MEDIUM-TERM POPULATION PROJECTIONS FOR INDIA, STATES AND UNION TERRITORIES, 2001-2051

J. Retnakumar*

Abstract

Most of the existing population projections for India and the states are based on 1991 Census base year population. More importantly, the demographic scenario of the states in the country has been undergoing dramatic changes in the recent past. Therefore, population projections for India and the states are by now little out-dated. The present exercise is carried out with a view to fill this gap by incorporating the latest demographic trends of the country for providing an up-dated estimate of India's future population. The projected results suggest that, the population of India would become 1581 million under high variant and 1549 million under medium variant assumptions by 2051. The absolute size of the population would decline in Kerala, Karnataka, Tamil Nadu, Andhra Pradesh, Delhi and Punjab from 2041 onwards.

Introduction

This paper presents a medium-term population projection (≤ 50 years) for 29 states and six Union Territories of India and for India as a whole until 2051. The exercise is aimed at making an assessment of what would be the most likely future size and composition of India's population. The projected population may vary with the actual population for the projected periods because of the huge base population coupled with remarkable demographic diversity, which could influence the population dynamics of India in the years to come.

1.1 Existing Population Projections for India and States

Several organizations and individual demographers have projected the population of India for the year 2300, starting with 2016 (Registrar General 1996; 2006, US Bureau of Census 1999, Dyson and Hanchate 2000, Natarajan and Jayachandran 2001, Srinivasan

* Faculty Member, IBS (ICFAI Business School) Hyderabad, Dontanapally, Shankarpalli Mandal, Ranga Reddy District-501 203, Andhra Pradesh, India. Email: jretnakumar@rediffmail.com.

and Shastri 2001, Visaria and Visaria 2003, Dyson 2004, Bhat 2004,World Bank 2004, United Nations 2004; 2005).

The US Census Bureau (1999), the World Bank (2004) and the United Nations (2004; 2005) have projected India's future population, as part of their exercise to project the population of different counties of the world. However, these exercises do not attempt any population projections for the individual states and Union Territories in India. Bhat's (2004) projection covered major northern and southern states along with a national projection for India. Only the Registrar General (1996; 2006) has projected the populations for all the states (major and smaller) and Union Territories. Except this, all the remaining projections have covered India and the 15 major states. Natarajan and Jayachandran (2001) projected populations at the district level along with a national population projection. Long-term projections have been attempted at the state level by Visaira and Visaria (2003) and at the national level by the United Nations (2004) for the year 2101 and 2300 respectively.

Considering the different scenarios (alternatives and variants), we find that these projections indicate that India's population would range between 1229-1290 million in 2016 and 1314-1476 million in 2026. In 2051, it would range between 1295-1889 million. Extremely long-term projections indicate that India's population will be in the range of 1458-1812 million by 2101 and about 1372 million by the year 2300 (Table 1.1).

Table 1.1: Projected population for India by various sources, 2016-2300

Authors/Institutions	Type of projections	Projected population (in million)				
		2016	2026	2051	2101	2300
Registrar General of India (1996)		1263				
Registrar General of India (2006)		1268	1399			
US Bureau of Census (1999)		-	1048			
Dyson and Hanchate (2000)		-	1394			
Natarajan and Jayachandran (2001)		-	1414	1646		
Srinivasan and Shastri (2001)	Alternative-1	1269	1409	1628		
	Alternative-2	1250	1340	1295		
	Alternative-3	1233	1330	1416		
Visaria and Visaria (2003)	Standard variant	-	-	1619	1812	
Dyson (2004)	High variant	-	1455	1730		
	Standard variant	1290	1419	1578		
	Low variant	-	1391	1458		
Bhat (2004)	Optimistic scenario	1229	1380			
	Realistic scenario	1256	1403			
World Bank (2004)		1231	1351	1585		
United Nations (2004)	Medium variant	-	-	1531	1458	1372
United Nations (2005)	Low variant	1230	1314	1332		
	Medium variant	1260	1395	1592		
	High variant	1290	1476	1889		

Notes: Cohort Component Method of population projection has been used for All-India and major states, whereas Mathematical Method of population projection has been employed for projecting the population of Union Territories, smaller states and districts in India. The projected figures by US Bureau of Census (1999) relate to years 2025 whereas Bhat's (2004) projection is for the years 2015 and 2025. United Nations' (2004) final projected figures are for the year 2300, whereas the remaining projections are for the years 2050 and 2100. Similarly, the World Bank's (2004) final population projections are for the year 2090. The remaining projections by World Bank (2004) and United Nations (2005) cover the period 2015, 2025 and 2050.

Sources: Registrar General (1996; 2006), US Bureau of Census (1999), Dyson and Hanchate (2000), Natarajan and Jayachandran (2001), Srinivasan and Shastri (2001), Visaria and Visaria (2003), Dyson (2004), Bhat (2004), World Bank (2004), United Nations (2004; 2005)

1.2 Need for a Fresh Population Projection

A close look at these exercises suggest that majority of the projections are carried out on the basis of 1991 Census base year population. The major drawback of these projections is that, the age-sex distribution of 1991 Census is by now a little out-dated. Three projections have been attempted with the 2001 Census population. Srinivasan and Shastri (2001) and Dyson (2004) have used provisional population totals whereas the Registrar General (2006) has used smooth age-sex distribution based on the 2001 Census. The use of the old base year population and the differences between the provisional and the final population figures makes significant discrepancies when they are employed to project future populations[1].

Aside from fertility and mortality trends, migration trend is the most important component that might affect the future population, at least in the case of a few states. Most of the projections assume that internal migration as well as emigration have no significant role in the population dynamics of India. However, Dyson (2004) and the Registrar General (2006) have incorporated the net out-migration component in their population projections at the state level. In the projections made by the Registrar General (2006), the 1991 Census population was used as the base year population for the estimation of net-out migration rates at the state level. The use of 1991 base year population over-estimates the net-out migration rates. The appropriate method is the use of mid-year inter-censal population (i.e. 1996) as the base year population for estimating net-out migration rates.

The paper attempts two sets of projection i.e., the high variant and the medium variant. There are two sets of fertility variants (high and medium); one set of mortality and migration assumptions will be used in the projections. The mortality trend is assumed to remain unchanged in both the projections since it is believed that mortality variations have a much smaller effect on population trends than fertility. In sum, the study is an endeavor to make a fresh population projection for India and the major states till 2051, based on smoothed age-sex distributions of the 2001 Census. It also corrects the net-out migration rates by applying the mid-year inter-censal population as the base year population.

1.3 Data and Methods

The smoothed age-sex distribution of 2001 Census provided by Registrar General of India (2006) has been used as the base year population. SRS (Sample Registration System) data have been used for estimating future pattern of fertility and life expectancies. Net-out migration rates have been computed by using Census data. The Cohort Component Method of projection has been used for 21 states with more than 10 million population whereas the logistic curve function has been applied in the case of the rest of the states and Union Territories with relatively smaller populations[2].

The Cohort Component Method makes specific assumptions about the future levels and patterns of fertility, mortality and migration and applies them with the age-sex structure of the base year population. The technique has been applied with the help of SPECTRUM population projection software (DEM PROJ). The mathematical expression of the Component Method is as follows: $P_t = P_t\text{-}1 + B_t\text{-}1, t - D_t\text{-}1, t + M_t\text{-}1, t$; Where; P_t = Population at time t, P_t-1 = Population at time t-1, B_t-1, t = Births in interval from time t-1 to time t, D_t-1, t = Deaths in interval from time t-1 to time t, M_t-1, t = Net migration in the interval from time t-1 to time t. The general formula for the logistic curve function is $Y_0 = \frac{1}{k + ab^x}$, where *K* is a constant, and *e* is the base of natural logarithms, leaving *a* and *b* to be determined[3].

1.4 Assumptions and Projected Input Data

a) Fertility

Owing to the diverse patterns of fertility decline among the states, and the availability of state-wise annual TFRs since 1971, the Gompertz Curve is used as the best method for predicting the trends in fertility (TFR). The Gompertz curve is defined as:

$$\frac{TFR_t}{U\text{-}L} = (a)^b$$

or alternatively, Ln (-Ln (TFR-L)/(U-L))) = Ln (-Ln.a) + t.Ln.b, Where; U= Upper Limit, L = Lower Limit and a and b are constants

There is no unanimity among demographers about the extent to which fertility could come down in India. It was argued that only very recently have human populations experienced level of fertility as low as 1.6, let alone sustained for any length of time (Dyson and Hanchate 2000, Dyson 2004). The recent projections by United Nations assume that the more developed regions are anticipated to undergo fertility increase,

especially in Europe, where fertility is assumed to reach 1.83 children as per medium variant projections for 2045-2050 (United Nations 2006: 4). Therefore, the present study, under the high variant assumption, assumes that TFR at the national and the state levels would not fall below 1.8 by 2051.

For major states, in which the Component Method of population projection was applied, the TFRs during 1981-2005 were obtained from SRS, for projecting their future levels. For some states, for which SRS estimates of TFR were not available from the year 1981 onwards and past trends showed substantial fluctuations. For example, the TFRs for Delhi show fluctuations during 1990-2005. Therefore, the TFR estimates during 1998-2001 were linearly extrapolated till 2006. Similarly, for Himachal Pradesh the observed values of TFR from 1990-2005 have been used for projecting the future levels of fertility. The TFR estimates for Jammu and Kashmir are not available for the past several years; estimates from NFHS-II and NFHS-III have been linearly extrapolated till 2010. After obtaining the levels of TFR for these states, Gompertz Curves were fitted for estimating future levels of fertility.

Though SRS provides TFR estimates for most of the states in the country, time series data are not available for the newly created states, a difficulty which makes the future assessment of TFR difficult. The SRS provides the fertility estimates for three newly created states (Uttarakhand, Jharkhand and Chhattisgarh) since 1999. The available TFR estimates for Uttarakhand show no clear pattern in fertility[4]. In the absence of alternative methods, TFR estimates provided by Bhat (2004a) for Uttarakhand seem to be the reliable level of fertility in the state for the year 2001. The projection by the Registrar General (2006) assumed a TFR of 2.8 by 2006-2010. The TFR estimate during 2001-2010 were linearly interpolated and fitted in the Gompertz Curve to obtain future levels of TFR for Uttarakhand. For the rest of the states such as Jharkhand and Chhattisgarh, the TFRs during 1999-2002 (where the trend is consistent) have been linearly extrapolated till 2006 and then the Gompertz Curve has been fitted to obtain the future levels of TFR. The indirect estimates of TFR based on Reverse Survival Method[5] for the newly created and bifurcated states for the year 2001 come somewhat close to the SRS estimates of

fertility and are used in the present study except for Jharkhand. Since the state of Kerala had reached a TFR of 1.8 in 2001, no Gompertz Curve has been fitted for the state, under the high variant assumption.

In the projections, the lowest threshold of TFR (L) was assumed to be 1.8 under the high variant assumption (for most of the northern states) and 1.6 under the medium variant assumption (for the southern states). While fitting the Gompertz Curve, three types of upper asymptotes have been assumed for the states depending upon whether the particular state is a higher or a medium or a low TFR state. The upper asymptote (U) is taken as six for the southern states and seven for the northern states. For the western and the eastern states, U is taken as 6.5. The upper limit of TFR remained the same in both the high and the medium variant projections. Weighted estimates of TFR (weights are the percentage share of females in the ages 15-49) during 2001-2051 are used for projecting the future trends in fertility at the national level. The projected TFRs at the state level and at the national levels (weighted and un-weighted) under the high variant during 2001-2051 are presented in Table 1.2.

Table 1.2: Projected total fertility rates for states and all-India (high variant), 2001-2051

States/India	2001	2006	2011	2016	2021	2026	2031	2036	2041	2046	2051
Andhra Pradesh	2.30	1.97	1.85	1.81	1.80	1.80	1.80	1.80	1.80	1.80	1.80
Assam	3.00	2.74	2.49	2.28	2.11	1.98	1.90	1.84	1.81	1.80	1.80
Bihar	4.40	3.86	3.45	3.05	2.69	2.39	2.15	1.98	1.88	1.83	1.80
Chhattisgarh	3.20	2.84	2.51	2.25	2.06	1.93	1.85	1.82	1.80	1.80	1.80
Delhi	2.00	1.93	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
Gujarat	2.90	2.55	2.31	2.13	1.99	1.89	1.84	1.81	1.80	1.80	1.80
Haryana	3.10	2.63	2.27	2.03	1.88	1.82	1.80	1.80	1.80	1.80	1.80
Himachal Pradesh	2.20	2.01	1.88	1.82	1.80	1.80	1.80	1.80	1.80	1.80	1.80
Jammu and Kashmir	2.70	2.40	2.20	2.06	1.95	1.88	1.83	1.81	1.80	1.80	1.80
Jharkhand	3.40	3.06	2.68	2.36	2.12	1.96	1.87	1.82	1.80	1.80	1.80
Karnataka	2.40	2.14	1.97	1.87	1.82	1.80	1.80	1.80	1.80	1.80	1.80
Kerala	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
Madhya Pradesh	3.90	3.45	3.09	2.75	2.46	2.22	2.04	1.92	1.85	1.82	1.80
Maharashtra	2.40	2.16	1.98	1.88	1.82	1.80	1.80	1.80	1.80	1.80	1.80
Orissa	2.60	2.38	2.13	1.96	1.87	1.82	1.80	1.80	1.80	1.80	1.80
Punjab	2.40	2.11	1.94	1.85	1.81	1.80	1.80	1.80	1.80	1.80	1.80
Rajasthan	4.00	3.45	3.02	2.63	2.31	2.07	1.92	1.84	1.81	1.80	1.80
Tamil Nadu	2.00	1.83	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
Uttar Pradesh	4.50	4.10	3.67	3.25	2.85	2.49	2.22	2.02	1.89	1.83	1.81
Uttarakhand	3.50	3.15	2.80	2.50	2.26	2.07	1.94	1.86	1.82	1.80	1.80
West Bengal	2.40	2.05	1.89	1.82	1.80	1.80	1.80	1.80	1.80	1.80	1.80
India (Un-weighted)	3.10	2.72	2.43	2.20	2.03	1.91	1.85	1.81	1.80	1.80	1.80
All-India (weighted)	**3.09**	**2.76**	**2.53**	**2.34**	**2.17**	**2.04**	**1.94**	**1.87**	**1.83**	**1.81**	**1.80**

The projected levels of TFR indicate that eventually all the states will reach the level of 1.8 by 2051. The TFR of all-India stood at 3.1 children per women in 2001 and this average masks the heterogeneity in fertility levels among the Indian states. As per SRS estimates, only three states have attained below-replacement level of fertility in 2001 and few more states are on the verge of reaching replacement level fertility. For majority of the northern states, it would take many more years to reach the replacement level fertility.

An examination of fertility decline among the Indian states over the past quarter of a century (for which reliable data are available), suggest that differentials in fertility existed between the major northern and the southern states. It must be noted that the pace of fertility decline is not uniform between the northern and the southern states and that significant inter-regional differences exist (Table 1.3). Southern states had relatively low fertility rates even in the past with faster rates of fertility decline, as in case of Andhra

Pradesh and Tamil Nadu or on a par with Karnataka. On the other hand, most of the northern states had higher levels of fertility with slower rates of decline.

Table 1.3: Trends in fertility pattern among major northern and southern states, 1981-2005

	Andhra Pradesh	Karnataka	Kerala	Tamil Nadu	Uttar Pradesh	Bihar	Rajasthan	Madhya Pradesh	Southern states	Northern states
1981	4.0	3.6	2.8	3.4	5.8	5.7	5.2	5.2	3.5	5.5
1991	3.0	3.1	1.8	2.2	5.1	4.4	4.6	4.6	2.5	4.7
2001	2.3	2.4	1.8	2	4.5	4.4	4.0	3.9	2.1	4.3
2005	2.0	2.2	1.7	1.7	4.2	4.3	3.7	3.6	1.9	4.0
Rate of decline in fertility(by number of Children)										
1981-1991	1.0	0.5	1.0	1.2	0.7	1.3	0.6	0.6	1.0	0.8
1991-2001	0.7	0.7	0.0	0.2	0.6	0.0	0.6	0.7	0.4	0.4
2001-2005	0.3	0.2	0.1	0.3	0.3	0.1	0.3	0.3	0.2	0.3
1981-2005	2.0	1.4	1.1	1.7	1.6	1.4	1.5	1.6	1.6	1.5

Notes: Figures for northern and southern states are weighted averages computed for women in the ages of 15-49.

Source: Compiled from SRS Reports

The fall in fertility over the past 25 years is seen to be by no means consistent in all the states and that the northern and the southern states began their fertility transition from different base levels. Fertility may come down in the northern states much faster in the coming years. Whether the former would reach a level of 1.6 children per women is very much debatable, on account of the expected population momentum in these states. It is most likely that fertility differentials would exist between the northern and the southern states and that they would not narrow down at least for a few years to come.

Fertility rates in southern states and some of the smaller northern states with low levels of fertility may go down below 1.8 as has been the experience of some of the European countries in recent years. Many studies have taken a realistic assumption that the TFR levels at the all-India and at the state levels would not decline below 1.6 children per women, as has been the experience of many developing countries (Registrar General 1996, United Nations 2001, Srinivasan and Shastri 2001, Natarajan and Jayachandran 2001).

Fifty-four countries are seen to have attained below-replacement fertility levels (both developing and developed countries including countries in Asia and Caribbean), though fertility levels rose in certain countries; in 22 countries the fertility level had fallen to a level of 1.5 or even lower by 1996. Among those countries that attained below-replacement level fertility, in some countries fertility had declined, and in some countries fertility had increased while in some others fertility had fluctuated (United Nations 2000:120). During 2000-2005, fertility levels have reached a historically unprecedented low level of 1.3 children per women in 15 developed countries, all located in Southern and Eastern Europe (United Nations 2006: 37). However, evidence suggests that, a very low level of fertility is limited to only to developed and European nations; countries like Republic of Korea (1.23) and China (1.7) are also into the category of very low fertility. Experience suggests that more and more countries are moving towards a very low fertility scenario with TFR ranging from 1.6 to 1.3 children per woman. In India, district level fertility estimates made through indirect methods based on 2001 census data suggest that fertility in the South Indian city of Chennai has reached 1.3 children per woman[6].

With different sets of data, both historical and very recent empirical evidence, suggest that comparatively son preference is much stronger in the northern states than southern states of India (Willamson 1976, Arnold *et al*. 1998, Dyson 2004). Even after attaining the desired level of family size, continuing higher preference for son[7] would result relatively higher levels of fertility in the northern states than southern states. The significant north-south fertility differentials may be expected to persist in the coming years, though all the states in the country would attain below-replacement level fertility. The differences in TFR between the northern and the southern states would narrow considerably by mid-21st century; however, most of the northern states in the country are expected to have higher fertility than the southern states.

Considering all the above aspects, a different approach was used to find the future pattern of fertility between northern (higher fertility) and southern states (attained replacement or approaching replacement level fertility). The medium variant assumption puts a lower level of TFR of 1.6 for all the southern states. The same level of TFR is applied to the

states of Himachal Pradesh, Delhi, Maharashtra, Punjab and West Bengal since they are close to below-replacement level fertility or would be approaching the below-replacement level in the near future. Consequently, all those states with a TFR of 2.4 (or less) in 2001 are projected with a lower level of fertility at 1.6. Thus, the only difference between the high variant and the medium variant is that the high variant takes a lower limit of fertility at 1.8 for all the states and the medium variant keeps TFR of 1.6 for those states with lower levels of fertility. The projected levels of TFR under medium variant assumption are presented in Table 1.4.

Table 1.4: Projected total fertility rates for states and all-India (medium variant), 2001-2051

States/India	**2001**	**2006**	**2011**	**2016**	**2021**	**2026**	**2031**	**2036**	**2041**	**2046**	**2051**
Andhra Pradesh	2.30	1.92	1.75	1.63	1.60	1.60	1.60	1.60	1.60	1.60	1.60
Assam	3.00	2.74	2.49	2.28	2.11	1.98	1.90	1.84	1.81	1.80	1.80
Bihar	4.40	3.86	3.45	3.05	2.69	2.39	2.15	1.98	1.88	1.83	1.80
Chhattisgarh	3.20	2.84	2.51	2.25	2.06	1.93	1.85	1.82	1.80	1.80	1.80
Delhi	2.00	1.96	1.82	1.66	1.60	1.60	1.60	1.60	1.60	1.60	1.60
Gujarat	2.90	2.55	2.31	2.13	1.99	1.89	1.84	1.81	1.80	1.80	1.80
Haryana	3.10	2.63	2.27	2.03	1.88	1.82	1.80	1.80	1.80	1.80	1.80
Himachal Pradesh	2.20	2.03	1.83	1.69	1.63	1.60	1.60	1.60	1.60	1.60	1.60
Jammu and Kashmir	2.70	2.40	2.20	2.06	1.95	1.88	1.83	1.81	1.80	1.80	1.80
Jharkhand	3.40	3.06	2.68	2.36	2.12	1.96	1.87	1.82	1.80	1.80	1.80
Karnataka	2.40	2.10	1.92	1.74	1.65	1.61	1.60	1.60	1.60	1.60	1.60
Kerala	1.80	1.65	1.62	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
Madhya Pradesh	3.90	3.45	3.09	2.75	2.46	2.22	2.04	1.92	1.85	1.82	1.80
Maharashtra	2.40	2.13	1.95	1.76	1.67	1.62	1.60	1.60	1.60	1.60	1.60
Orissa	2.60	2.38	2.13	1.96	1.87	1.82	1.80	1.80	1.80	1.80	1.80
Punjab	2.40	2.07	1.89	1.71	1.64	1.61	1.60	1.60	1.60	1.60	1.60
Rajasthan	4.00	3.45	3.02	2.63	2.31	2.07	1.92	1.84	1.81	1.80	1.80
Tamil Nadu	2.00	1.73	1.66	1.61	1.60	1.60	1.60	1.60	1.60	1.60	1.60
Uttar Pradesh	4.50	4.10	3.67	3.25	2.85	2.49	2.22	2.02	1.89	1.83	1.81
Uttarakhand	3.50	3.15	2.80	2.50	2.26	2.07	1.94	1.86	1.82	1.80	1.80
West Bengal	2.40	2.00	1.82	1.67	1.61	1.60	1.60	1.60	1.60	1.60	1.60
India (Un-weighted)	3.10	2.72	2.43	2.20	2.03	1.91	1.85	1.81	1.80	1.80	1.80
India (weighted)	**3.09**	**2.74**	**2.50**	**2.27**	**2.10**	**1.97**	**1.87**	**1.80**	**1.80**	**1.80**	**1.80**

The projected TFRs under the high variant assumption show that the TFR is expected to reach 1.8 in six states in 2021, 11 states in 2031 and 15 states in 2041 and that all the states except Uttar Pradesh would reach this level by 2051. There existed only three states in the country with below-replacement level fertility in 2001; nine states would reach this level in 2011 and 18 states by 2026. The exceptions from reaching below-

replacement level fertility would be Madhya Pradesh, Bihar and Uttar Pradesh. The Gompertz Curve estimation (high variant) indicates that all-India would be attaining below-replacement level fertility during 2016-2021 whereas the weighted figures suggest that it would be attaining it by 2021-2026, about five years later. Under the medium variant assumption, India will attain below-replacement level during 2016-2021. In terms of weighted estimates of TFR, it might take a slightly longer time to attain the below-replacement level fertility.

The levels of TFR under the medium variant assumption indicate that Andhra Pradesh, Delhi, Himachal Pradesh, Kerala, Karnataka, Tamil Nadu and West Bengal have attained below-replacement level fertility. Karnataka (high variant assumption) and Maharashtra (both variants) have attained below-replacement level fertility in 2007. Harayana, Jammu and Kashmir and Orissa are expected to attain the level before 2016 whereas Chhattisgarh and Gujarat would reach it only by 2021. Madhya Pradesh will be attaining replacement level fertility by 2031. Only two states, Bihar and Uttar Pradesh would remain unable to attain the below-replacement level fertility even by 2031.

b) Assumptions on Trends in Sex Ratio at Birth

The Registrar General has estimated the sex ratios at birth (male live births per 100 female live births) based on SRS data for the period 2001-2026. The same method has been followed in the present study as well (Table: 1.5).

Table 1.5 Projected sex ratio at birth (male live births per 100 female live births), 2006-2051

States/India	2006	2011	2016	2021	2026	2031	2036	2041	2046	2051
Andhra Pradesh	104	104	104	104	104	104	104	104	104	104
Assam	102	102	102	102	102	102	102	102	102	102
Bihar	112	112	112	112	112	112	112	112	112	112
Chhattisgarh	103	103	103	103	103	103	103	103	103	103
Delhi	115	115	115	115	115	115	115	115	115	115
Gujarat	118	118	118	118	118	118	118	118	118	118
Haryana	125	125	125	125	125	125	125	125	125	125
Himachal Pradesh	111	111	111	111	111	111	111	111	111	111
Jammu and Kashmir	106	106	106	106	106	106	106	106	106	106
Jharkhand	104	104	104	104	104	104	104	104	104	104
Karnataka	106	106	106	106	106	106	106	106	106	106
Kerala	108	108	108	108	108	108	108	108	108	108
Madhya Pradesh	110	110	110	110	110	110	110	110	110	110
Maharashtra	110	110	110	110	110	110	110	110	110	110
Orissa	108	108	108	108	108	108	108	108	108	108
Punjab	126	126	126	126	126	126	126	126	126	126
Rajasthan	114	114	114	114	114	114	114	114	114	114
Tamil Nadu	107	107	107	107	107	107	107	107	107	107
Uttar Pradesh	115	115	115	115	115	115	115	115	115	115
Uttarakhand	110	110	110	110	110	110	110	110	110	110
West Bengal	105	105	105	105	105	105	105	105	105	105
India	**111**	**111**	**111**	**111**	**111**	**111**	**111**	**111**	**111**	**111**

Source: Registrar General (2006)

c) Mortality Assumptions

For projecting the likely levels of life expectancy, working models developed by the United Nations have been used. It is assumed that in the coming years, improvements in life expectancy would be at a slower pace and that they would slowly converge to the West model life table pattern.

There is evidence of deaths from HIV/AIDS having dramatically slowed the pace of population growth in a few countries, particularly Southern African countries (United Nations 2005a). The recent NFHS-III (2007) estimates the number of HIV infected persons at about 2.47 million. The latest NACO estimates put the overall prevalence of HIV at about 0.36 percent amounting to between 2 and 3.1 million people. Earlier, there was wide disagreement among scholars regarding the HIV/AIDS prevalence in India. Finally, though researchers are aware of HIV and its likely impact on future life expectancy, most population projections for India do not consider this issue (Registrar General 1996; 2006, Natrajan and Jayachandran 2001, Visaria and Visaria 2003, Bhat

2004). Taking into account these aspects, the current projection too does not incorporate the impact of HIV/AIDS on life expectancy.

We use life expectancies for 1999-2003 (2001 mid-year) as provided by the Registrar General (Registrar General 2006b). Since Age Specific Death Rates (ASDR) are not available for the newly created states and states such as Delhi and Jammu and Kashmir for 2001, separate life expectancies (for males and females) were computed by constructing life tables using the death rates of 2004. No ASDRs are available for Uttarakhand and therefore, the life expectancies computed by the Registrar General (2006) for 2001-2006 have been used as base year estimates in the projections. The United Nations has developed three sets of life expectancy models such as 'fast pace', 'medium pace' and 'slow pace' by five-year intervals based on the initial level of mortality pattern[8]. For all-India and the states, life expectancies during 1989-93 and 1998-02 were obtained from SRS life tables and classified under the United Nations models of life expectancy improvement. Patterns indicated in SRS life table were assumed to continue in the future.

The newly created states of Jharkhand, Uttarakhand and Chhattisgarh are expected to follow the mortality pattern of their parent states of Bihar, Uttar Pradesh and Madhya Pradesh respectively. For Delhi and Jammu and Kashmir, the medium pace model was used to predict the future pattern of life expectancies. The projected life expectancies at the state level are presented in Table 1.6

Table 1.6: Projected life expectancies by Sex for states and all-India (without reckoning HIV/AIDS) 2001-2051

India/states	Sex	2001	2006	2011	2016	2021	2026	2031	2036	2041	2046	2051
Andhra Pradesh	**M**	62.2	64.2	66.2	67.7	68.9	70.1	71.1	72.1	73.1	73.8	74.7
	F	64.8	66.8	68.8	70.3	71.5	72.7	73.7	74.7	75.7	76.5	77.3
Assam	**M**	57.8	59.8	61.8	63.8	65.8	67.3	68.8	69.8	70.8	71.6	72.4
	F	58.3	60.3	62.3	64.3	66.3	68.3	69.8	71.3	72.5	73.5	74.5
Bihar	**M**	61.6	63.6	65.6	67.1	68.6	69.6	70.6	71.4	72.2	73.0	73.5
	F	59.7	61.7	63.7	65.7	67.7	69.2	70.7	71.9	73.1	74.1	75.1
Chhattisgarh	**M**	62.0	64.0	66.0	67.5	68.5	69.5	70.5	71.3	72.1	72.9	73.4
	F	65.2	67.2	69.2	70.7	71.9	73.1	74.1	75.1	75.9	76.7	77.2
Delhi	**M**	68.1	69.1	70.1	70.9	71.7	72.5	73.3	73.8	74.3	74.8	75.3
	F	71.6	72.8	73.8	74.8	75.8	76.6	77.4	78.2	78.7	79.2	79.7
Gujarat	**M**	62.5	64.5	66.5	68.0	69.2	70.4	71.6	72.6	73.4	74.2	75.0
	F	64.6	67.1	69.4	71.4	72.9	74.1	75.3	76.3	77.3	78.3	79.1
Haryana	**M**	65.0	66.5	68.0	69.0	70.0	70.8	71.6	72.4	73.2	73.7	74.2
	F	65.6	67.6	69.1	70.6	71.8	73.0	74.0	75.0	75.8	76.6	77.4
Himachal Pradesh	**M**	65.8	67.3	68.8	69.8	70.8	71.6	72.4	73.2	73.7	74.2	74.7
	F	66.6	68.6	70.1	71.3	72.5	73.5	74.5	75.5	76.3	77.1	77.9
Jammu and Kashmir	**M**	64.8	66.8	68.3	69.3	70.3	71.1	71.9	72.7	73.2	73.7	74.2
	F	65.9	67.9	69.4	70.9	72.1	73.3	74.3	75.3	76.1	76.9	77.7
Jharkhand	**M**	62.2	64.2	66.2	67.7	68.7	69.7	70.7	71.5	72.3	73.1	73.6
	F	62.7	64.7	66.7	68.7	70.2	71.4	72.6	73.6	74.6	75.6	76.4
Karnataka	**M**	62.9	64.9	66.9	68.4	69.4	70.4	71.2	72.0	72.8	73.3	73.8
	F	66.4	68.4	69.9	71.4	72.6	73.6	74.6	75.6	76.4	77.2	78.0
Kerala	**M**	70.9	72.1	73.3	74.3	75.3	76.1	76.9	77.7	78.2	78.7	79.2
	F	76.0	76.8	77.6	78.1	78.6	79.1	79.6	80.1	80.4	80.7	81.0
Madhya Pradesh	**M**	57.2	59.7	62.2	64.2	66.2	67.7	68.9	70.1	71.1	72.1	73.1
	F	56.9	58.9	60.9	62.9	64.9	66.9	68.9	70.4	71.6	72.8	73.8
Maharashtra	**M**	65.2	66.7	68.2	69.2	70.2	71.0	71.8	72.6	73.1	73.6	74.1
	F	67.6	69.1	70.6	71.8	73.0	74.0	75.0	75.8	76.3	76.8	77.3
Orissa	**M**	58.6	60.6	62.6	64.6	66.6	68.1	69.1	70.1	70.9	71.7	72.5
	F	58.7	61.2	63.7	66.2	68.5	70.5	72.0	73.5	74.7	75.9	76.9
Punjab	**M**	67.6	68.6	69.6	70.6	71.4	72.2	73.0	73.5	74.0	74.5	75.0
	F	69.6	71.1	72.3	73.5	74.5	75.5	76.3	77.1	77.9	78.4	78.9
Rajasthan	**M**	60.7	62.7	64.7	66.7	68.2	69.2	70.2	71.0	71.8	72.6	73.1
	F	61.8	63.8	65.8	67.8	69.3	70.8	72.0	73.2	74.2	75.2	76.0
Tamil Nadu	**M**	64.3	66.3	67.8	68.8	69.8	70.8	71.6	72.4	73.2	73.7	74.2
	F	66.5	68.5	68.5	70.0	71.2	72.4	73.6	74.6	75.6	76.4	77.2
Uttar Pradesh	**M**	59.6	62.1	64.1	66.1	67.6	68.8	70.0	71.0	72.0	73.0	73.8
	F	58.7	61.2	63.7	66.2	68.5	70.5	72.0	73.5	74.7	75.9	76.9
Uttarakhand	**M**	62.0	64.0	66.0	67.5	68.5	69.5	70.5	71.3	72.1	72.9	73.4
	F	66.0	68.0	69.5	71.0	72.2	73.4	74.4	75.4	76.2	77.0	77.8
West Bengal	**M**	63.5	65.5	67.0	68.5	69.5	70.5	71.3	72.1	72.9	73.4	73.9
	F	65.0	67.0	69.0	70.5	71.7	72.9	73.9	74.9	75.9	76.7	77.5
India	**M**	**61.8**	**63.8**	**65.8**	**67.3**	**68.8**	**69.8**	**70.8**	**71.6**	**72.4**	**73.2**	**73.7**
	F	**63.5**	**65.5**	**67.5**	**69.0**	**70.5**	**71.7**	**72.9**	**73.9**	**74.9**	**75.9**	**76.7**

Notes: Life expectancies for Chhattisgarh, Delhi, Jammu and Kashmir and Jharkhand are computed with the ASDRs of 2004. Figures for Uttarakhand were obtained from Registrar General (2006).

Sources: Figures for 2001 are obtained from Registrar General (2006b: 5); Registrar General (2006).

d) Migration Assumptions

The present projection exercise assumes that the current rate of net-out migration would remain constant throughout the projection period. Based on the 2001 Census migration data and using the 1996 base year population, inter-state net migrants (measure in terms of persons reporting a place of last residence different from the place of enumeration) during the decade 1991-2001 has been estimated. The relevant information on net-out migration at the state level used in the projection is presented in Table 1.7.

Table 1.7: Net-out migration rates (Per 1000) by sex for Indian states, 2001-2051

	2001		2011		2026		2031		2045		2051	
States	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Andhra Pradesh	-0.31	-0.31	-0.31	-0.31	-0.31	-0.31	-0.31	-0.31	-0.31	-0.31	-0.31	-0.31
Assam	-0.51	-0.84	-0.51	-0.84	-0.51	-0.84	-0.51	-0.84	-0.51	-0.84	-0.51	-0.84
Bihar	-3.42	-1.47	-3.42	-1.47	-3.42	-1.47	-3.42	-1.47	-3.42	-1.47	-3.42	-1.47
Chhattisgarh	-0.51	-0.62	-0.51	-0.62	-0.51	-0.62	-0.51	-0.62	-0.51	-0.62	-0.51	-0.62
Delhi	15.58	12.78	15.58	12.78	15.58	12.78	15.58	12.78	15.58	12.78	15.58	12.78
Gujarat	2.01	0.81	2.01	0.81	2.01	0.81	2.01	0.81	2.01	0.81	2.01	0.81
Haryana	3.49	3.04	3.49	3.04	3.49	3.04	3.49	3.04	3.49	3.04	3.49	3.04
Himachal Pradesh	0.34	-0.56	0.34	-0.56	0.34	-0.56	0.34	-0.56	0.34	-0.56	0.34	-0.56
Jammu and Kashmir	-0.34	-0.52	-0.34	-0.52	-0.34	-0.52	-0.34	-0.52	-0.34	-0.52	-0.34	-0.52
Jharkhand	-0.72	-0.21	-0.72	-0.21	-0.72	-0.21	-0.72	-0.21	-0.72	-0.21	-0.72	-0.21
Karnataka	0.33	0.04	0.33	0.04	0.33	0.04	0.33	0.04	0.33	0.04	0.33	0.04
Kerala	-0.74	-0.76	-0.74	-0.76	-0.74	-0.76	-0.74	-0.76	-0.74	-0.76	-0.74	-0.76
Madhya Pradesh	-0.13	0.01	-0.13	0.01	-0.13	0.01	-0.13	0.01	-0.13	0.01	-0.13	0.01
Maharashtra	3.28	1.87	3.28	1.87	3.28	1.87	3.28	1.87	3.28	1.87	3.28	1.87
Orissa	-0.89	-0.36	-0.89	-0.36	-0.89	-0.36	-0.89	-0.36	-0.89	-0.36	-0.89	-0.36
Punjab	1.86	0.60	1.86	0.60	1.86	0.60	1.86	0.60	1.86	0.60	1.86	0.60
Rajasthan	-0.69	-0.43	-0.69	-0.43	-0.69	-0.43	-0.69	-0.43	-0.69	-0.43	-0.69	-0.43
Tamil Nadu	-0.76	-0.69	-0.76	-0.69	-0.76	-0.69	-0.76	-0.69	-0.76	-0.69	-0.76	-0.69
Uttar Pradesh	-2.24	-1.42	-2.24	-1.42	-2.24	-1.42	-2.24	-1.42	-2.24	-1.42	-2.24	-1.42
Uttarakhand	-0.24	-0.58	-0.24	-0.58	-0.24	-0.58	-0.24	-0.58	-0.24	-0.58	-0.24	-0.58
West Bengal	-0.38	-0.33	-0.38	-0.33	-0.38	-0.33	-0.38	-0.33	-0.38	-0.33	-0.38	-0.33

Note: While projecting the population, the net-out migration rates were assigned in five-year intervals

1.5 Discussion

a) Results of Population Projection for Major States

The projected results suggest that, under the high variant assumption, the population of the country would grow from 1028 million in 2001 to 1404 million in 2026 and to 1581 million by 2051 (Table1.8).

Table 1.8: Projected populations of states and India under high variant assumption (in million), 2006-2051

States	2006	2011	2016	2021	2026	2031	2036	2041	2046	2051
Andhra Pradesh	80.63	84.69	88.47	91.63	94.07	96.01	97.5	98.42	98.66	98.32
Assam	28.67	30.69	32.72	34.64	36.25	37.57	38.7	39.64	40.34	40.77
Bihar	91.87	101.09	111.16	121.46	130.6	138.25	145.09	151.47	157.05	161.32
Chhattisgrah	22.61	24.39	26.16	27.8	29.2	30.39	31.45	32.37	33.1	33.6
Delhi	14.68	15.46	16.23	16.95	17.52	17.89	18.11	18.2	18.19	18.02
Gujarat	54.53	58.14	61.48	64.38	66.8	68.8	70.37	71.48	72.11	72.28
Haryana	22.89	24.55	26.06	27.33	28.35	29.17	29.82	30.22	30.35	30.21
Himachal Pradesh	6.41	6.73	7.02	7.27	7.46	7.62	7.74	7.81	7.82	7.78
Jammu and Kashmir	10.79	11.49	12.23	12.91	13.46	13.87	14.2	14.49	14.71	14.83
Jharkhand	29.37	31.86	34.42	36.84	38.84	40.47	41.92	43.24	44.33	45.08
Karnataka	56.15	59.27	62.12	64.54	66.48	68.06	69.27	70.06	70.37	70.25
Kerala	33.41	34.87	36.15	37.23	38.1	38.77	39.22	39.42	39.35	39.04
Madhya Pradesh	66	71.82	77.84	83.6	88.63	92.99	96.9	100.31	103	104.94
Maharashtra	102.57	107.95	112.95	117.35	120.86	123.54	125.57	126.82	127.12	126.48
Orissa	38.78	40.71	42.54	44.19	45.52	46.56	47.37	47.94	48.21	48.16
Punjab	25.78	27.13	28.35	29.36	30.11	30.68	31.07	31.24	31.16	30.82
Rajasthan	62.32	68.29	74.42	80.18	85.06	89.18	92.9	96.18	98.74	100.47
Tamil Nadu	65.16	67.5	69.46	70.95	72.02	72.73	73.04	72.94	72.41	71.49
Uttar Pradesh	184.05	203.35	224.36	245.45	264.28	280.75	295.89	309.85	321.94	331.57
Uttarakhand	9.22	9.98	10.74	11.45	12.05	12.57	13.02	13.43	13.76	14
West Bengal	84.88	89.12	93.22	97.01	100	102.15	103.69	104.73	105.14	104.84
India (Un weighted)	1106.99	1183.65	1257.69	1324.81	1380.38	1426.16	1464.20	1494.15	1514.69	1524.85
India (Weighted)	**1107.70**	**1187.38**	**1266.87**	**1340.86**	**1403.74**	**1456.54**	**1501.38**	**1538.02**	**1564.88**	**1580.94**

Under the medium variant assumption, the projected population would be about 1393 million in 2026 and 1549 million in 2051 (Table 1.9). The variation in population size between the high variant and the medium variant is about 32 million by the end of the projection period.

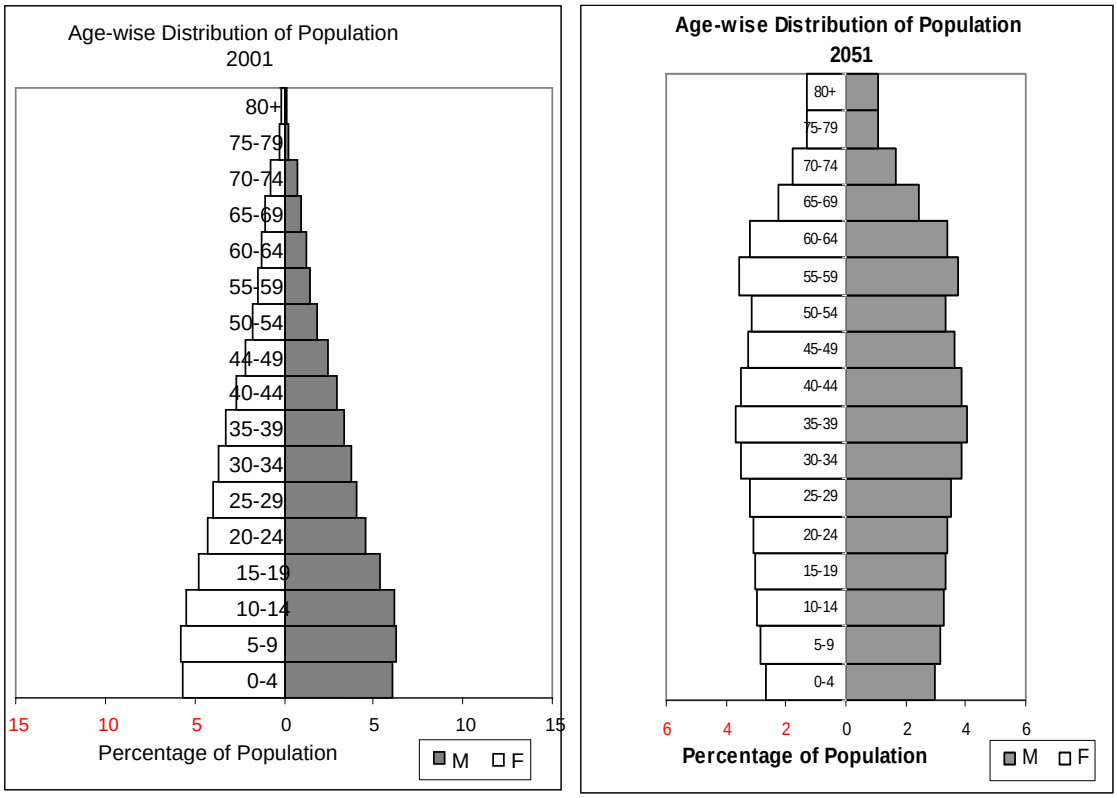
Table 1.9: Projected population for states and all-India (in million), 2006-2051

	2006	2011	2016	2021	2026	2031	2036	2041	2046	2051
Andhra Pradesh	80.53	84.31	87.54	89.98	91.66	92.75	93.24	93.02	92.07	90.51
Assam	28.67	30.69	32.72	34.64	36.25	37.57	38.7	39.64	40.34	40.77
Bihar	91.87	101.09	111.16	121.46	130.60	138.25	145.09	151.47	157.05	161.32
Chhattisgarh	22.61	24.39	26.16	27.80	29.20	30.39	31.45	32.37	33.10	33.6
Delhi	14.69	15.50	16.21	16.82	17.26	17.52	17.62	17.57	17.38	17.02
Gujarat	54.53	58.14	61.48	64.38	66.80	68.80	70.37	71.48	72.11	72.28
Haryana	22.89	24.55	26.06	27.33	28.35	29.17	29.82	30.22	30.35	30.21
Himachal Pradesh	6.41	6.72	6.99	7.19	7.33	7.44	7.49	7.49	7.43	7.30
Jammu and Kashmir	10.79	11.49	12.23	12.91	13.46	13.87	14.2	14.49	14.71	14.83
Jharkhand	29.37	31.86	34.42	36.84	38.84	40.47	41.92	43.24	44.33	45.08
Karnataka	56.10	59.11	61.72	63.73	65.20	66.23	66.83	66.92	66.46	65.52
Kerala	33.28	34.50	35.50	36.30	36.88	37.20	37.24	37.00	36.47	35.70
Madhya Pradesh	66.00	71.82	77.84	83.60	88.63	92.99	96.90	100.31	103.00	104.94
Maharashtra	102.50	107.96	112.38	116.15	118.86	120.63	121.64	121.70	120.70	118.67
Orissa	38.78	40.71	42.54	44.19	45.52	46.56	47.37	47.94	48.21	48.16
Punjab	25.76	27.06	28.16	28.99	29.54	29.89	30.04	29.94	29.55	28.91
Rajasthan	62.32	68.29	74.42	80.18	85.06	89.18	92.9	96.18	98.74	100.47
Tamil Nadu	65.00	67.00	68.49	69.45	69.97	70.04	69.63	68.72	67.36	65.58
Uttar Pradesh	184.05	203.35	224.36	245.45	264.28	280.75	295.89	309.85	321.94	331.57
Uttarakhand	9.22	9.98	10.74	11.45	12.05	12.57	13.02	13.43	13.76	14.00
West Bengal	84.78	88.96	92.77	95.90	98.09	99.42	100.11	100.13	99.36	97.82
India (Un weighted)	1106.99	1183.65	1257.69	1324.81	1380.38	1426.16	1464.20	1494.15	1514.69	1524.85
India (Weighted)	**1107.28**	**1185.93**	**1263.04**	**1333.60**	**1392.67**	**1441.17**	**1481.06**	**1513.15**	**1536.33**	**1549.00**

However, the major discussions of the projected population are confined only to medium variant projections since it was assumed that the country it is the most likely follow medium variant pattern in the coming years. Under medium variant projections, the population is expected to increase by about 51 percent in the next 50 years (2001-2051). In most of the southern states, along with Delhi and Punjab, the absolute size of the population would decline from 2041. Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Rajasthan, Uttar Pradesh and Uttarakhand will experience significant increase in the size of the population. Uttar Pradesh will continue to be the most populated state in the country with a population size of about 332 million in 2051.

The age structure of the population will change remarkably by 2051 compared to the scenario in 2001 (Figure: 1.1). The age pyramid shows that the younger age-group population was higher than the elderly population in 2001. With the decline in fertility and the young population transiting to higher age cohorts, the base of the pyramid in 2051 narrows down significantly, while the middle and the top portions tend to broad.

Figure 1.1: Population pyramid for India 2001 and 2051



Source: Projected results

Table 1.9 presents the selected demographic indicators for India till 2051. Significant reduction is expected in infant and child mortality rates in the future years. Infant mortality is expected to reach about 14 by 2051 from the current level of 49. Similarly under-five mortality would be coming down to 15 from 66 during the same period. The CBR will decline from 24.2 in 2001 to 11.4 (a decline of 12.8 percentage points) by 2051, because of decline in TFR. Similarly, CDR is expected to increase to 10.3 from the current level of 8.5 (an increase of 1.8 points) because of ageing, though life expectancy will improve albeit slowly. The birth rate is expected to fall fast on account of decline in

fertility and death rate would slow down on account of changing age structure of the population and the expected improvements in mortality. These changes would lead to significant decline in birth rates and the slight increase in death rates would lead to the narrowing down of the existing differences in birth and death rates to a great extent by the end of the projected period. This would result in reduced population growth rate in the country. The rate of the population would be one percent from 2021 onwards and it would be around 0.11 percent by 2051.

Table 1.9: Selected projected demographic indicators for India under medium variant, 2001-2051

India	**2006**	**2011**	**2016**	**2021**	**2026**	**2031**	**2036**	**2041**	**2046**	**2051**
Gross Reproduction Rate	1.30	1.18	1.08	1.00	0.93	0.89	0.85	0.85	0.85	0.85
Net Reproduction Rate	1.17	1.09	1.00	0.94	0.89	0.85	0.83	0.83	0.84	0.84
Mean Age of Childbearing	27.20	26.50	25.90	25.40	25.00	24.70	24.50	24.50	24.50	24.50
Child-woman Ratio	0.41	0.38	0.36	0.33	0.30	0.27	0.26	0.26	0.25	0.25
Infant Mortality Rate	49.6	41.2	35.50	30.00	26.30	22.50	19.70	17.10	14.90	13.40
Under-five Mortality Rate	65.80	52.90	44.50	36.80	31.80	26.80	23.10	19.70	17.10	15.30
CBR (per 1000)	22.20	21.20	19.50	17.50	15.50	14.20	13.40	12.90	12.10	11.40
CDR (per 1000)	8.20	7.90	7.70	7.50	7.70	8.00	8.50	9.00	9.60	10.30
Growth rate (percent)	1.40	1.33	1.19	1.00	0.78	0.62	0.49	0.38	0.25	0.11
Annual births and deaths (in million)										
Births	24.55	25.16	24.67	23.39	21.53	20.52	19.83	19.46	18.56	17.65
Deaths	9.04	9.33	9.70	10.06	10.71	11.53	12.59	13.68	14.73	15.95
Population (In million)										
Male	573.12	614.28	654.76	691.77	722.58	747.63	768.03	784.30	795.85	801.70
Female	534.15	571.65	608.27	641.82	670.08	693.54	713.03	728.85	740.48	747.30
Percent of population										
0-4	10.43	9.97	9.46	8.68	7.74	7.06	6.64	6.37	6.06	5.72
5-14	21.89	19.69	18.31	17.68	16.78	15.43	14.08	13.18	12.64	12.2
15-49	53.26	54.62	54.97	54.7	54.72	54.77	54.13	52.36	50.38	48.77
15-64	62.84	65.26	66.82	67.62	68.57	69.5	70.12	70.18	69.81	69.04
65+	4.84	5.08	5.41	6.02	6.91	8.02	9.15	10.28	11.48	13.03
Females percent (15-49)	53.18	54.59	54.97	54.43	54.2	54.16	53.58	51.84	49.8	48.04
Dependency ratio	0.51	0.45	0.42	0.39	0.36	0.32	0.3	0.28	0.27	0.26
Median age	24	25	27	29	30	32	34	35	37	38
Density (Per sq. km)	337	361	384	406	424	438	451	460	467	471

The decline in fertility would cause a significant shrink in the proportion of population in the younger age groups (0-4 and 5-14). The proportion of population in ages 0-4 is expected to decline to 5.7 percent from the current level of 11.8 percent. Similarly in the age group 5-14, the decline will be from the current 23.6 percent to 12.2 percent. In sum,

the proportion of the younger population (less than 15 years of age) will reach about 17.9 percent in 2051 compared to the current level of 35.4 percent. The continuing decline in fertility and the gradual increase in life expectancy would bring substantial increase in the population in age groups of 15-64 and 65 and above. The proportion of population in the age group 15-64 will also increase to 69 percent from the current level of 60 percent. However, the proportion of population in ages 15-49 would increase till 2031 and decline thereafter.

The elderly population (65+) is expected to rise from 4.9 percent in 2006 to 6.9 percent in 2026 and to 13 percent by 2051 (also see figure 1.1). In absolute terms, the proportion of the elderly would record more than four fold increase from 45 million in 2001 to 202 million by 2051. One in every ten persons in India would be an elderly person in 2051. Another implication of the fertility decline and morality improvement is the rise in the median age of the population from 24 years in 2006 to 38 years in 2051. It means that an average Indian who lives 24 years in 2001 is expected to reach 38 years of age by 2051. Finally, population growth in the country would lead to an increase in the density of population from the present level of 313 persons to 471 persons per square kilometre.

b) Smaller States/Union Territories

The SRS do not provide estimates of demographic indicators for eight smaller states and six union territories of India. So the Cohort Component Method of population projection is not applicable to these administrative units for assessing future population size. Therefore, the projected figures of these administrative units were obtained by extrapolating the projected figures supplied by the Registrar General (2006) using the pattern of logistic curve. The projected populations of these administrative units are given in Table 1.10

Table 1.10: Projected populations for smaller states and union territories of India (in 000'), 2006-2051

	2006	2011	2016	2021	2026	2031	2036	2041	2045	2051
Smaller states										
Arunachal Pradesh	1169	1241	1313	1379	1438	1510	1574	1637	1697	1755
Goa	1492	1767	1977	2232	2275	2440	2537	2612	2668	2709
Manipur	2308	2449	2592	2723	2839	2981	3109	3232	3351	3465
Meghalaya	2470	2621	2773	2914	3038	3190	3326	3458	3586	3708
Mizoram	946	1004	1063	1116	1164	1222	1274	1325	1374	1420
Nagaland	2119	2119	2119	2119	2119	2119	2119	2119	2119	2119
Sikkim	576	612	647	679	709	744	776	807	836	865
Tripura	3407	3616	3826	4019	4191	4400	4588	4771	4947	5115
Union Territories										
Andaman and Nicobar Islands	419	494	551	617	653	693	723	745	761	773
Chandigarh	1103	1438	1780	2226	2518	2878	3176	3425	3624	3778
Dadra and Nagar Haveli	266	354	422	506	534	582	611	631	644	653
Daman and Diu	216	270	330	409	441	486	516	538	553	562
Lakshadweep	72	76	81	86	78	89	93	96	99	102
Pondicherry	1098	1391	1669	2028	2232	2523	2768	2982	3162	3310

End notes

1. The final population figure was found to be about 1.6 million higher than the provisional population figures based on the 2001 Census.

2. The 10 million plus states are Andhra Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, Uttarakhand and West Bengal. The smaller states are Goa, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura and the Union Territories are Pondicherry, Chandigarh, Andaman and Nicobar Islands, Dadra and Nagar Haveli, Daman and Diu and Lakshadweep.

3. For methods of computation see Croxton and Cowden (1955: 310).

4. SRS gives the average number of children per women at 2.4 whereas the last two rounds of NFHS (NFHS-II and NFHS-III) show 2.6, indicating no change in the levels of TFR during the past six years for Uttaranchal (Government of India 2006).

5. See Bhat (2004a).

6. There are seven districts in Kerala, four districts in Tamil Nadu and one district in Karnataka which had a TFR level of 1.6 or lower in 2001. But none of the districts in the northern states finds place in this classification. For further details see Guilmoto and Rajan (2002).

7. With few exceptions, the degree of son preference in a state is positively correlated with the level of fertility. It will be difficult to eliminate entirely the effect of son preference on fertility in India in the near future and if the gender preferences for children could be entirely eliminated, the levels of fertility in India would fall by about eight percent (Mutharayappa *et al.* 1997).

8. See United Nations (2000a:185).

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