



CENSUS OF INDIA 1981

SERIES 1

INDIA

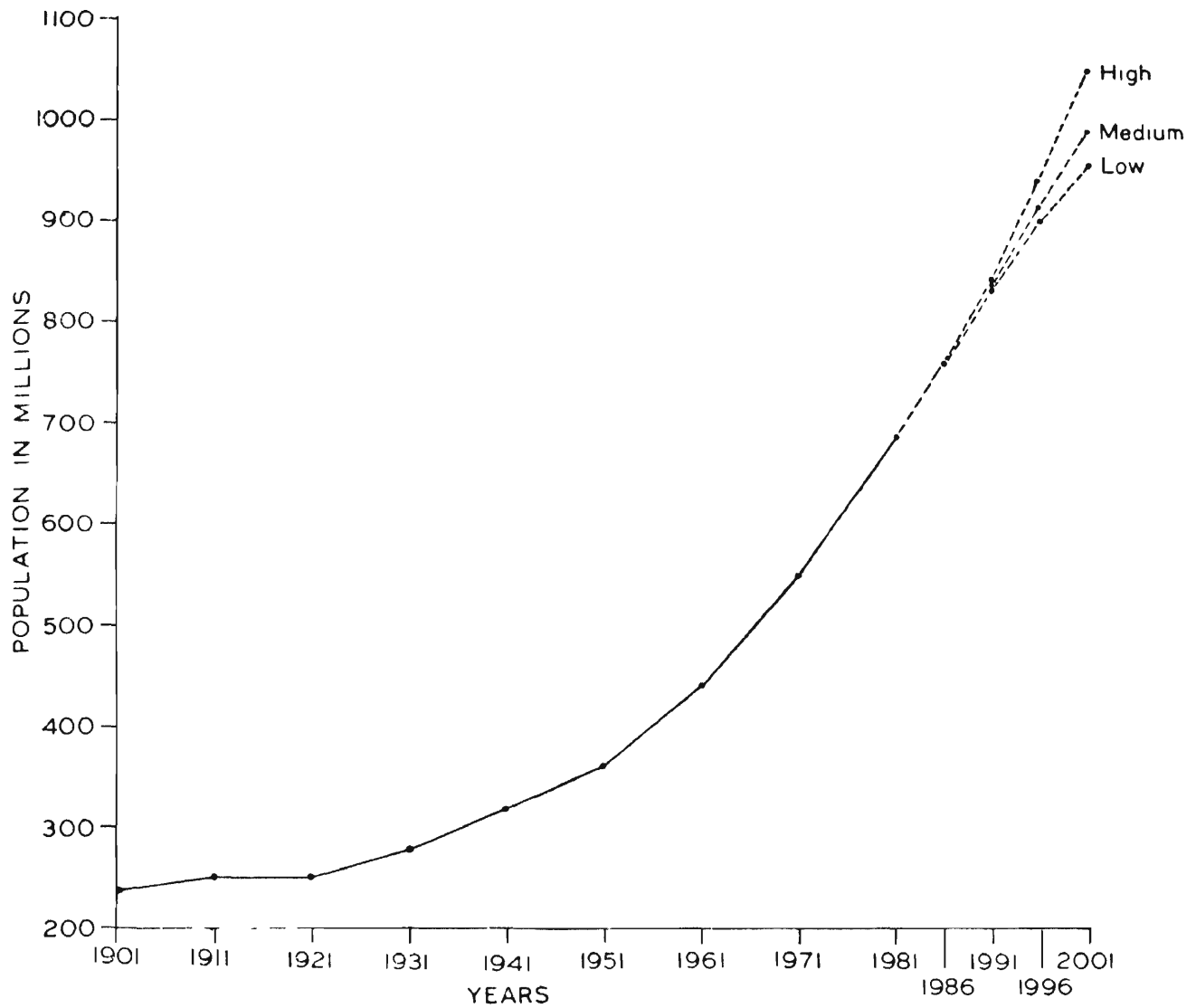
Paper 1 of 1984

**POPULATION PROJECTIONS
FOR INDIA 1981—2001**

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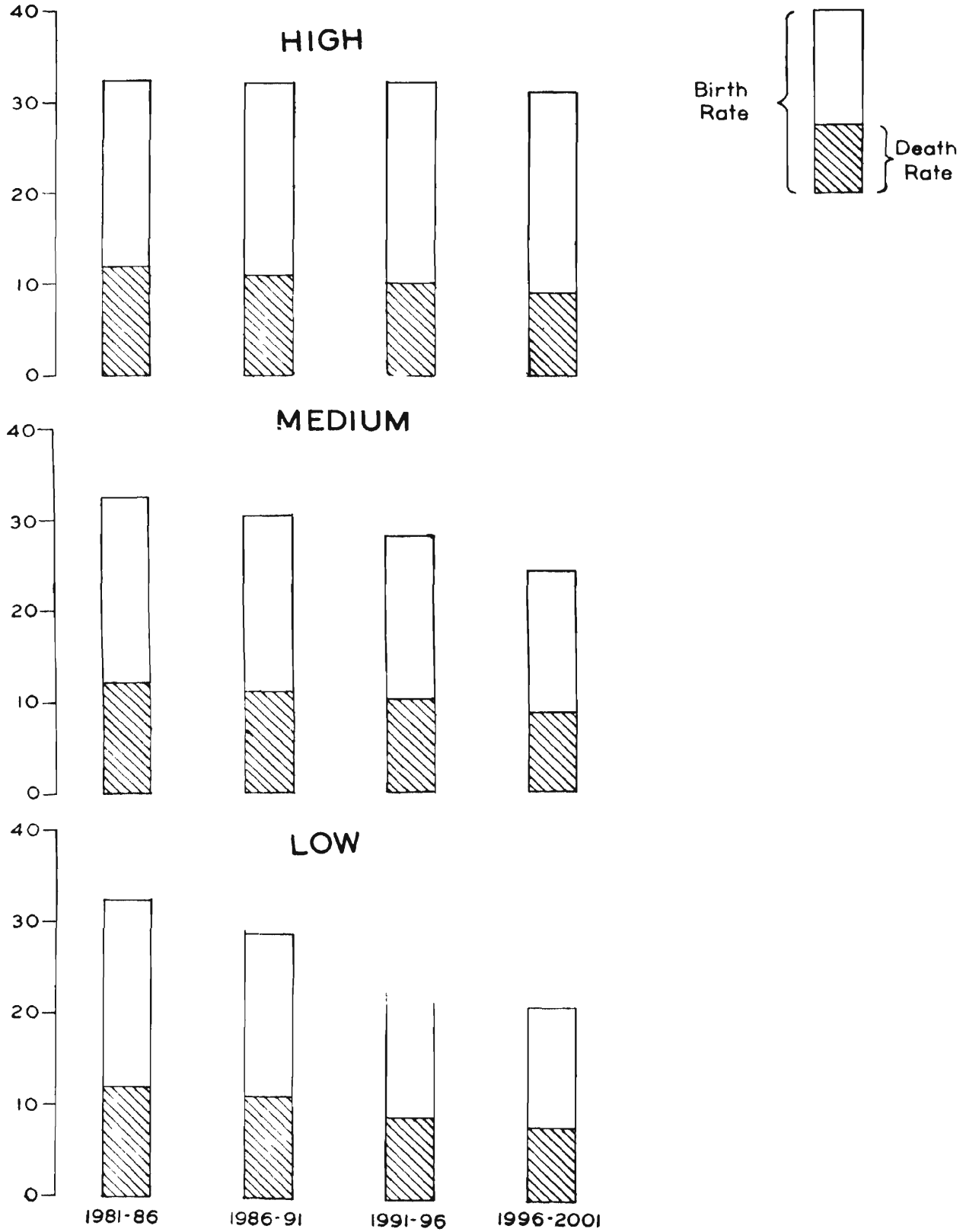
POPULATION OF INDIA

1901-1981 as per Census
Beyond 1981 as projected



PROJECTED BIRTH RATES AND DEATH RATES INDIA 1981-2001

(Per 1000)



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PREFACE

The need for projection of population for future years by age and sex has been felt by all the official agencies. The 1981 Census has revealed that the population of India was 685.2 millions as on 1st March, 1981, including the projected population of Assam. Prior to the 1981 census it had been estimated that the population of India would be about 672 millions by 1981. In the wake of the primary data from the 1981 Census becoming available such an exercise has again become topical.

This publication attempts such a projection taking into consideration the population and the age structure revealed by the 1981 Census as also the present levels of fertility and mortality and their likely trends in future years. The base levels of fertility and mortality as well as the population projections have been worked out on the basis of the 5 per cent sample data of the 1981 Census.

It should be recognised that in a period when both fertility and mortality are showing decline, it would be difficult to predict the population exactly. Even otherwise, demographic change cannot remain unaffected by the all round faster pace of change, often in directions and with results rather unpredictable.

We have had to refer, of necessity, to the massive family welfare (planning) programme now underway in the country. I will like to clarify that when we project an alternate projection based on a less than 100 per cent fulfilment of the targets adopted under this programme then it is only in order to bring out the possible results of a shortfall, if any, and for under-scoring the need for continuing maximum effort.

The over-riding consideration in undertaking this exercise has been that of bringing out a workable series as quickly as possible. Full credit goes to Shri K.S. Natarajan and his colleagues in our Demography Division. We have also availed of advice given by Dr. M. Holla and Shri K.N. Shrinivasan of the Vital Statistics Division.

I am thankful to Shri V. P. Pandey, Joint Registrar General, India and those manning the Printing Wing for seeing the publication through the press with the speed and efficiency.

I hope the exercise presented here will be of interest to planners, various government agencies, demographers and all others interested in the subject.

Statewise projections will follow.

NEW DELHI
March 9, 1984

V. S. VERMA
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GROWTH OF INDIA'S POPULATION

1. According to the 1981 census the population of India is 685.18 millions consisting of 354.40 millions males and 330.79 millions females. Statement 1 presents the population of India as at the censuses from 1901 onwards. The statement also gives the intercensal growth rates. The figures for 1981 for Assam, where the census could not be conducted, are based on projections.

Statement 1 : Population by sex, percentage decadal variation, and annual exponential growth rate of population, India - 1901—1981

| Year | Total population | | | Decadal variation (Per cent) | Average annual exponential growth rate (Per cent) |
|--------|------------------|-------------|-------------|------------------------------|---|
| | Persons | Males | Females | | |
| 1 | 2 | 3 | 4 | 5 | 6 |
| 1901 | 238,396,327 | 120,791,301 | 117,358,672 | . | ... |
| 1911 | 252,093,390 | 128,385,368 | 123,708,022 | 5.75 | 0.56 |
| 1921 | 251,321,213 | 128,546,225 | 122,774,988 | (-)0.31 | (-)0.03 |
| 1931 | 278,977,238 | 142,929,689 | 135,788,921 | 11.00 | 1.04 |
| 1941 | 318,660,580 | 163,685,302 | 144,690,267 | 14.22 | 1.33 |
| 1951 | 361,088,090 | 185,528,462 | 175,559,628 | 13.31 | 1.25 |
| 1961 | 439,234,771 | 226,293,201 | 212,941,570 | 21.51 | 1.96 |
| 1971* | 548,159,652 | 284,049,276 | 264,110,376 | 24.80 | 2.20 |
| 1981** | 685,184,692 | 354,397,884 | 330,786,808 | 25.00 | 2.25 |

1 The distributions of population of Pondicherry by sex for 1901 (246,354), 1931 (258,628) and 1941 (285,011) are not available. The figures for these years are, therefore, exclusive of these population so far as distribution by sex is concerned.

2 In 1901, sex-wise distributions of the population of Chandernagore (26,830) of West Bengal and Gonda M.B. (18,810) of Uttar Pradesh are not available.

3 The population figures exclude population of area under unlawful occupation of Pakistan and China where the census could not be taken.

* As on April 1, 1971. In 1981 census, the reference date was March 1, 1981 in all the States and Union Territories except Jammu and Kashmir where it was May 6, 1981. In the 1961 census the reference date was March 1, 1961. In working out the decadal variations for 1961-71 and 1971-81 the change in the reference date has not been taken into account. However, in working out average annual growth rates these have been taken into account.

** Includes projected population of Assam where the 1981 census could not be conducted owing to disturbed conditions prevailing in that state then.

2. India's population has grown over the years. During the 20 year period, 1901 to 1921, the population of the country increased by about 13 millions only. During the 1971-81 decade even the *annual* additions to population exceeded 13.7 millions.

3. Prior to 1921, India experienced many famines and epidemics which constituted the main reason for the slow growth rate. Droughts, floods and epidemics of cholera, smallpox, plague and malaria took their toll in many parts of the country. The decade 1911-21, which shows small decrease in population, saw the great influenza epidemic of 1918. It is said to have taken a toll of 12 million lives in the country.

4. After 1921, however, with improvement in transport and communication facilities, movement of food articles became much easier, with the result that famine was brought under control to a greater extent than was possible earlier. Public health paved the way for reduction in the intensity of communicable diseases so that calamities on a national scale were avoided.

5. The years after 1921 can be divided into two parts—1921—1951 and 1951—81. The dividing line marks the first census of independent India and the institution of several programmes for economic development under the five year plans. The population was growing slowly but steadily during 1921—51. The annual growth rate rose from -0.03% in 1911—21 to 1.25% by 1941—51. Then came a sharp rise, with growth rate reaching 2.20% in 1961—71 and 2.25% in 1971—81. Though the growth rate in the decade 1971—81 is slightly higher than in 1961—71, the underlying levels of vital rates are different. During this decade both the fertility and mortality have declined. According to the census, the birth rate has declined from an estimated level of 41.2 in 1961—71 to 37.2 in the decade 1971—1981. The death rate estimated at around 19.2 in the decade 1961—71 is also estimated to have declined to 15.0 in the decade 1971—81. Thus the growth rate has remained more or less the same in the decade 1971—81, though both birth and death rates have declined.

6. If the present annual exponential growth rate of 2.25% continues unabated, the population of India will reach 858 millions by 1991 and 1,074 millions by 2001. However, we now have a strong family welfare (planning) programme going on in the country and the actual population growth may be less than the figure mentioned above for the year 2001 depending upon the extent to which this programme is able to meet its targets. If, as is now being contemplated, the programme succeeds in protecting 60 percent of the couples in the reproductive age group effectively by the year 2000, the population as per the projections attempted by us may be about 959.2 millions by the year 2001. If however, the programme succeeds in effectively protecting 48.8 per cent of such couples then the population by 2001 may be in neighbourhood of 991.5 millions.

POPULATION PROJECTIONS FOR INDIA UPTO 2001

7. The 1981 census has revealed that the population of India is 685.2 millions as on 1st March, 1981. This figure includes the projected figures for the State of Assam where census could not be conducted. The Expert Committee on Population Projections had based its 1978 Report on the 1971 census data. A fresh look at census data and formulation of fresh sets of projections in the light of the 1981 census results are now due.

Base level estimates

8. The expectations of life at birth for the decade 1971-81 as a whole worked out by forward survival method and by Preston and Bennett's method presented below indicates that the SRS death rate may not be an under estimate, and may estimate the levels more or less correctly.

Statement 2 : Expectations of life at birth for the decade 1971- 81

| Source | Male | Female |
|---|------|--------|
| 1 | 2 | 3 |
| (1) SRS age specific death rates for 1971-80 | 50.9 | 50.0 |
| (2) Forward survival method, using South Asian Model Life Tables | 51.2 | 51.2 |
| (3) Preston and Bennett's method, using inter censal growth rates by age group. | 52.5 | 52.9 |

9. In view of this the life tables based on the SRS for the year 1980 have been used as baseline (See Annexure 1).

10. The annual exponential growth rate of the population of India during 1971-81 including projected figure of Assam would be 22.5/1000 as against 22.0/1000 in 1961-71. The exponential growth rate for India excluding Assam would be 22.25/1000.

11. It has been estimated on the basis of analysis of the census age data by using reverse survival method that the birth rate during the decade 1971-81 would be 37.2. The figures for 1971-76, 1976-81 would be 39.9 and 34.6 respectively. The corresponding death rate would be 15.0 for the decade 1971-81 which would be very close to the SRS death rate of 14.7 (See Annexure 2).

12. The census analysis indicates that the birth rate during 1976-81 is 34.6 as against 33.42 given by SRS for 1976-80 (calendar years). The figure of 33.42 for SRS does not include Bihar and West Bengal. The analysis indicates that the SRS birth rate figures for 1976-80 would need an inflation by a factor 1.0359 (34.6/33.4). Inflating the birth rate for 1980 by this factor, we may estimate the level of birth rate in 1980 as 34.5. Dividing the birth rate by the proportion of married females in the age group 15-44 to total population in 1981, the general marital fertility rate has been estimated as 204.

13. The e_0 for 1980 has been estimated as 54.1 for males and 54.7 for females. Life tables based on SRS age specific mortality rates have been used as base level life tables (See Annexure 3).

Age data

14. The single year age data presented by the census shows usual patterns of concentrations at ages ending in digits 0 and 5 followed by 2, 8 and 6 in case of males and 8, 2 and 6 in case of females. The age ratio score, sex ratio score and joint score for various 5 year age groupings like 0-4, 1-5, 2-6, 3-7, 4-8 have been examined and most suitable age groupings determined. The data were then smoothed by using Grabill's weighted co-efficients to obtain single year age data. In the age group 0-4 adjustments have been done for age distortion and omission based on Census Evaluation Study. The Census Evaluation Study had indicated that a large proportion of children in the age group 0-4 had been omitted in the census and that the ages of a number of children have been distorted. Substantial number of children in this age group were reported in ages 5-9. This is also reflected in the concentration at ages 5 and 6 in the single year age data. The 5-9 age group was slightly reduced due to the transfer of persons across age group 0-4. From these group totals, single year ages were estimated. In other words, in the age group 0-9 no major changes were made except for adjusting for age distortion and omission in the age group 0-4.

15. The age ratio score, sex ratio score and the joint score of the unsmoothed and smoothed age data are presented below.

Statement 3 : Age ratio score, sex ratio score and joint score for unsmoothed and smoothed data, 1981

| 1 | Unsmoothed data | Smoothed data |
|---------------------|--------------------|------------------|
| 1 | 2 | 3 |
| (1) Age ratio score | | |
| Males | 12.29 | 1.77 |
| Females | 10.63 | 1.31 |
| (2) Sex ratio score | 4.30 | 2.62 |
| (3) Joint score | 35.83 | 10.94 |
| (4) Whipple's index | | |
| Males | 304 | ... |
| Females | 305 | .. |
| (5) Myer's index | | |
| Males | 64.5 | ... |
| Females | 68.0 | ... |

16. The population in the age group 0-4 had been inflated to take into account the omissions. Pro-rata adjustments were than made in all the age groups to keep the census totals as published. In other words, the adjustment for omission were done more to correct the age distribution than to correct the census totals. This is felt essential since in large number of other tables released through census, it would not be possible to make corresponding adjustments. This is in consonance with earlier practice.

17. As pointed out earlier, census could not be conducted in Assam in 1981. In view of this the projected population and the projected age distribution for Assam for 1981 (based on 1977 projections) were made use of. These were added to the smoothed age data based on 5% sample.

Assumptions regarding mortality

18. Starting with the SRS life tables for 1980 the annual increase in expectation of life at birth has been assumed to be 0.50 years for males and females during the period 1981—2001. This would imply that by the year 2001, the expectation of life at birth would be 64.1 years for males and 64.7 years for females. It should be pointed out that even at base level the female life expectancy is higher than that of males and this trend is expected to continue (See Annexure 4).

Assumptions regarding fertility

19. Three different assumptions have been made regarding fertility trends. In all these it has been assumed that the changes in the proportion of females married in the age group 15-44 witnessed during 1961, 1971 and 1981 would continue till the year 2001. The main difference in the assumptions regarding the future would arise out of assumptions regarding the likely levels of couples to be effectively protected by the year 2000.

20. In assumption 1, it has been assumed that the level of couples effectively protected would remain at 28% till 2000. This projection would give the level of population which would result if the present family planning efforts are only maintained and changes in the proportion married are allowed to continue undisturbed. This projection has been termed as 'High'.

21. Assumption 2 is based on the current thinking on family planning. According to the present thinking about 60% of the couples in the reproductive age group would be protected against conception in order to reach the net reproduction rate of 1 by the year 2001. This assumption has been termed as 'Low'.

22. In the third assumption it has been assumed that the percentage of couples effectively protected may not reach 60 by 2000 but may be around 48.8. Here a view has been taken that the percentage of couples effectively protected would no doubt show an accelerated trend in future years compared to the past years but to achieve an increase of 2% per annum in the couples protected may be a difficult task. In keeping with that assumption it has been assumed that the couples effectively protected may increase on an average at the rate of 1.3% per annum. Projections based on this assumption has been termed as 'Medium'. The rationale for this assumption is presented in Annexure 5.

23. The derived general fertility rates for the various quinquennia are presented below

Statement 4 : Assumed general fertility rates

| Assumption | 1981—86 | 1986—91 | 1991—96 | 1996—2001 |
|------------|---------|---------|---------|-----------|
| 1 | 2 | 3 | 4 | 5 |
| High | 152 | 147 | 144 | 141 |
| Medium | 152 | 138 | 122 | 106 |
| Low | 152 | 133 | 110 | 88 |

Assumption regarding migration

24 According to 1981 census there were 79.38 lakh persons whose place of birth was outside India. The corresponding figure according to 1971 census (excluding Assam) was 81.21 lakhs. The 10 year survival ratios as derived from the census age data of 1971 and 1981 censuses for India as a whole work out to 0.9165 for males and 0.9122 for females. Assuming that the migrants have the same survival ratios during the decade as the nonmigrants we may estimate the interdecadal migrants into India (excluding Assam) to be around 5.12 lakhs (2.05 lakh males and 3.07 lakh females). There could be a number of persons born in India who have moved out during the decade 1971-81 and could not be counted in 1981 census. According to one estimate, there were 5 lakh Indians in the middle east of whom 3,33,000 were in the Gulf countries. It would therefore, be reasonable to assume that the net migration has been negligible. The same has been assumed for future years.

Method of projection

25. The life tables for males and females separately for the year 1980 based on the age specific death rates of the Sample Registration System were used as the base. It was assumed that the age specific mortality would conform to the South Asian Model pattern of life tables presented by the United Nations and these life tables were assumed for the end of the projection period 2001. From the set of initial and final life tables, n^q_x for the intervening years were derived assuming that mortality would decline linearly. From the derived values of the n^q_x 's the e^q_x was calculated for each of the intervening years. These were made to converge to the level of e^q_x assumed earlier by an iterative procedure. The survival ratios for each five year age group were then calculated from the life tables so derived. These survival ratios were used to project the population.

26. The populations aged 0-4 in various years were derived using the projected values of the general fertility rates. The general fertility rate was applied to the female population in the reproductive age group 15-44 to derive the number of births during the quinquennium. This number was multiplied by the survival ratio from birth to age group 0-4 to derive the population aged 0-4.

RESULTS

27. The population of India would be 1,052.5 millions in 2001, if no further family planning efforts are made and the present level of 28.0% couples protected is maintained. This should be considered as an upper limit. If on the other hand 60% of the couples are effectively protected by 2000, the population may be 959.2 millions that is less by 93.3 millions. However, it will be safe to work on another line of possibility also in case it is not possible to reach the above goal of 60 per cent by the year 2000. For this purpose a possibility of reaching 48.8 per cent effective couple protection rate by the year in question, has been considered and this alternate projection which we have called Medium projection gives us a population figure of 991.5 millions by the year 2001. The projections based on this assumption would imply a decline in growth rate of population from 2.1 per cent in 1981 to 1.6 per cent over 1996-2001. On the other hand if, the target of 60 per cent couple protection by the year 2000 is achieved then it will mean a still lower growth rate of 1.3 per cent over the years 1996-2001.

28. Another feature worth noting is that whether Low or Medium projection is taken into account, by 1991 the population of India is likely to be in the range of 832.5 millions to 836.4 millions and major differences are likely to occur only in the later decade viz 1991-2001. This is because, the likely level of couples effectively protected upto 1983-84 have been taken into consideration in our calculations. Table 1 shows the projected population and the underlying vital rates.

29. The following statement compares the above projections with the earlier recommended projections made by the Expert Committee on Population Projection in 1977.

Statement 5 : Comparative statement showing old and new projections

| Year | Recommended 1977 Popula- tion Projection (‘000) | Present Projections (‘000) | | | Change | | |
|------|--|----------------------------|---------|---------|------------------|------------------|------------------|
| | | High | Medium | Low | High | Medium | Low |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1981 | 672,014 | 685,159 | 685,159 | 685,159 | 13,145 (1.92) | 13,145 (1.92) | 13,145 (1.92) |
| 1986 | 735,094 | 758,158 | 758,158 | 758,158 | 23,064 (3.04) | 23,064 (3.04) | 23,064 (3.04) |
| 1991 | 798,958 | 843,499 | 836,450 | 832,534 | 44,541 (5.28) | 37,492 (4.48) | 33,576 (4.03) |
| 1996 | 863,758 | 941,970 | 915,493 | 900,982 | 78,212 (8.30) | 51,735 (5.65) | 37,224 (4.13) |
| 2001 | .. | 1,052,514 | 991,479 | 959,216 | ... | ... | ... |

Figures refer to 1st March.

Figures in bracket show the percentage change compared to earlier projections.

30. While in 1981, the difference between old projections and census was only 13.1 millions the difference will widen in later years. By 1996 the difference is likely to be of the order of 51.7 millions. The main reason for this difference is the drastic revision of the earlier fertility assumptions. While in earlier projections a birth rate of 30/1000 was expected to be reached by the year 1983-84, in the present Medium projection, this expectation is likely to materialise only in the year 1989-90.

31. The following statement shows the projected population according to Medium projection in selected plan years.

Statement 6 : Population projections for selected plan years (Medium projection)—India

| Year | Population as on 1st March (millions) |
|------|---|
| 1 | 2 |
| 1985 | 743.22 |
| 1990 | 820.57 |
| 1995 | 899.83 |
| 2000 | 976.66 |

Implications of the projections

32. According to our Medium projection the annual addition to the population is likely to be of the order of 14.60, 15.66, 15.81, 15.20 millions respectively in 1981-86, 1986-91, 1991-96 and 1996-2001. In other words, the population pressure, in terms of absolute additions, is likely to ease only by 1996. Even then the absolute number of annual additions to the population is likely to be higher than that witnessed during 1971-81, i.e. 13.7 millions.

33. The following statement shows the percentage change in the female population in the age group 15-44 and the number of married females in this age group according to the Medium projection.

Statement 7 : Percentage change in age group 15-44 of female population 1961-2001 : India

| Year | Females in 15-44 ('000) As on 1st March | Married Females ('000) As on 1st March | Average annual percentage change | |
|-------|---|--|----------------------------------|-----------------|
| | | | Females | Married Females |
| 1 | 2 | 3 | 4 | 5 |
| 1961 | 92,776 | 79,555 | | ... |
| 1971 | 113,430 | 95,168 | 2.23 | 1.96 |
| 1981 | 143,857 | 115,776† | 2.68 | 2.17 |
| 1986* | 164,325 | 129,439 | 2.85 | 2.36 |
| 1991* | 187,558 | 144,532 | 2.83 | 2.33 |
| 1996* | 208,876 | 157,388 | 2.27 | 1.78 |
| 2001* | 230,464 | 169,714 | 2.07 | 1.57 |

* Col. 2 projected and col 3 extrapolated

† Since no census was conducted in Assam, the number of married females in 1981 has been estimated by applying the proportion of married females in the age group 15-44 according to 1981 census 5% sample data, i.e. 0.8048 to the female population aged 15-44 shown in col. 2

34. It is noticed that female population in the reproductive age group 15-44, which increased at the rate of 2.23% and 2.68% during 1961-71 and 1971-81 will increase by 2.85%, and 2.83% respectively in 1981-86 and 1986-91. Only in 1991-2001 would the rate decline. Similarly, the number of married females in the reproductive age group 15-44 is also likely to increase by 2.36% and 2.33% during 1981-86 and 1986-91 compared to 1.96% and 2.17% respectively in 1961-71 and 1971-81. The slightly lower growth rate of married females compared to females in age group 15-44 is due to the assumption that the age at marriage would increase. During the 1990's however, the growth rate of married females is likely to go down.

Table 1 : Consolidated statement of projections from 1981 to 2001, India

Expectation of life at birth for base year 1980 : M—54.1 ; F—54.7

Base year general fertility rate (GFR) (1980) : 164

Mortality assumptions :— Annual increase in expectation of life at birth (year/year) : M/F - 0.50/0.50

| | | 1981-86 | 1986-91 | 1991-96 | 1996-2001 | 2001 | | | | | |
|---|------------------|-----------|-----------|-----------|-----------|----------------------------------|-----------|-----------|-----------|-----------|------------|
| Projected values of expectations of life at birth | | M 55.6 | 58.1 | 60.6 | 63.1 | 64.1 | | | | | |
| | | F 56.2 | 58.7 | 61.2 | 63.7 | 64.7 | | | | | |
| Assumption | Vital rates | | | | | Population as on 1st March ('00) | | | | | |
| Fertility | Vital rate (GFR) | 1981-1986 | 1986-1991 | 1991-1996 | 1996-2001 | Sex | 1981 | 1986 | 1991 | 1996 | 2001 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| High | BR | 32.46 | 32.30 | 31.97 | 31.06 | P | 6,851,590 | 7,581,580 | 8,434,987 | 9,419,704 | 10,525,142 |
| | DR | 12.21 | 10.97 | 9.89 | 8.87 | M | 3,543,843 | 3,913,595 | 4,347,578 | 4,849,822 | 5,414,149 |
| | GR | 20.25 | 21.33 | 22.08 | 22.19 | F | 3,307,747 | 3,667,985 | 4,087,409 | 4,569,882 | 5,110,993 |
| | GFR | 152 | 147 | 144 | 141 | SR | 1,071 | 1,067 | 1,064 | 1,061 | 1,059 |
| Medium | BR | 32.46 | 30.45 | 27.61 | 24.42 | P | 6,851,590 | 7,581,580 | 8,364,498 | 9,154,925 | 9,914,792 |
| | DR | 12.21 | 10.80 | 9.55 | 8.48 | M | 3,543,843 | 3,913,595 | 4,311,383 | 4,713,744 | 5,100,343 |
| | GR | 20.25 | 19.65 | 18.06 | 15.94 | F | 3,307,747 | 3,667,985 | 4,053,115 | 4,441,181 | 4,814,449 |
| | GFR | 152 | 138 | 122 | 106 | SR | 1,071 | 1,067 | 1,064 | 1,061 | 1,059 |
| Low | BR | 32.46 | 29.42 | 25.16 | 20.78 | P | 6,851,590 | 7,581,580 | 8,325,341 | 9,009,820 | 9,592,157 |
| | DR | 12.21 | 10.71 | 9.36 | 8.25 | M | 3,543,843 | 3,913,595 | 4,291,280 | 4,639,179 | 4,934,468 |
| | GR | 20.25 | 18.72 | 15.80 | 12.53 | F | 3,307,747 | 3,667,985 | 4,034,061 | 4,370,641 | 4,657,689 |
| | GFR | 152 | 133 | 110 | 88 | SR | 1,071 | 1,067 | 1,064 | 1,061 | 1,059 |

SR stands for Sex Ratio : Males per 1000 Females

Table 2 : Population projections ('00) by age and sex,

HIGH

| Age group | 1981 | | | 1986 | | | 1991 | | |
|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| | Persons | Males | Females | Persons | Males | Females | Persons | Males | Females |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 0— 4 | 970,857 | 495,875 | 474,982 | 1,026,900 | 526,991 | 499,909 | 1,151,236 | 591,040 | 560,196 |
| 5— 9 | 921,455 | 474,304 | 447,151 | 920,304 | 471,687 | 448,617 | 981,519 | 505,159 | 476,360 |
| 10—14 | 827,690 | 433,036 | 394,654 | 910,812 | 469,066 | 441,746 | 911,432 | 467,321 | 444,111 |
| 15—19 | 694,593 | 362,957 | 331,636 | 820,246 | 429,462 | 390,784 | 904,058 | 465,849 | 438,209 |
| 20— 24 | 585,718 | 300,895 | 284,823 | 686,355 | 359,458 | 326,897 | 812,303 | 426,001 | 386,302 |
| 25—29 | 509,833 | 259,106 | 250,727 | 577,728 | 297,632 | 280,096 | 678,689 | 356,153 | 322,536 |
| 30—34 | 443,458 | 226,112 | 217,346 | 502,302 | 255,836 | 246,466 | 570,594 | 294,410 | 276,184 |
| 35—39 | 391,204 | 201,695 | 189,509 | 435,690 | 222,182 | 213,508 | 494,803 | 252,035 | 242,768 |
| 40—44 | 345,288 | 180,760 | 164,528 | 381,874 | 196,379 | 185,495 | 426,764 | 217,186 | 209,578 |
| 45—49 | 298,028 | 158,424 | 139,604 | 333,936 | 174,021 | 159,915 | 370,911 | 190,008 | 180,903 |
| 50—54 | 243,089 | 129,875 | 113,214 | 284,069 | 149,910 | 134,159 | 319,934 | 165,667 | 154,267 |
| 55—59 | 195,090 | 103,082 | 92,008 | 226,035 | 119,539 | 106,496 | 265,891 | 139,064 | 126,827 |
| 60—64 | 154,637 | 79,968 | 74,669 | 173,902 | 90,573 | 83,329 | 203,407 | 106,233 | 97,174 |
| 65—69 | 115,034 | 58,906 | 56,128 | 128,684 | 64,709 | 63,975 | 146,961 | 74,828 | 72,133 |
| 70+ | 155,616 | 78,848 | 76,768 | 172,743 | 86,150 | 86,593 | 196,485 | 96,624 | 99,861 |
| All ages | 6,851,590 | 3,543,843 | 3,307,747 | 7,581,580 | 3,913,595 | 3,667,985 | 8,434,987 | 4,347,578 | 4,087,409 |

as on 1st March, 1981-2001, India

H I G H

| Persons | 1996 | | Persons | 2001 | | Age group |
|-----------|-----------|-----------|------------|-----------|-----------|-----------|
| | Males | Females | | Males | Females | |
| 11 | 12 | 13 | 14 | 15 | 16 | 1 |
| 1,288,626 | 661,873 | 626,753 | 1,417,128 | 728,086 | 689,042 | 0— 4 |
| 1,108,990 | 570,692 | 538,298 | 1,250,682 | 643,510 | 607,172 | 5— 9 |
| 973,866 | 501,351 | 472,515 | 1,102,342 | 567,337 | 535,005 | 10—14 |
| 906,074 | 464,744 | 441,330 | 969,615 | 499,238 | 470,377 | 15—19 |
| 897,192 | 462,804 | 434,388 | 901,082 | 462,388 | 438,694 | 20—24 |
| 805,134 | 422,760 | 382,374 | 891,332 | 459,987 | 431,345 | 25—29 |
| 671,888 | 352,910 | 318,978 | 798,875 | 419,605 | 379,270 | 30—34 |
| 563,494 | 290,748 | 272,746 | 665,146 | 349,339 | 315,807 | 35—39 |
| 486,243 | 247,302 | 238,941 | 555,473 | 286,323 | 269,150 | 40—44 |
| 416,181 | 211,141 | 205,040 | 475,989 | 241,504 | 234,485 | 45—49 |
| 357,048 | 181,915 | 175,133 | 402,384 | 203,218 | 199,166 | 50—54 |
| 301,299 | 154,804 | 146,495 | 338,130 | 171,122 | 167,008 | 55—59 |
| 241,390 | 124,886 | 116,504 | 275,741 | 140,341 | 135,400 | 60—64 |
| 174,337 | 89,459 | 84,878 | 209,582 | 107,003 | 102,579 | 65—69 |
| 227,942 | 112,433 | 115,509 | 271,641 | 135,148 | 136,493 | 70+ |
| 9 419,704 | 4 849,822 | 4,569,882 | 10,525,142 | 5,414,149 | 5,110,993 | All ages |

Table 3 : Population projections ('00) by age and

M E D I U M

| Age group | 1981 | | | 1986 | | | 1991 | | |
|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| | Persons | Males | Females | Persons | Males | Females | Persons | Males | Females |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 0-4 | 970,857 | 495,875 | 474,982 | 1,026,900 | 526,991 | 499,909 | 1,080,748 | 554,846 | 525,902 |
| 5-9 | 921,455 | 474,304 | 447,151 | 920,304 | 471,687 | 448,617 | 981,518 | 505,158 | 476,360 |
| 10-14 | 827,690 | 433,036 | 394,654 | 910,812 | 469,066 | 441,746 | 911,432 | 467,321 | 444,111 |
| 15-19 | 694,593 | 362,957 | 331,636 | 820,246 | 429,462 | 390,784 | 904,058 | 465,849 | 438,209 |
| 20-24 | 585,718 | 300,895 | 284,823 | 686,355 | 359,458 | 326,897 | 812,303 | 426,001 | 386,302 |
| 25-29 | 509,833 | 259,106 | 250,727 | 577,728 | 297,632 | 280,096 | 678,689 | 356,153 | 322,536 |
| 30-34 | 443,458 | 226,112 | 217,346 | 502,302 | 255,836 | 246,466 | 570,594 | 294,410 | 276,184 |
| 35-39 | 391,204 | 201,695 | 189,509 | 435,690 | 222,182 | 213,508 | 494,803 | 252,035 | 242,766 |
| 40-44 | 345,288 | 180,760 | 164,528 | 381,874 | 196,379 | 185,495 | 426,764 | 217,186 | 209,578 |
| 45-49 | 298,028 | 158,424 | 139,604 | 333,936 | 174,021 | 159,915 | 370,911 | 190,008 | 180,903 |
| 50-54 | 243,089 | 129,875 | 113,214 | 284,069 | 149,910 | 134,159 | 319,934 | 165,667 | 154,267 |
| 55-59 | 195,090 | 103,082 | 92,008 | 226,035 | 119,539 | 106,496 | 265,891 | 139,064 | 126,827 |
| 60-64 | 154,637 | 79,968 | 74,669 | 173,902 | 90,573 | 83,329 | 203,407 | 106,233 | 97,174 |
| 65-69 | 115,034 | 58,906 | 56,128 | 128,684 | 64,709 | 63,975 | 146,961 | 74,828 | 72,133 |
| 70+ | 155,616 | 78,848 | 76,768 | 172,743 | 86,150 | 86,593 | 196,485 | 96,624 | 99,861 |
| All ages | 6,851,590 | 3,543,843 | 3,307,747 | 7,581,580 | 3,913,595 | 3,667,985 | 8,364,498 | 4,311,383 | 4,053,115 |

sex, as on 1st March, 1981-2001 — India

M E D I U M

| 1996 | | | 2001 | | | Age group |
|------------------|------------------|------------------|------------------|------------------|------------------|-----------------|
| Persons | Males | Females | Persons | Males | Females | |
| 11 | 12 | 13 | 14 | 15 | 16 | 1 |
| 1,091,749 | 560,744 | 531,005 | 1,065,342 | 547,336 | 518,006 | 0—4 |
| 1,041,088 | 535,743 | 505,345 | 1,059,615 | 545,198 | 514,417 | 5—9 |
| 973,866 | 501,351 | 472,515 | 1,034,845 | 532,593 | 502,252 | 10—14 |
| 906,074 | 464,744 | 441,330 | 969,615 | 499,238 | 470,377 | 15—19 |
| 897,192 | 462,804 | 434,388 | 901,082 | 462,388 | 438,694 | 20—24 |
| 805,134 | 422,760 | 382,374 | 891,332 | 459,987 | 431,345 | 25—29 |
| 671,888 | 352,910 | 318,978 | 798,875 | 419,605 | 379,270 | 30—34 |
| 563,494 | 290,748 | 272,746 | 665,146 | 349,339 | 315,807 | 35—39 |
| 486,243 | 247,302 | 238,941 | 555,473 | 286,323 | 269,150 | 40—44 |
| 416,181 | 211,141 | 205,040 | 475,989 | 241,504 | 234,485 | 45—49 |
| 357,048 | 181,915 | 175,133 | 402,384 | 203,218 | 199,166 | 50—54 |
| 301,299 | 154,804 | 146,495 | 338,130 | 171,122 | 167,008 | 55—59 |
| 241,390 | 124,886 | 116,504 | 275,741 | 140,341 | 135,400 | 60—64 |
| 174,337 | 89,459 | 84,878 | 209,582 | 107,003 | 102,579 | 65—69 |
| 227,942 | 112,433 | 115,509 | 271,641 | 135,148 | 136,493 | 70+ |
| 9,154,925 | 4,713,744 | 4,441,181 | 9,914,792 | 5,100,343 | 4,814,449 | All ages |

Table 4 : Population projections ('00) by age and**L O W**

| Age group | 1981 | | | 1986 | | | 1991 | | |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | Persons | Males | Females | Persons | Males | Females | Persons | Males | Females |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 0—4 | 970,857 | 495,875 | 474,982 | 1,026,900 | 526,991 | 499,909 | 1,041,591 | 534,743 | 506,848 |
| 5—9 | 921,455 | 474,304 | 447,151 | 920,304 | 471,687 | 448,617 | 981,518 | 505,158 | 476,360 |
| 10—14 | 827,690 | 433,036 | 394,654 | 910,812 | 469,066 | 441,746 | 911,432 | 467,321 | 444,111 |
| 15—19 | 694,593 | 362,957 | 331,636 | 820,246 | 429,462 | 390,784 | 904,058 | 465,849 | 438,209 |
| 20—24 | 585,718 | 300,895 | 284,823 | 686,355 | 359,458 | 326,897 | 812,303 | 426,001 | 386,302 |
| 25—29 | 509,833 | 259,106 | 250,727 | 577,728 | 297,632 | 280,096 | 678,689 | 356,153 | 322,536 |
| 30—34 | 443,458 | 226,112 | 217,346 | 502,302 | 255,836 | 246,466 | 570,594 | 294,410 | 276,184 |
| 35—39 | 391,204 | 201,695 | 189,509 | 435,690 | 222,182 | 213,508 | 494,803 | 252,035 | 242,768 |
| 40—44 | 345,288 | 180,760 | 164,528 | 381,874 | 196,379 | 185,495 | 426,764 | 217,186 | 209,578 |
| 45—49 | 298,028 | 158,424 | 139,604 | 333,936 | 174,021 | 159,915 | 370,911 | 190,008 | 180,903 |
| 50—54 | 243,089 | 129,875 | 113,214 | 284,069 | 149,910 | 134,159 | 319,934 | 165,667 | 154,267 |
| 55—59 | 195,090 | 103,082 | 92,008 | 226,035 | 119,539 | 106,496 | 265,891 | 139,064 | 126,827 |
| 60—64 | 154,637 | 79,968 | 74,669 | 173,902 | 90,573 | 83,329 | 203,407 | 106,233 | 97,174 |
| 65—69 | 115,034 | 58,906 | 56,128 | 128,684 | 64,709 | 63,975 | 146,961 | 74,828 | 72,133 |
| 70+ | 155,616 | 78,848 | 76,768 | 172,743 | 86,150 | 86,593 | 196,485 | 96,624 | 99,861 |
| All ages | 6,851,590 | 3,543,843 | 3,307,747 | 7,581,580 | 3,913,595 | 3,667,985 | 8,325,341 | 4,291,280 | 4,034,061 |

sex, as on 1st March, 1981-2001—India

L O W

| 1996 | | | 2001 | | | Age group |
|------------------|------------------|------------------|------------------|------------------|------------------|-----------------|
| Persons | Males | Females | Persons | Males | Females | |
| 11 | 12 | 13 | 14 | 15 | 16 | 1 |
| 984,365 | 505,590 | 478,775 | 884,435 | 454,392 | 430,043 | 0—4 |
| 1,003,367 | 516,332 | 487,035 | 955,382 | 491,564 | 463,818 | 5—9 |
| 973,866 | 501,351 | 472,515 | 997,350 | 513,296 | 484,054 | 10—14 |
| 906,074 | 464,744 | 441,330 | 969,615 | 499,238 | 470,377 | 15—19 |
| 897,192 | 462,804 | 434,388 | 901,082 | 462,388 | 438,694 | 20—24 |
| 805,134 | 422,760 | 382,374 | 891,332 | 459,987 | 431,345 | 25—29 |
| 671,888 | 352,910 | 318,978 | 798,875 | 419,605 | 379,270 | 30—34 |
| 563,494 | 290,748 | 272,746 | 665,146 | 349,339 | 315,807 | 35—39 |
| 486,243 | 247,302 | 238,941 | 555,473 | 286,323 | 269,150 | 40—44 |
| 416,181 | 211,141 | 205,040 | 475,989 | 241,504 | 234,485 | 45—49 |
| 357,048 | 181,915 | 175,133 | 402,384 | 203,218 | 199,166 | 50—54 |
| 301,299 | 154,804 | 146,495 | 338,130 | 171,122 | 167,008 | 55—59 |
| 241,390 | 124,886 | 116,504 | 275,741 | 140,341 | 135,400 | 60—64 |
| 174,337 | 89,459 | 84,878 | 209,582 | 107,003 | 102,579 | 65—69 |
| 227,942 | 112,433 | 115,509 | 271,641 | 135,148 | 136,493 | 70+ |
| 9,009,820 | 4,639,179 | 4,370,641 | 9,592,157 | 4,934,468 | 4,657,689 | All ages |

ANNEXURES

ANNEXURE 1

ESTIMATES OF DEATH RATE DURING 1971—81

Census differencing method

1.1 Persons who are aged 10 and above in 1981 are the survivors of the population counted in 1971 census. The difference between the population aged 10 and above in 1981 and the population counted in 1971 census is considered approximately as the deaths in the ages 5 and above during the decade 1971—81. This is then multiplied by the ratio of deaths in all ages to deaths in ages 5 and above, derived from an external source such as civil registration system or the sample registration system. The deaths in the ages 5 and above derived by the above method from census age data are subject to following errors of opposite sign.

- (a) Since the deaths to children in the age group 0-4 counted in 1971 census, would be higher, the difference may not relate exactly to ages 5 and above. It may relate to some such ages as 3 and above or 4 and above i.e. the deaths may be over estimates of deaths aged 5 and above during the decade.
- (b) In practice, however in all the censuses the population aged 0-4 is relatively more under counted than that of the population in other age groups. Thus the difference ($P_{0+}^{71} - P_{10+}^{81}$) may be an under estimate of the true number of deaths in the age group 5 and above.

One can assume that the two errors, which are in opposite direction may counter balance to some extent. Multiplying the number of deaths during the decade (44, 724, 000) by the ratio D_0/D_5^+ of 1.9883 derived by using 1971-80 SRS death rates to the average age structure of SRS 1971—78, we may estimate the death rate during the decade 1971—81 as 14.85 per 1000 population. The corresponding birth rate would be 37.1 per 1000.

Forward Projection Method (Manual IV Method)

1.2 In this method, the age wise population of the 1971 census have been projected 10 years ahead and compared with the 1981 census unadjusted population by age. The comparison has been made using the cumulated age distribution and the South Asian Model Life Table of the United Nations. The median value of the first nine values was obtained subject to the condition that the values of expectation of life at birth corresponding to projected 10^+ of 1981, and 15^+ of 1981 would respectively be the upper and lower bounds. Only the median of those values falling within these bounds was considered. The expectation of life at birth was 51.2 years both for males and females. Using the age specific death rates corresponding to these expectations of life at birth, the death rate for the decade 1971—81 would be 14.41 for males and 14.37 for females and 14.39 for persons. The corresponding birth rate would be 36.64 per thousand. It should be emphasised that the procedure essentially estimates adult mortality and extends the estimates to infer about child mortality. Since we have used unsmoothed (i.e. as per census) age data particularly in 0-4, both death rates and birth rates are under estimates.

1.3 If instead, we use smoothed age data the death rate goes to 15.01 for males and 15.16 for females, giving an over all death rate of 15.08. Consequently the birth rate may be estimated as 37.33.

Preston and Bennett's Method*

1.4 Recently Preston and Bennett have developed a method of estimating adult mortality from two censuses. The method does not require the assumption of stability and does not use a model life table system. The method does not also use census questions on survival of kin. The population is assumed to be closed for migration.

1.5 The method is in essence the extension of stable population relationships to non-stable population. Using the above method it has been estimated that the expectation of life at birth for India (excluding Assam) would be 52.5 years for males and 52.9 years for females.

* Preston S.H. and Bennett N.G. A census based method for estimating adult mortality—Population Studies No. 37 (1983)—91-104.

ANNEXURE 2

ESTIMATES OF BIRTH RATE DURING 1971-81

2.1 In view of the close agreement of SRS death rates and census based death rates, the child mortality rates based on SRS were used to estimate birth rate by reverse survival method. The child mortality estimates derived by applying Brass technique to data on children ever born and children surviving collected in 1981 census, gave another set of birth rate estimates. These were distinctly lower than the corresponding estimates derived from SRS. The birth rates were also compared with estimates based on Rele's method.

2.2 The following statement presents the comparison :

Statement 2.1 : Estimates of C.B.R. by reverse survival method during 1971-81

| Sl. No. | Method | 1971-76 | 1976-81 | 1971-81 |
|---------|---|---------|---------|---------|
| 1 | 2 | 3 | 4 | 5 |
| 1. | Using SRS Child mortality rates. | 39.9 | 34.6 | 37.2 |
| 2. | Using Child mortality derived from Census, by Brass technique | 37.7 | 33.9 | 35.8 |
| 3. | Rele's technique ($e_0 = 51.2$) | 39.5 | 34.2 | 36.8 |

2.3 Since the reverse survival method using the SRS death rates are based on observed mortality data as against rates based on models, birth rate of 37.2 has been recommended as estimate for the decade 1971-81. The birth rates based on SRS were 35.6 and 33.4 during 1971-75 and 1976-80, respectively, excluding Bihar and West Bengal.

ANNEXURE 3

SRS BASED LIFE TABLES – INDIA 1980

3.1 Life tables for 1980 have been constructed using SRS age specific death rates for 1980, using Greville's Method of converting observed central death rates to the life table mortality functions. The following statement presents the ${}_nq_x$ and the e_x^0 at various ages, separately for males and females.

Statement 3.1 : Life tables for India based on SRS 1980

| Age x | Males | | Females | |
|----------|-----------|---------|-----------|---------|
| | ${}_nq_x$ | e_x^0 | ${}_nq_x$ | e_x^0 |
| 1 | 2 | 3 | 4 | 5 |
| 0 | 0.11300 | 54.1 | 0.11500 | 54.7 |
| 1 | 0.06783 | 59.9 | 0.08004 | 60.7 |
| 5 | 0.01628 | 60.1 | 0.01957 | 61.8 |
| 10 | 0.00847 | 56.1 | 0.00827 | 58.0 |
| 15 | 0.01015 | 51.5 | 0.01460 | 53.5 |
| 20 | 0.01154 | 47.0 | 0.01898 | 49.2 |
| 25 | 0.01119 | 42.5 | 0.01996 | 45.1 |
| 30 | 0.01687 | 38.0 | 0.01770 | 41.0 |
| 35 | 0.02339 | 33.6 | 0.02271 | 36.7 |
| 40 | 0.03546 | 29.3 | 0.02711 | 32.5 |
| 45 | 0.04700 | 25.3 | 0.03599 | 28.3 |
| 50 | 0.07060 | 21.4 | 0.05077 | 24.3 |
| 55 | 0.10229 | 17.9 | 0.08041 | 20.4 |
| 60 | 0.16148 | 14.6 | 0.12802 | 17.0 |
| 65 | 0.25808 | 11.9 | 0.18755 | 14.1 |
| 70 | 1.00000 | 10.2 | 1.00000 | 11.7 |

ANNEXURE 4

OUTLOOK FOR MORTALITY IN INDIA

4.1 One of the important components of population growth is mortality. For projecting future population, it is necessary to have an idea of past trends and the present levels of mortality, the factors that are likely to affect the death rate in future, and to take into account the various health schemes that are likely to be implemented in the near future. This has been attempted in this note.

4.2 The following statement shows the expectation of life at birth as estimated from various censuses and surveys. These rates relate to a particular decade and may be taken as centered at the mid point of the decade.

Statement 4.1 : Expectation of life at birth

| Period | Males | Females |
|---------|---------|---------|
| 1 | 2 | 3 |
| 1941—51 | 32.5 | 31.7 |
| 1951—61 | 41.9 | 40.6 |
| 1961—71 | 46.4 | 44.7 |
| 1971—81 | 50.9* | 50.0* |
| | 51.2** | 51.2** |
| | 52.5*** | 52.9*** |

- * based on Sample Registration System.
- ** based on forward survival method using South Asian Model life tables and unsmoothed age data of 1971 and 1981 censuses.
- *** based on Preston and Bennett technique using unsmoothed age data of 1971 and 1981 censuses.

4.3 It is seen from the above statement that there is a reasonable agreement on the expectation of life at birth estimated from the census age distribution by using various indirect techniques and the expectations calculated from the SRS data for the decade 1971—81. In view of this close agreement between SRS data and the census data and the fact that while the indirect estimation techniques are based in certain mathematical models, the SRS data are based on actual observations in the field, it seems better to adopt the SRS data on deaths for the decade as a whole, for any exercise in projection.

4.4 It would be seen that the expectation of life at birth for males has increased from 46.4 during 1961—70 to 50.9 in 1971—81. This would represent an average increase of 0.45 years per annum in the expectation of life at birth for males. For females the improvement seems to have been higher at 0.53 years per annum. Even when considered over a period of last 20 years the expectation of life at birth has increased from 41.9 during 1951—60 to 50.9 in 1981 for males and from 40.6 to 50.0 for females. This would represent an average annual increase of

0.50 years per annum for males and 0.47 years per annum for females. When the data for 1951 are also considered the annual improvement in e_0 would be of the order of 0.61 years for males and 0.61 years for females. One would, therefore, be reasonable in assuming that in the next 20 years also an improvement of the order of at least 0.5 years per annum may continue.

4.5 The following statement shows the estimated value of e_0 at various periods based on SRS.

Statement 4.2 : Expectation of life at birth based on SRS mortality rates

| Period | Males | Females |
|-------------|-------|---------|
| 1 | 2 | 3 |
| 1970—75 (a) | 50.5 | 49.0 |
| 1976—77 (b) | 50.8 | 50.0 |
| 1980 | 54.1 | 54.7 |

Source a : Sample Registration System 1970—75.
b : Sample Registration Bulletin—Vol. 14 No. 2.

4.6 It is seen that the e_0 has improved faster during the later part of the decade. Assuming that the e_0 for 1970—75 period would relate to the mid point Jan. 1973 and the 1980 rate to June, 1980, one can estimate the improvements during the 7.5 years period as 3.6 years for males and 5.7 years for females. In other words the annual improvement in e_0 would be 0.48 years for males and 0.76 years for females.

4.7 Two things are worth noting. The first point is that the higher e_0 for males compared to females observed earlier seems to have been reversed during the decade 1971—81. The second is the fact that female mortality seems to be falling at a faster rate than male.

4.8 Starting from a level of 54.1 years and 54.7 years for males and females respectively in 1980 we may reach an e_0 of 64.1 years for males and 64.7 years for females by the year 2001. Therefore, the assumption made by the expert committee in 1977 that e_0 may reach 64 by 2001 seems to be reasonable.

4.9 It would be pertinent to point out that it has been observed from the experience of many countries that once a level of e_0 of 55 is reached a slight acceleration in gains takes place until the expectation of life at birth approaches 65 years, after which the rate of gain slows down and becomes slight when the expectation has risen substantially higher than 70 years. The model life tables of the U.N. were prepared on this basis. The reason as explained in U.N. Manual III¹ is that at this level of e_0 past observations have indicated an acceleration in the decrease of infant mortality. The level of e_0 of 64 years for males and females would be consistent with the trend observed by U.N.

4.10 It is of interest to note that the World Bank² which projected the population of 118 countries had laid a general rule very much similar to the above. The ratio of increase in expectation of life at birth was assumed to be a function of the level from which the decline occurs with slower rates at either end of the scale. Specifically the future expectation of life at birth of a country was estimated by the following statement.

(1) U.N. Manual III—Methods for Population Projection by sex and age—New York 1956.
(2) K.C. Zachariah and R. Cuca—Population Projections for Bank member countries 1970—2000—1972.

Statement 4.3 : Anticipated annual increase in e_0^0 for various base levels of e_0^0

| Expectation of life at birth | Annual increase in e_0^0 (years) |
|------------------------------|------------------------------------|
| 1 | 2 |
| 30—34.9 | 0.2 |
| 35—39.9 | 0.3 |
| 40—44.9 | 0.4 |
| 45—49.9 | 0.5 |
| 50—59.9 | 0.6 |
| 60—64.9 | 0.4 |
| 65—69.9 | 0.2 |

4.11 Assuming a similar scale, the expectation of life at birth may be estimated at various years as under :

| Year | Estimated value of e_0^0 |
|------|----------------------------|
| 1980 | 54.4 |
| 1989 | 59.8 |
| 2000 | 64.2 |

4.12 In other words, the e_0^0 would reach 64 years by 2001, if health sector in India does not fare very badly. The past experience has shown that it has done reasonably well, though not as spectacularly as in some other countries.

4.13 There has been an alternate view held by many western demographers that a further improvement in mortality would be a difficult task in view of the severe problems of controlling diarrhoea, pneumonia and malnutrition that now predominate much of the developing world. Gwadkin* in a well documented article has expressed a view that the future declines in mortality in the developing world may not follow the past trends. Robert Cassen† while conceding that the greatest gains are possible in infant and child mortality, contends that progress in that sphere depends on combating malnutrition--infection syndrome, which in turn depends on simultaneous advances in nutrition, education, health services, water supply and sanitation which are progressing only slowly in rural areas where mortality is still high. He further expressed the view that an intensive family planning campaign and the greatly expanded malaria eradication programme have diverted health workers away from other health work.

4.14 It would be worth recalling that in India many more deaths occur in the age group below 5 than in those above. Any programme which aims at reducing the cause of death in this category would have the highest impact on the reduction in mortality. A new scheme of integrated child development services (ICDS) was initiated on an experimental basis. The aim of the programme was to improve the nutrition, health and educational services for children, mothers and pregnant women and to deliver these services to the local people mainly through members of their own community. Under this scheme it has been proposed to provide the following package of services :

- (i) Supplementary nutrition
- (ii) Immunisation
- (iii) Health check-up
- (iv) Referral services
- (v) Nutrition and health check-up
- (vi) Non formal education

* Davidson R. Gwadkin; Indication of change in developing country mortality trends : End of an era.— Population and Development Review Vol. 6 No. 4.

† India : Human Resources, World Bank Staff Working paper No. 279.

4.15 Of these the first four schemes refer to children below six years. This is the first time that a direct intervention of the Government has been attempted to reduce the child mortality.

4.16 It is, therefore, likely that the mortality in this age group would decline much faster than in the past, when such specific schemes were not in operation. In this connection it should be noted that the child mortality in the age group 0-4 has been declining rapidly since 1978, according to the Sample Registration System. The following statement gives the age specific mortality rates in the age groups 0-4 and 5-9

Statement 4.4 : Age specific mortality rates according to SRS in younger age groups

| Year | Age group | |
|------|-----------|-----|
| | 0-4 | 5-9 |
| 1 | 2 | 3 |
| 1976 | 51.0 | 4.8 |
| 1977 | 50.9 | 4.3 |
| 1978 | 48.3 | 4.2 |
| 1979 | 45.7 | 3.7 |
| 1980 | 41.8 | 3.6 |

4.17 It is seen that in the age group 0-4 the mortality has declined by 18% during the last 5 years and most of it has taken place during the later half of the quinquennium. Similarly, in the age group 5-9 there has been 25% decline in mortality rate, the decline being sharper in the later half. This would further give a justification for the conclusion that already a large decline in mortality is being experienced and this trend is likely to continue if the scope of schemes like ICDS is extended further in the coming years. This would imply that e% would accelerate faster than the 0.5 year per annum assumed earlier. It may be difficult, however, to quantify the extent to which the acceleration in mortality decline would take place. Outlook for a slow improvement in mortality which has been suggested by a number of western demographers like Coale, Dyson and Cassen does not seem to be holding good. While the improvement in India may not be as substantial as experienced in countries like China, there is no denying the fact that improvements have taken place and these may continue in future.

ANNEXURE 5

LIKELY LEVELS OF FERTILITY

Likely levels of proportion married in the reproductive age group 15—44 by the year 2001

5.1 It has been observed from the census data that the mean age at marriage of females has risen during the last decade 1971—81. The mean age at marriage which was estimated at 17.16 years during 1971 has increased to 18.32 in 1981. This increase is largely due to the decrease in the proportion of females married in the age group 10—14 and 15—19. Since for any consideration of fertility, marriages in the age group 10—14 may not be of great significance, only the proportion married in the reproductive age group 15—44 has been considered in the following paragraphs.

5.2 In the age group 15—19 the proportion of married females to total females has declined from 55.41 per cent in 1971 to 43.47 per cent in 1981. In the age group 20—24 the decline has only been marginal from 88.83 per cent to 84.44 per cent. The decline observed in the age group 15—19 is shared by all the states as may be seen from Statement 5.1. Particularly

Statement 5.1 : Proportion of married females in each age group 15—44, India

| India/State | 15—44 | | 15—19 | | 20—24 | |
|------------------|-------|-------|-------|-------|-------|-------|
| | 1971 | 1981 | 1971 | 1981 | 1971 | 1981 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| INDIA* | 83.90 | 80.48 | 55.41 | 43.47 | 88.83 | 84.44 |
| 1 Andhra Pradesh | 85.35 | 84.09 | 66.86 | 56.27 | 92.66 | 90.38 |
| 2 Bihar | 90.45 | 88.56 | 76.20 | 64.06 | 95.25 | 93.39 |
| 3 Gujarat | 80.72 | 76.29 | 39.48 | 26.96 | 88.59 | 82.86 |
| 4 Haryana | 87.37 | 80.64 | 61.03 | 47.44 | 93.92 | 88.81 |
| 5 Karnataka | 80.45 | 76.11 | 49.61 | 36.17 | 86.84 | 78.78 |
| 6 Kerala | 63.10 | 60.65 | 18.13 | 13.98 | 64.16 | 57.74 |
| 7 Madhya Pradesh | 91.02 | 87.07 | 77.88 | 62.71 | 95.37 | 91.75 |
| 8 Maharashtra | 83.80 | 79.76 | 53.13 | 38.09 | 88.12 | 83.97 |
| 9 Orissa | 85.45 | 77.42 | 56.70 | 30.93 | 92.31 | 86.78 |
| 10 Punjab | 73.64 | 69.39 | 22.32 | 14.12 | 77.60 | 67.41 |
| 11 Rajasthan | 91.21 | 88.54 | 75.46 | 64.25 | 96.63 | 94.71 |
| 12 Tamil Nadu | 75.98 | 72.66 | 26.77 | 22.83 | 81.19 | 75.74 |
| 13 Uttar Pradesh | 90.77 | 88.42 | 72.95 | 60.50 | 95.34 | 93.68 |
| 14 West Bengal | 79.18 | 74.66 | 51.42 | 37.28 | 85.03 | 77.82 |

*Figures shown in columns 2,4 and 6 include Assam. All other figures exclude Assam.

important is the decline in the states like Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh, where the proportion married in the age group 15—19 was above 70% in 1971 but below 65% in 1981. In Andhra Pradesh and Haryana also, where the proportion married in the age group 15—19 was above 60% in 1971 decline is seen. The decline indicates that social changes affecting age at marriage are taking place in all the states. The following statement shows the proportion of married females in the age group 15—44 according to 1951, 1961, 1971 and 1981 censuses.

Statement 5.2 : Proportion of married females to total females in the age group 15—44, India

| Year | Proportion married | Change in the proportion |
|------|--------------------|--------------------------|
| 1 | 2 | 3 |
| 1951 | 82.94 | |
| 1961 | 85.75 | 2.81 |
| 1971 | 83.90 | -1.85 |
| 1981 | 80.48 | -3.42 |

5.3 It is seen that the proportion has started declining from 1961 and this decline has accelerated during 1971—81. If we assume that this declining trend will continue further, we may extrapolate the proportion married assuming that the first order difference will remain constant. Under this assumption the proportion married may be estimated to be 77.06 per cent in 1991 and 73.64 per cent in 2001. It appears that roughly 12 per cent ($1 - 73.64/83.90$) decline in fertility as measured by GFR may be anticipated in the next 20 years due to increase in age at marriage which is a non family planning measure. If, however, the pattern of growth in literacy accelerates, this may decline faster. This, therefore, has to be considered as a lower limit.

5.4 Statement 5.3 shows the projected values of proportion married in the age group 15—44 in various states. It has been assumed that the proportion may not go below 60% by 2000. This is the level that has been reached by countries like Sri Lanka in 1980. In Sri Lanka the proportion was 61.76%. It has also been assumed that in Tamil Nadu and Maharashtra with higher urban percentage and higher female literacy the proportion may decline faster. Therefore the second degree curve has been fitted in these two states. In all other states, the proportion married in 15—44 has been assumed to decline linearly till 2001.

**Statement 5.3 : Percentage of married females to total females in age group 15– 44 :
India and States, 1961, 1971 and 1981 and the projected values**

| S. No. | India/State | As per census | | | Projected percentage | |
|--------|----------------|---------------|-------|-------|----------------------|-------|
| | | 1961 | 1971 | 1981 | 1991 | 2001 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | INDIA | 85.75 | 83.90 | 80.48 | 77.06 | 73.64 |
| 1 | Andhra Pradesh | 85.67 | 85.35 | 84.09 | 82.83 | 81.57 |
| 2 | Bihar | 89.46 | 90.45 | 88.56 | 86.67 | 84.78 |
| 3 | Gujarat | 85.03 | 80.72 | 76.29 | 71.86 | 67.43 |
| 4 | Haryana | N.A. | 87.37 | 82.65 | 77.93 | 73.21 |
| 5 | Karnataka | 83.22 | 80.45 | 76.11 | 71.77 | 67.43 |
| 6 | Kerala* | 68.71 | 63.10 | 60.65 | 60.16 | 60.16 |
| 7 | Madhya Pradesh | 90.65 | 91.02 | 87.07 | 83.12 | 79.17 |
| 8 | Maharashtra ‡ | 85.84 | 83.80 | 79.76 | 73.72 | 65.68 |
| 9 | Orissa | 85.29 | 85.45 | 77.42 | 69.39 | 61.36 |
| 10 | Punjab | N.A. | 73.64 | 69.39 | 65.14 | 60.89 |
| 11 | Rajasthan | 91.28 | 91.21 | 88.54 | 85.87 | 83.20 |
| 12 | Tamil Nadu ‡ | 78.29 | 75.98 | 72.66 | 68.43 | 62.99 |
| 13 | Uttar Pradesh | 91.43 | 90.77 | 88.42 | 86.07 | 83.72 |
| 14 | West Bengal | 83.42 | 79.18 | 74.66 | 70.14 | 65.62 |

* Assumed to remain around levels attained by Sri Lanka

‡ Second degree curve has been used for projection

N.A.—not available

Likely levels of couples effectively protected

5.5 Statement 5.4 shows the percentage of couples in reproductive age group effectively protected against conception during various years.

Statement 5.4 : Percentage of couples effectively protected by various methods of family planning from 1966—67 to 1983—84

| Year | Percentage of couples effectively protected against conception |
|----------|--|
| 1 | 2 |
| 1966—67 | 4.1 |
| 1967—68 | 6.0 |
| 1968—69 | 7.1 |
| 1969—70 | 8.9 |
| 1970—71* | 9.9 |
| | (10.6) |
| 1971—72 | 12.4 |
| 1972—73 | 14.7 |
| 1973—74 | 14.9 |
| 1974—75 | 15.0 |
| 1975—76 | 17.1 |
| 1976—77 | 23.7 |
| 1977—78 | 22.6 |
| 1978—79 | 22.4 |
| 1979—80 | 22.3 |
| 1980—81 | 22.7 |
| 1981—82 | 23.7 |
| 1982—83 | 25.9 |
| 1983—84 | 28.0 (anticipated) |

Source :— 1966—68 to 1970—71 : Based on Family Welfare Planning Year Book 1972—73
1970—71 to 1981—82 : Family Welfare Programme in India : Year Book 1981—82

*Figures for 1970—71 onwards are based on number of eligible couples estimated on the basis of 1971 census. The figures for previous years are based on estimates prepared at that time. Both the set of figures are presented for 1970—71. The figure of 1970—71 based on 1971 census figure is 10.6.

5.6 Starting from a level of 4.1 per cent couples effectively protected in 1966—67, a level of 28.0 per cent has been reached in 1983—84. In other words, 23.9% of the couples have been additionally protected during the last 17 years.

5.7 A further analysis of the statement presented shows that during 1966—71 on an average the couples protected increased by 1.4 per cent per annum. During 1971—76 the couples protected increased again on an average by 1.3%. During the years 1976—84 also the percentage of couples protected has increased by an average of 1.36 per cent. It would thus be seen that an

average increase of 1.3 per cent per annum in the percentage of couples effectively protected seems to be in tune with the past trends. We may reasonably hope that the tempo would be maintained in the future also. This would imply that by 2001 about 50.1 per cent of the couples in the reproductive age group may be protected against conception, if the past tempo of family planning is maintained. Even this modest goal would require a shift in emphasis from sterilisation to other methods. As observed by the Working Group on Population Policy set up by the Planning Commission any future reduction in fertility would imply a considerable shift in family size norms currently prevalent and motivating the hard core of eligible couples for family planning especially for spacing methods. Another factor would be the increasing number of females in the reproductive age group due to higher levels of fertility which prevailed in the past or the demographic backlash.

5.8 It has been accepted by the Government that our goal must be to reach a net reproduction rate (NRR) of one by the year 2001. It has been estimated that to achieve this goal, 60 per cent of the couples in the reproductive age group 15-44 would have to be effectively protected by contraception by the year 2000.

5.9 According to the latest available statistics of couples effectively protected, upto the period 1983-84, about 28% of the couples in the reproductive age group 15-44 might have been protected. To reach the goal of NRR one by 2001, the percentage of couples effectively protected should increase at the rate of 2 per cent per annum for next 16 years.

5.10 Statement 5.5 shows the targets to be covered by selected years to reach the goal of NRR=1. The targets were prepared before the 1981 census results and would need upward revision in view of the 1981 census results and the short fall in performance since 1980. The revised targets are being worked out independently by a Working Group, set up by the Department of Family Welfare and are likely to be much higher than those indicated in statement 5.5

Statement 5.5 : Targets to be achieved by selected years to reach the goal of NRR=1 at national level

(in millions)

| years | High priority sterilisation | | | | Medium priority sterilisation | | | | Low priority sterilisation | | | |
|---------|-----------------------------|--------|------|-----------------|-------------------------------|--------|------|-----------------|----------------------------|--------|-------|-----------------|
| | S | I.U.D. | C.C. | Total acceptors | S | I.U.D. | C.C. | Total acceptors | S | I.U.D. | C.C. | Total acceptors |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 1981-82 | 4.66 | 1.87 | 2.80 | 9.32 | 3.29 | 3.38 | 3.38 | 9.96 | 2.12 | 4.24 | 4.24 | 10.60 |
| 1985-86 | 5.07 | 2.03 | 3.04 | 10.14 | 4.72 | 4.72 | 4.86 | 14.30 | 3.99 | 7.99 | 7.09 | 19.97 |
| 1990-91 | 6.12 | 2.45 | 3.67 | 12.24 | 5.79 | 5.79 | 5.96 | 17.54 | 5.21 | 10.43 | 13.43 | 26.07 |
| 1995-96 | 6.88 | 2.75 | 4.13 | 13.76 | 6.56 | 6.56 | 6.75 | 19.88 | 6.01 | 12.01 | 12.01 | 30.03 |
| 2000-01 | 6.72 | 2.69 | 4.03 | 13.44 | 6.50 | 6.50 | 6.70 | 19.70 | 6.07 | 12.15 | 12.15 | 30.37 |

Note : High priority sterilisation assumes that all new acceptors would be distributed among the three methods of sterilisation, I.U.D and C.C users in the ratio of 5 : 2 : 3 respectively, in Medium priority sterilisation in the ratio 1 : 1 : 1 and in low priority sterilisation in the ratio 1 : 2 : 2.

'S' Stands for sterilisations.

Source : Report of the Working Group on Population Policy.

5.11 It is seen that to achieve the targets, number of sterilisations and IUD's have to be increased sharply. While emphasis on sterilisation would no doubt continue to be important, it may be difficult to motivate more and more couples who would be younger in age in a sustained manner to sterilisation. The emphasis has, therefore, to shift to IUD and other conventional contraceptives. However, number of IUDs insertions has crossed a million mark only recently i.e., in 1982-83, 1983-84. To achieve the goal of NRR=1, by 2001, about 4.86 million IUDs have to be accepted by 1985-86, even if Medium priority sterilisation is to be assumed.

5.12 Statement 5.6 presents the percentage of couples effectively protected, the average annual increase in the percentage of couples effectively protected and the likely level of the couples protected that will be attained by the year 2000 based on performance since the 1970s. In estimating the level likely to be attained by 2000 four different growth rates have been assumed. The first relates to the period 1972-75, the second to the period 1972-76, the third to the period 1980-83 and the fourth to the 11 year period 1972-83. The periods from 1976-80 have not been considered since these years are subjected to extra-ordinary fluctuations in the percentage of couples effectively protected.

5.13 It is seen from the statement 5.6 that except in Maharashtra in no other state the couples effectively protected has increased on an average over 2 per cent during the last 11 years.

5.14 In States of Bihar, Rajasthan, Uttar Pradesh which constitute respectively 10.21, 4.99 and 16.21 per cent of the population of India in 1981, the improvements in the percentage of couples effectively protected have been of the order of 0.7, 0.9 and 0.6 per annum only during the last 11 years and the levels of couples effectively protected as on 1983 were as low as 13.7 per cent, 15.7 per cent and 13.1 per cent respectively. Even, under the most favourable rate of growth they will only reach a level of 25.6 per cent, 31.0 per cent and 35.2 per cent by the year 2000 as against the targeted figure of 60 per cent in the States. To reach a target of 60 per cent couples effectively protected by the year 2000 in these States the improvement per annum has to be more than 2.5 per cent in the next 17 years. In the States of Andhra Pradesh, Gujarat, Haryana, Kerala, Maharashtra, Punjab and Tamil Nadu which have been designated as group 'A' States by the Working Group on Population Policy, the couples effectively protected has to reach a level of 60 per cent by the year 1990. If past trends are any indication this is not likely to be reached in the State of Andhra Pradesh even by the year 2000.

5.15 These average annual increases have been applied to the percentage of couples effectively protected in the year 1983 to obtain the likely levels by the year 2000. In deciding the likely level, the growth rate which gives the highest couples effectively protected has been assumed, subject to the condition that in no State will the percentage of couples protected exceed 68 per cent. This is based on the assumption that the best performance of past years would be reflected for next 17 years. The figure of 68 per cent is slightly arbitrary. It is pertinent to point out that the Working Group on Population Policy had recommended that once a level of NRR of one is reached it may remain at the same level, which would mean a level of 60% couples effectively protected. The maximum percentage likely to be reached has been presented in bold type in Statement 5.6

5.16 The weighted average of the projected percentage of couples effectively protected with the proportion of females likely to be married in the age group 15-44 by the year 2000 indicates that the couples effectively protected could reach a level of 48 per cent only by 2000 in these 14 States taken together.

5.17 As against this the level of 48.8 per cent by 2000 has been assumed in the projection in the hope that faster improvement may be possible.

Statement 5.6 : Percentage of couples effectively protected, the average annual increase and the likely levels to be reached by 2000.

| State | Couples effectively protected | | | | | Average annual increase (%) of couples effectively protected | | | | Likely levels to be reached by 2000 on the assumption that of G R observed continues | | | |
|----------------|-------------------------------|------|------|------|------|--|-----------|-----------|-----------|--|-----------|-----------|-----------|
| | 1972 | 1975 | 1976 | 1980 | 1983 | 1972-1975 | 1972-1976 | 1980-1983 | 1972-1983 | 1972-1975 | 1972-1976 | 1980-1983 | 1972-1983 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Andhra Pradesh | 14.0 | 18.3 | 19.3 | 26.7 | 28.4 | 1.4 | 1.3 | 0.6 | 1.3 | 52.2 | 50.5 | 38.6 | 50.5 |
| Bihar | 6.1 | 6.7 | 8.2 | 12.3 | 13.7 | 0.2 | 0.5 | 0.5 | 0.7 | 17.1 | 22.2 | 22.2 | 25.6 |
| Gujarat | 17.1 | 20.4 | 23.5 | 32.8 | 36.9 | 1.1 | 1.6 | 1.4 | 1.8 | 55.6 | 64.1 | 60.7 | 67.5 |
| Haryana* | 16.1 | 24.2 | 30.4 | 30.3 | 31.5 | 2.7 | 3.6 | 0.4 | 1.4 | 77.4 | 92.7 | 38.3 | 55.3 |
| Karnataka | 9.5 | 13.5 | 15.0 | 22.9 | 26.7 | 1.3 | 1.4 | 1.3 | 1.6 | 48.8 | 50.5 | 48.8 | 53.9 |
| Kerala | 18.3 | 21.1 | 25.5 | 29.4 | 33.5 | 0.9 | 1.8 | 1.4 | 1.4 | 48.8 | 64.1 | 57.3 | 57.3 |
| Madhya Pradesh | 10.1 | 13.2 | 14.0 | 21.1 | 23.6 | 1.0 | 1.0 | 0.8 | 1.2 | 40.6 | 40.6 | 37.2 | 44.0 |
| Maha-rashtra* | 17.4 | 25.1 | 30.3 | 35.2 | 40.0 | 2.6 | 3.2 | 1.6 | 2.1 | 84.2 | 94.4 | 67.2 | 75.7 |
| Orissa | 15.9 | 17.3 | 19.2 | 24.8 | 27.5 | 0.5 | 0.8 | 0.9 | 1.1 | 36.0 | 41.1 | 42.8 | 46.2 |
| Punjab* | 19.0 | 21.0 | 24.0 | 25.0 | 34.5 | 0.7 | 1.2 | 3.2 | 1.4 | 46.4 | 54.9 | 88.9 | 58.3 |
| Rajasthan | 5.5 | 7.2 | 8.2 | 13.3 | 15.7 | 0.6 | 0.7 | 0.8 | 0.9 | 25.9 | 27.6 | 29.3 | 31.0 |
| Tamil Nadu | 15.4 | 20.4 | 23.1 | 28.6 | 28.4 | 1.7 | 1.9 | ... | 1.2 | 57.3 | 60.7 | 28.4 | 48.8 |
| Uttar Pradesh | 6.1 | 9.9 | 9.4 | 11.6 | 13.1 | 1.3 | 0.8 | 0.5 | 0.6 | 35.2 | 26.7 | 21.6 | 23.3 |
| West Bengal | 9.3 | 12.2 | 13.0 | 22.0 | 25.7 | 1.0 | 0.9 | 1.2 | 1.5 | 42.7 | 41.0 | 46.1 | 51.2 |

* Restricted to 67.5%.

5.18 It should be pertinent to emphasise that in working out these projections it has been assumed that the best performance observed in the past years would be repeated for the next 18 years.

5.19 It is in view of this that a Medium projection based on 50% protection rate by 2000—01 has also been attempted.

5.20 We may, therefore, project the population under three assumptions namely High, Medium and Low according to the likely levels of fertility. Under 'High' couples to be effectively protected would remain at 28% by the year 2001. Under 'Medium' 50% of the couples would be effectively protected by the year 2001 and under 'Low' 62% of the couples would be effectively protected by the year 2001.

5.21 The anticipated level of couples effectively protected under various assumptions may be as under :—

Statement 5.7 : Likely levels of percentage of couples effectively protected

| Terminal Year | High | Medium | Low |
|---------------|------|--------|------|
| 1 | 2 | 3 | 4 |
| 1983—84 | 28.0 | 28.0 | 28.0 |
| 1985—86 | 28.0 | 30.6 | 32.0 |
| 1990—91 | 28.0 | 37.1 | 42.0 |
| 1995—96 | 28.0 | 43.6 | 52.0 |
| 2000—01 | 28.0 | 50.1 | 62.0 |

Likely levels of fertility

5.22 The general marital fertility rate in 1980 may be estimated around 204. On this basis the general marital fertility rate in various years may be roughly estimated, making use of the proportion of couples likely to be protected. Multiplying these by the extrapolated proportion of females married in the age group 15—44, we may estimate the likely levels of general fertility rate for various years on the assumption that there is likely to be one year gap between couples effectively protected and the fall in fertility. These may form the basis of fertility assumptions. Statement 5.8 presents the relevant rates.

Statement 5.8 : Estimated levels of general and marital fertility rates by various years under alternate assumptions

| Year @ | General marital fertility rate | | | Estimated percentage of married Females in age group 15—44 | General fertility rate | | |
|--------|--------------------------------|--------|-----|--|------------------------|--------|-----|
| | High | Medium | Low | | High | Medium | Low |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1984 | 189 | 189 | 189 | 79.45 | 150 | 150 | 150 |
| 1987 | 189 | 182 | 179 | 78.43 | 148 | 143 | 140 |
| 1992 | 189 | 165 | 152 | 76.72 | 145 | 127 | 117 |
| 1997 | 189 | 148 | 126 | 75.01 | 142 | 111 | 95 |
| 2002 | 189 | 131 | 100 | 73.30 | 139 | 96 | 73 |

@ As on 1st March

NOTE : Cols. 2, 3 and 4 were calculated as follows :

$$\frac{\text{GMFR in 1980} \times (1 - \text{proportion of couples likely to be protected in selected years})}{(1 - \text{proportion of couples protected in 1979})}$$

5.23 The above are only a set of assumptions. We may have to review the performance of family planning from time to time. If the percentage of couples protected turn out to be very much different from any of these paths, the projection will have to be revised accordingly. It may be worthwhile to repeat the exercise one year before the eighth plan beginning in 1989.