in the contribution of child death (age 1-4) for a change in LEB over the study period.

3.5 Summary and Conclusions

Present chapter looked at levels, trends and pattern of mortality in India and its major states. To observe the above, thesis performed the trend analysis of mortality measures as crude death rate, infant mortality rate, child mortality rate and mortality of age 15-60 by sex and place of residence for India and major states. In addition, chapter assesses the changes in life expectancy at birth over time and across the states and also look for the percentage share of different age group mortality for a change in life expectancy at birth over the period 1971 to 2010. The study of Indian mortality data over the period 1971 to 2010 noticed the inequalities in survivals across the states and time. Although, study observes the decline in mortality of all ages over time, for all major states and India, but the rate of decline is found different for all states. Gap between rural and urban mortality is reducing almost in each major state of India over the period. Results also indicate that the contribution of infant and child mortality for a change in the LEB is quite high when compared to a change in mortality of the other age death rates.