

Web Edition:

PROVISIONAL POPULATION TOTALS  
Chapter 4  
Census of India 2001  
Series 1, India, Paper 1 of 2001



## Chapter 4

# Population Projections



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## **Population Projections**

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Population projection is a scientific attempt to peep into the future population scenario, conditioned by making certain assumptions, using data relating to the past available at that point of time. Assumptions used and their probability of adhering in future, forms a critical input in this mathematical effort. Predicting the future course of human fertility and mortality is not easy, especially when looking beyond much further in time. Medical and health intervention strategies, food production and its equitable availability, climatic variability, socio-cultural setting, politico-economic conditions and a host of other factors influence population dynamics, making it a somewhat unpredictable exercise. Therefore, much caution must be exercised when either making or using the population projections and the context of various conditions imposed, should not be lost sight of on the basis of past behaviour and the likely future scenario assumed.

Different population projections at the country level are made by the Government, National and International agencies from time to time. In addition, individual demographers make projections for the country as a whole and sometimes at the sub-national level also. The international agencies who make projections for the world as a whole and also for individual countries are the United Nations Population Division, the World Bank, the United Nations Population Fund (UNFPA) etc. The need for population projection in India at various levels and by different components like age, sex, rural-urban etc., for the use by the official agencies uniformly, both at the center and the states was keenly felt in 1958 on the eve of the formulation of the third five year plan.

Beginning in 1958, it has been customary for the Office of the Registrar General and Census Commissioner, India to undertake the exercise of population projection on behalf of the Planning Commission of India. The first Expert Committee on Population Projections was set up by the Planning Commission in 1958 under the chairmanship of the Registrar General, India to provide a set of population projections for India and states. The projections upto 1971 were then made available to the Planning Commission pending the release of 1961 Census data. Subsequently, with the release of the final population totals of the 1961 Census as well as taking into account the life table values of 1951-60, the Expert Committee was reactivated in 1963 for effecting a further revision of the projections and extending them up to 1981. The Committee gave its report in 1964. Out of the three sets of projections namely high, medium and low, the second one, that is, the medium one was recommended for official use.

Following the release of the 1971 Census provisional population totals, the Expert Committee was once again reconstituted to revise the existing official series of population projections of 1964. The Planning Commission again felt the need for another series of projections based on more recent data and subsequently constituted another Expert Committee in 1974, which submitted its report in 1978.

After the release of the five per cent sample data of the 1981 Census, Planning Commission reconstituted the Expert Committee on Population Projections in 1984. Population Projections for the period 1981-2001 were prepared under three assumptions on the basis of trends in fertility. This report was published in 1988 and the medium projections were recommended for official use.

In the light of the trends observed during 1980's in major demographic parameters, as revealed by the Sample Registration System (SRS), the Planning Commission apprehended that the future size

of India's population might be higher than that projected by the Expert Committee. In order to have a fresh look at the projections, the Planning Commission set up a Standing Committee of Experts on Population Projections towards the end of October, 1988. This Committee reviewed the medium projections made by the Expert Committee of 1984, in light of the further data available on fertility, mortality and contraceptive prevalence (family planning) and submitted its report in 1989.

With the availability of age-sex distribution of population from the 1991 Census, the latest data relating to family planning performances and recent levels and trends in fertility and mortality as emerging from the SRS, a fresh need was felt by the Planning Commission for a new set of population projections. As such, the Planning Commission constituted a Technical Group on Population Projections in 1996 under the chairmanship of the Registrar General, India with the following objectives:-

- To review the methodology of Population Projections adopted in the past
- To prepare fresh projections of mortality status and parameters of fertility conditions based on changed pattern of contraceptive use and proportion of married females (1991 Census) and other characteristics
- To make population projections afresh up to 2016
- To prepare projections of the possible period when  $NRR = 1$  will be achieved by the States / UTs and the country as a whole.

The assumptions made to project the population of India up to 2016 are discussed below:-

- ◆ The Technical Group considered the Total Fertility Rate (TFR) as the overall indicator of fertility. The earlier approach of taking  $NRR=1$  as the replacement level of fertility was changed to  $TFR = 2.1$ . The TFR estimates based on the SRS data for India and major states were adopted. The lowest threshold of TFR was assumed to be 1.6. Two sets of TFR values from the SRS for India and major states for two time periods 1981-93 and 1985-93 were considered by the Group. On careful examination, the Group recommended the use of projected values of TFRs based on the period 1985-93 except for the states of Madhya Pradesh, Punjab, Rajasthan and Uttar Pradesh. For these four states, the projected levels of TFR based on the period 1981-93 were adopted. The projected levels of TFRs assumed for India for the initial period 1996-2001 and terminal period 2011-2016 were 3.13 and 2.52 respectively.
- ◆ Although the SRS based sex ratio at birth of 110 for the period 1981-90, was found to be much higher than the internationally accepted conventional sex ratio at birth of 105-106, yet the Technical Group recommended the use of sex ratio at birth as obtained from the SRS in view of the overall broad consistency and reliability of the SRS data.
- ◆ For projecting the mortality levels, initially the Group considered two sets of mortality projections. The first one was based on five-yearly abridged life tables constructed from SRS Age Specific Death Rates (ASDR) for the periods 1981-85 to 1989-93. The second set of mortality projections were considered by utilizing the projected survival ratios based on the observed ASDR value from the SRS. After examining the merits of the two sets of mortality projections, the later one, that is, the survivorship ratio method was recommended for undertaking the population projections. An upper limit of 70 years for the expectation of life for males and females was recommended for all India and major states except for Kerala and Tamil Nadu. The projected levels of expectation of life at birth for males were 62.30 years for the period 1996-2001 and 67.04 years for the duration 2011-2016. Similarly, for females, these figures were 65.27 years and 69.18 years respectively.

- ◆ In addition to considering the increase in the expectation of life at birth, the Group also considered the likely impact of AIDS on death rate. After considering the effect of likely deaths due to AIDS, it was found that future levels of the expectation of life at birth would have no significant impact of AIDS in the next 25 years.

In Statement 11 are given the mortality and fertility assumptions used for projecting India's population.

### Statement 11

#### Projected values of expectation of life at birth, Total Fertility Rate, and corresponding Population Projections for different periods

| Sl. No | Indices | Period    |           |           |           |
|--------|---------|-----------|-----------|-----------|-----------|
|        |         | 1996-2001 | 2001-2006 | 2006-2011 | 2011-2016 |
| 1      | 2       | 3         | 4         | 5         | 6         |

|   |  |                  |                  |                  |                  |
|---|--|------------------|------------------|------------------|------------------|
| 1 | Projected values of Expectation of life at birth |                  |                  |                  |                  |
|   | Males  | 62.30            | 63.87            | 65.65            | 67.04            |
|   | Females  | 65.27            | 66.91            | 67.67            | 69.18            |
| 2 | TFR  | 3.13             | 2.88             | 2.68             | 2.52             |
| 3 | Projected Population*                            | 1012.4<br>(2001) | 1094.1<br>(2006) | 1178.9<br>(2011) | 1263.5<br>(2016) |

Note:

1. Population Projection for particular year is shown in millions
2. Figures in the parentheses indicate the end year for which the corresponding projections have been made.
3. Source: Population Projections for India and States : 1996-2016. Registrar General, India, New Delhi, 1996

In Statement 12 are given the population projections for each of the four census years since 1971 by the various Expert Committees and the absolute and percentage variations from the final or provisional totals at the country level. This allows us to know the confidence with which one can use the projected population figures for various planning purposes. In 1971, the projected population was higher than the actual population aggregates while in 1981 it was just the reverse. The final population total in 1991 was fairly close to the projected population as estimated by the Standing Committee for that Census. For the current Census, however, the projected population has fallen short by over 14 millions. This possibly implies that either mortality has improved faster than expected or fertility decline is a bit slower than assumed. Another possibility that exists is that the base population itself needed a revision. It is quite likely that more than one of these factors are operating simultaneously and we shall have to wait for some more results, including that of the Post Enumeration Survey, to narrow down the choice of assumptions which may not have behaved as well as predicted.

## Statement 12

### Projected and Actual/Provisional Population of India, 1971-2001

(in '000)

| Year | Projected population | Actual/Provisional population | Difference <sup>(6)</sup> | Percent difference <sup>(7)</sup> |
|------|----------------------|-------------------------------|---------------------------|-----------------------------------|
| 1    | 2                    | 3                             | 4                         | 5                                 |

|      |                          |                              |         |       |
|------|--------------------------|------------------------------|---------|-------|
| 1971 | 559,622 <sup>(1)</sup>   | 548,160 (A)                  | -11,462 | -2.05 |
| 1981 | 672,014 <sup>(2)</sup>   | 683,329 (A) <sup>(10)</sup>  | 11,315  | 1.68  |
| 1991 | 837,249 <sup>(3)</sup>   | 846,388 (A) <sup>(9)</sup>   | 9,139   | 1.09  |
| 1991 | 843,596 <sup>(4)</sup>   | 846,388 (A) <sup>(9)</sup>   | 2,792   | 0.33  |
| 2001 | 1,012,386 <sup>(5)</sup> | 1,027,015 (P) <sup>(8)</sup> | 14,629  | 1.45  |

Note:

(A): Actual; (P): Provisional

1. According to the Report of the Expert Committee on Population Projections, Registrar General, India, July 1968
2. According to the Report of the Expert Committee on Population Projections, Registrar General, India, October, 1978
3. According to the Report of the Expert Committee on Population Projections, Registrar General, India, January, 1988
4. According to the Report of the Standing Committee of Experts Projections, Planning Commission, India, October, 1989
5. According to the Population Projection for India and States, 1996 – 2016, Registrar General, India, New Delhi, 1996.
6. {Column (3) - Column (2)}
7. {Column (3)-Column (2)} \*100/Column (2).
8. See note 4 under Statement 2 of Chapter 3
9. See note 3 under Statement 2 of Chapter 3
10. See note 2 under Statement 2 of Chapter 3

Statement 13 compares the projected population at the State level with the provisional population totals compiled in the current census. Notable differences between the projected and the provisional population figures have been observed in the States of Rajasthan, Bihar and Jharkhand (combined), Gujarat and Maharashtra. For these four states taken together, the provisional figures exceed the projected figures by more than 16.2 millions. Among the major states, the provisional population figures exceed the projected figures by more than two percent for Punjab, Haryana, Rajasthan, Bihar and Jharkhand (combined), Gujarat and Maharashtra. For Jammu and Kashmir, U.P. and Uttaranchal (combined), Madhya Pradesh and Chhatisgarh (combined), Karnataka and Tamil Nadu, the differences between the projected and the provisional figures are negligible.

Comparable figures showing the projected population with the actual population at the state level in earlier censuses from 1971 to 1991 are presented in Tables 5, 6, 7 and 8. Out of these, the last two Tables of 1991 pertain to projected figures based on two separate Committees on Population Projections.

### Statement 13

#### Projected and Provisional Population of India, States and Union territories as on March 1, 2001

| (in '000) |                                      |                                      |                              |                         |                                    |
|-----------|--------------------------------------|--------------------------------------|------------------------------|-------------------------|------------------------------------|
| Sl.No     | India/States/<br>Union territories * | Projected<br>population <sup>1</sup> | Provisional<br>population    | Difference <sup>2</sup> | Percent<br>difference <sup>3</sup> |
| 1         | 2                                    | 3                                    | 4                            | 5                       | 6                                  |
|           | <b>India</b>                         | <b>1,012,386</b>                     | <b>1,027,015<sup>4</sup></b> | <b>14,629</b>           | <b>1.45</b>                        |
| 1         | Jammu & Kashmir                      | 10,071                               | 10,070                       | -1                      | -0.01                              |
| 2         | Himachal Pradesh                     | 6,805                                | 6,077 <sup>5</sup>           | -728                    | -10.69                             |
| 3         | Punjab                               | 23,794                               | 24,289                       | 495                     | 2.08                               |
| 4         | Chandigarh *                         | 907                                  | 901                          | -6                      | -0.67                              |
| 5         | Haryana                              | 20,120                               | 21,083                       | 963                     | 4.79                               |
| 6         | Delhi *                              | 14,366                               | 13,783                       | -583                    | -4.06                              |
| 7         | Rajasthan                            | 54,509                               | 56,473                       | 1,964                   | 3.60                               |
| 8         | Uttar Pradesh & Uttaranchal          | 174,290                              | 174,532                      | 242                     | 0.14                               |
| 9         | Bihar & Jharkhand                    | 101,819                              | 109,788                      | 7,969                   | 7.83                               |
| 10        | Sikkim                               | 570                                  | 540                          | -30                     | -5.18                              |
| 11        | Arunachal Pradesh                    | 1,217                                | 1,091                        | -126                    | -10.34                             |
| 12        | Nagaland                             | 1,721                                | 1,989                        | 268                     | 15.55                              |
| 13        | Manipur                              | 2,569                                | 2,389                        | -180                    | -7.02                              |
| 14        | Mizoram                              | 972                                  | 891                          | -81                     | -8.33                              |
| 15        | Tripura                              | 3,859                                | 3,191                        | -668                    | -17.31                             |
| 16        | Meghalaya                            | 2,484                                | 2,306                        | -178                    | -7.16                              |
| 17        | Assam                                | 26,492                               | 26,638                       | 146                     | 0.55                               |
| 18        | West Bengal                          | 79,992                               | 80,221                       | 229                     | 0.29                               |
| 19        | Orissa                               | 36,156                               | 36,707                       | 551                     | 1.52                               |
| 20        | Madhya Pradesh & Chhatisgarh         | 81,189                               | 81,181                       | -8                      | -0.01                              |
| 21        | Gujarat                              | 48,971                               | 50,597 <sup>6</sup>          | 1,626                   | 3.32                               |
| 22        | Daman & Diu *                        | 142                                  | 158                          | 16                      | 11.31                              |
| 23        | Dadra & Nagar Haveli *               | 194                                  | 220                          | 26                      | 13.63                              |
| 24        | Maharashtra                          | 92,057                               | 96,752                       | 4,695                   | 5.10                               |

|    |                             |        |        |      |        |
|----|-----------------------------|--------|--------|------|--------|
| 25 | Andhra Pradesh              | 76,392 | 75,728 | -664 | -0.87  |
| 26 | Karnataka                   | 52,719 | 52,734 | 15   | 0.03   |
| 27 | Goa                         | 1,627  | 1,344  | -283 | -17.39 |
| 28 | Lakshadweep *               | 72     | 61     | -11  | -15.84 |
| 29 | Kerala                      | 32,530 | 31,839 | -691 | -2.13  |
| 30 | Tamil Nadu                  | 62,252 | 62,111 | -141 | -0.23  |
| 31 | Pondicherry *               | 1,134  | 974    | -160 | -14.12 |
| 32 | Andaman & Nicobar Islands * | 394    | 356    | -38  | -9.58  |

Note:

1. Population Projection for India and States, 1996 – 2016, Registrar General, India, New Delhi, 1996.
2. Provisional population minus Projected population
3. (Provisional population minus Projected population) x 100 / Projected population
- 4, 5 and 6 : See note 4 under Statement 2 of Chapter 3.

Table 9 and Figure 8 make it possible to have a critical view of the population projections made for India for the year 2000/2001 by several individual demographers and organizations at different points of time. The assumptions made for each of these projections, particularly on the base population and correction factor used, if any, mortality and fertility assumptions, contraceptive prevalence rates, etc., wherever available have been indicated in the footnote of Table 9. In most of these projections, the net migration has been assumed to be negligible. In few cases the precise assumptions are not available but these projections have been included to show the wide fluctuations, which may occur particularly when making projections for periods beyond thirty or more years for a population still confronting with a moderate level of mortality and high level of fertility in 1950's. Of the fourteen projections used for illustration, only two pertain to a period of 1950's while another five to 1980's. The rest of the projections are relatively recent and the last two projections barely precede by a couple of months prior to the Census.

Kingsley Davis (1950), making a mathematical projection and assuming that mortality and fertility would behave as during the period 1921-41, estimated a population of 790 million for India and Pakistan combined. This obviously is much off the mark. On the other hand the term projection of Coale and Hoover (1958) with the assumption of sustained fertility until 1986 and for future years also estimated a population, which is higher by about one hundred and twenty millions from the provisional results of Census of India 2001. The additional impact of mortality decline notwithstanding, this projection possibly suggests that the minimum impact of family limitation programme is to the tune of about 120 million, since a sustained fertility was assumed right from the base year of projection (1956) and no mortality decline has been assumed after 1986.

Fertility in India has definitely declined in parts of the country though not at a pace as assumed in some of the earlier estimates made by this office for the Planning Commission (at Serial Numbers 3 and 4 of Table 9). The population estimates made in 1980's have fallen short by 36 and 41 millions respectively. Possibly they reinforce the argument that fertility did not decline as rapidly or widely as was assumed. Even the more recent estimate of 1996 suggests a deficit of around 15 million. In effect this means that based on the assumptions used, the decline in growth of population may have fallen behind by about one year. The more recent projections at serial numbers 10 to 14 in Table 9 also differ from the provisional results. Figure 8 clearly demonstrates some of the perils of long term projections and makes it mandatory for the country to go on revising its medium and long term projections on a continuous basis. This obviously means a consistent supply and

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availability of mortality and fertility data from the Civil Registration System, the Sample Registration System and fertility surveys on a stand-alone basis and for an external validation with a view to complement the other efforts. It is also important to take note that the perils of long term projections notwithstanding, it is felt that based on the medium term projection, India is all set to take over the population of China in possibly less than fifty years and continue to add to its population even beyond 2050, (Long range World Population Projections: Based on the 1998 Revision, UN, New York 2000). The writing on the wall is loud and clear and an acceptable way has to be found which fits into our socio-political system so that the dream of population stabilization becomes a reality in not too far a distant.

