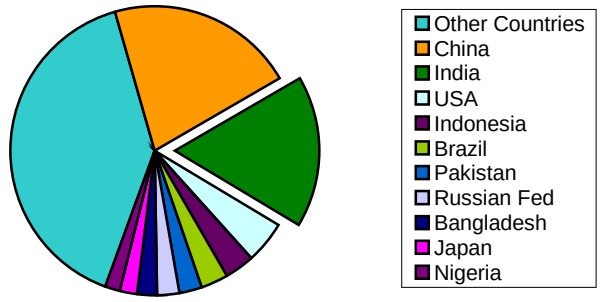
2. DEMOGRAPHIC TRANSITION

Figure 2.1: Population: India and the world



Source: Reference 2.2

India accounts for only 2.4 % of the world surface areas and yet it supports and sustains 16.2 % of the world population (Figure 2.1). In 1950, China with 21 % share of the population was the most populous country followed by India, which had a share of 14.2 %. It is estimated that by 2050, India will overtake China to become the most populous country with about 17.2 % of global population. A comparison of some demographic parameters between India and some of the neighboring countries is given in Table 2.1. China and Sri Lanka are far ahead of India in all these parameters.

Demographic transition 1947-2007

Demographic transition is a global phenomenon. Demographers recognize four phases of demographic transition. In the first phase improved health care technologies and improved access to health care result in reduction in mortality rates but, birth rate continues to be high and therefore population growth occurs. In the second there is reduction in birth rate but the reduction in death rate is higher than reduction in birth rate, as a result population increases. In the third phase, birth rates and death rates are both low; however population growth continues because of a large number of individuals in the reproductive age group. In the fourth phase the

Table 2.1: Some demographic parameters: India and its neighbors

Country	Life expectancy at birth (years)	Under-five mortality rate (per 1000 live births)		Infant mortality rate (per 1000 live births)		Maternal mortality ratio (per 100,000 live births)
	2000-05	**1990**	**2004**	**1990**	**2004**	**2004**
China	71	49	31	38	26	51
India	63	123	85	80	62*	540*
Nepal	61	145	76	100	59	740
Pakistan	63	128	101	96	80	530
Sri Lanka	74	23	14	19	12	92
Bangladesh	63	144	77	96	56	380
South Asia	63	126	84	84	62	NA

NA: Not available

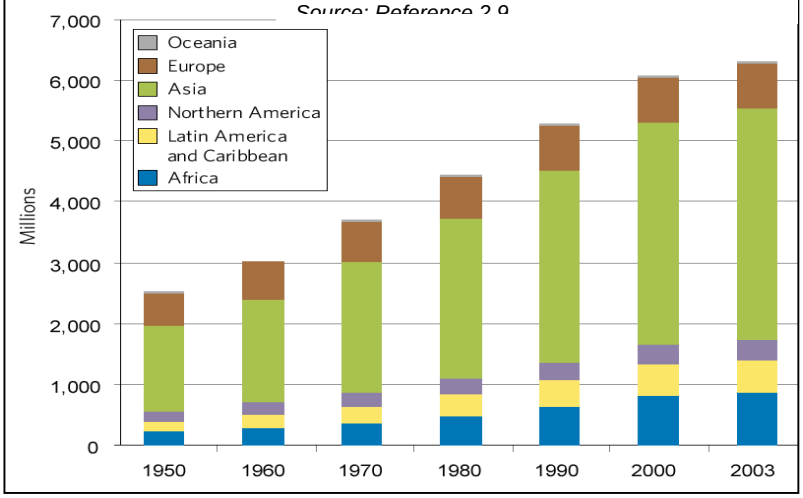
** Figures shown for India are at variance with official figures of the Office of Registrar General of India for MMR and IMR. Data shown in the table are as per the methodology and adjustment made by UNDP.*

Source: Reference 2.2

population level stabilizes with number of births and deaths being low and equal. Different countries are in different stages of demographic transition. Change in mid year population over the last five decades in different regions of the world is shown in Figure 2.2**.** All the regions have shown some increase in population. Asia has the largest population and has shown the largest increase in population. Sub-Saharan Africa comes a close second; in terms of population growth in Europe and North America has experienced the lowest population growth rates. India is currently in the third phase of demographic transition, during which the increase in population is mainly among the 15-60 age; optimal use of this demographic opportunity window can result in rapid improvement in economic growth, nutrition and health status of the population.

Figure 2.2: Mid-year population estimate

Source: Reference 2.9



Accurate information on vital indices is an essential prerequisite for effective monitoring of the ongoing demographic transition. In India the Civil Registration System has not been generating accurate and dependable data on vital events in all states. Census provides data once in ten years but once decade information is inadequate for planning new interventions and monitoring impact of ongoing programmes. The Sample Registration System (SRS) was established in order to provide dependable annual, state-specific data on vital rates. The SRS was initiated by the Office of the Registrar General, India on a pilot basis in a few selected states in 1964-65. It became fully operational during 1969-70 covering about 3700 sample units. Thereafter the sample size was periodically increased. At present SRS covers 6671 sample units (4436 rural and 2235 urban) in all States and Union territories. The sample unit in rural areas is a village or a segment of it if the village has a population of 1500 or more. In urban areas the sampling unit is a census enumeration block with a population ranging from 750 to 1000. Data from SRS and Census are widely used for assessing on going demographic transition in the country.

Time trends in demographic indices in India

Time trends in some of the major demographic indices are shown in Table 2.2. Rapid fall in the crude death rate (CDR) from 25.1 in 1951 to 7.6 in 2005 occurred because of technological advances and the improved quality and coverage of health care. The reduction in crude birth rate (CBR) has been less steep, declining from 40.8 in 1951 to 23.8 in 2005. As a result, the annual exponential population growth rate has been

over 2 % in the 1971-1991 periods (Table 2.2). The 1991 Census showed that the population growth rate had fallen below 2 % after three decades (Figure 2.3). Census

Table 2.2: India selected- health indicators

No. Parameter	1951	1981	1991	Current level
Crude birth rate (per 1000)	40.8	33.9	29.5	23.8 (2005)
Crude death rate (per 1000)	25.1	12.5	9.8	7.6 (2005)
Total fertility rate (per woman)	6	4.5	3.6	2.9 (2005)
Maternal mortality ratio (Per 100,000 live births)	NA	NA	437	301 (2001-03)
Infant mortality rate (Per 1000 live births)	146 (1951-61)	110	80	58 (2005)
Child (0-4) mortality rate (Per 1000 children)	57.3 (1972)	41.2	26.5	17.0 (2004)
Couple protection rate (%)	10.4 (1971)	22.8	44.1	48.2 (1998-99)
Life expectancy at birth				
Male	37.2	54.1 (1995)	59.7	63.8 (2006)
Female	36.2	54.7 (1995)	60.9	66.9 (2006)

Source: Reference 2.5; 2.13; NA: Not available

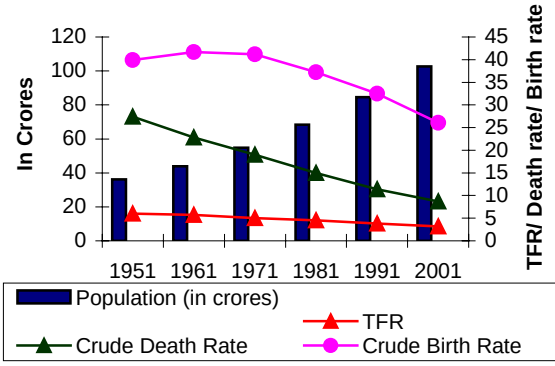
2001 confirmed that the pace of demographic transition in India has been steady even though it is slow and that the India has joined China as the population billionaire. Demographic profile of India from Census 2001 is given in Annexure 2.1. As of 2006, India's population is 1112 million. There are 25 million births and 2.3 million under five deaths in the country. Life expectancy is 65.4 years.

Decadal growth: 1991-2001

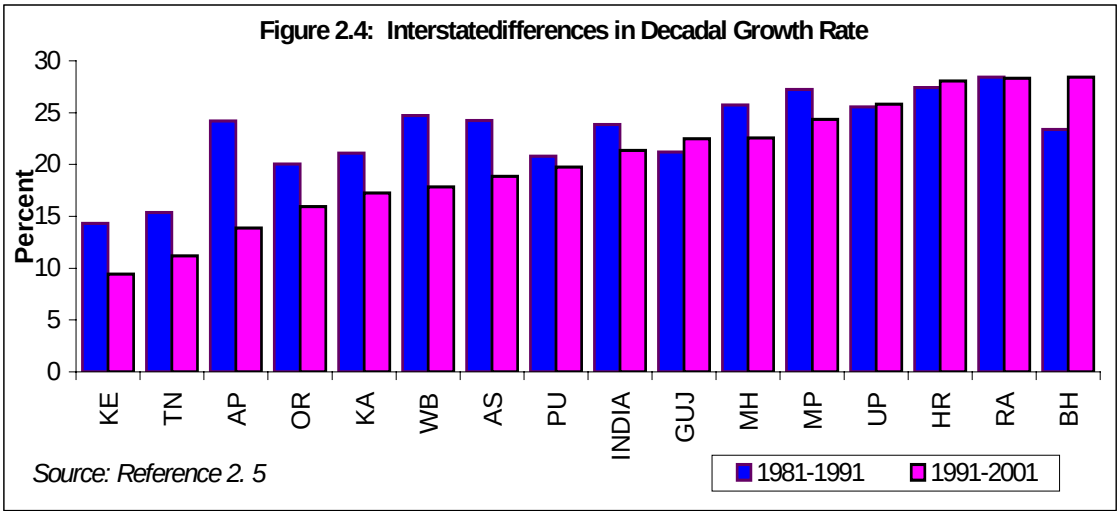
The population of India, which at the turn of the twentieth century, was only around 238 million increased by over four times to reach 1027 million by 2001. The population grew by one and half times in the first half of the twentieth century, while in the next fifty years it recorded a three-fold increase. In absolute terms, the population of India during the decade 1991-2001 increased by a 180.6 million, more than the estimated population of Brazil, the fifth most populous country in the world.

The decadal growth rate has declined from 23.9% for 1981-91 to 21.3% for 1991-2001. Interstate differences in decadal growth are given in Annexure 2.2. The decadal growth rate in a majority of the states has shown a decline. Tamil Nadu and Karnataka have attained replacement level of fertility and Andhra Pradesh has shown a remarkable fall in fertility and decadal growth rate during the 1990s. Only Bihar has shown a substantial increase in the decadal growth rate (Figure 2.4). The National Population Policy has set the goal that the country will achieve the replacement level of fertility by 2010. If this were achieved, the 2001-2011 will witness a very steep decline in decadal growth rate.

Figure 2.3: Demographic transition in India

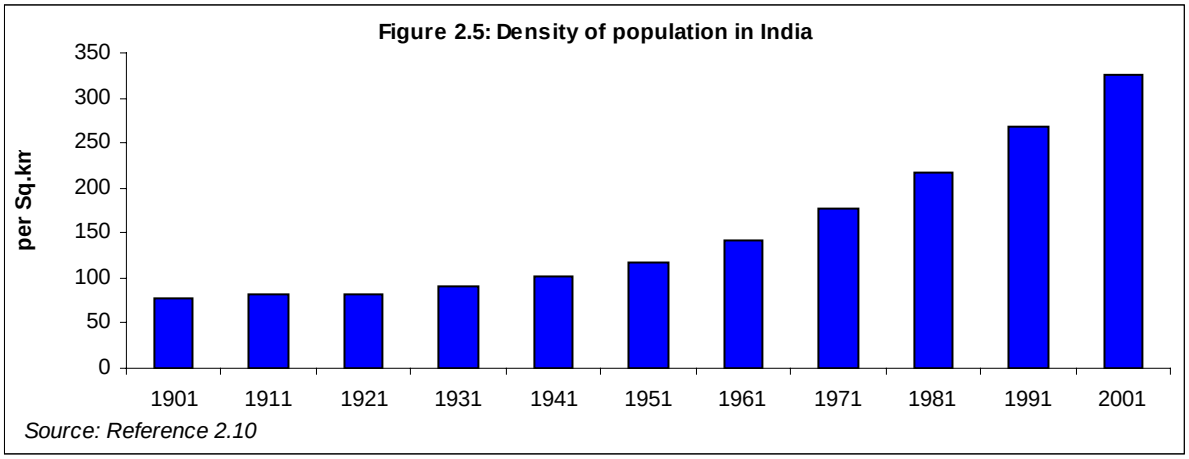


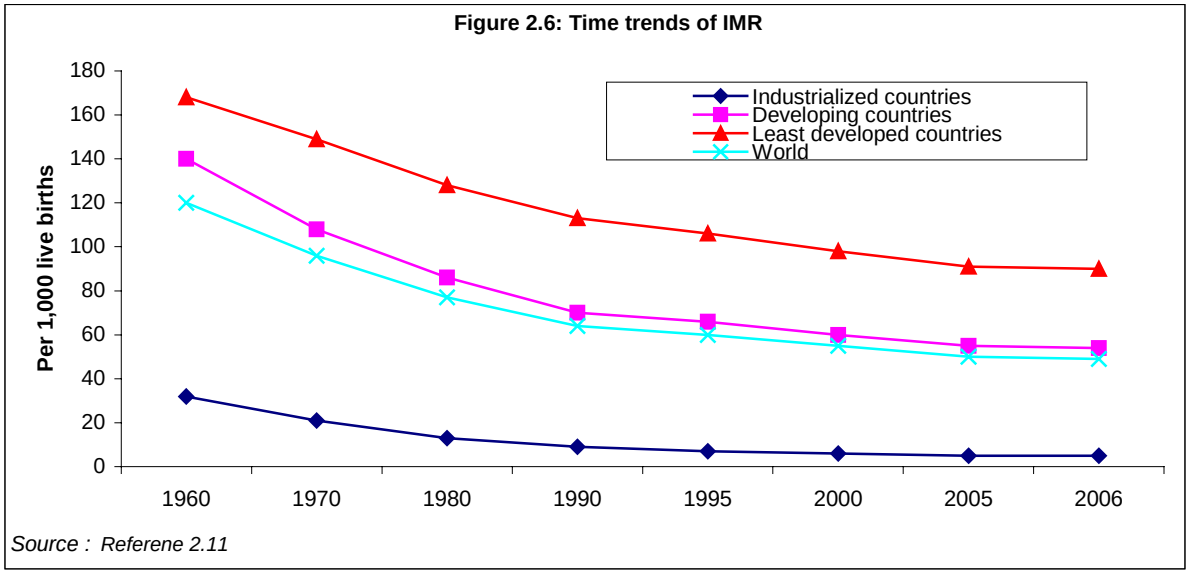
Source: Reference 2.8



In India, the proportion of children in the age group of 0-6 years decreased from 18% in 1991 to 15% in 2001. A fairly strong positive relationship exists between percentage of child population in the age group 0-6 years and the level of fertility. In 1991 only four states/Union Territories had child population less than fourteen %; in 2001 the number of the states and Union Territories with child population less than 14% is sixteen. This is indicative of a fairly wide spread fall in fertility across many states/Union Territories.

One of the major consequences of population growth is the increase in the population density (Figure 2.5). In the last hundred years population density has increased from 77/sq.km to 325/sq.km. Interstate differences in population density are indicated in Annexure 2.3. The Malthusian assumption that population growth will lead to overcrowding, poverty, undernutrition, environmental deterioration, poor quality of life and increase in disease burden has been challenged in the last few decades. The East Asian countries have shown that population can be a major resource for economic growth. India currently faces a window of opportunity during demographic transition when there is increase among younger, better-educated, well-nourished and healthy population. If the country successfully faces the challenge of



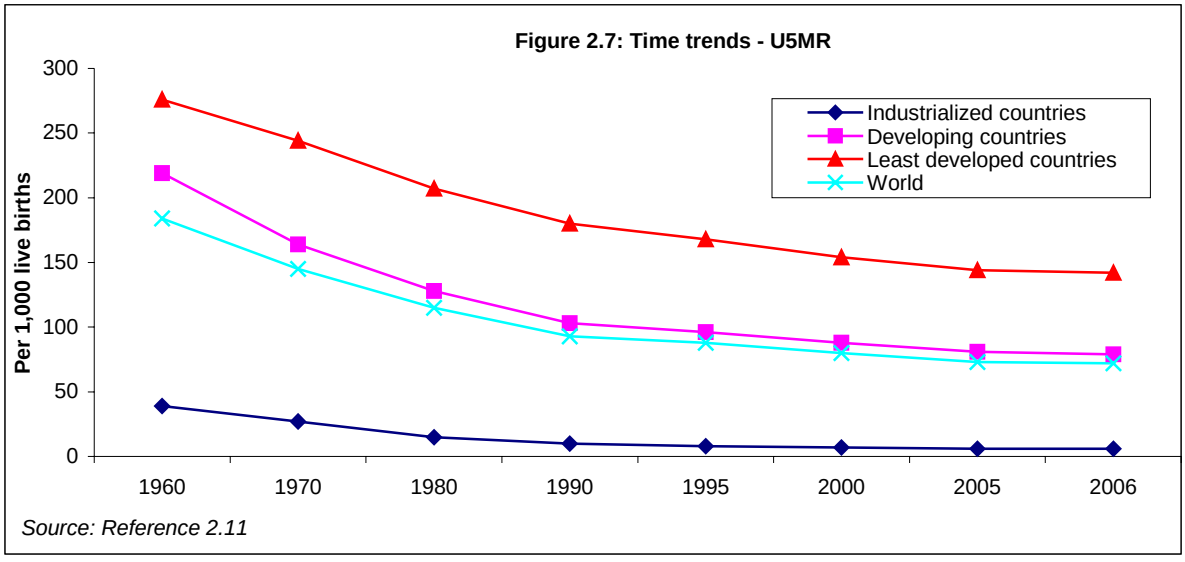


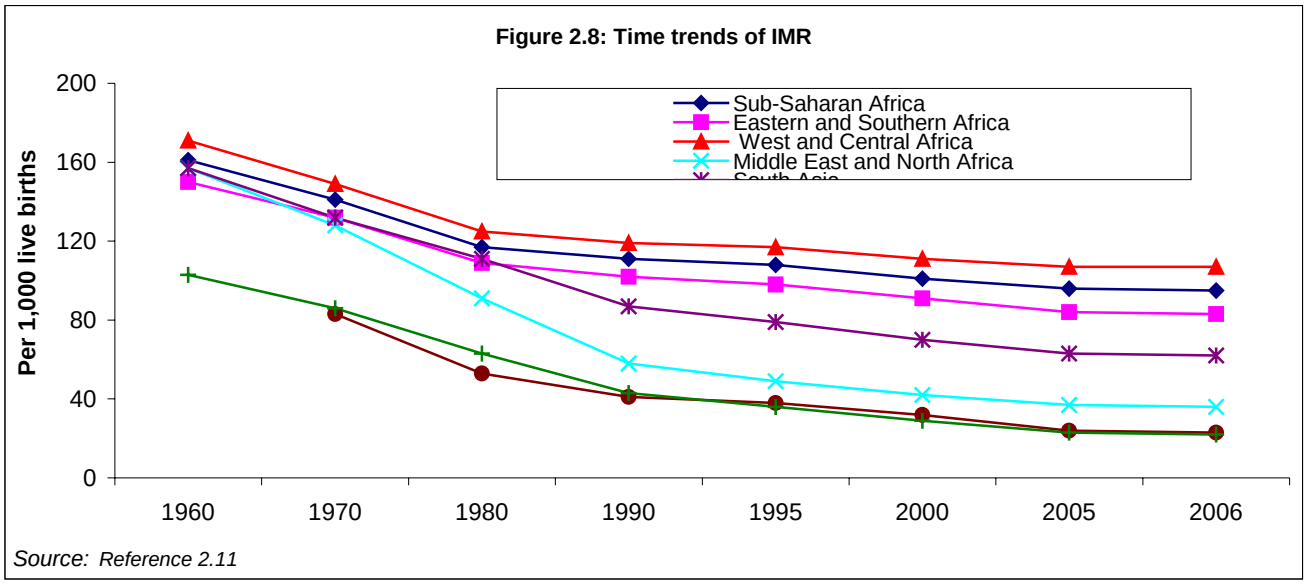
providing education, appropriate employment with adequate remuneration, promoting healthy life styles, improving access to and utilization of available social services it is possible for the country to achieve rapid economic growth and improvement in quality of life.

Mortality rates

Neonatal, Infant and under-five Mortality Rates (IMR)

A time trend in IMR and U5MR in industrialized, developing, least developing countries and world is given in Figure 2.6 & 2.7. By middle of 20th century industrialized countries had reached relatively low level of IMR and U5MR and thereafter there has been a slow, progressive decline. IMR and U5MR in developing and least developed countries had been 5-6 times higher than the industrialized countries. In spite of relatively steep decline in IMR and U5MR between 1960-1990,

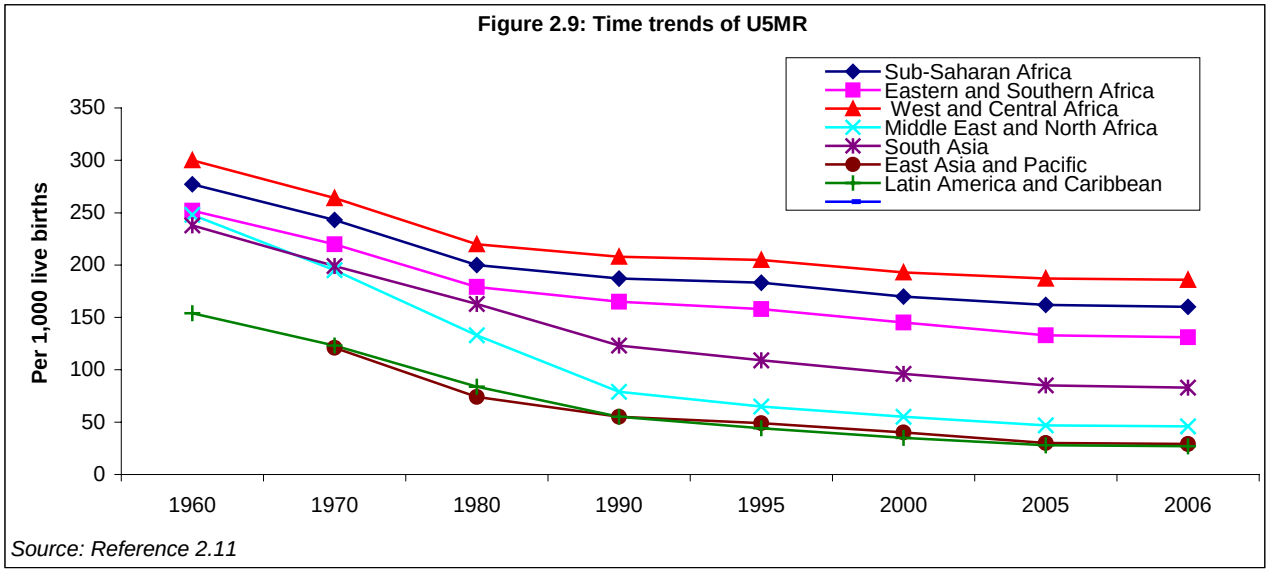


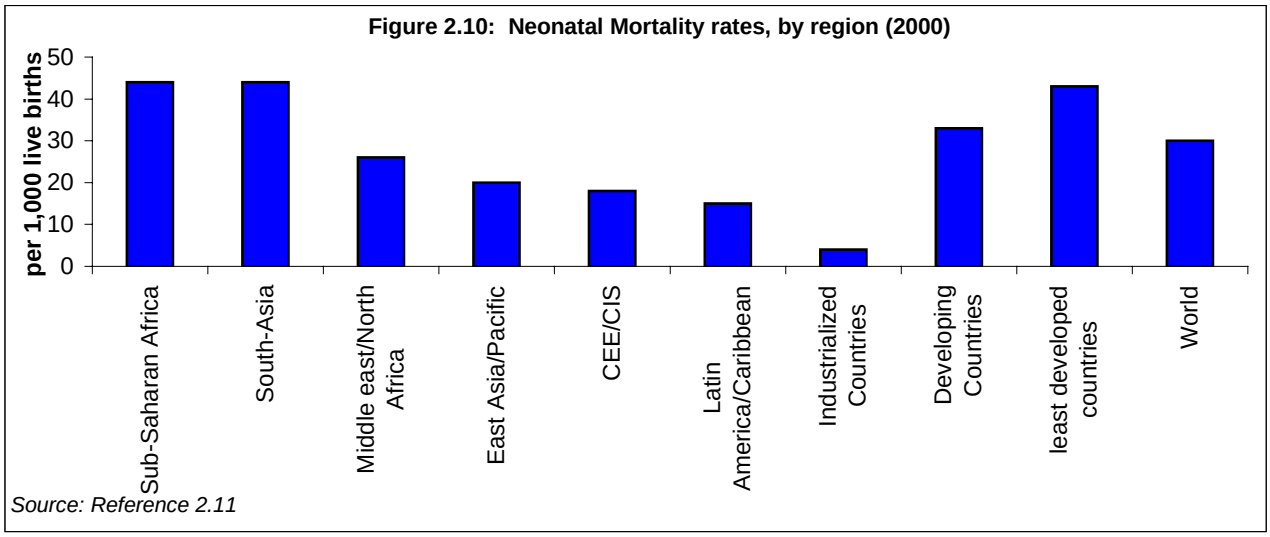


the IMR and U5MR in developing countries is still unacceptably high. These countries have to redouble their efforts to achieve the Millennium Development Goal.

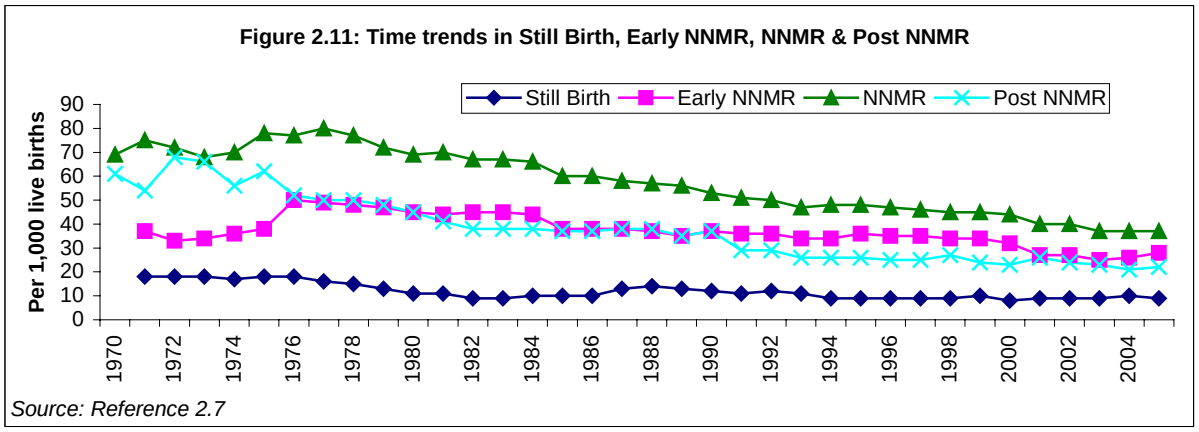
Time trends in IMR and U5MR in developing countries in different regions of the world is given in Figure 2.8 & 2.9. Over the last five decades there has been a progressive reduction in IMR and U5MR in all regions. Among all the regions South Asia recorded a steepest decline in IMR and U5MR between 1960-1990. Subsequent decline in IMR and U5MR in South East Asia has been less steep. The countries of this region will have to strive hard to reach to IMR and U5MR seen in East Asia.

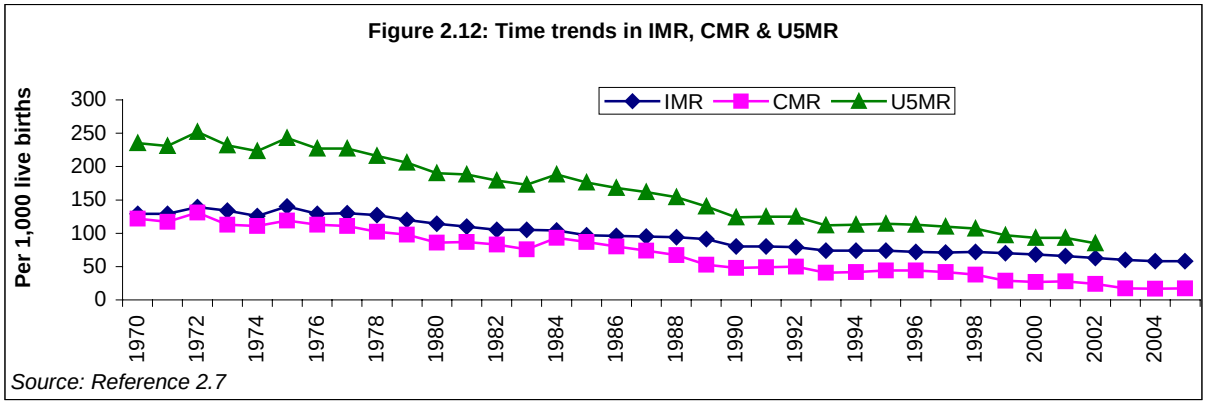
Neonatal mortality rates account for 2/3rd or more of the IMR in most regions of the world. NNMRs in most developing countries are unacceptably high (Figure 2.10). It is a matter of concern that the reported neonatal mortality rates are in South Asia is as high as the reported NNMR in Sub-Saharan Africa

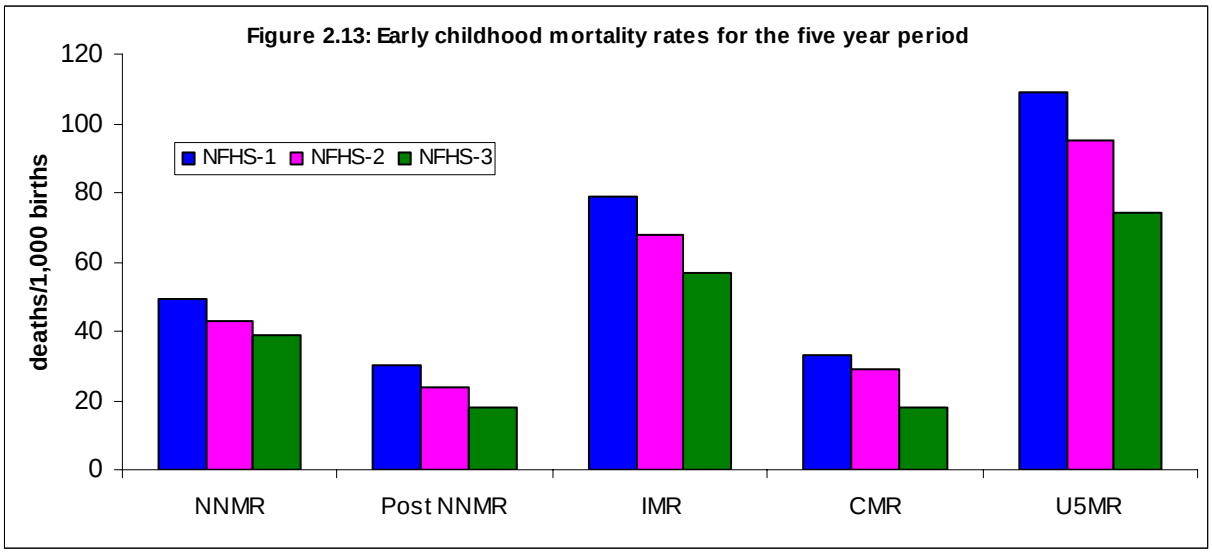




In India SRS provides annual information on vital rates including NNMR, IMR and U5MR at state level in urban and rural areas. Improved access to immunization, health care and nutrition programmes have resulted in substantial decline in IMR and U5MR between 1970 to 2005 Figure (2.12). In the last two decades the reduction in IMR and U5MR are relatively slower. Reduction in neonatal mortality (Figure 2.11 & 2.12) has been very slow as compared to decline in IMR. This is because of the poor access to antenatal and intrapartum care.



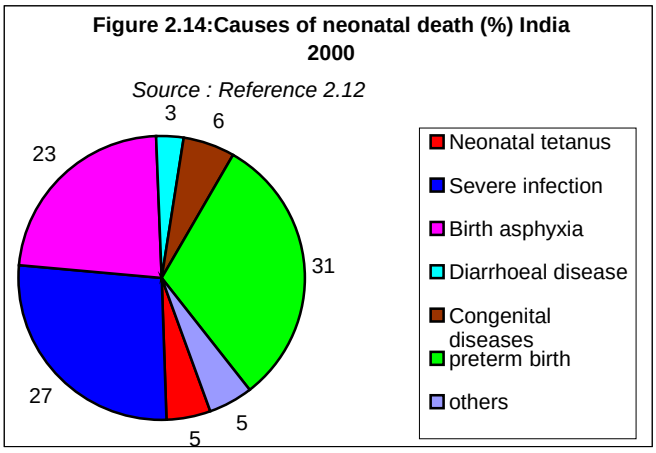




Data on changes in NNMR, PNMR, IMR, CMR, and U5MR between 1991-2006 from NFHS 1, 2 and 3 are shown in figure 2.13. These data also confirm that as compared to IMR and PNMR, the decline in NNMR is slow. Even in 2005, one in 18 children die within the first year of life, and one in 13 die before reaching age 5.

Major causes of NNMR and U5MR in India in 2000 are given in Figure 2.14 & 2.15. Over the last three decades there has not been any substantial change in the major causes of death either in the neonatal period or causes of death in under 5 age.

- In the absence of system for collection and analysis of data on morbidity during childhood available mortality data and analysis of causes of death from SRS have been utilized for drawing up priority interventions for improving child survival and health. Ongoing major intervention programmes in child health include: essential new born care;
- Immunization to prevent morbidity and mortality due to vaccine preventable diseases;
- Programmes for reducing mortality due to acute respiratory infection and diarrhea and



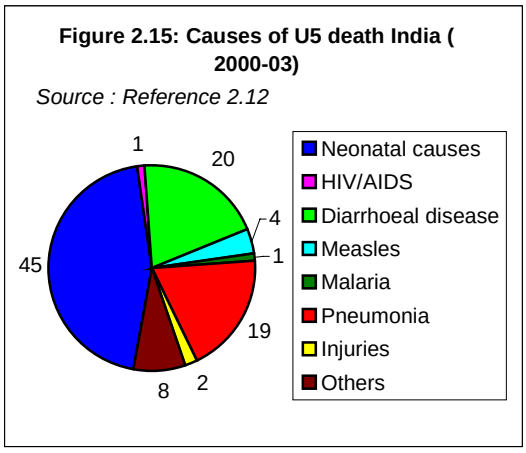
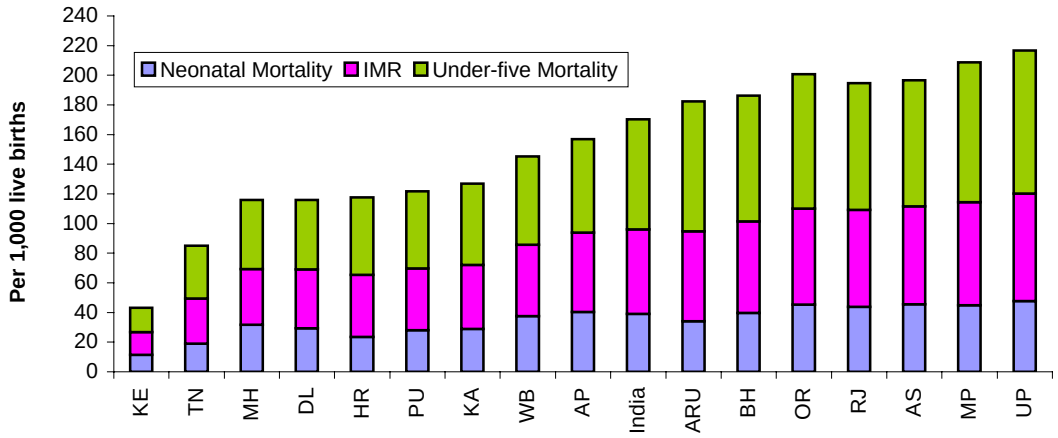


Figure 2.16: Interstate differentials in mortality



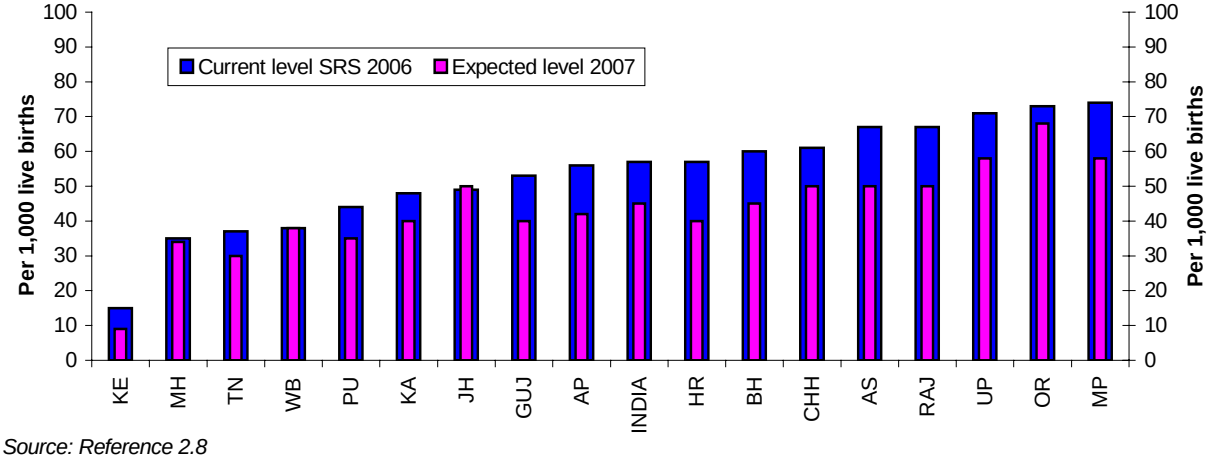
Source: Reference 2.13

- Food and micronutrient supplementation programmes aimed at improving the nutritional status.

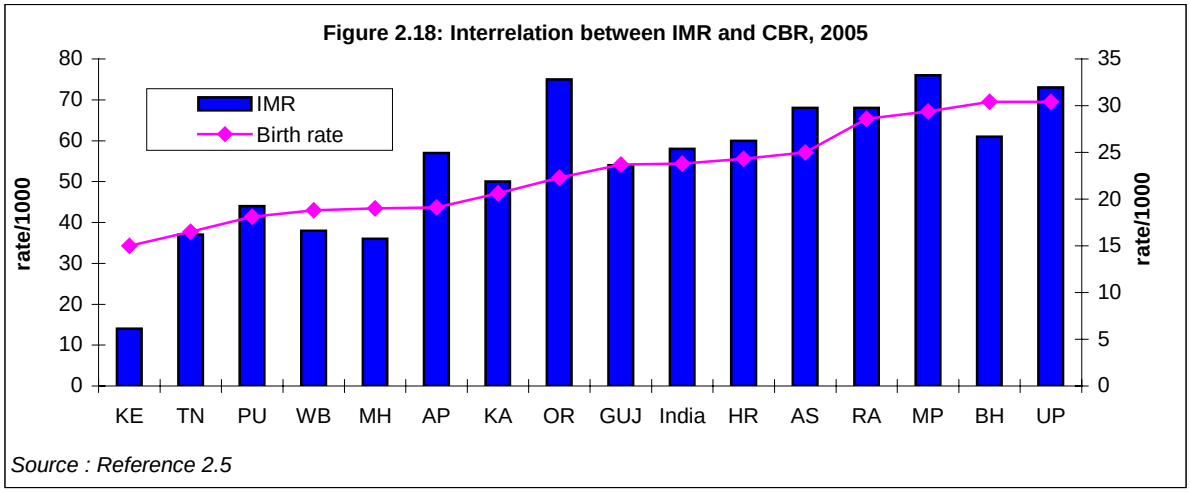
Interstate differences in IMR, NNMR and U5MR

Data on interstate differences in NNMR, IMR and U5MR computed from NFHS-3 is given in Figure 2.16. Interstate differences in birth rate, death rate, normal growth rate and infant mortality rate (SRS 2006) are given in Annexure 2.4. Interstate differences in IMR are given in Annexure 2.5. Census of India counts living population but it also computes mortality rates. Data on interdistrict variation in under 5 mortality computed from Census of India is given in Annexure 2.6. This information is available and should be used for decentralized district level planning. In order to achieve decentralized planning on year-to-year basis reliable district-specific data on birth rates and IMR must be available on an annual basis. This can be achieved only though 100% recording of birth and death through Civil Registration System and collation and analysis of this data at the district level. Such a system would also

Figure 2.17: Infant mortality rate



Source: Reference 2.8



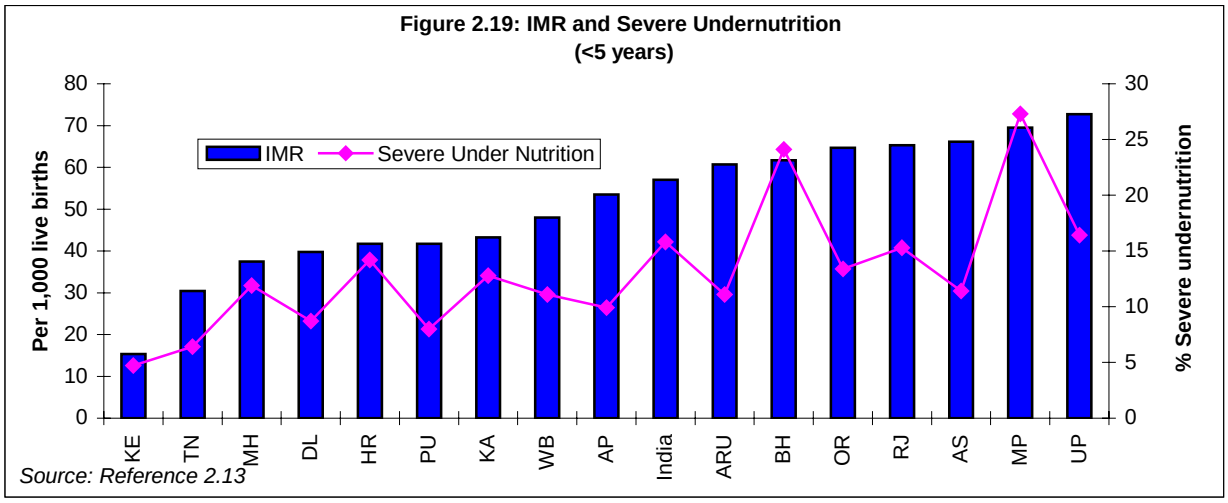
enable continuous monitoring of the impact of the intervention and mid-course corrections. In order to achieve this, strengthening of the CRS has been given high priority during the Eleventh Plan period. The interstate differences in mortality are partly due to differences in availability and utilisation of health care and partly due to differences in nutritional status. Kerala has mortality rates comparable to several developed countries showing that it is possible for India to achieve low IMR within all the existing constraints. Tenth Five year Plan took the large interstate differences in IMR into account and suggested differential strategy to address the problem in different states and set state specific goals to be achieved by 2007 (Figure 2.17). Data from SRS 2006 indicate that Maharashtra, West Bengal and Jharkhand are likely to achieve the goals set.

Inter-relationship between IMR and CBR

Access to family welfare services and contraceptive care are critical determinants of birth rate and infant mortality. In spite of the fact that health and contraceptive care are provided by the same personnel, the decline in these indices do not always go hand in hand. In spite of a relatively high IMR, states like Tamil Nadu and Andhra Pradesh have achieved a replacement level of fertility (Figure 2.18). States like Bihar have high fertility rates in spite of relatively low IMR. In states/districts where fertility has declined without a commensurate decline in IMR, there should be a focused, area-specific situation analysis and intervention to reduce IMR.

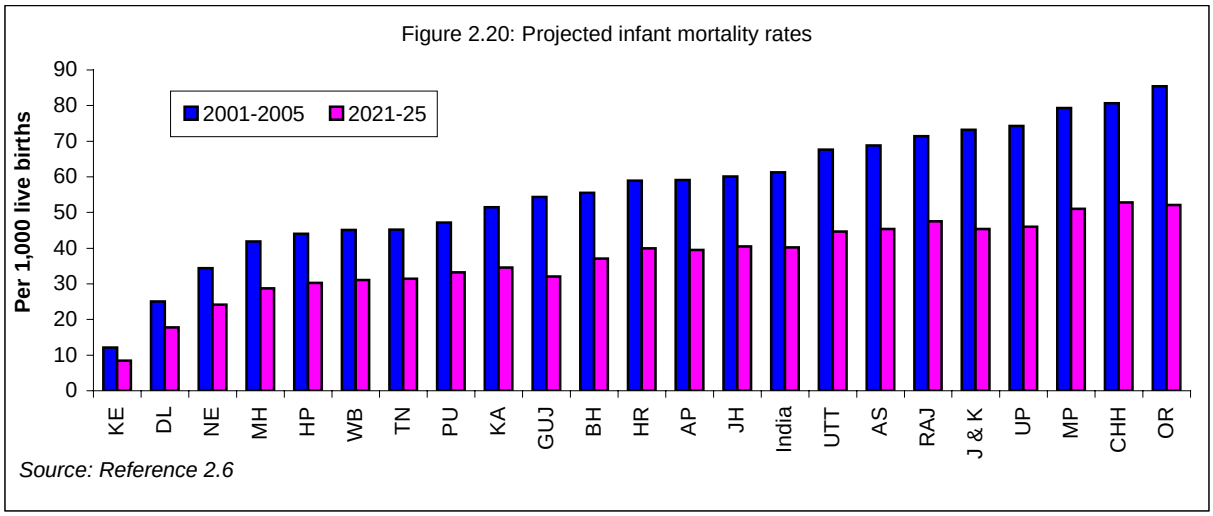
Interrelationship between infant mortality and under nutrition

It is well known that under nutrition increases susceptibility to infections; infections aggravate undernutrition. If uninterrupted this vicious circle could result in death. Poor dietary intake, poor caring practices and lack of access to health care are major factors responsible both for undernutrition in children and high infant mortality. Relationship between undernutrition and IMR in different states computed from NFHS 2005-06 is given in Figure 2.19. There are marked differences in undernutrition rates and IMR between states (Figure 2.19).



In most of the states (e.g. Orissa) with high undernutrition, infant mortality is high; states with low undernutrition rates (e.g. Kerala) have low IMR. However there are exceptions. In spite of high under nutrition rates in Bihar and Maharashtra, IMR is relatively low. In spite of relatively high per capita income, dietary intake and health care both undernutrition and IMR are relatively high in Punjab. There are substantial inter district variation in infant mortality with in the states. The Tenth Plan envisaged that each district will collect, collate, analyze and utilize their district data for planning interventions to improve nutritional status, reduce IMR, monitor progress and effect midterm corrections.

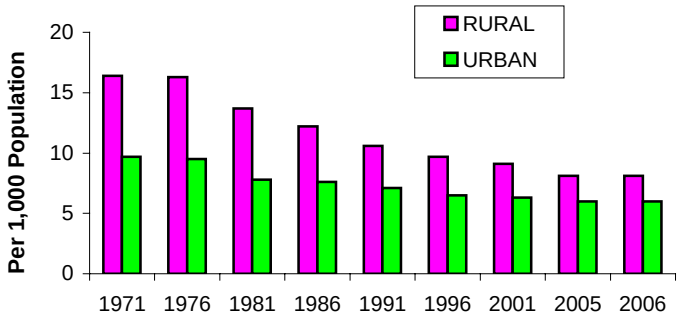
Realizing the urgent need to reduce in IMR the Ministry of Health and Family Welfare has initiated efforts to strengthen health care delivery system in the states with high IMR rates. Additional funds, equipment and manpower are being provided to bridge the gaps in health services and improve access to essential child health care during the Eleventh Plan period. Projected IMR for different states in 2001-05 and for 2025 is given in Figure 2.20. Projections take into account ongoing efforts to achieve reduction in IMR in all the states and reduction in interstate differences.



Crude Death Rate

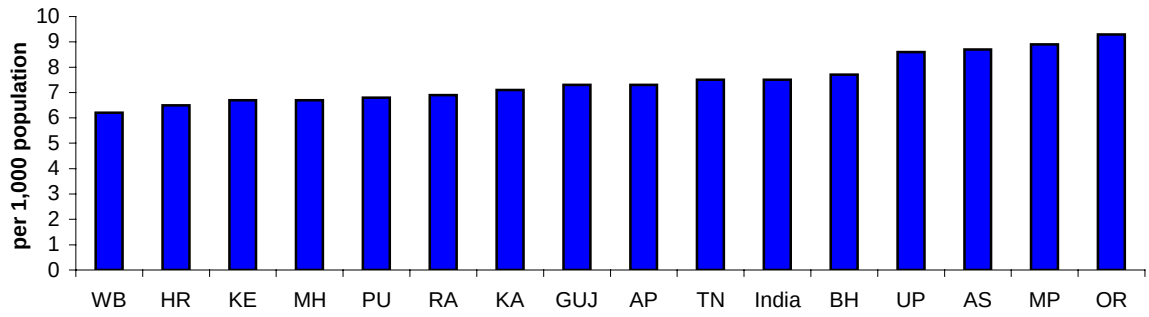
Data from SRS indicate that there has been a steady decline in crude death rates in last three decades (14.9 in 1971 to 7.6 in 2005). CDR in Urban areas is lower as compared to CDR in rural areas (Figure 2.21). There are large interstate differences in CDR. CDRs are higher than the national average in Orissa, Uttar Pradesh, Madhya Pradesh, Assam and Bihar. Kerala and West Bengal have lowest CDR in India (Figure 2.22 and Annexure 2.4).

Figure 2.21: Time trends in Death rate



Source: Reference 2.7

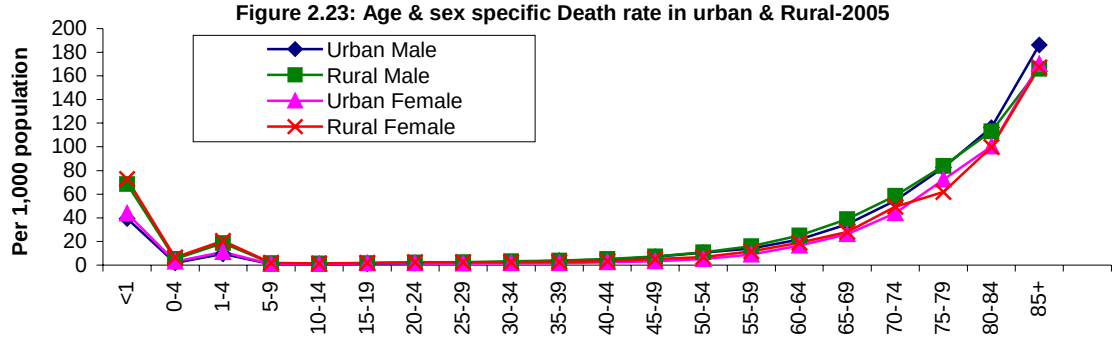
Figure 2.22: Inter State differences in Death Rates (2006)



Source : Reference 2.5 , 2.7

Age and sex specific mortality rates for urban and rural population is shown in Figure 2.23. Mortality rates are higher in under five and over sixty years of age. Mortality rates in urban areas are lower as compared to rural areas especially in children and elderly.

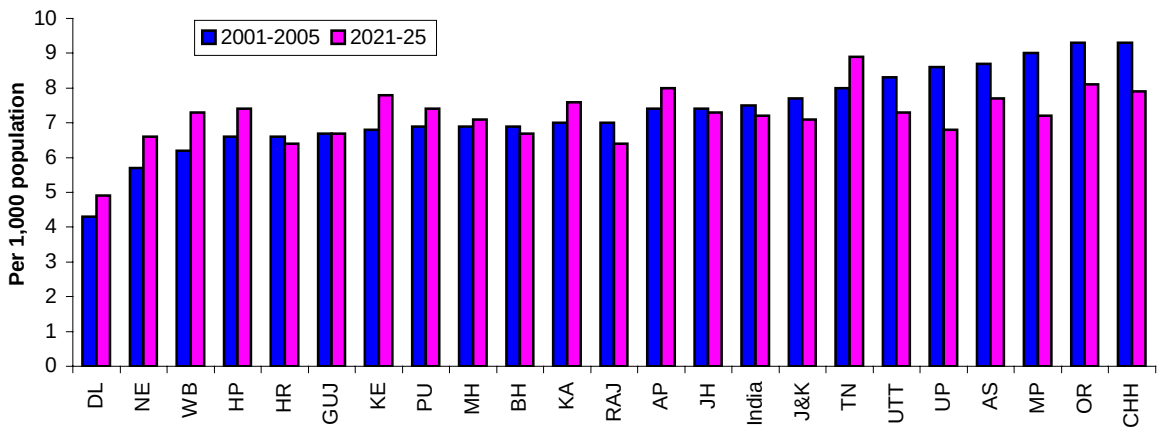
Figure 2.23: Age & sex specific Death rate in urban & Rural-2005



Source: Reference 2.7

Projected crude death rates for India and its states are shown in Figure 2.24. At the

Figure 2.24: Projected crude death rates



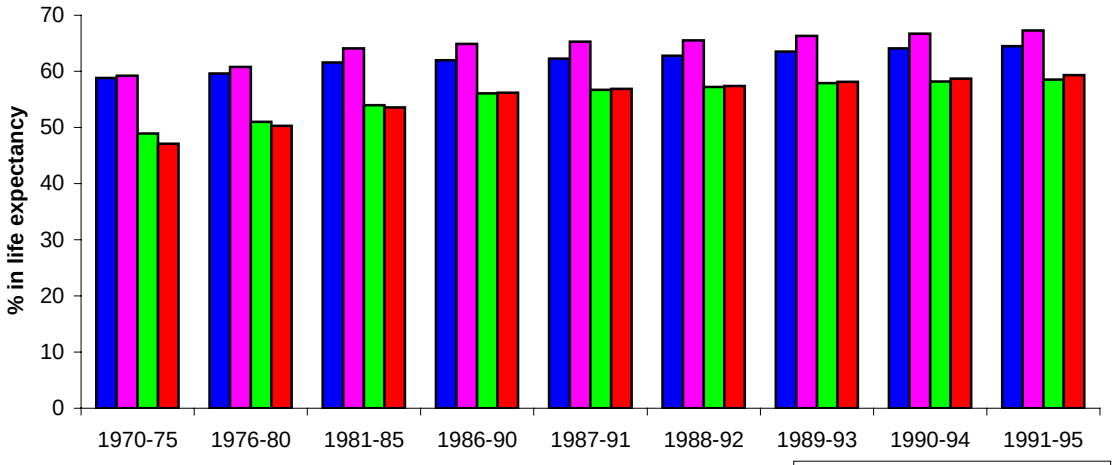
Source: Reference 2.6

national level, the crude death rate is expected to fall marginally from 7.5 during 2001-05 to 7.2 during 2021; the low magnitude of decline in CDR is because of a relatively steep increase in the proportion of the elderly during this period. The crude death rates in states like, Himachal Pradesh, Punjab, Delhi, and West Bengal, Andhra Pradesh, Karnataka, Kerala and North Eastern states are likely to increase during 2021-25, because of increase in proportion of elderly population.

Time trends in life expectancy at birth and at one-year age

Data on time trends in life expectancy at birth and at one year in urban and rural areas and in men and women are presented in Figure 2.25, 2.26 & 2.27. It is obvious that the there has been a progressive increase in life expectancy both in urban and rural areas. But in all periods life expectancy is lower in rural as compared to the urban areas. Currently life expectancy at birth for females is higher than the life expectancy at birth for males. Improvement in life expectancy over the last decade is indicated in Figure 2.26 and Annexure 2.7.

Figure 2.25: Time trends in life expectancy at birth



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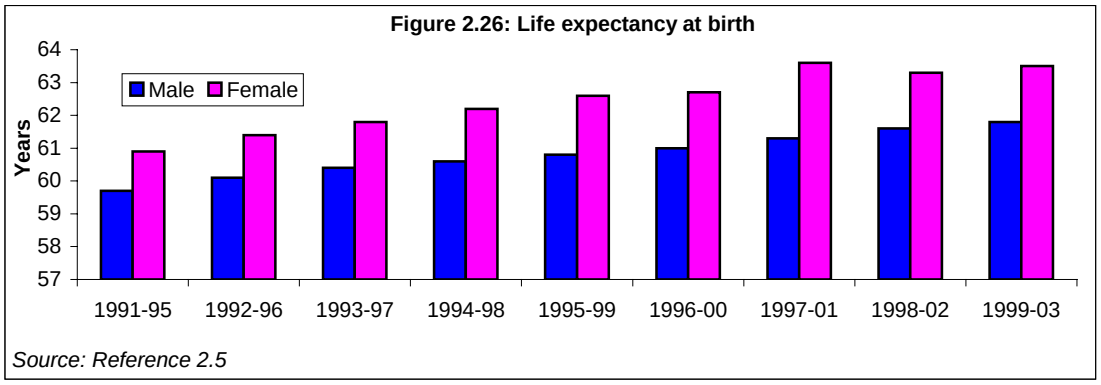
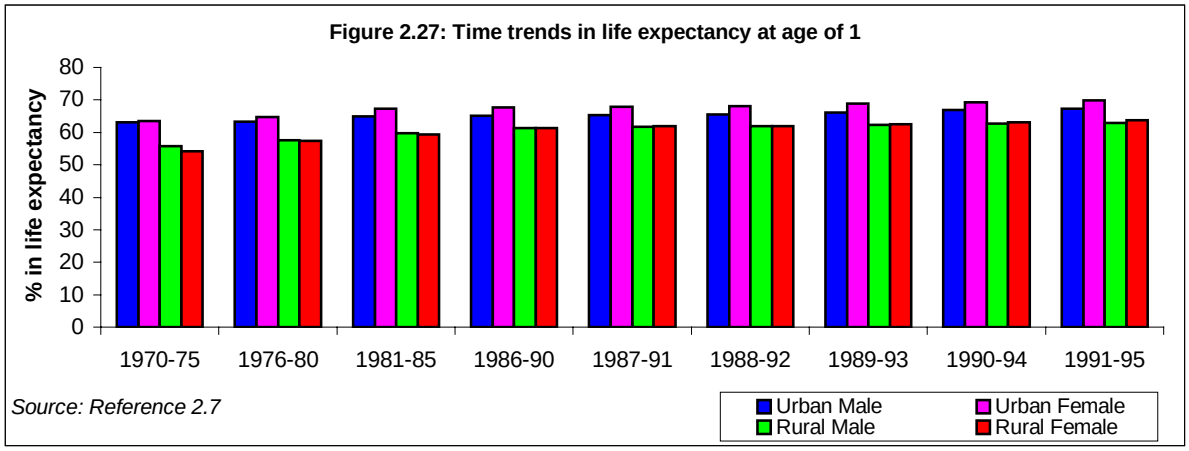
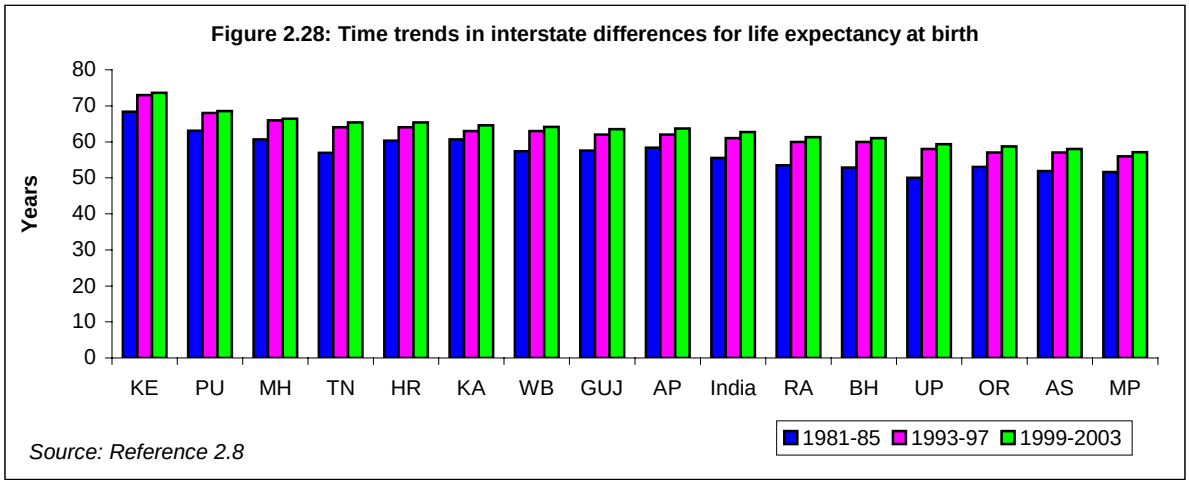


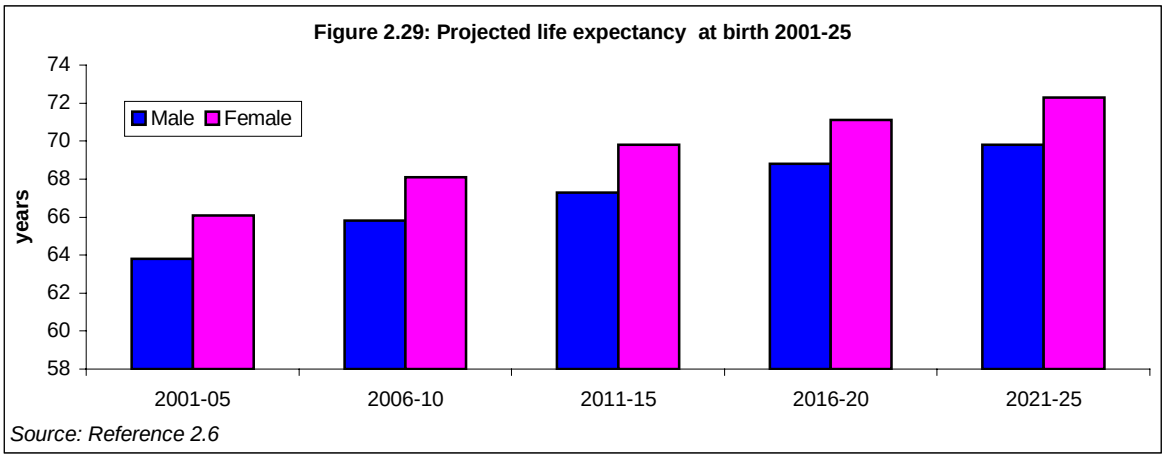
Interstate differences in life expectancy at birth

There had always been substantial interstate differences in life expectancy. Over years there has been an increase in life expectancy in all the states but the rate of increase differ (Figure 2.28 and Annexure 2.7); in 1970 in most of the states women had lower life expectancy as compared to men. By 1995, in majority of the states



women lived longer. Projected life expectancy at birth at national level in 2001-25 is shown in Figure 2.29. SRS based information on interstate differences in life expectancy for men and women at different ages are given in Annexure 2.8 & 2.9. Longer survival of elderly women who are illiterate and have been housewives, in the

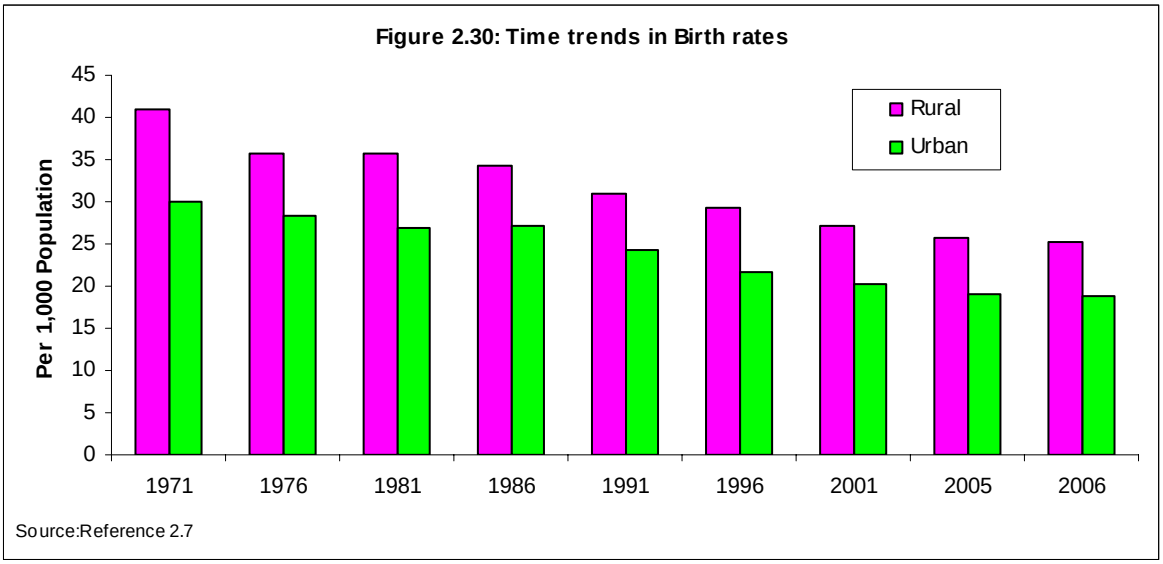


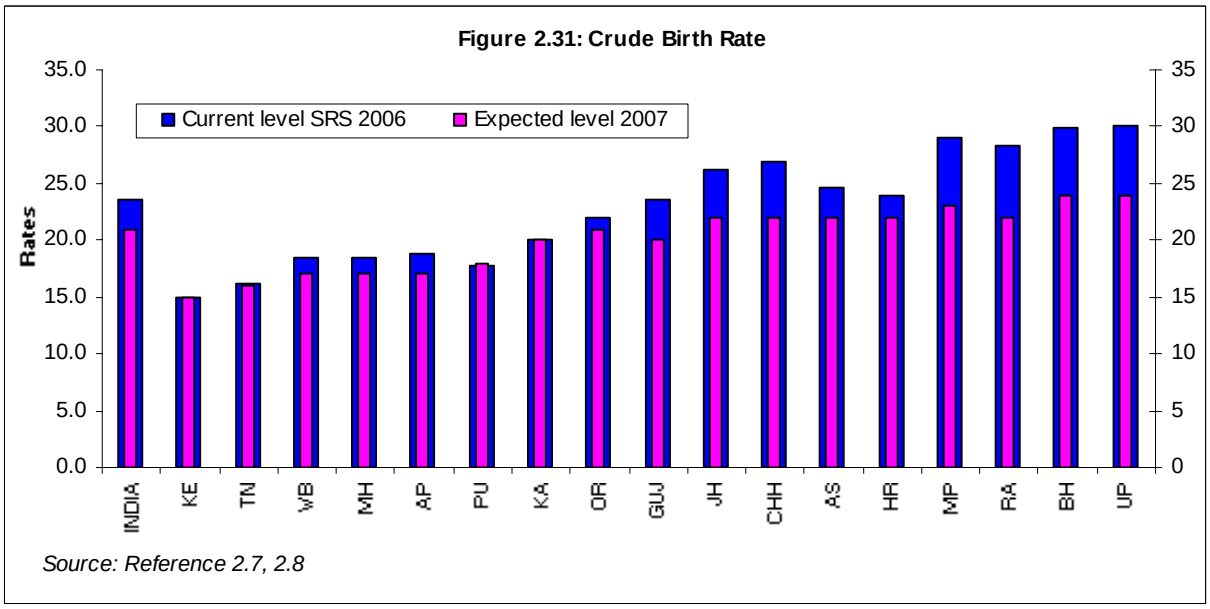


current trend of breaking up of the joint family system and changing life styles may have adverse effect on health and nutritional status of elderly women.

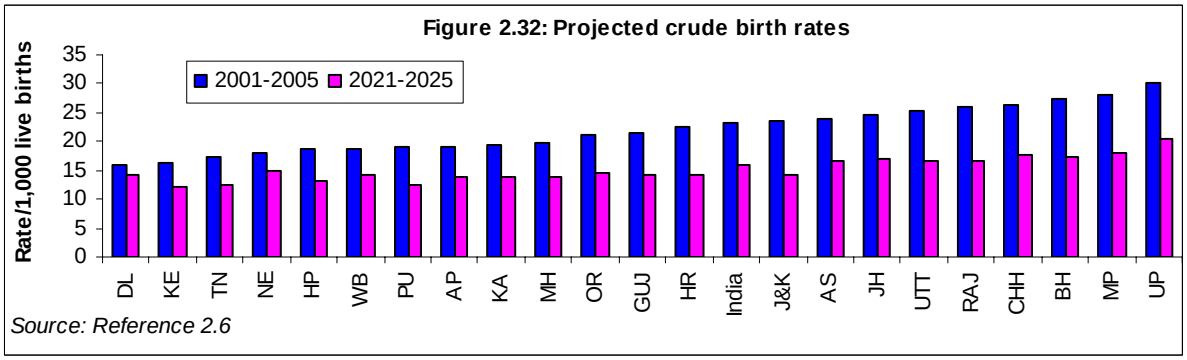
Crude Birth Rate

Crude birth rates have shown a decline in last three decades, from 40.8 in 1971 to 23.8 in 2005 (Figure 2.30). Urban areas have lower CBR as compared to rural areas (Figure 2.30). There are large interstate differences in CBR. Uttar Pradesh, Madhya Pradesh, and Bihar have CBR higher; Kerala, Tamil Nadu, Punjab and West Bengal have lower CBR than national average (Annexure 2.4) as compared to national average. Tenth Five Year Plan goals for 2007 were set taking these into account (Figure 2.31). Kerala, Karnataka, Punjab and Tamilnadu have achieved birth rate goals set in the Tenth Plan; the gap between goals and current CBR is high in populous states like Uttar Pradesh, Madhya Pradesh, Bihar and Rajasthan. Under NRHM/RCH special efforts are being made to improve access to services and meet unmet needs for contraception. These efforts are expected to result in reduction in CBR. The magnitude of reduction is expected to be higher in states, which are currently having high birth rate, so that the difference in CBR between states will be reduced.



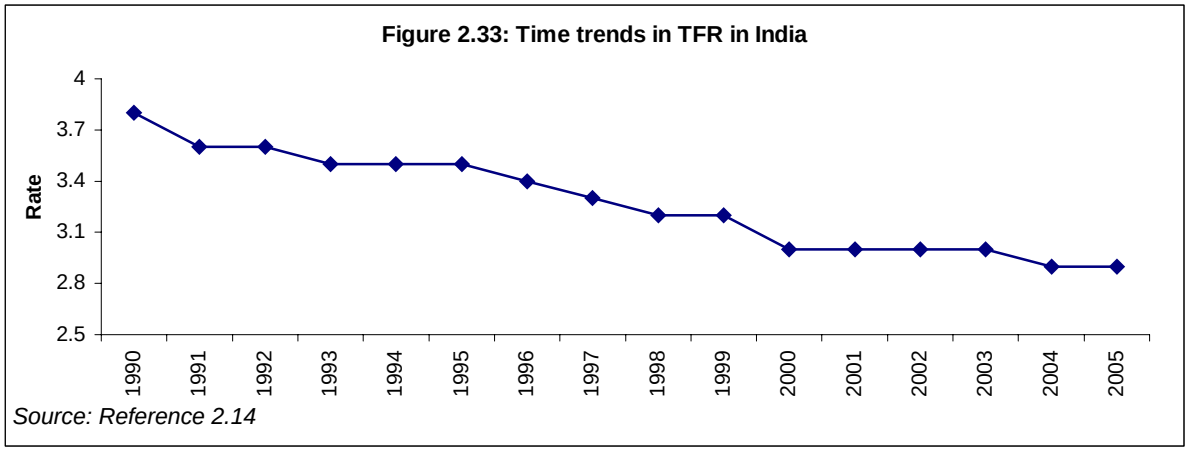


Projected CBR for India and the states in 2001 and 2025 is shown in Figure 2.32. Population projections envisage that crude birth rate in India will decline from 23.2 during 2001-05 to 16.0 during 2021-25, mainly due to decline in CBR in populous Northern states.

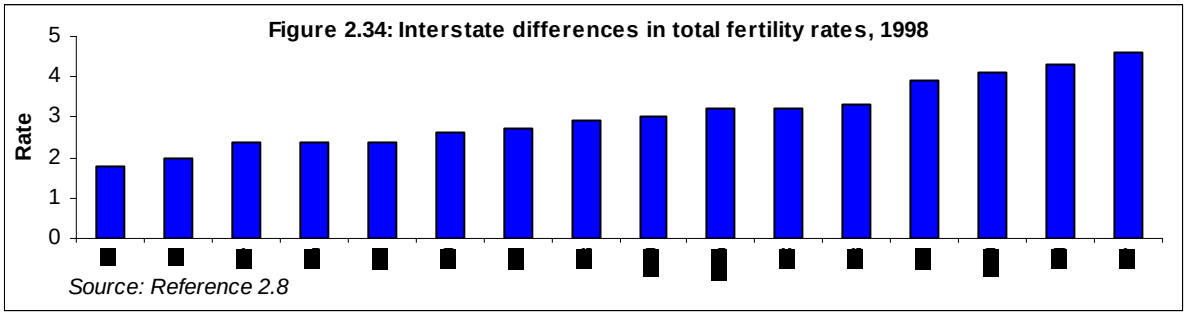


Total fertility rate (TFR)

TFR has declined from 6 in 1951 to 3.6 in 1991 (Annexure 2.10) an average decline of 0.35 per quinquennium. There was some acceleration in decline of TFR (Figure



2.33) in the decade of the nineties. National Population Policy set the goal of TFR of



2.1.by 2010.

Population projections assume that the TFR decline could be by 0.8 children for the decade 2001-2011 and that TFR for 2011 will be 2.3 and TFR of 2.1 will be achieved between 2011 and 2015.

Table 2.3: Year by which TFR of 2.1 will be Achieved

India & States	Years by which projected TFR will be 2.1
India	2015
Andhra Pr.	2002
Assam	2019
Bihar	2021
Chhatisgarh	2022
Delhi	Achieved in 2001
Gujarat	2012
Haryana	2012
Himachal Pr.	Achieved in 2002
J & K	NA
Jharkhand	2018
Karnataka	2005
Kerala	Achieved in 1998
Madhya Pr.	2025
Maharashtra	2009
Orissa	2010
Punjab	2006
Rajasthan	2021
Uttar Pr.	2027
Uttranchal	2027
Tamil Nadu	Achieved in 2000
West Bengal	2003
Northeast (Exd. Assam)	2005
India (weighted)	2021

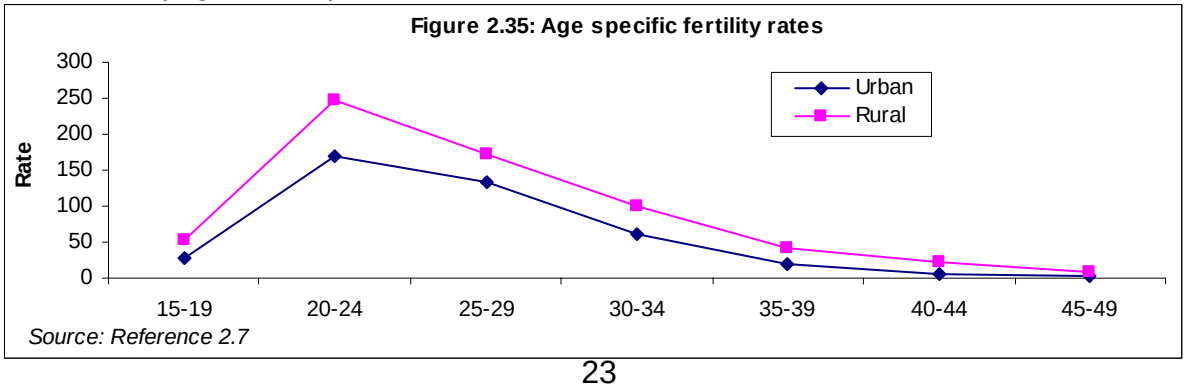
NA: Not available

Interstate differences in TFR

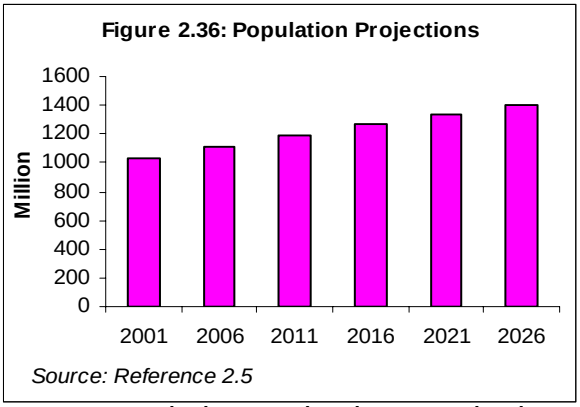
Interstate differences in TFR between states in 1998 are shown in Figure 2.34. Projected time by which different states are expected to achieve replacement level of fertility is given in Table 2.3. There are large interstate differences in TFR. Kerala, Tamil Nadu, West Bengal and Andhra Pradesh have all already achieved TFR level of 2.1 whereas Madhya Pradesh, Rajasthan, Bihar and Uttar Pradesh are projected to achieve the goal much later. With increased awareness among population and improved access to contraceptive care there could be steeper decline in fertility over the next two decades

Age and sex specific fertility rates

There has been substantial decline in fertility rate in all age groups in India over the last five decades. Age specific fertility rates in urban areas are substantially lower as compared to rural areas (Figure 2.35).



Population projections and nutrition transition

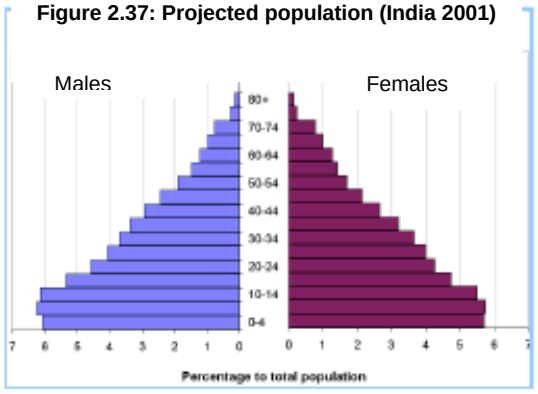


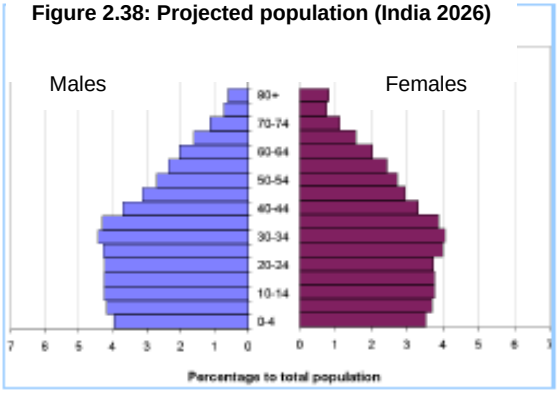
India has been undertaking population projections and utilizing these data in planning not only to ensure provision of essentials necessities such as food, shelter and clothing but also prerequisites for human development such as education, employment and health care. Over the years there has been considerable refinement in the methodology used for population projections and substantial improvement in the accuracy of predictions. Technical Group on Population Projections worked out the population projections for the country and the states for the period 2001 to 2026 on the basis of census 2001 and other available demographic data are shown in the Figure 2.36. Projected IMR, crude death rates and crude birth rates, in different states in 2001-2005 and 2021 – 2025 are given in Figure 2.20, 2.24 and 2.32 respectively.

In spite of the fact that there has been substantial reduction in birth rates, population growth rate will continue to be high due to:

- the large size of the population in the reproductive age-group (accounting for an estimated 60 % of the total population growth);
- higher fertility due to the unmet need for contraception (contributing to around 20 % of population growth); and
- high wanted fertility due to the prevailing high IMR and other socio-economic reasons (Estimated contribution of about 20 % to population growth).

The population pyramids for 2001 and 2021 are shown in Figure 2.37 and 2.38. Characteristics of projected population of India in 2001 to 2026 are given in Annexure 2.11. The average age of Indians was 23 in 2001 and is expected to rise to 31 years old in 2026.





Source: Reference 2.6

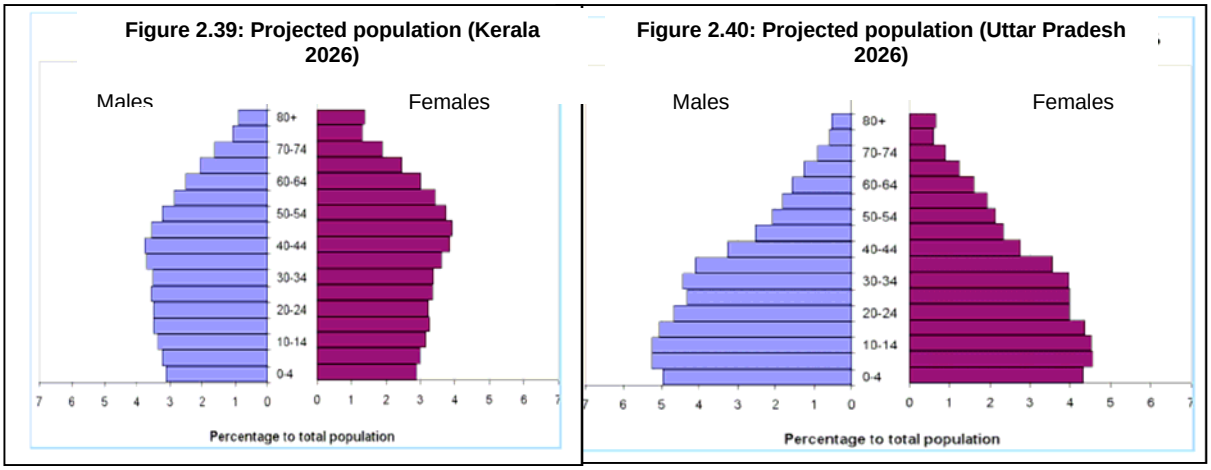


Figure 2.39: Projected population (Kerala 2026)

Figure 2.40: Projected population (Uttar Pradesh 2026)

The substantial interstate differences in age structure and consequently population pyramid will persist even in 2026 because different states have achieved fertility and mortality transition at different rates (Figure 2.39 and 2.40). These have to be taken into account while planning nutrition and health interventions in these states.

Changes in age distribution of the population between 1951 and 2021 in three major age groups are shown in Figure 2.41 and 2.42. Between 2001 and 2026, because of the declining fertility, the proportion of population aged under 15 years is projected to decline from 35.4 to 23.4 percent; the proportion of the middle (15-59 years) and the older ages (60 years and above) are set to increase considerably. With the declining fertility, along with the increases in life expectancy, the number of older persons in the population is expected to increase by more than double from 71 million in 2001 to 173 million in 2026 an increase in their share to the total population from 6.9 to 12.4 percent. The proportion of population in the working age-group 15-59 years is expected to rise from 57.7 percent in 2001 to 64.3 percent in 2026.

In the under 15-year age group there will be no increase in numbers. The health and nutrition infrastructure will therefore be not grappling with ever increasing number of children for providing care and they will be able to concentrate on:

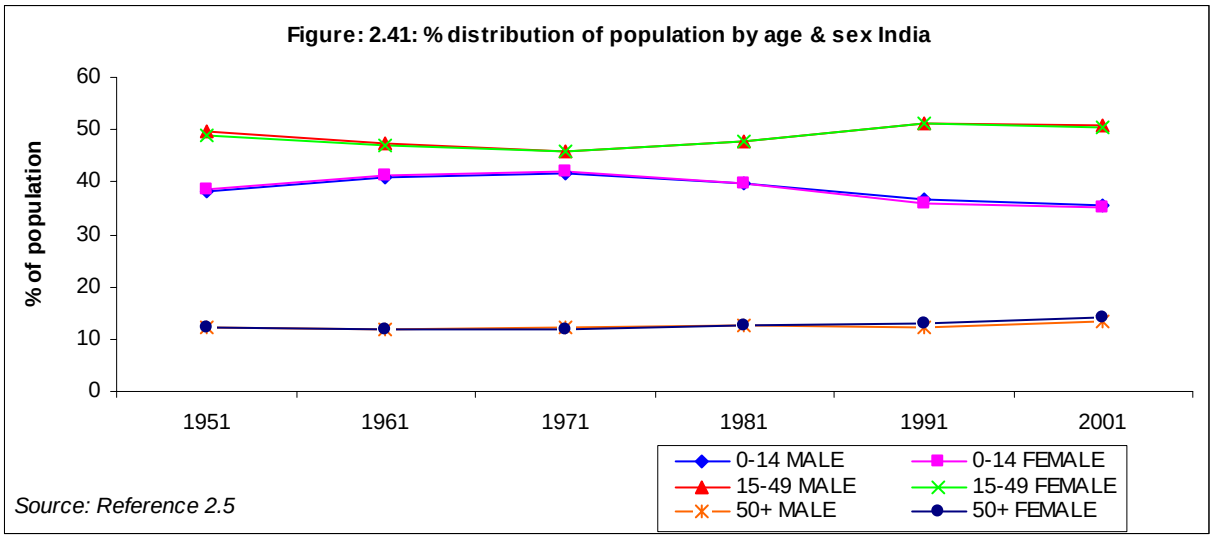
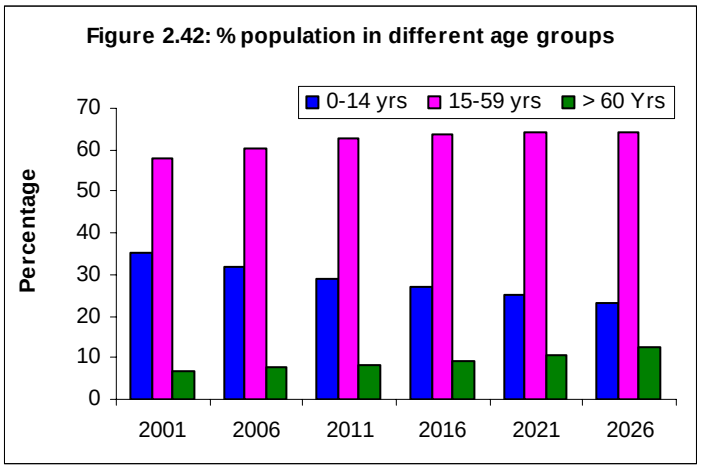


Figure: 2.41: % distribution of population by age & sex India

Source: Reference 2.5

- quality and coverage of health and nutrition services and achieve improvement in health and nutritional status and
- improve access to education & skill development.



There will be a massive increase in the 15-59 years age group. They will be more literate and be aware of their needs and expect better quality of services and fulfillment of their felt needs for nutrition/ MCH/family planning care. The country has a major opportunity to rapidly improve their health and nutritional status by merely meeting their felt needs through effective implementation of National Rural Health Mission its urban counterpart and ICDS programme.

There will be a substantial increase in the population of elderly (more than 60 years) in the next two decades. Most of the increase will be in the relatively active healthy 60-70 years and by catering to their essential nutrition and health care it will be possible to minimize the health and nutrition problems in this group. The country will have to gear up to make the best use of the demographic opportunity window over the next two decades and improve the health and nutritional status of all the segments of the population. The coming two decades represent an unparalleled demographic opportunity to improve health and nutritional status of all age groups in the population. If this window of opportunity is optimally utilized it will be possible for the country to achieve very significant decline in undernutrition rates.

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