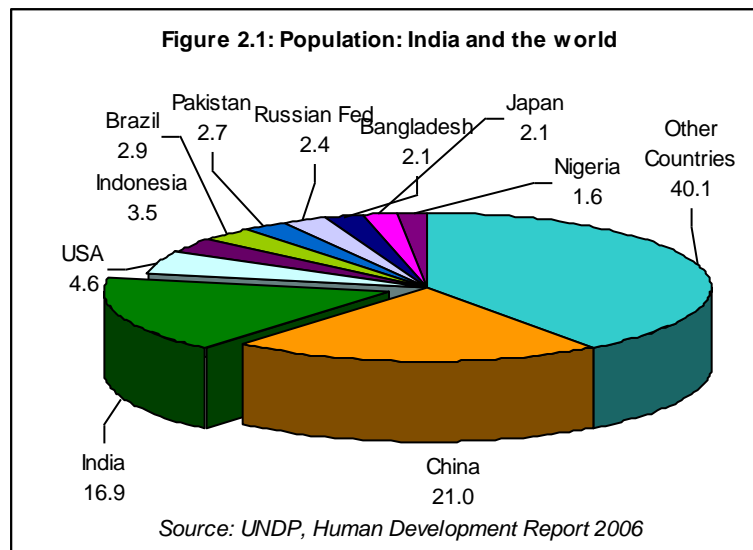


## 2. DEMOGRAPHIC TRANSITION

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 population level stabilizes with both the number of births and deaths being low and equal.

### India and the world

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 % population. A comparison of some demographic parameters between India and some of the neighbouring countries is given in Table 2.1. China and Sri Lanka are far ahead of India in all these parameters.

### Monitoring demographic transition

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 a decade information is inadequate for planning new interventions and monitoring impact of ongoing programmes. The Sample Registration System (SRS) was established in order to

**Table 2.1: Some demographic parameters: India and its neighbours**

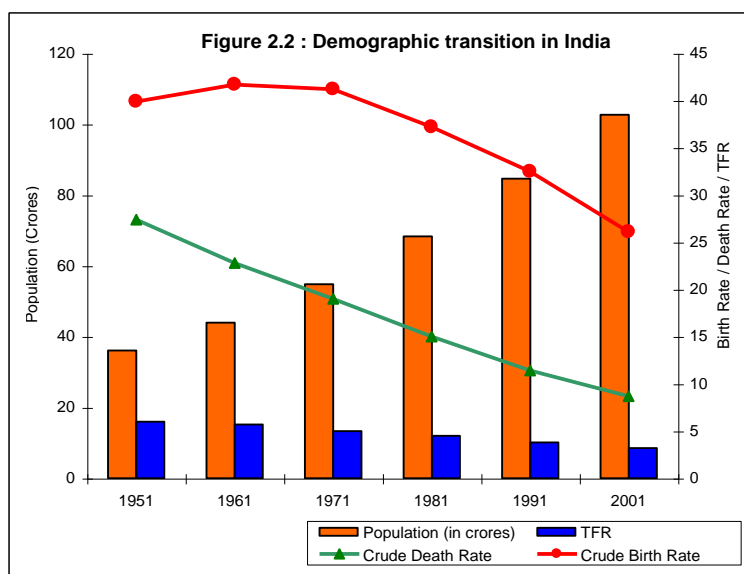
Country	Life expectancy at birth (years)	Under-five mortality rate (per 1000 live births)		Infant mortality rate (per 1000 live births)		Maternal mortality ratio (per 100,000 live births)
		2000-05	1990	2004	1990	
<b>China</b>	71	49	31	38	26	51
<b>India</b>	63	123	85	80	62*	540*
<b>Nepal</b>	61	145	76	100	59	740
<b>Pakistan</b>	63	128	101	96	80	530
<b>Sri Lanka</b>	74	23	14	19	12	92
<b>Bangladesh</b>	63	144	77	96	56	380
<b>South Asia</b>	63	126	84	84	62	NA
<i>NA : Not available</i>						
<i>* 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.</i>						
<i>Source: UNDP, Human Development Report 2006</i>						

provide dependable annual, state-specific data on vital rates, in the absence of dependable data from the Civil Registration System (CRS) in India.

SRS is a large scale demographic survey for providing reliable annual estimates of birth rate, death rate and other fertility and mortality indicators at the national and sub-national levels. SRS also provides information time trends in life expectancy (tables have been generated from SRS data base using MORTPAK-LITE which is a United Nations software package for mortality measurements). The field investigation consists of continuous enumeration of births and deaths by a resident part time enumerator, generally a teacher and an independent survey every six months by a supervisor. The data obtained through these operations are matched. The unmatched and partially matched events are re-verified in the field and thereafter an unduplicated count of births and deaths is obtained. The advantage of this procedure (in addition to elimination of errors of duplication) is that it leads to a quantitative assessment of the sources of distortion in the two sets of records making it a self-evaluating technique. 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.

### **Time trends in demographic indices in India**

Technological advances and the improved quality and coverage of health care resulted in a rapid fall in the crude death rate (CDR) from 25.1 in 1951 to 7.6 in 2005. In contrast, 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 fell below 2 % after three decades (Figure 2.2). 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. Census 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.

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

Source: Office of Registrar General India; NFHS; NA: Not available

## Mortality rates

SRS provides annual information on vital events at state level (urban and rural). The time trends on national level estimates of infant mortality rate, birth rate and death rate, for 1971-2005 are given Table 2.3 and time trends in mortality and life expectancy between 1991 and 2004 are given in Figure 2.3. Interstate differences in mortality rates is given in Annexure 2.1.

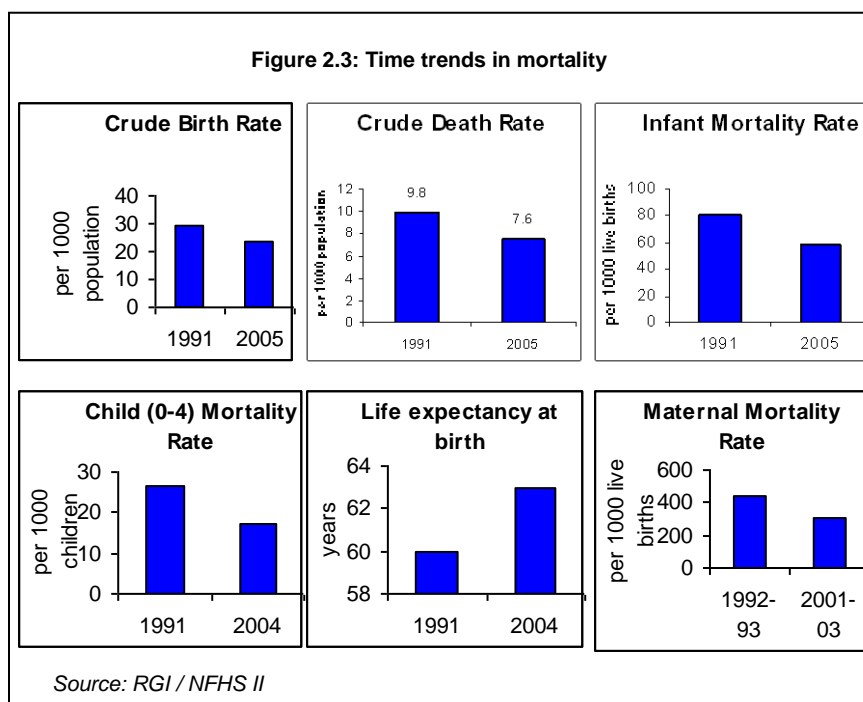
Year	Birth Rate			Death Rate			Infant mortality rate		
	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
1971	36.9	40.9	30.1	14.9	16.4	9.7	129	138	82
1976	34.4	35.8	28.4	15	16.3	9.5	129	139	80
1981	33.9	35.6	27	12.5	13.7	7.8	110	119	62
1986	32.6	34.2	27.1	11.1	12.2	7.6	96	105	62
1991	29.5	30.9	24.3	9.8	10.6	7.1	80	87	53
1996	27.5	29.3	21.6	9	9.7	6.5	72	77	46
2001	25.4	27.1	20.3	8.4	9.1	6.3	66	72	42
2005	23.8	25.6	19.1	7.6	8.1	6.0	58	64	40

Source: SRS reports

### **Neonatal, infant and under-five mortality rates (NNMR, IMR and U5MR)**

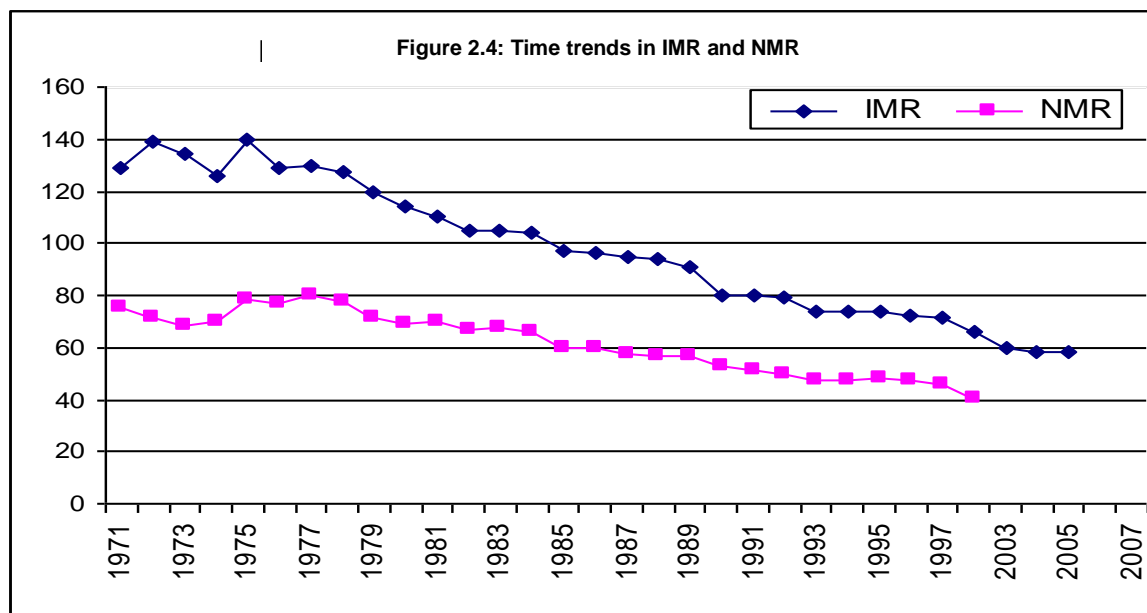
Neonatal infant and under-five mortality rates are excellent indicators of the health status of children. In India there is no system for collection and analysis of data on morbidity during childhood. In the absence of this, available mortality data and analysis of causes of death have been utilised for drawing up priority interventions for improving child health. Ongoing major intervention programmes in child health include:

- essential new born care;
- immunization to prevent morbidity and mortality due to vaccine preventable diseases;
- Food and micro-nutrient supplementation programmes aimed at improving the nutritional status
- programmes for reducing mortality due to acute respiratory infection and diarrhoea



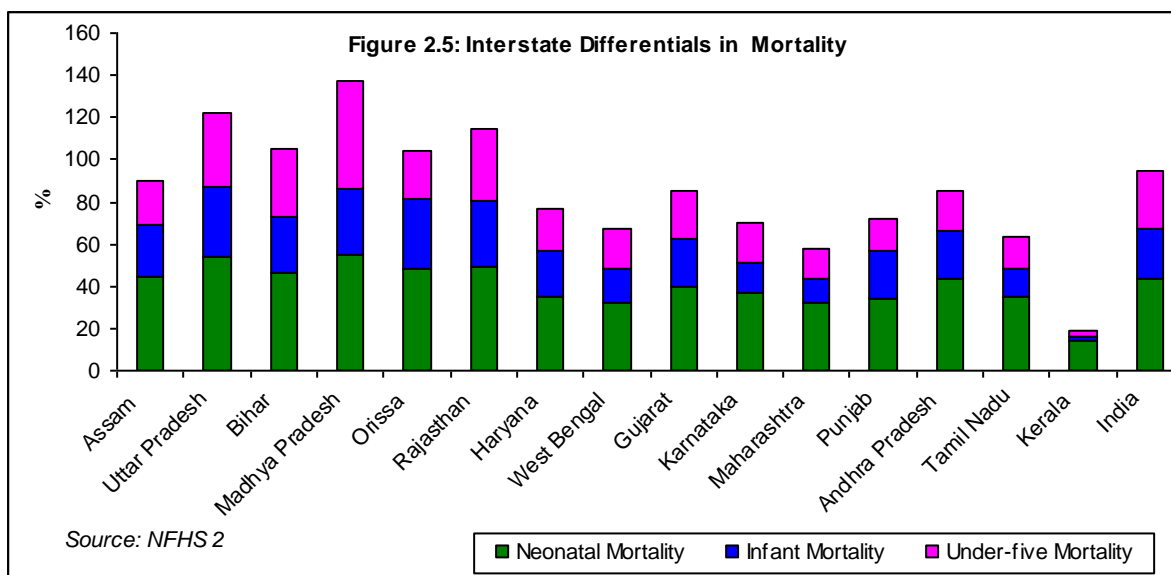
Improved access to immunisation, health care and nutrition programmes have resulted in a substantial decline in IMR over the last three decades (Table 2.3; but the decline in perinatal and neonatal mortality has been very slow (Figure 2.4). This is because of

the poor access to antenatal and intrapartum care. Higher under-five mortality rates persist indicating gender bias in child rearing practices. Over the last three decades there has not been any substantial change in the major causes of deaths during infancy and childhood.



*Interstate differences in IMR, NNMR and U5MR*

Data on interstate differences in NNMR, IMR and U5MR computed from NFHS-2 is given in Figure 2.5. Interstate differences in IMR (Annexure 2.2) in both males and females (SRS 2006) are given Table 2.4. There are large interstate differences in IMR and the Tenth Five year Plan goals for 2007 were set taking these into account (Figure 2.6). Data from SRS indicated that as of 2005, no states except Maharashtra, West Bengal and Jharkhand are likely to achieve the



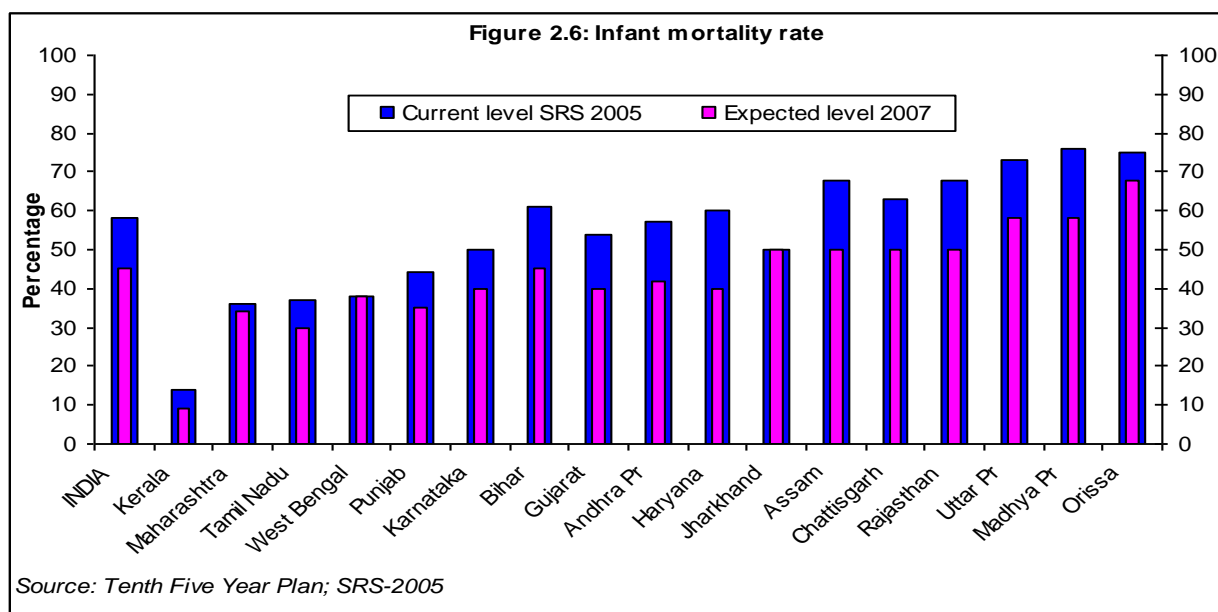
goals set. The interstate differences in morality are partly due to differences in

**Table 2.4: Selected indicators for human development for major states**

State	Life expectancy at birth (1999-2003)			Infant Mortality Rate (per 1000 live births)-2005			Birth rate (per 1000)-2005	Death rate (per 1000)-2005
	Male	Female	Total	Male	Female	Total		
Andhra Pradesh	62.2	64.8	63.7	56	58	57	19.1	7.3
Assam	57.8	58.3	58	66	69	68	25	8.7
Bihar	61.6	59.7	61	60	62	61	30.4	8.1
Gujarat	62.5	64.6	63.5	52	55	54	23.7	7.1
Haryana	65	65.6	65.4	51	70	60	24.3	6.7
Karnataka	62.9	66.4	64.6	48	51	50	20.6	7.1
Kerala	70.9	76	73.6	14	15	14	15	6.4
Madhya Pradesh	57.2	56.9	57.1	72	79	76	29.4	9
Maharashtra	65.2	67.6	66.4	34	37	36	19	6.7
Orissa	58.6	58.7	58.7	74	77	75	22.3	9.5
Punjab	67.6	69.6	68.6	41	48	44	18.1	6.7
Rajasthan	60.7	61.8	61.3	64	72	68	28.6	7
Tamil Nadu	64.3	66.5	65.4	35	39	37	16.5	7.4
Uttar Pradesh	59.6	58.7	59.3	71	75	73	30.4	8.7
West Bengal	63.5	65	64.1	38	39	38	18.8	6.4
India	61.8	63.5	62.7	56	61	58	23.8	7.6

Source : Office of the Registrar General of India, Ministry of Home Affairs

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.



Realizing the urgent need to reduce the interstate differences in mortality the Ministry of Health and Family Welfare has initiated efforts to strengthen health

care delivery system in the state with high fertility/ mortality. Additional funds, equipment and manpower are being provided to bridge the gaps in health services and improve access to essential health care.

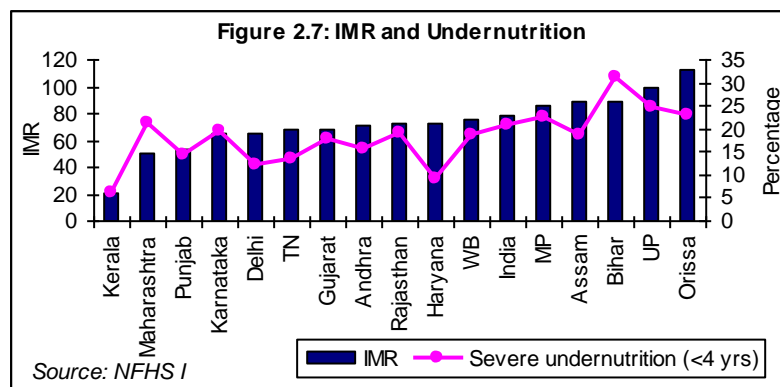
Census of India counts living population but it also computes mortality rates. Data on interdistrict variation in under 5 mortality computed from Census of India is given in Annexure 2.3. This information may be useful in decentralized district level planning.

### Inter-relationship between IMR and CBR

Access to family welfare services and contraceptive care is one critical determinant of infant mortality and birth rate. 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. There are massive inter-state and intra-state differences in birth rates and IMR. In spite of a relatively high IMR, states like Tamil Nadu and Andhra Pradesh have achieved a steep decline in fertility (Table 2.4). 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. For this, reliable district-specific data on birth rates and IMR must be available on an annual basis. This can be achieved only through 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 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 Tenth Plan period.

### Interrelationship between under nutrition and infant mortality

It is well known that undernutrition increases susceptibility to infections; and that 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. There are marked differences in under nutrition rates and IMR between states (Figure 2.7). In most of the states (eg Orissa) with high under nutrition the infant mortality is high; states with low under nutrition rates (eg 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 under nutrition 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, analyse and utilise their district data for planning interventions to improve nutritional status, reduce IMR, monitor progress and effect midterm corrections.

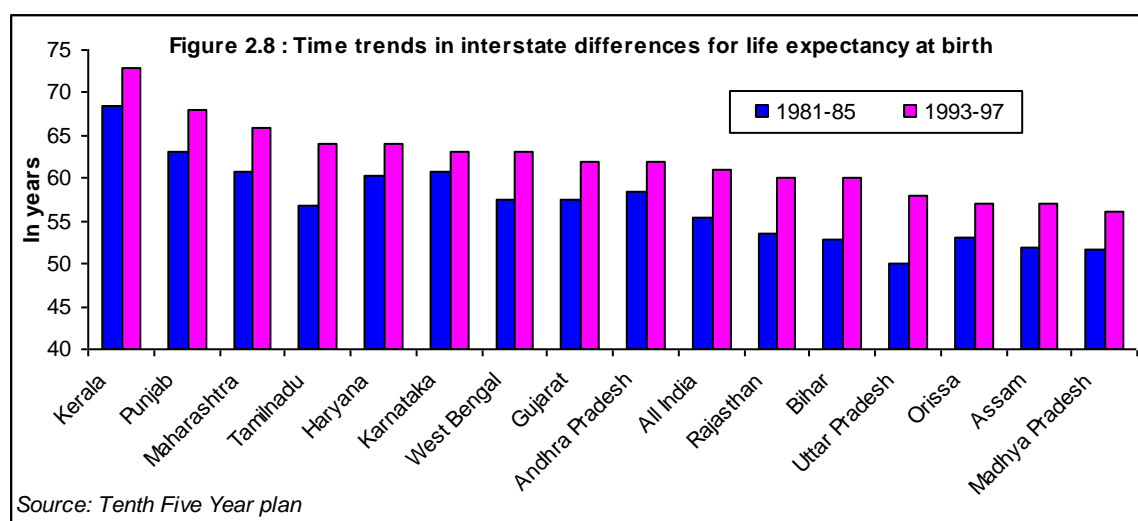
### Crude Death Rate

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). Urban areas have lower CDR as compared to rural areas (Table 2.3). 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 (Table 2.4 and Annexure 2.1).

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 Annexure 2.4. It is obvious that the there has been a progressive increase in life expectancy both in urban and rural areas. 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.

### Interstate differences in life expectancy at birth

There had always been substantial interstate differences in life expectancy. Over the years there has been a steep increase in life expectancy in all the states but the rate of increase differs (Annexure 2.5). In the interstate differences in life expectancy had not decreased (Figure 2.8). In 1970 in most of the states women



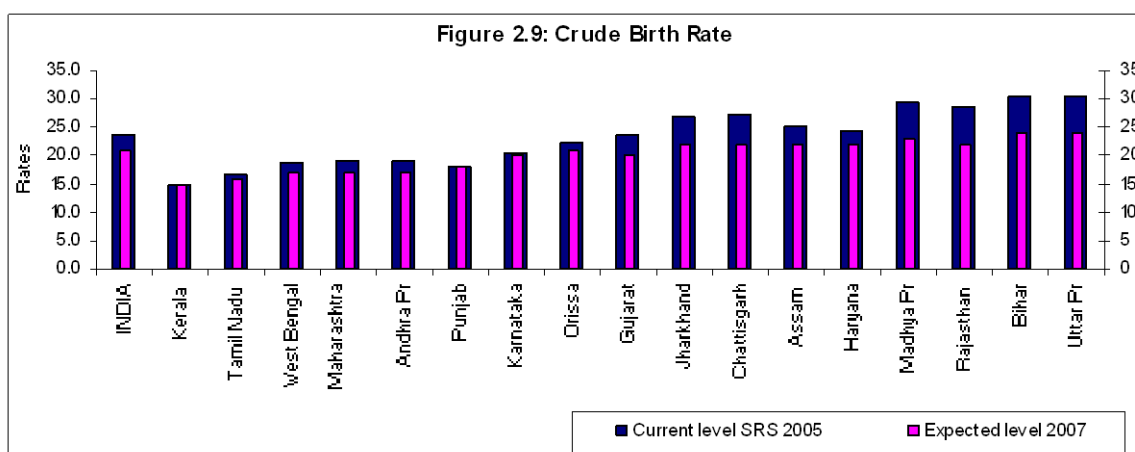
had lower life expectancy as compared to men. By 1995, in majority of the states



women lived longer. SRS based information on interstate differences in life expectancy for men and women at different ages are given in Annexure 2.6 & 2.7. 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.

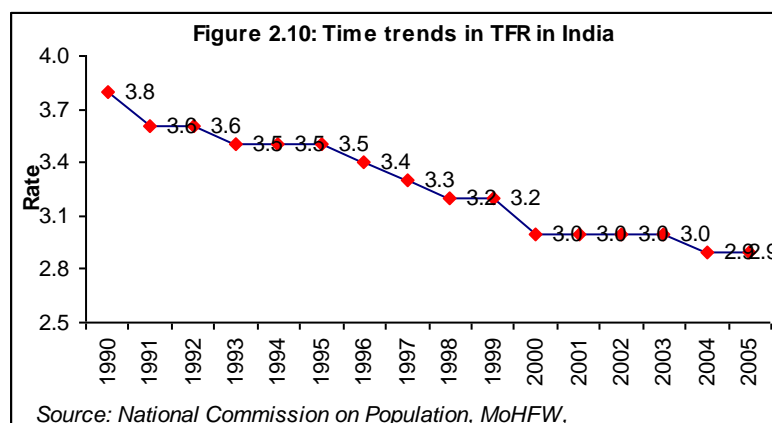
### Crude Birth Rate

Crude birth rates have shown a decline in last three decades, from 40.8 in 1951 to 23.8 in 2005 (Table 2.2). Urban areas have lower CBR as compared to rural areas (Table 2.3). Uttar Pradesh, Madhya Pradesh, and Bihar have CBR higher than national average; Kerala, Tamil Nadu, Punjab and West Bengal have lower CBR (Table 2.4) as compared to national average. There are large interstate differences in CBR and the Tenth Five Year Plan goals for 2007 were set taking these into account (Figure 2.9). Efforts were made to reduce the differences in performance between states during Tenth Plan. While Kerala TamilNadu and Punjab have reached the goals by 2005, others have not yet reached the goals. The populous north Indian states are still having substantially higher birth rates.



### Total fertility rate (TFR)

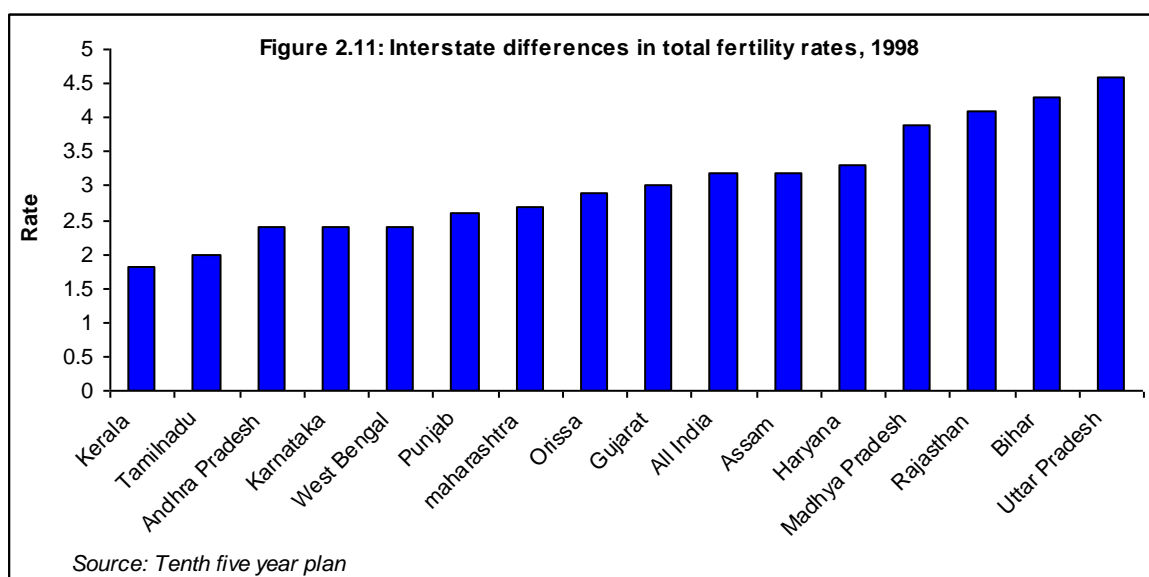
TFR has declined from 6 in 1951 to 3.6 in 1991 an average decline of 0.35 per quinquennium. There was some acceleration in decline of TFR (Figure 2.10) in the decade of the nineties; National Population Policy set the goal of TFR of 2.1 by 2010. Population projections assume that the TFR decline could 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.

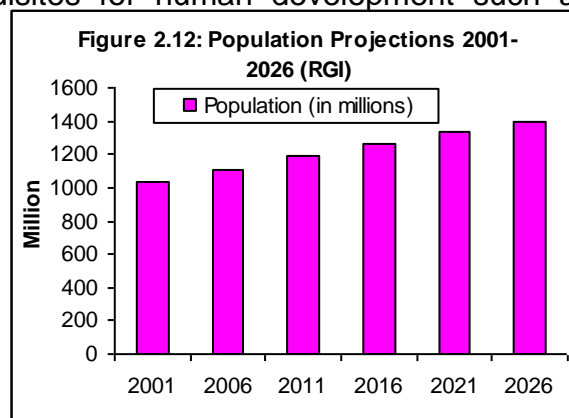
### **Interstate differences in TFR**

There are large interstate differences in TFR Kerala, Tamil Nadu, West Bengal and Andhra Pradesh has all already achieved TFR level of 2.1 whereas Madhya Pradesh, Rajasthan, Bihar and Uttar Pradesh are far behind the goal (Figure 2.11). It is expected that in these states there will be acceleration in decline of TFR during the next five years.



### **Population projections and their nutrition implications**

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 2.12. Projected crude birth rates, crude death rates and IMR in different states in 2001-2006 and 2021 – 2025 are given in Annexure 2.8, 2.9 and 2.10.

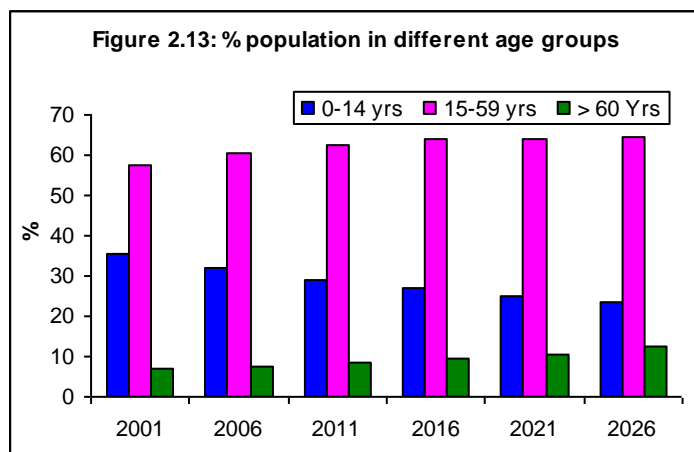
In spite of the fact that there has been substantial reduction in birth rates, population growth rate will continue to be high due to:

- 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 projections for different age groups are shown in Figure 2.13. 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:

- 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 counter part 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.

## Reference

### 2.1 Census of India 2001:

[http://www.censusindia.gov.in/maps/Theme\\_based\\_maps/Theme\\_based\\_maps.htm](http://www.censusindia.gov.in/maps/Theme_based_maps/Theme_based_maps.htm); last accessed on 20/09/07

### 2.2 Human Development Report, 2006; UNDP: <http://hdr.undp.org/hdr2006/pdfs/report/HDR06-complete.pdf>; last accessed on 20/09/06

### 2.3 National Family Health Survey (NFHS-1): <http://www.nfhsindia.org/data/india1/iachap9.pdf>; last accessed on 20/09/07

### 2.4 National Family Health Survey (NFHS-2): <http://www.nfhsindia.org/india2.html>; last updated on 20/09/07

### 2.5 Office of the Registrar General 2002, New Delhi: <http://www.censusindia.net/>; last accessed on 20/09/07

### 2.6 Population Projections, Census of India 2001:

[http://www.censusindia.net/Projection\\_Report.pdf](http://www.censusindia.net/Projection_Report.pdf); last accessed on 20/09/07

### 2.7 Sample Registration Survey 2006:

[http://www.censusindia.gov.in/Vital\\_Statistics/SRS\\_Bulletins/SRS\\_Bulletins\\_links/SRS\\_Bulletin-April\\_2006.pdf](http://www.censusindia.gov.in/Vital_Statistics/SRS_Bulletins/SRS_Bulletins_links/SRS_Bulletin-April_2006.pdf), last accessed on 20/09/07

### 2.8 Tenth Five Year Plan, 2002-2007:

<http://planningcommission.nic.in/plans/planrel/fiveyr/welcome.html>; last accessed on 20/09/07