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Pace of Fertility Decline and Prospects for Population Stabilisation in Andhra Pradesh

Introduction

THE State of Andhra Pradesh has attracted the attention of demographers and development planners in recent years for two main reasons. First, the pace of fertility transition in the State has been fairly rapid during the recent years. Although the mechanisms of fertility decline have not been fully investigated, the fact remains that a significant fertility decline has occurred in the State despite slow progress in socio-economic development. Thus, the State of Andhra Pradesh defies the conventional wisdom that socio-economic development is necessary for rapid fertility decline. Second, the Government of Andhra Pradesh takes the pride of having been the first State Government to formulate a State Population Policy. The release of the policy document in 1998 underscores the Government's commitment for finding solutions to population problems of the State.

With an estimated population of 74 million in mid-1998, constituting about 8 per cent of India's population, Andhra Pradesh is the fifth most populous State in India. In terms of land area also, Andhra Pradesh is the fifth largest State in the country. The density was 242 (persons per sq km) for the State as compared to 274 for the country and the state ranked tenth among the major states in this respect. On several socio-economic indicators like literacy, urbanisation, industrialization, female status, female age at marriage, infant mortality and income level, the State presents a picture of sluggish progress.

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The pattern of population growth in Andhra Pradesh since the beginning of this century is similar to that of the country as a whole. The population of the State has more than doubled its size, from 31.1 million in 1951 to 66.5 million in 1991. The net addition to State's population during the decade 1981-91 was 13 million as compared to a net addition of 10 million during the previous decade 1971-81. The State currently adds about a million people annually. At this rate of increase, the population of Andhra Pradesh is expected to reach 135 million by the year 2040, by which time India will have the distinction of being the most populous nation in the world.

These facts, however, conceal the changes in the demographic scenario that have occurred in recent years, A study of the trends in such demographic variables as mortality, fertility, nuptiality and age structure would reveal the dynamics of population growth. Available knowledge strongly suggests that some of the important demographic characteristics of Andhra Pradesh have undergone significant changes during the last two decades. Using available information from the Census, Sample Registration System (SRS) and demographic sample surveys, this paper examines the pace of fertility transition in Andhra Pradesh since Independence. The prospects of achieving a sustained fertility decline in the State are assessed in light of demographic changes that have taken place in recent years.

Trends in Population Growth

While the population of India grew at 0.56 per cent per annum during the decade 1901-11, the population of Andhra Pradesh grew at a much higher rate of 1.2 per cent per annum during this decade. In the following decade 1911-21, a negative growth was recorded and the State witnessed a marginal decline in population size. In fact, during this decade a marginal decline in population size was noticed in a number of major States and also for the country as a whole. The outbreak of influenza epidemic in 1918-19 throughout the country which took a heavy toll of life was the main reason for decline in population during this decade. In the next two decades 1921-41, the growth rate remained constant at 1.2 per cent a year. With a continuous fall in mortality, there was a gradual acceleration in population growth in the subsequent decades. The annual growth rate increased sharply from 1.45 per cent per annum during 1951-61 decade to 1.90 per cent during 1961-71 decade. Although the growth rate continued to increase in the next two decades, the rate of increase has slowed down.

A comparison of the growth of population in Andhra Pradesh with that of India reveals some interesting features. The State recorded consistently a lower rate of population growth during the decades from 1951-61 to 1971-81 as compared to India. However, during the last decade 1981-91, the State had shown slightly a higher growth rate (2.17 per cent) than all India (2.14 per cent). Another important feature that may be noted from the results of 1991 census is that all the Southern States (with the

exception of Andhra Pradesh) had shown appreciable reductions in their growth rates between 1971-81 and 1981-91. The average annual growth rate declined from 1.77 per cent to 1.31 per cent in Kerala, from 2.39 per cent to 1.88 per cent in Karnataka and from 1.63 per cent to 1.39 per cent in Tamil Nadu. But in the case of Andhra Pradesh the growth rate has slightly increased to 2.17 per cent in 1981-91 decade from 2.08 in the earlier decade.

The apparent failure of Andhra Pradesh's rate of population growth to register a decline in the 1980s has created concern among demographers and planners. The fertility impact of the family welfare programme and the quality of family planning acceptor data were questioned. The failure of the growth rate to register a decline does not necessarily mean that fertility has not declined. Although the rate of population growth is a useful measure of population dynamics, it is a poorer indicator to reveal the changes in fertility and mortality. It is quite possible that both fertility and mortality could have declined at the same magnitude as to keep the growth rate unaltered. It is, therefore, necessary to examine the trends in fertility and mortality for assessing the fertility impact of the family welfare programme and mortality impact of public health programme. In the sections to follow, an analysis of the available data from secondary sources is presented to examine the fertility trends in the State.

Fertility Transition

Trends in Crude Birth Rate

Prior to 1961, the level of fertility in India was high and remained virtually constant. Our knowledge on the level of fertility is sketchy for this period because of paucity of information on important demographic variables. Efforts to understand the level of fertility in the Indian sub-continent were made by demographers using the census age-sex data for different decades from 1901-11 to 1931-41. Although much credibility cannot be attached to these estimates because of limitations of data quality and methods of estimation, it may be noted that the Indian birth rate did not exceed 50 per 1000 population at the beginning of this century (Davis, 1951). All the regions in India must have had the same level of fertility during this period since contraceptive use was then negligible and reproductive behaviour was mainly governed by socio-cultural factors.

Some indirect estimates of birth rate based on census age data for the decades 1941-51 to 1961-71 are available for the State of Andhra Pradesh. They indicate that the birth rate during 1941-51 decade was about 43. It declined to 40 during 1951-61 and to 34.9 during the subsequent decade 1961-71 (Ramachandrudu and Subrahmanyam, 1994).

From 1970 onwards, we have reasonably acceptable estimates of birth rate from SRS and they indicate that the birth rate in Andhra Pradesh has been declining steadily since mid-1970s. However, the pace of decline in the birth rate has not been uniform throughout. It was rather slow in the 1970s and early 1980s but since mid-1980s, there

has been an acceleration in the pace of decline. A linear regression fitted to the birth rate for the 17-year period 1970-86 does not give a very close fit ($R^2 = 0.71$). If we consider the post-Emergency period (1977-86), a linear regression of CBR on time is found to give a poor fit with R^2 value reduced to 0.54, as there was no significant trend in the birth rate during that period. However, a linear regression fitted to the birth rate for the period 1986-97 gives a close fit with R^2 value of 0.87, indicating a significant trend in the birth rate during the period. The CBR declined from 31.6 in 1986 to 22.5 in 1997, a 32 per cent decline in 11 years. In 1997, the latest year for which SRS estimates are available, the CBR was 23.1 in the rural areas and 20.5 in the urban areas, giving a rural-urban difference of 2.6. The natural growth rate (NGR) which was hovering around 20 per 1000 population between 1980 and 1987, declined steadily to reach 14.1 in 1997. The corresponding figures for the States of Karnataka, Kerala and Tamil Nadu were 15.1, 11.7 and 11.0, respectively (Registrar General, India, 1998).

Trends in Total Fertility Rate

Besides the birth rate, sufficient evidence is available to show that fertility, measured in terms of total fertility rate (which is a better measure of fertility than the CBR) has declined significantly in Andhra Pradesh during the late 1980s and early 1990s. For the period 1961-81, some indirect estimates of TFR derived from census age data are available (Rele, 1987). From 1980 onwards time series estimates of TFR for India and its States are available from SRS.

For the period 1961-71, fertility in Andhra Pradesh seems to have remained more or less stable at around a total fertility rate of 5.5 per woman. The period around 1966 seems to have been the turning point in fertility transition. The pace of decline in fertility accelerated, with an estimated TFR of 5.15 in 1971-76 and 4.45 in 1976-81. The fertility remained almost constant at around a TFR of 3.9 for four years from 1981 to 1984 and then it declined steadily in the next 12 years to reach 2.5 in 1996 (Table 1). A smooth declining trend in fertility over time is observed if TFRs based on three year moving average for the period 1982-84 to 1994-96 are considered (Fig. 1). The tempo of decline in fertility has been relatively fast during the 10-year period 1986-96 as compared to the 15-year period 1981-96. Both rural and urban areas have shown fertility declines of the same magnitude during 1986-96. While fertility in urban areas has reached replacement-level, fertility in rural areas is about 28 per cent above the replacement level.

Table 2 provides trends in age pattern of fertility during 1971-96. The fertility rate in every age group, 15-19 to 45-49 years has shown a consistent declining trend over time. Both rural and urban areas have shown declines in fertility. The age specific fertility rates follow the expected bell-shaped pattern. The peak fertility was observed for the 20-24 aged group. Fertility rates decline sharply after age 25 reaching extremely low levels for women aged 40-44 and 45-59.

TABLE 1 : TRENDS IN TOTAL FERTILITY RATE, 1961-96, ANDHRA PRADESH

<i>Year</i>	<i>Total Fertility Rate</i>			
	<i>Total</i>	<i>Rural</i>	<i>Urban</i>	<i>Rural/urban Ratio</i>
Census Based Estimates				
1961-66	5.51	NA	NA	-
1966-71	5.41	NA	NA	-
1971-76	5.15	NA	NA	-
1976-81	4.45	NA	NA	-
SRS Estimates				
1981	3.95	4.18	3.05	1.37
1982	3.92	4.16	3.11	1.34
1983	3.91	4.14	3.15	1.31
1984	3.98	4.13	3.47	1.19
1985	3.70	3.81	3.33	1.14
1986	3.84	4.08	3.11	1.31
1987	3.65	3.82	3.08	1.24
1988	3.26	3.38	2.84	1.19
1989	3.11	3.24	2.65	1.22
1990	3.10	3.24	2.63	1.23
1991	2.96	3.08	2.52	1.22
1992	2.80	2.93	2.34	1.25
1993	2.73	2.81	2.47	1.14
1994	2.65	2.74	2.41	1.14
1995	2.73	2.88	2.32	1.24
1996	2.54	2.70	2.10	1.28
Per cent annual decline				
in TFR, 1981-96	2.38	2.36	2.08	
Per cent annual decline				
in TFR, 1986-96	3.39	3.38	3.25	

NA . Not available

SOURCES: The census based estimates of TFR for 1961-66 to 1976-81 are taken from Rele (1987). The estimates of TFR from 1981 onwards are taken from SRS Bulletins for various years.

Current fertility in Andhra Pradesh is characterised by a substantial amount of early childbearing : 23 per cent of total fertility is accounted for by births in the age group 15-19; 88 per cent of births occur to women under 30 years of age. The mean age at childbearing (MAC) has declined steadily from 27.6 years in 1971 to 23.8 years in 1996. Both rural and urban areas showed a consistent declining trend in MAC over this period. The decline in MAC is 3.8 years for rural areas and 3.6 years for urban areas during 1971-96 period. The downward trend in MAC indicates a shift in the age pattern of reproduction with a significant proportion of births occurring among younger women (Table 2).

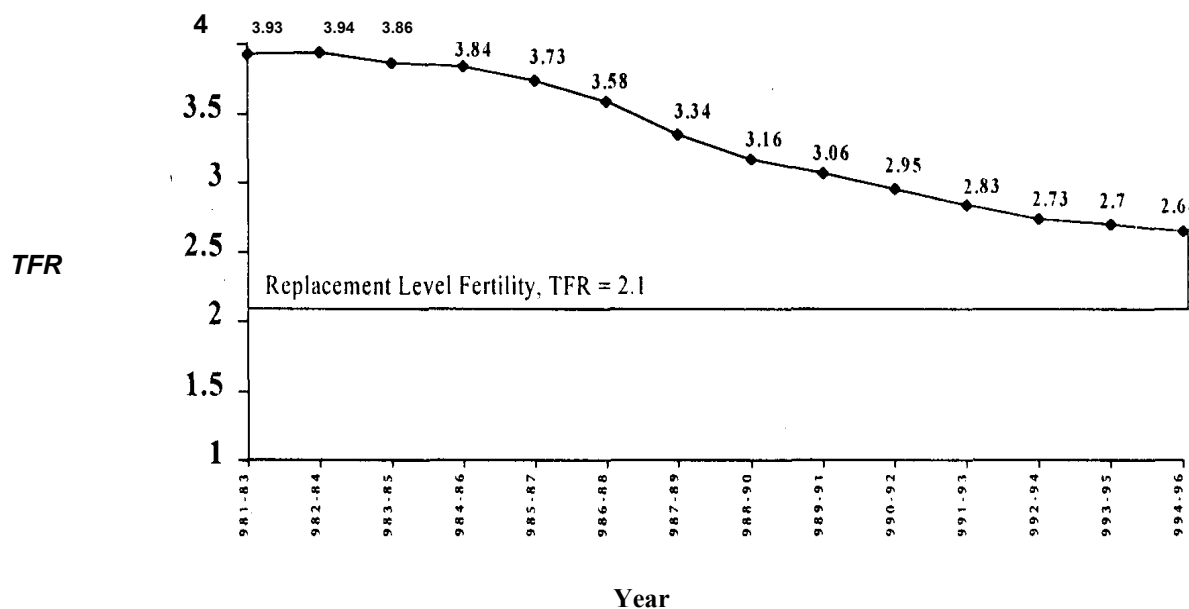


Fig. 1. Trends in TFR (Three Year Moving Average), 1981-96, Andhra Pradesh

Incidence of Higher Order Births

Evidence of fertility decline can also be obtained by examining the trends in the incidence of higher order births. The change in the percentage of higher order births, of order 4 and above in total births, that carries considerable health risk to the mother and child, is a good indicator of fertility change and also to assess the overall fertility impact of contraceptive prevalence. Since the family welfare programme in high fertility countries is primarily aimed at reducing the higher order births, changes in the proportion of higher order births over a period of time can be expected to reflect changes in the fertility levels. When fertility declines from high to low level, the proportions of lower order births are expected to increase as a result of reduction in higher order births.

Table 3 provides SRS data on the distribution of births by order of birth for selected years from 1972 to 1996. A steady declining trend in the percentage of higher order births during the period 1972-96 is observed. For instance, the percentage of births of order 5 and above has declined from 27.7 in 1972 to 12.6 in 1984 and further to 3.6 in 1996. Likewise, the percentage of births of order 4 and above has declined from 42.9 in 1972 to 24.3 in 1984 and further to 9.9 in 1996. As expected, the percentage of first order births has increased from 23 in 1972 to 40.1 in 1996 and that of second order births from 18.3 to 32.3 during the period. The change in the distribution of births by order of birth is observed both in rural and urban areas. The declining trend in the proportion of higher order births during the period 1972-96 is another piece of evidence of decline in fertility.

A scrutiny of data given in Table 4 reveals that the rate of decline in the proportion of higher order births is higher during the recent period 1991-96 as compared to earlier periods 1984-96 and 1972-84. There has been an acceleration in the tempo of reduction in fertility in late 1980s and early 1990s as compared to 1970s. The rate of decline in

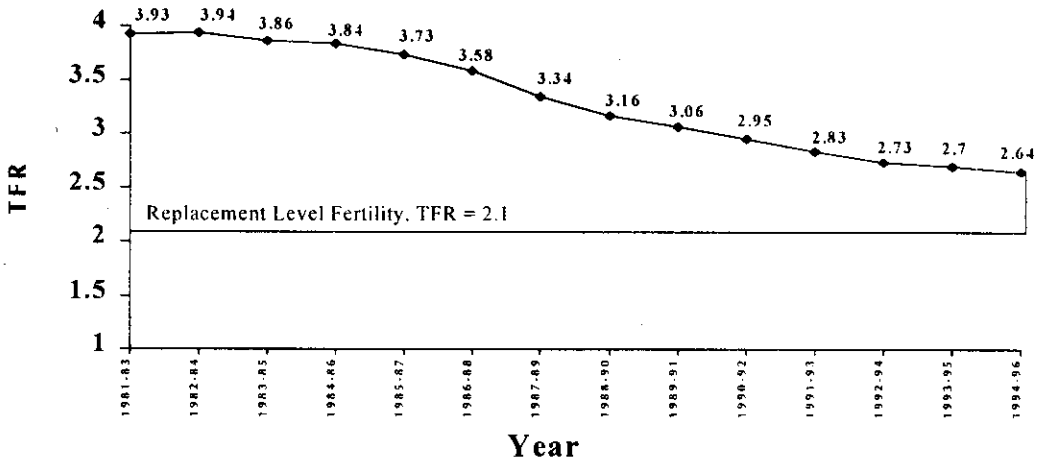


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TABLE 2 : TRENDS IN AGE PATTERN OF FERTILITY, 1971-96, ANDHRA PRADESH

Age Group (years)	Age Specific Fertility Rates per 1000											
	Total				Rural				Urban			
	1971	1981	1991	1996	1971	1981	1991	1996	1971	1981	1991	1996
15-19	145.9	122.3	121.5	119.3	156.2	131.1	133.0	136.3	104.2	86.7	80.0	71.7
20-24	246.2	234.7	217.9	221.5	248.1	244.9	218.8	232.4	238.1	200.6	215.0	191.7
25-29	229.9	195.9	140.0	105.7	226.2	206.8	145.3	105.1	245.4	158.5	123.3	107.3
30-34	153.8	124.6	67.1	43.2	150.3	133.1	70.8	44.8	172.9	92.5	55.1	38.7
35-39	110.3	73.7	28.6	14.4	115.1	79.0	29.9	16.6	88.1	49.0	23.7	7.5
40-44	37.5	28.9	12.3	4.4	39.6	31.7	13.5	4.9	24.6	16.0	7.7	2.5
45-49	15.7	9.7	4.3	0.4	15.0	10.3	4.9	0.5	19.0	7.1	2.0	0.0
TFR	4.70	3.95	2.96	2.54	4.75	4.18	3.08	2.70	4.46	3.05	2.53	2.10
MAC	27.6	27.0	25.1	23.8	27.5	27.0	25.1	23.7	27.8	26.6	25.1	24.2

TFR : Total Fertility Rate per 1000 Women

MAC : Mean Age at Childbearing

Sources : Registrar General, *Sample Registration System*, various years.

TABLE 3 : PERCENTAGE DISTRIBUTION OF LIVE BIRTHS BY ORDER OF BIRTH, 1972-96, ANDHRA PRADESH

Order of Birth	1972	1978	1984	1991	1996
Rural					
1	22.8	24.7	31.0	38.5	39.1
2	18.8	22.4	25.5	28.8	33.0
3	15.3	18.0	19.6	18.3	18.1
4+	43.1	34.9	23.9	14.4	9.8
5+	28.2	21.3	12.0	6.0	3.7
All	100.0	100.0	100.0	100.0	100.0
Urban					
1	23.8	28.8	30.3	35.4	43.6
2	16.1	24.2	25.0	29.9	29.8
3	17.8	17.7	19.2	17.0	16.0
4+	42.3	29.3	25.5	17.7	10.6
5+	26.0	18.4	14.4	9.3	3.8
All	100.0	100.0	100.0	100.0	100.0
Total					
1	23.0	25.7	30.8	37.6	40.1
2	18.3	22.8	25.4	29.1	32.3
3	15.8	17.9	19.5	17.9	17.7
4+	42.9	33.6	24.3	15.4	9.9
5+	27.7	20.6	12.6	7.0	3.6
All	100.0	100.0	100.0	100.0	100.0

Sources: Registrar General, India, *Sample Registration System*, various years.

TABLE 4 : PERCENTAGE DECLINE IN THE INCIDENCE OF HIGHER

Hirth Order	ORDER	BIRTHS, 1972-96, ANDHRA PRADESH		
		Average Annual Change (%)		
		1972-84	1984-96	1991-96
4+	Rural	3.7	4.9	6.4
	Urban	3.3	4.9	8.0
	Total	3.6	4.9	7.1
5+	Rural	4.8	5.8	7.7
	Urban	3.7	6.1	11.8
	All	4.5	6.0	9.7

Source: Computed from the flumes given in Table 3.

the percentage of higher order births (order 4 and above) has increased from 3.6 per cent during 1972-84 to 4.9 per cent in 1984-96 and further to 7.1 per cent during 1991-96. Rural areas have shown a slightly higher rate of decline in the proportion of higher order births than urban areas, indicating that rural fertility has declined faster than urban fertility (Table 4).

There exists a high degree of relationship between the incidence of higher order births and fertility level of the population (Srinivasan, 1998). When 15 major States of India are considered, the correlation coefficient between the proportion of first order births and TFR in 1996 is 0.93 and that between the proportion of higher order births (birth order 4 and above) and TFR in 1996 is 0.94. For a given level of TFR, we can estimate the corresponding expected value of the percentage of higher order births using the regression equation ($TFR = 1.36 + 0.09 B$, $n = 15$ and $R^2 = .89$) between percentage of births of birth order 4+ and TFR. In order to reach replacement-level fertility, the percentage of births of order 4+ should be reduced to about 8 from the current level of 10 in Andhra Pradesh. In Tamil Nadu where replacement level fertility has already been reached ($TFR = 2.06$), the percentage of births of order 4 and above was 7.7 in 1996.

District Level Estimates of Fertility

Indirect estimates of CBR and TFR based on reverse-survival procedure have been worked out for the districts of Andhra Pradesh for the periods 1974-80 and 1984-90 (Mari Bhat, 1996). Taking all the 23 districts of Andhra Pradesh, a linear regression was fitted using the district level estimates of CBR in 1984-90 and couple protection rate in 1986. Similarly, a linear regression was fitted using the district level estimates of TFR in 1984-90 and couple protection rate in 1986. The following regressions were obtained:

$$\mathbf{CBR = 37.73 - 0.2752 (CPR)}$$

$$\mathbf{R^2 = 0.51; TV = 23}$$

$$\mathbf{TFR = 4.94 - 0.0487 (CPR)}$$

$$\mathbf{R^2 = 0.52; N = 23}$$

Using the above regression equations, we have worked out the district level estimates of CBR and TFR in 1996, using the estimates of couple protection rate in 1995. These estimates are given in Tables 5 and 6.

The estimates of CBR in 1996 vary from the lowest value of 19.1 in West Godavari district to the highest value of 27.0 in Ranga Reddy district. In most of the districts in Coastal region, the CBR ranges between 19 and 22. All the districts in Rayalaseema and Telangana regions (with the exception of Khammam and Nalgonda) have **CBR** above the state average of 22.8 (Table 5).

The pace of fertility decline is not uniform across the districts of the State. The districts in the coastal region have experienced a faster pace of fertility transition as compared to districts in the other two regions. According to estimates of TFR given in Table 6 replacement-level fertility ($TFR = 2.1$) has already been reached in the districts

TABLE 5 : ESTIMATES OF CBR FOR THE DISTRICTS OF ANDHRA PRADESH, 1974-80, 1984-90 AND 1996

<i>District</i>	<i>Estimates</i>	<i>of CBR</i>	<i>Estimate of CBR</i>	<i>in 1996</i>
	<i>1974-80</i>	<i>1984-90</i>	<i>Regression estimate</i>	<i>Adjusted estimate</i>
(1)	(2)	(3)	(4)	(5)
Srikakulam	34.2	29.2	21.3	20.5
Vizianagaram	34.0	28.0	22.7	21.8
Visakhapataam	32.7	26.8	21.8	21.0
East Godavari	31.9	27.5	21.7	20.9
West Godavari	31.9	26.4	19.8	19.1
Krishna	29.4	25.8	20.4	19.6
Guntur	29.8	24.9	21.0	20.3
Prakasam	33.1	26.7	22.0	21.2
NeUore	30.7	25.0	22.7	21.9
Chittoor	31.6	25.0	24.0	23.1
Cuddapah	32.4	25.5	25.3	24.4
Anantapur	37.4	30.3	25.4	24.5
Kumool	36.5	32.6	24.8	23.9
Mahabubnagar	39.6	33.7	27.4	26.5
Ranga Reddy	38.7	33.4	28.0	27.0
Hyderabad	30.2	26.5	24.0	23.1
Medak	35.1	31.2	27.9	26.9
Nizamabad	33.4	28.3	25.7	24.8
Adilabad	36.3	32.3	27.4	26.4
Karimnagar	31.4	26.5	25.0	24.2
Warangal	36.1	29.3	24.4	23.5
Khammam	36.1	29.7	23.3	22.4
Nalgonda	36.5	30.5	23.6	22.7
State	33.5	28.2	23.6	22.8

Notes: Estimates of CBR for 1974-80 and 1984-90 given in columns (2) and (3) are taken from Man Bhat (1996). The estimates of CBR for the year 1996 given in column (4) were obtained from the values of couple protection rate in 1995 for the districts using the following regression equation:

$$\text{CBR in 1996} = 37.73 - 0.2752 (\text{CPR in 1995})$$

The regression estimates of CBR were adjusted by a correction factor (22.8/23.6) so that the adjusted CBR for the State is exactly equal to SRS estimate of 22.8 in 1996. Column (5) gives the adjusted estimates of CBR for the districts of Andhra Pradesh.

of Srikakulam, West Godavari, Krishna and Guntur in 1996, and fertility is approaching replacement level in the other five districts in the Coastal region. In the Rayalaseema

TABLE 6 : ESTIMATES OF TFR FOR THE DISTRICTS OF ANDHRA PRADESH, 1974-80, 1984-90 AND 1996

<i>District</i>	<i>Estimates of TFR</i>		<i>Estimate of TFR in 1996</i>	
	<i>1974-80</i>	<i>1984-90</i>	<i>Regression estimate</i>	<i>Adjusted estimate</i>
Srikakulam	4.6	3.5	2.03	2.10
Vizianagaram	4.5	3.2	2.27	2.35
Visakhapatnam	4.1	2.9	2.12	2.20
East Godavari	4.2	3.2	2.11	2.19
West Godavari	3.9	2.9	1.76	1.82
Krishna	3.6	2.9	1.87	1.94
Guntur	3.7	2.7	1.98	2.05
Prakasam	4.4	3.0	2.15	2.23
Nellore	3.8	2.6	2.29	2.37
Chittoor	4.0	2.7	2.51	2.60
Cuddapah	4.2	2.8	2.73	2.83
Anantapur	5.1	3.6	2.76	2.86
Kumool	5.0	4.1	2.65	2.75
Mahabubnagar	5.5	4.2	3.12	3.23
Ranga Reddy	5.1	4.0	3.22	3.34
Hyderabad	3.6	2.9	2.51	2.60
Medak	4.8	3.9	3.19	3.31
Nizamabad	4.2	3.2	2.82	2.92
Adilabad	4.9	4.0	3.10	3.21
Karimnagai	4.2	3.2	2.69	2.79
Warangal	4.9	3.4	2.57	2.66
Khammam	4.9	3.5	2.38	2.47
Nalgonda	4.9	3.6	2.44	2.53
State	4.3	3.2	2.45	2.54

Notes: Estimates of TFR for 1974-80 and 1984-90 given in columns (2) and (3) are taken from Man Bhat (1996). The estimates of TFR for the year 1996 given in column (4) were obtained from the values of couple protection rate in 1995 for the districts using the following regression equation :

$$\text{TFR in 1996} = 4.94 - 0.0487 (\text{CPR in 1995})$$

The regression estimates of TFR were adjusted by a correction factor (2.54/2.45) so that the adjusted TFR for the State is exactly equal to SRS estimate of 2.54 in 1996. Column (5) gives the adjusted estimates of TFR for the districts of Andhra Pradesh region, current level of TFR varies between 2.6 in Chittoor district and 2.86 in Anantapur district. All the districts in Telangana region, with the exception of Khammam and

Nalgonda have TFRs higher than the State average of 2.54 (Table 6). By region, the lowest TFR is observed in the coastal region (2.12), followed by Rayalaseema region (2.75) and Telangana region (2.89) (Table 7).

All the districts were classified into four groups according to the estimated value of TFR in 1996. In Group I which consists of Srikakulam, West Godavari, Krishna and Guntur, with a combined population of 13.6 million in 1991, replacement-level fertility has been reached. In the six districts in Group II which constitute 26 per cent of the State's population, fertility is approaching replacement-level. In Group III there are nine districts with a combined population of 25.6 million, constituting about 39 percent of the State's population. The values of TFR of the districts in this group vary between 2.5 and 3.0. The four districts in Group IV, namely Mahabubnagar, Ranga Reddy, Medak and Adilabad had a combined population of 10 million in 1991. The estimates of TFR of these districts are above 3.0 (Table 8). Further reduction in fertility for the State as a whole would depend upon the pace of fertility decline in the districts of Telangana and Rayalaseema regions where the current levels of fertility are considerably higher than the State average.

TABLE 7 : ESTIMATES OF CBR AND TFR BY REGION, ANDHRA PRADESH

Region/State	Estimates of CBR			Estimates of TFR		
	1974-80	1984-90	1996	1974-80	1984-90	1996
	(1977)	(1987)		(1977)	(1987)	
Coastal Andhra	31.7	26.6	20.6	4.04	2.97	2.12
Rayalaseema	34.5	28.5	23.9	4.58	3.32	2.75
Telangana	35.3	30.1	24.7	4.69	3.58	2.89
State	33.6	28.3	22.8	4.38	3.27	2.54

Notes: 1. Coastal Andhra consists of nine districts of Srikakulam, Vizianagaram, Visakhapatnam, East Godavari, West Godavari, Krishna, Guntur, Prakasam and Nellore

2. Rayalaseema region consists of four districts of Chittoor, Cuddapah, Anantapur and Kumool.

3. Telangana region consists of eight districts of Mahabubnagar, Ranga Reddy, Hyderabad, Medak, Nizamabad, Adilabad, Karimnagar, Warangal, Khammam and Nalgouda.

Source: Computed from the figures given in Tables 5 and 6. Estimates for three regions for the period 1974-80 were obtained by taking the weighted average of the district level estimates with weights as the 1981 census population of the districts. To get the estimates of CBR and TFR for 1984-90 and 1996, the 1991 census population of the districts were taken as weights.

Trends in Contraceptive Prevalence

Since the inception of the family welfare programme, Andhra Pradesh has been performing well in promoting family planning acceptance among the eligible couples. The performance of the family welfare programme is usually assessed from the current prevalence of family planning by methods. The percentage of couples protected against

TABLE 8 : CLASSIFICATION OF DISTRICTS ACCORDING TO THE LEVEL OF TFR EN 1996

<i>Group</i>	<i>TFR</i>	<i>Districts</i>	<i>Combined population in 1991 (in 000's)</i>	<i>Percent to State population</i>
I	≤ 2.10	Srikakulam, West Godavari, Krishna, Guntur	13645	20.5
II	2.11 - 2.49	Visakhapatnam, Vizianagaram, East Godavari, Prakasam, Nellore, Khammam	17304	26.0
III	2.50 - 2.99	Chittoor, Cuddapah, Ananlhapui, Kumool, Hyderabad, Nizamabad, Karimnagar, Warangal, Nalgonda	25578	38.5
IV	3.00-3.50	Mahaboobnagar, Ranga Reddy, Medak, Adilabad	9981	15.0

the risk of conception, termed as couple protection rate (CPR) in different years by various contraceptive methods is used for assessing the performance of the family welfare programme.

The CPR in Andhra Pradesh had increased from 14.7 per cent in 1972 to 19.0 per cent in 1976. A dramatic increase of 7 percentage points in the CPR was, however, recorded in the subsequent year 1977. This large spurt in the value of CPR was mainly due to coercive measures adopted during the Emergency period to accelerate the rate of acceptance. Following the period of Emergency, the programme suffered a set-back and the percentage of protected couples declined to 25.5 in 1978. The backlash effect of the Emergency continued for some more years and this is reflected in the CPR, which remained steadily around 25 per cent till 1981. The Family Welfare Programme had fully recovered by 1991 and since then there has been a steady and consistent increase in the CPR. Between 1981 and 1988, in just 7 years, the CPR recorded a significant increase of about 14 percentage points, an annual increment of 2 percentage points. However, this tempo of increase in CPR did not sustain for a long time. In the subsequent 8 years, between 1988 and 1996, the average annual increase in CPR reduced to 1.2 percentage points. In 1995, 51 per cent of couples were protected by all methods of family planning in the State (Table 9).

Since the inception of the family welfare programme in India, sterilization has received a major thrust in the programme strategy. In Andhra Pradesh, while the couple protection rate by all family planning methods was 51 per cent in 1995, sterilization alone accounted for about 40 per cent. For the country as a whole, sterilization accounts for about 70 per cent in the overall contraceptive protection rate. Another important aspect of family welfare programme is the increasing acceptance of female sterilization since 1977. This pattern is observed for Andhra Pradesh as well as for the country as

TABLE 9 : DISTRICT LEVEL ESTIMATES OF COUPLE PROTECTION RATE (CPR), 1985-1995, ANDHRA PRADESH

<i>District</i>	<i>Couple Protection Rate (CPR)</i>					
	<i>1985</i>	<i>1987</i>	<i>1989</i>	<i>1991</i>	<i>1993</i>	<i>1995</i>
Srikakulam	34.9	41.8	47.4	50.7	55.1	59.7
Vizianagaram	33.7	41.2	48.1	52.2	47.8	54.8
Visakhapatnam	34.6	38.8	48.4	50.0	52.6	57.8
East Godavari	43.5	46.1	50.2	52.0	55.2	58.2
West Godavari	44.5	47.1	53.4	59.0	60.0	65.2
Krishna	42.2	46.7	55.0	55.4	55.9	63.1
Guntur	40.1	42.7	49.0	57.0	56.1	60.8
Prakasam	30.3	35.8	46.5	53.8	52.5	57.2
Nellore	31.3	36.3	44.8	46.9	50.6	54.5
Chittoor	33.0	33.7	39.1	43.9	41.4	50.0
Cuddapah	32.6	33.9	44.8	39.6	40.0	45.3
Anantapur	29.6	32.0	33.5	35.9	38.8	44.7
Kumool	27.3	29.7	35.5	37.4	39.8	47.0
Mahabubnagar	20.4	24.2	29.5	28.8	31.0	37.4
Ranga Reddy	21.6	28.6	32.9	26.2	29.3	35.3
Hyderabad	39.4	43.8	50.3	48.3	49.1	50.0
Medak	24.1	25.0	30.3	27.4	30.7	35.9
Nizamabad	27.2	30.6	32.7	37.2	41.7	43.6
Adilabad	20.1	21.4	22.9	23.8	28.6	37.7
Karimnagar	24.2	29.2	35.2	38.0	39.4	46.1
Warangal	29.4	32.3	37.5	40.8	45.6	48.6
Khammam	33.7	38.0	43.5	45.9	50.5	52.6
Nalgonda	26.5	30.2	39.8	43.2	47.0	51.4
State	32.2	36.0	41.8	44.3	46.1	51.2

Source: Data supplied by Conunissionerate of Family Welfare, Government of Andhra Pradesh.

a whole. In Andhra Pradesh, vasectomy acceptors among the total sterilization acceptors accounted for about 78 per cent during the 10-year period, 1960-70. During the subsequent 7 years, i.e. between 1970 and 1977, the average share of vasectomies in the total sterilizations reduced to 60 per cent. The major thrust during the Emergency period was on vasectomy. During the two-year period (1975-77), about 6.1 lakh vasectomies were performed in Andhra Pradesh which was more than the total vasectomies performed during the decade 1960-1970.

During the post- Emergency period, the family welfare programme suffered a setback and the backlash effect was more severely felt on vasectomy than on other methods.

During the period of recovery, a relative shift from vasectomy to tubectomy seemed to have developed. The share of vasectomies in the total sterilizations declined steadily during the period immediately following the Emergency and, thereafter, it declined rapidly (Srikantan and Balasubramanian, 1989). In 1996, the share of vasectomy in the total sterilizations has come down to as low as 5 per cent in Andhra Pradesh. The National Family Health Survey carried out in Andhra Pradesh in 1992 revealed that of the total current contraceptive users of any modern method of family planning (47 per cent), female sterilization accounted for 38.5 per cent, while vasectomy accounted for only 6.7 per cent in 1992. The spacing methods like IUD and condom accounted for only 1.8 per cent (PR-C, Andhra University and HPS, Bombay, 1995).

The performance of family planning varies considerably among the districts of Andhra Pradesh. The districts of Srikakulam, West Godavari, Krishna and Guntur achieved a couple protection rate of 60 per cent or above in 1995. The lowest **CPR** is observed in Ranga Reddy district (35.3 per cent) which is much below the State average of 51 per cent. In general, all the districts in the Coastal Andhra have performed well in family welfare programme. The other two regions, Rayalaseema and Telangana, are lagging behind Coastal Andhra. All the districts in these two regions with the exception of Khammam and Nalgonda have couple protection rate below the State average. The level of fertility and contraceptive acceptance are also related to socio-economic development of the region. The better developed region of coastal Andhra was able to achieve a significant reduction in fertility through substantial increase in contraceptive use.

Fertility Impact of Contraceptive Prevalance

Fertility level or the number of children ever born to women is essentially a function of age at starting of childbearing, pattern of birth spacing and age at stopping of childbearing. Therefore, a more complete understanding of the behavioural changes underlying fertility transition from natural to controlled fertility calls for an assessment of the part played by age at which reproductive behaviour begins, birth spacing and age at which childbearing is terminated (Dissanayake, 1996). In other words, nuptiality changes and marital fertility changes due to use of contraception are the two most important components governing the overall level of fertility. Although other factors like prevalence of induced abortion, duration of postpartum infecundability and prevalence of permanent sterility do have some influence on fertility, their role in accounting for a change in fertility is very minor.

Following the method used by Retherford and Rele (1989), the change in the TFR between any time interval (say between 1981 and 1991) is decomposed into two components, one due to changes in age specific proportions married and the other due to changes in age specific marital fertility rates. Each one of these two major components

TABLE 10 : RESULTS OF DECOMPOSITION OF CHANGES IN TFR, 1971-81, 1981-91 AND 1971-91

<i>Changes accounted for by</i>	<i>1971-81</i>		<i>1981-91</i>		<i>1971-91</i>	
	<i>Absolute Change in TFR</i>	<i>Relative Change (%)</i>	<i>Absolute Change in TFR</i>	<i>Relative Change (%)</i>	<i>Absolute Change in TFR</i>	<i>Relative Change (%)</i>
Nuptiality	-0.10	13.3	-0.15	15.2	-0.27	15.5
Marital Fertility	-0.65	86.7	-0.84	84.8	-1.47	84.5
Total	-0.75	100	-0.99	100	-1.74	100

Notes: The SRS estimates of TFR used for decomposition are 4.70, 3.95, 2.96 for 1971, 1981, and 1991 respectively. The age specific fertility rates from SRS and age specific proportions married women from census were used to decompose the change in TFR accounted for by nuptiality change and marital fertility change during the period. Negative changes represent declines in rates. The percentage changes are computed relatively to the total decline in TFR during the period.

is further decomposed by age. The age specific fertility rates from SRS and age specific proportions married women from census were used to decompose the change in the TFR accounted for by nuptiality change and marital fertility change during the period. The results of decomposition of changes in TFR during 1971-81, 1981-91 and 1971-91 are given in Table 10.

During 1981-91 decade, the TFR declined from 3.95 in 1981 to 2.96 in 1991. The decomposition analysis reveals that 15.2 per cent of the decline in TFR stemmed from changes in nuptiality and 84.8 per cent from changes in marital fertility. During the previous decade 1971-81, nuptiality changes accounted for 13.3 per cent, while marital fertility accounted for 86.7 per cent of the decline in the TFR from 4.7 in 1971 to 3.95 in 1981. Both in 1971-81 and 1981-91 decades, marital fertility played a more dominant role than nuptiality in accounting for decline in the overall fertility level of the population (Table 10).

Both nuptiality and marital fertility components are broken down further by age. The results are shown in Tables 11 and 12. Proportions married women in Andhra Pradesh declined at the younger reproductive ages and increased at the older reproductive ages (Table 13), so that nuptiality contributions to the change in the TFR were negative at the younger reproductive ages (15-19 and 20-24) and positive at the older reproductive ages (Tables 11 and 12). The singulate mean age at marriage (SMAM) for females increased by only 2 years from 16.2 years in 1971 to 18.2 years in 1991 (Table 13). Marital fertility declined in all ages (except 15-19 during 1981-91 decade) and the decline is of greater magnitude at the middle and older reproductive ages (Tables 11 and 12). Since nuptiality changes have been rather slow during 1971-81 and 1981-91 decades, marital fertility played a significant role in accounting for fertility decline

TABLE 11 : DECOMPOSITION OF THE CHANGE IN TFR IN AGE GROUPS, 1971-81

<i>Component</i>	<i>Age Group</i>							
	<i>All AGES (15-49)</i>	<i>15-19</i>	<i>20-2-1</i>	<i>25-29</i>	<i>3H-34</i>	<i>35-39</i>	<i>40-44</i>	<i>45-49</i>
Nuptiality	-0.10	-0.116	-0.032	-0.001	0.016	0.017	0.012	0.007
Marital Fertility	-0.65	-0.002	-0.025	-0.169	-0.162	-0.200	-0.055	-0.037
Total	-0.75	-0.118	-0.057	-0.170	-0.146	-0.183	-0.043	-0.030

Notes: See Table 10.

TABLE 12 : DECOMPOSITION OF THE CHANGE IN TFR IN AGE GROUPS, 1981-91

<i>Component</i>	<i>Age Group</i>							
	<i>All Ages (15-49)</i>	<i>15-19</i>	<i>20-24</i>	<i>25-29</i>	<i>30-34</i>	<i>35-39</i>	<i>40-44</i>	<i>45-49</i>
Nuptiality	-0.15	-0.130	-0.036	0.000	0.004	0.004	0.004	0.002
Marital Fertility	-0.84	0.126	-0.048	-0.280	-0.292	-0.230	-0.087	-0.030
Total	-0.99	-0.004	-0.084	-0.280	-0.288	-0.226	-0.083	-0.028

Notes: See Table 10.

TABLE 13 : SINOULATE MEAN AGE AT MARRIAGE (SMAM) AND AGE SPECIFIC PROPORTIONS CURRENTLY MARRIED WOMEN, 1971-1991, ANDHRA PRADESH

<i>Component</i>	<i>SMAM (years)</i>	<i>Proportions currently married women</i>						
		<i>15-19</i>	<i>20-24</i>	<i>25-29</i>	<i>30-34</i>	<i>35-39</i>	<i>40-44</i>	<i>45-49</i>
1971	16.2	0.669	0.927	0.947	0.911	0.884	0.779	0.709
1981	17.3	0.562	0.902	0.949	0.933	0.916	0.839	0.785
1991	18.2	0.455	0.874	0.949	0.942	0.933	0.875	0.840

Source: Data are drawn from Balasubramanian and Satya Sekhar (1998).

during 1971-91. A significant part of the decline in marital fertility is undoubtedly due to the effect of family welfare programme as non-programme acceptance of contraception is of lesser importance in Andhra Pradesh.

As mentioned earlier, sterilization is the major component of the family welfare programme in Andhra Pradesh which accounts for about 80 per cent of the couple

protection rate by all methods. In assessing the demographic impact of contraception, age and parity of acceptors of family planning methods are important determinants. From service statistics, data on wife's age and parity of the couples are available for sterilized couples. A scrutiny of these figures reveals that age and parity distributions of acceptors of sterilization have undergone significant downward shifts over time. The mean age of wife of vasectomy acceptors has declined from 32.0 years in 1975-76 to 27.5 years in 1994-95, while the mean age of wife of tubectomy acceptors declined from 29.8 years to 26.4 years during this period. Similarly, the parity (the number of living children at acceptance of sterilization) has also declined from 3.3 to 2.5 for vasectomy acceptors and from 3.3 to 2.7 for tubectomy acceptors (Ministry of Health and Family Welfare, Year Book 1995-96 and previous years). The National Family Health Survey carried out during 1992-93 showed that among all the major States of India, the lowest median age of wife of 24.5 years at the time of sterilization was recorded in the State of Andhra Pradesh. Because terminal methods are accepted at lower age and lower parity, the fertility impact of family welfare programme has been quite significant in Andhra Pradesh.

Future Prospects of Fertility Decline

Future prospects of fertility decline can be assessed by extrapolating the past trends in the TFR. Annual estimates of fertility and mortality for the States of India are available from SRS from 1970 onwards. However, SRS estimates of fertility and mortality are considered to be more reliable from 1981 onwards. Trend analysis of TFR in terms of log linear model on time has been used for projecting the future levels of TFR. The lowest threshold level of TFR is assumed to be 1.5. This assumption is based on the finding that in about 30 countries in the world the value of TFR in 1997 is around 1.5.

The above equation was fitted to two sets of TFR from SRS, namely the time periods 1981-96 and 1984-96. The equation fitted very well for the period 1984-96 with highly significant value of R^2 . The fitted equation is :

$$\text{Ln}(\text{TFR} - 1.5) = 0.979 - 0.073t$$

$$R^2 = 0.96, N = 13$$

The projected values of TFR for the period 1996-2020 based on fitted log linear model are given in Table 14. The assumed values of TFR in future as per demographic goals set by the Government of Andhra Pradesh are also given in the same Table for comparison (Government of Andhra Pradesh, 1997).

The projections made by log linear model indicate that replacement-level fertility (TFR = 2.1) in the State would be reached by the year 2003 and a TFR of 1.68 would be attained by 2020 (Table 14 and Fig. 2). The current level of TFR in Kerala State is 1.8, the level which Andhra Pradesh is expected to reach by 2013. The State Government,

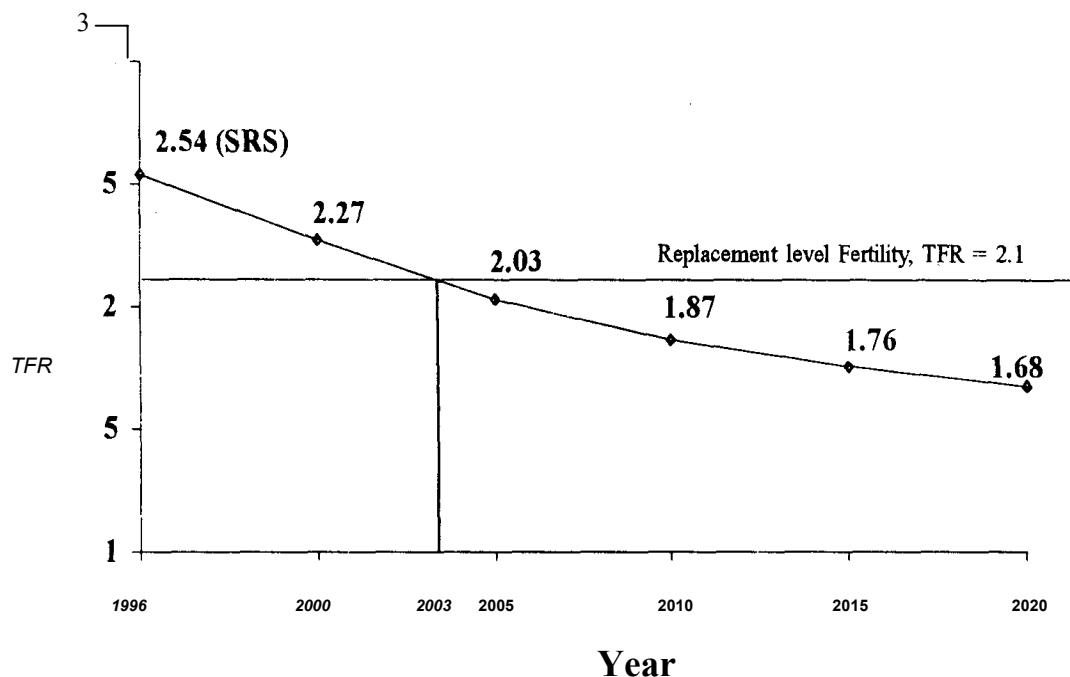


Fig. 2. Projected Levels of TFR by Log Linear Model on Time, $\ln(TFR - 1.5) = 0.979 - 0.073 t$

however, has set ambitious goals of achieving replacement-level fertility by the year 2000 and a TFR of 1.5 by 2010.

TABLE 14 : PROJECTED LEVELS OF TFR, 1996-2020, ANDHRA PRADESH

	Year					
	1996 (SRS)	2000	2005	2010	2015	2020
Based on log linear model on time	2.54	2.27	2.03	1.87	1.76	1.68
Goals set by the State Government	2.54	2.10	-	1.50	1.50	1.50

While assessing the prospects of achieving a sustained fertility decline to below replacement level, it is necessary to consider both demand for smaller families and supply of family planning services. "Demand" represents the basic determinants of fertility, namely, the socio-economic and cultural factors that promote to motivation to limit family size, while "supply" represents the necessary mechanisms through which demand gets expressed in actual behaviour (Mauldin and Berelson, 1978).

Of all the socio-economic variables affecting fertility, female education is probably the major driving force behind fertility control. The cross-country analyses indicate that throughout the world there seems to be a strong inverse correlation between the level of female education and the level of fertility. In countries where fertility is low, the level

of female literacy is invariably high. In the more developed countries, where fertility is at or below replacement level, literacy is practically universal.

The high proportion of illiterate women, a major feature of the educational situation in Andhra Pradesh, stands out clearly from the census figures. According to the 1991 census, only 33 per cent of women aged 7 and over were literate in the State. The corresponding figure in 1981 was 24 per cent. If the past trends in female literacy are any indication of the future, Andhra Pradesh would be able to achieve literacy rate of no more than 50 per cent by the year 2011, the rate that was observed for Tamil Nadu in 1991. This quantum of increase is just not sufficient to generate adequate demand for widespread acceptance of contraception to achieve a sustained fertility decline.

Another important indicator which has direct relevance to fertility reduction is mortality among infants. A sustained fertility decline cannot be achieved with high levels of infant mortality because the concept of a two-child family norm is relevant only in a relatively low mortality situation. The cross-country data indicate that infant mortality rate ranges between 4 and 23 for countries where TFR is less than or equal to 1.5. For the countries with TFR varying between 1.6 and 2.1, the IMR ranges from 4 to 39 (Table 15).

TABLE 15 : ASSOCIATION BETWEEN FERTILITY, INFANT MORTALITY AND FEMALE LITERACY

<i>TFR</i>	<i>No. of Countries</i>	<i>Infant Mortality Rate</i>		<i>Adult Female Literacy</i>	
		<i>Minimum</i>	<i>Maximum</i>	<i>Minimum</i>	<i>Maximum</i>
≤ 1.5	23	4	23	73	100
1.6 to 2.1	31	4	39	73	100
2.2 to 3.0	18	7	66	59	100
3.1 to 4.0	17	10	83	26	100
4.1 and above	59	33	195	7	80

Note: Data pertain to 148 countries with populations of a million or more in 1998. Some oil-exporting developing countries such as Kuwait, Oman, Saudi Arabia, United Arab Emirates and West Bank were excluded.

Source: Data on TFR and IMR are taken from Population Reference Bureau (1998) and data on adult female literacy rate are taken from UNICEF (1999).

For 54 countries where fertility is at or below replacement level, the minimum value of adult female literacy is 73 per cent. In other words, the cross-country data suggest that in order to have a sustained fertility decline to replacement and below replacement level, it is necessary to increase the female literacy rate to at least 73 percent and decrease infant mortality rate to below 40.

The current level of infant mortality in Andhra Pradesh (63 infant deaths per 1000 live births in 1997), although lower than the national average of 71, is much higher than

Kerala's level of 14. The pace of decline in infant mortality during the period 1984-97 has been rather slow. It declined from 78 in 1984 to 63 in 1997, a decline of 15 points in 13 years. An extrapolation using log linear model on time period 1984-96 gives an infant mortality rate of 55 in the year 2003, 48 in 2010 and 39 in 2020. This quantum of reduction in infant mortality is certainly not enough to speed up fertility decline in the State.

The experiences of Goa and Kerala indicate that the infant mortality rates were below 30 when replacement-level fertility was reached in 1987 in these States. In the case of Tamil Nadu when fertility reached replacement level in 1993, infant mortality rate was about 55, the level which Andhra Pradesh would reach by the year 2003. As far as female literacy is concerned, Tamil Nadu had a much higher level than Andhra Pradesh (51 per cent against 33 per cent in 1991).

Given the slow pace of decline in infant mortality during the recent period, the prospects of achieving rapid decline in infant mortality in the next few years do not seem bright in the absence of strong government intervention programmes. While general mortality responds rather quickly to public health measures, changes in infant mortality depend on a number of factors like the availability and accessibility of antenatal and postnatal care facilities, facilities of infant care after child birth, the level of mother's education and general socio-economic development.

The National Family Health Survey conducted in Andhra Pradesh in 1992 revealed that medical maternity care for mothers (antenatal and/or delivery care by a trained health professional) was associated with substantially lower mortality risks. Children of mothers who received no antenatal and delivery care experienced neonatal mortality that was almost twice that experienced by children whose mothers received both antenatal and delivery care. The survey also revealed that about two-thirds of deliveries occurred at home. Home deliveries were most prevalent for births whose mothers did not receive antenatal care (PRC, Andhra University and IIPS, Bombay, 1995).

Strong government interventions are needed to accelerate the tempo of decline in infant mortality in the State. Special efforts are needed to focus attention on providing antenatal care to all pregnant women, promoting institutional deliveries under medical supervision, and educating mothers on the proper management of childhood diarrhoea as well as correcting infant feeding practices. The interventions should be district-specific and area-specific with focus on areas where levels of infant mortality are high.

Even after reaching replacement-level fertility, the population of Andhra Pradesh will continue to increase for several years because of the large positive population momentum built into the young age structure of the population. A sizeable increase in the population of the State is therefore inevitable. Demographic projections indicate that population of the State is likely to reach 97 million by the year 2021 and would stabilise at around 113 million by the year 2056, if fertility declines to the replacement level by the year 2003 and then remains constant thereafter. However, if fertility continues its

downward trend according to the projected TFRs based on log linear model as given in Table 14, the State population would reach 92 million by 2021 and stabilise at 96 million by 2036. If the pace of fertility decline slows down in future, it will take longer time for the population to stabilise. In any case, an addition of at least 18 million people to the population of the State in the next 23 years is inevitable. -|

Conclusions

Andhra Pradesh's demographic future is mainly determined by the future course of fertility and mortality as migration will not play a significant role in determining the rate of population growth. Available evidences strongly indicate that some important demographic characteristics are changing and the pace of fertility transition has been fairly rapid since mid eighties.

The birth rate in the State has declined from the level of about 35 in 1971 per 1000 population in 1997 to 22.5 and the death rate declined from *the* level of 16 to 8.3 during this period. On an average, women in Andhra Pradesh now give birth to only 2.5 children as compared to about 5 children in early 1970s. About 50 per cent of married couple of reproductive age have been protected by contraception now as compared to only 10 per cent in 1970. Infant mortality rate has come down to 63 per 1000 live births in 1997 from the level of 123 in 1975. The expectation of life at birth for both sexes has increased from about 50 years in early 1970s to about 60 years in 1990. These are some of the notable changes that have occurred in the demographic profile of Andhra Pradesh. It is remarkable that despite slow progress in socio-economic development, the State was able to achieve rapid fertility decline during the recent period.

Among major States of India, Andhra Pradesh occupies the third position after Kerala and Tamil Nadu in the percentage of fertility transition completed. The total fertility rate has declined significantly from 4.0 in 1981 to 2.5 in 1996, a 38 percent decline in 15 years. However, the pace of fertility transition is not uniform across the districts of the State. According to our estimates, replacement-level fertility has been reached in 4 districts of coastal region, and fertility is approaching replacement level in the other 5 districts in this region. Acceptance of the two-child family norm has been widespread among the districts in coastal region. To generate widespread acceptance the two-child family norm throughout the State, it is necessary that the provision of family welfare programme services should be intensified in the laggard districts of Telangana and Rayalaseema regions where the current fertility levels are higher than the State average. According to our projections, replacement level fertility is likely to be reached in the State of Andhra Pradesh by the year 2003. The declining trend in fertility is likely to be continued below replacement-level and a TFR of 1.7 (Kerala's level in 1992) will be reached by the year 2018.

The progress achieved in the performance of family welfare programme in Andhra Pradesh is also significant. About 51 per cent of eligible couples in the State has been

protected by contraception in 1995 mainly due to female sterilization. Marital fertility declined in all ages and the decline was of greater magnitude among women aged 30 years and above. Marital fertility has played a more significant role than nuptiality in accounting for fertility decline during 1981-91. A significant part of the decline in marital fertility is undoubtedly due to the effect of family welfare programme.

With anticipated gain in longevity and fall in fertility, the State population is expected to increase for several years even after reaching replacement-level fertility because of the large population momentum built into the young age structure of the population. A sizeable increase in the population of the State is, therefore, inevitable. Demographic projections indicate that the population of the State is likely to grow till 2056 and would stabilise at around 113 millions, if fertility declines to reach replacement-level by the year 2003 and remains at that level thereafter. However, if fertility declines to replacement level by the year 2003 and continues its downward trend to reach 1.5 in 2031 and then remains constant thereafter, the State's population would stabilise at around 96 million by the year 2036. The size implications for alternative fertility scenarios are quite revealing.

To strengthen a broad based population stabilisation programme, it is necessary for us to go beyond family planning. We have to mobilise social community and people to bring about rapid social changes in attitudes and behaviour as in gender issues, fighting evil customs like child marriage and dowry, eradicating illiteracy especially among females, improving child survival and the status of women and Andhra Pradesh's demographic future largely depends on how well the Government will implement the various intervention strategies proposed in its State Population Policy document.

Note

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References

- Balasubramanian, K. and P. Satya Sekhar. 1998, Population (Chapter 3). In: Andhra Pradesh at 50 (A Data Based Analysis).** Data News Features, Hyderabad. Davis, K., 1951, *The Population of India and Pakistan*. Princeton University Press, Princeton. Dissanayake, Lakshman, 1996, Relative impact of starting, spacing and stopping fertility behaviour in Sri Lanka. *The Journal of Family Welfare*, 42(3). Government of Andhra Pradesh, 1997, *Andhra Pradesh State Population Policy : A Statement and 11 Strategy*. Department of Family Welfare, Government of Andhra Pradesh, Hyderabad.

- MariBhat, P. N., 1996, *Contours of Fertility Decline in India : A District Level Study Based on 1991 Census*. Studies on Human Development in India, Discussion Paper Series No. 13, UNDP Research Project, Trivandrum. Mauldin, W. Parker and Bernard, Berelson, 1978, Conditions of Fertility Decline in Developing Countries, 1965-75. *Studies in Family Planning*, 9(5). Ministry of Health and Family Welfare, 1997, *Family Welfare Programme in India, Year Book 1995-96*. Department of Family Welfare, Government of India, New Delhi. Population Reference Bureau^ 1998, *World Population. Data Sheet 1998*. Population Reference Bureau, Washington. PRC, Andhra University and IIPS, Bombay, 1995, *National Family Health Survey : Andhra Pradesh, 1992*. International Institute for Population Sciences, Bombay. Ramachandrudu, G. and K. V. R. Subrahmanyam, 1994, Andhra Pradesh Population Scenario—A Preliminary Analysis of the 1991 Census. Twelfth Annual Conference, Andhra Pradesh Economic Association, February, 1994. Registrar General, India, 1998, *Sample Registration System Bulletin*, 32(3). Office of the Registrar General, New Delhi. Rele, J. R., 1987, Fertility Levels and Trends in India, 1951-81. *Population and Development Review*, 13(13), September. Retherfbrd, Robert and J. R. Rele, 1989, A Decomposition of Recent Fertility Changes in South Asia. *Population and Development Review*, 15(4), December. Srikantan, K. S. and K. Balasubramanian, 1989, Stalling of Fertility Decline in India. In: S.K. Singh *et al.* (eds.). *Population Transition in India*, Vol. 1. B.R. Publishing Corporation, New Delhi. Srinivasan, K., 1998, *Basic Demographic Techniques and Applications*. Sage Publications, New Delhi. UNICEF, 1999, *The State of the World's Children 1999*. UNICEF.