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A Comparison of Fertility Transition in India and Madhya Pradesh

Introduction

MADHYA Pradesh is one of those states of the Indian Republic where the demographic situation continues to be a serious cause of concern to development planners and population policy makers. It is one of the few states of the country which have recorded an increase in the average annual population growth rate during the decade 1981-91 as compared to that in 1971-81. This rapid population growth in the state continues to be a major concern not only to its social and economic development but also to the population growth of the country as a whole.

Relatively rapid population growth in the state is associated with some very sharp intra state diversities in terms of culture and tradition, social and economic development and in the area of population control. These intra state diversities are perhaps sharpest in the country. Although the state is very rich in terms of natural resources yet this potential could not be tapped up to its optimum level so far. In fact, the state is rated as one of the least developed states of the country. As a result, the society in the state largely remains traditional and orthodox in behaviour. Whatever modernisation effect is there, it is confined mostly to selected urban areas.

Main cause of poor demographic transition in the state lies in a slower reduction in the crude birth rate as compared to the crude death rate. According to the latest estimates released by the Registrar General of India on the basis of sample registration system, the crude birth rate in the state, around 1990, was highest amongst all the major states of the country. It appears that the fertility reduction efforts initiated through the National Family Welfare programme in the state have not been very much effective in bringing down the birth rate in the slate.

In this paper, we have made an attempt to compare the process of fertility transition in the state with that in India since 1975. One of the objectives of this comparison is to identify salient features of the fertility transition path in the state as well as in the country and the factors that appear to have been responsible for particular paths followed by the birth rate in the state and in the country. A second objective of the present analysis is to discuss the future prospects of fertility decline in the state in the light of fertility transition that has taken place in the state so far.

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Methodology

The key indicator used in this analysis is the growth rate in the number of births. This indicator has been selected in place of conventional indicator growth rate of total population because it is very sensitive to fertility reduction efforts. Growth rate of total population, incidently, is not directly affected by these efforts. Since in the country as well as in the state, a major determinant of fertility transition has been official programme to reduce fertility, an analysis based on the growth rate of number of births rather than growth rate of total population is expected to give a better insight into the fertility transition process.

Number of births in a particular year in any population is determined by the level of fertility and size and structure of the population. Following Horiuchi (1991), total number of births in a particular year in a population can be represented as

$$B = N*TFR* (CBR/TFR) \quad (1)$$

where *B* is the total number of births in a year, *N* is the total population in that year, *TFR* is the total fertility rate and *CBR* is the crude birth rate. Denoting by *r* the growth rate, it is simple to show that

$$r_B = r_N + r_f + f_{bf} \quad (2)$$

where/stands for total fertility rate and *bf stands* for the ratio *CBRITFR.* Horiuchi has also shown that the ratio *CBRITFR* may be regarded as a measure of the age structure effect on the crude birth rate.

The above formulation suggests that the growth rate of total number of births in a population is the algebraic sum of the growth rate of total population, growth rate of total fertility rate and growth rate of the age structure effect on the crude birth rate. This means that the process of transition in the total number of births should be analyzed in the context of the process of transition in total population size, level of fertility and in the process of transition in the age structure effect on the crude birth rate.

It is possible to improve the above formulation by observing that not the whole population is exposed to the risk of a birth. Since only females in the reproductive age are exposed to the risk of a birth, equations (1) and (2) can be modified as under

$$B = W * TFR * (GFR/TFR) \quad (3)$$

and

$$r_B = r_W + r_f + r_{gf} \quad (4)$$

where *W* stands for total number of females in the reproductive age group and *GFR* is the general fertility rate. Here *gf* stands for the age structure effect on the general fertility rate. Above formulation can also be used to analyze the components of relative change in the annual number of births within the country over time. It can be shown that

$$B_2/B_1 = N_2/N_1 + TFR_2/TFR_1 + ASE_2/ASE_1 \quad (5)$$

$$= W_2/W_1 + TFR_2/TFR_1 + ASE'_2/ASE'_1 \quad (6)$$

where subscripts stand for the beginning and the end of the period of reference and *ASE* is the age structure effect of crude birth rate while *ASE'* is the age structure effect of general fertility rate.

Data Source

Data for the present analysis have been drawn mainly from the Sample Registration System which is being maintained by the Registrar General of India. The Sample Registration System provides information on crude birth rate, total fertility rate and general fertility rate for the country as a whole as well as for its constituent states. The Sample Registration System, however, does not provide information on the size of the population as well as on the number of females in the reproductive age group which is required for the analysis. This information has been drawn from the population censuses of 1971 and 1981 and was extrapolated beyond 1981 as the relevant information from the 1991 population census is not yet available.

Information available through the Sample Registration System, however, is found to be associated with yearly random fluctuations which are often substantial. In order to remove the effect of these random fluctuations from the analysis, we have used the average figures rather than the annual estimates. We have assumed that these average figures correspond to the mid point of the period under consideration. It may, however, be mentioned here that both different estimates of fertility as well as estimates of population size are based on different approaches. As such there may be some discrepancy in the results based on equation (1) and the results based on equation (3). This discrepancy, however, is nothing to do with the methodology used here as the purpose of the analysis, primarily, is to analyze the trend in the growth of total number of births and not to estimate the number of births. Moreover, the trend obtained from the use of equation (1) or from the use of equation (3) is almost same. Therefore, problems with the data used have little implication on the findings of the analysis.

Results

Basic information on number of births *per* year, total fertility rate, crude birth rate etc. for India and Madhya Pradcsh is summarised in Table 1 for different periods beginning from 1975. The trend in the total number of births has been different in India and in Madhya Pradesh. In India, growth rate in the number of births every year is declining regularly since 1975. Between 1975-79 and 1979-83, average annual growth rate for the country as a whole was 2.063 percent per year whereas in between 1983-87 and 1987-89, total number of births in the country increased at an average annual rate of 0.65 percent per year. Thus, total number of births in the country as a whole has shown almost a linear rapid decline in the period under reference (Fig. 1).

TABLE 1 : SELECTED DATA ON FERTILITY IN INDIA AND MADHYA PRADESH

Year	*Population (000)*		*CBR*	*TFR*	*GFR*
	Total	*Female (15-49)*			
India					
1977	625928	148500	33.9	4.6	142.8
1981	638310	153100	33.7	4.5	140.5
1985	743848	175000	32.8	4.3	139.5
1988	792311	190000	31.4	4.0	130.4
		Madhya Pradesh			
1977	47683	10800	38.7	5.6	170.3
1981	52179	12000	37.9	5.3	164.1
1985	57368	13100	37.7	4.9	164.4
1988	61596	14400	36.3	4.7	155.3

Remark : Estimates of *CBR, GFR* and *TFR* are average figures for the periods 1975-79,1979-83,1983-87 and 1987-89 respectively.

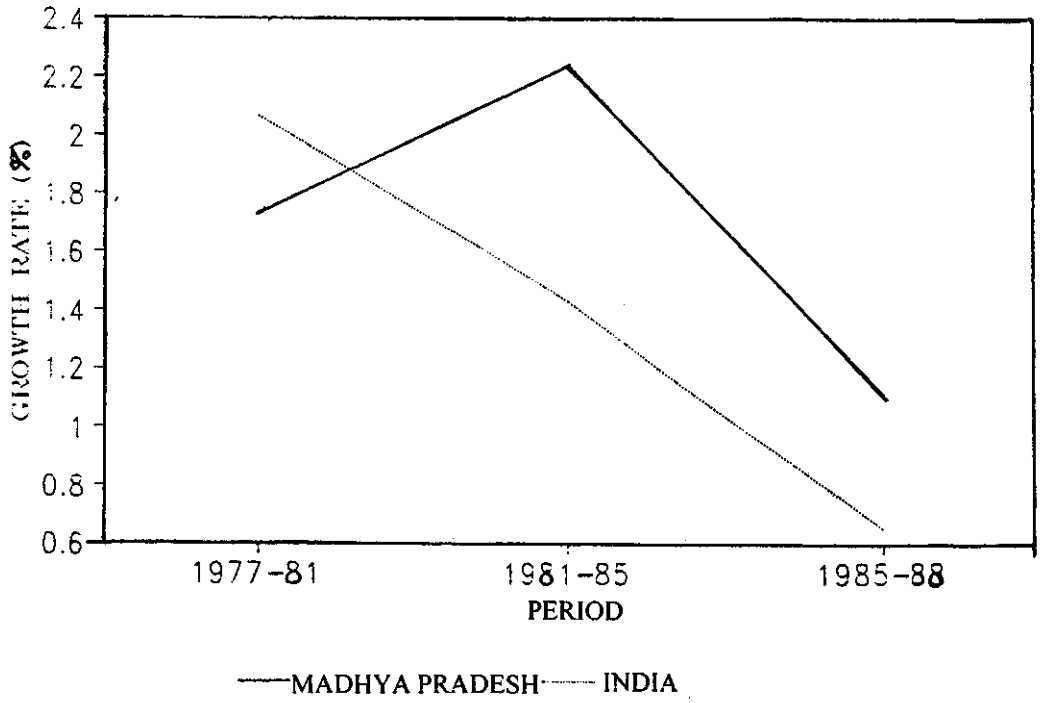

Fig. 1. Growth Rate of Total Births—India and Madhya Pradesh.

TABLE 2 : RATIO OF BIRTHS, POPULATION ETC. IN INDIA AND MADHYA PRADESH

Variable	*Ratio (1975-79/1987-89)*	
	Madhya Pradesh	*India*
Births	1.212	1.173
Population	1.292	1.266
Female (15-49)	1.393	1.337
TFR	0.839	0.870
Age structure effects on CBR	1.118	1.065
GFR	1.087	1.050

Source : Computed from Table 1 .

TABLES: GROWTH RATE OF NUMBER OF BIRTHS AND ITS DECOMPOSITION IN INDIA AND MADHYA PRADESH

Growth rate	*Country/State*	*Period*		
		1975-79 to 1979-83	*1979-83 to 1983-87*	*1983-87 to 1987-89*
r_B				
	India	2.063	1.427	0.650
	MP	1.731	2.238	1.109
r_N				
	India	2.211	2.104	2.104
	MP	2.253	2.370	2.370
r_w				
	India	2.469	1.606	2.898
	MP	2.658	2.192	3.007
r_f	India	-0.549	-1.137	-2.411
	MP	-1.376	-1.962	-1.389
r_{bf}	India	0.402	0.460	0.957
	MP	0.854	1.830	0.128
r_{gf}				
	India	0.144	0.958	0.161
	MP	0.449	2.008	-0.509

Source : Computed from Table 1.

By contrast in Madhya Pradesh, total number of births recorded an increase during the period 1975-79/1979-83. In fact, growth rate in the number of births in the state recorded an increase from 1.731 percent per year during the period 1975-79/1979-83 to 2.238 percent per year during the period 1979-83/1983-87. It is only after 1983-87, that the growth rate in the number of births in the state has shown a decline.

In Table 2, relative change in annual number of births between 1975-79 and 1987-89 and its components has been presented for the state as well as for the country as a whole. Interestingly, during the period under reference, decline in total fertility rate has been more in Madhya Pradesh as compared to that in India but the increase in the total number of births has been more in Madhya Pradesh. This relatively more rapid increase in the total number of births in the state has been due to a relatively more rapid increase in total population as well as in the age structure effects on the crude birth rate and general fertility rate. Clearly, relative to the level that prevailed during 1975-79, fertility level in the state has declined more rapidly in Madhya Pradesh as compared to the country as a whole but this relatively rapid rate of decline could not be translated into growth rate of the number of births because of typical population age structure.

In Table 3, average annual growth rates of total number of births, total population, females in the reproductive age group etc. have been presented. Very interestingly, during the period when there was a rapid increase in the number of births in Madhya Pradesh, level of fertility, as measured by the total fertility rate, had declined most rapidly. In fact during the period 1979-83 to 1983-87, general fertility rate in the state has recorded a positive average annual growth rate suggesting that during this period, the rate has increased. On the other hand, when growth in the number of births has been slow, decline in the level of fertility has also been slow. By contrast, for the country as whole, decline in the growth of number of births has been found to be directly related to the decline in the levels of fertility, measured either through the total fertility rate or through the general fertility rate. In fact, for the country as a whole, rate of decline in fertility has increased with time whereas in Madhya Pradesh, decline in fertility levels has slowed down during the period 1983-87/1987-89.

Interestingly, in the country as a whole as well as in Madhya Pradesh, age structure effects on either crude birth rate or on the general fertility rate have always been positive indicating that the age structure of the population of the country as well as of the state has been conducive to relatively higher number of births than those determined by the prevailing levels of fertility. In Madhya Pradesh, average annual growth rate in the age structure effects on both crude birth rate as well as on general fertility rate increased very rapidly during the period 1979-83 to 1983-87. But during 1983-87/1987-89, average annual growth rate of age structure effects on crude birth rate as well as on general fertility rate has declined significantly. In case of age structure effects on general fertility rate, this growth rate has even turned negative. But for the country as a whole, growth rate of age structure effects on crude birth rate has shown an increasing trend. In case of age structure effects on general fertility rate, however, growth rate increased very rapidly during the decade 1979-83/ 1983-87 but since then, there has been a significant decline in this growth rate. In fact, there appears a direct relationship between the average annual growth rate of age structure effects

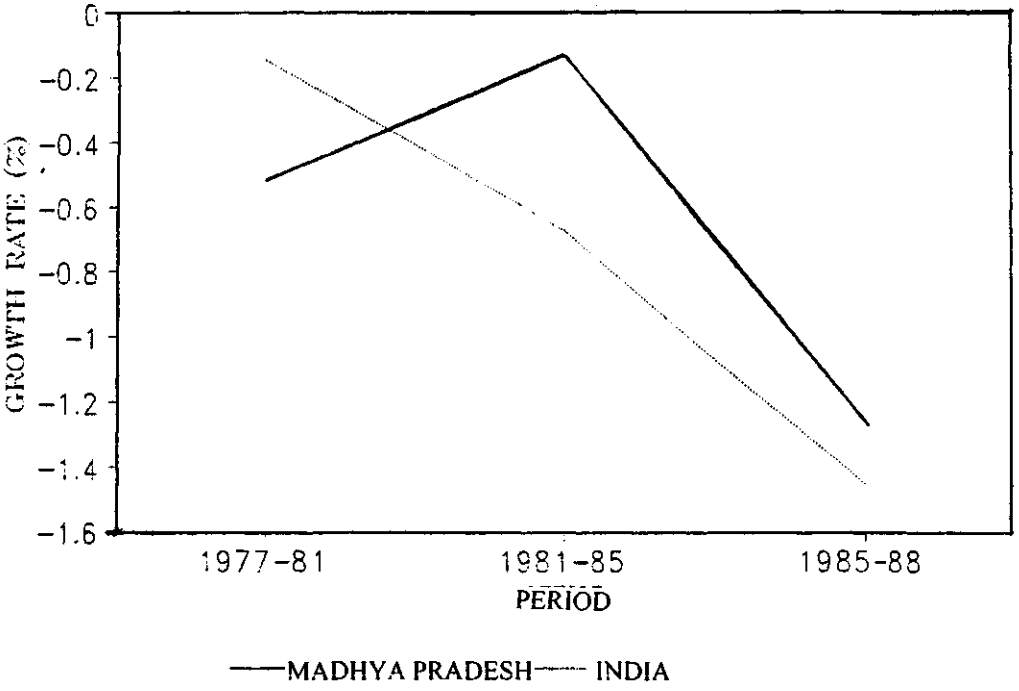

Fig. 2. Growth Rate of Crude Birth Rate—India and Madhya Pradesh.

on crude birth rate and the average annual growth rate of number of births in Madhya Pradesh. But no such association exists in case of the country as a whole. A similar situation prevails in case of general fertility rate also. Clear, age structure effects on crude birth rate and general fertility rate play a more dominating role in deciding the growth in the number of births in Madhya Pradesh as compared to that in the country as a whole.

The contribution of the size of population to the relative change in the annual number of births in the country as well as in the state has been found to be substantial and, expectedly, acts towards increasing the annual number of births. In Madhya Pradesh, reduction in total fertility rate was not sufficient enough to balance this population momentum. In India too, reduction in total fertility rate during the period 1975-79/1983-87 was not sufficient enough to balance the population momentum but during the period 1983-87/1987-89, decline in total fertility rate has been more than sufficient to balance the population momentum. Had there been no positive age structure effects on crude birth rate and general fertility rate, growth in the total number of births in the country during 1983-87/1987-89 would have been negative.

In brief, a secular decline in the average annual growth rate of number of births in the country as a whole during 1975-89 seems to be mainly attributable to a secular decline in the level of fertility as measured by the total fertility rate. By contrast, in Madhya Pradesh, average annual growth rate in the number of births first increased rather rapidly and declined

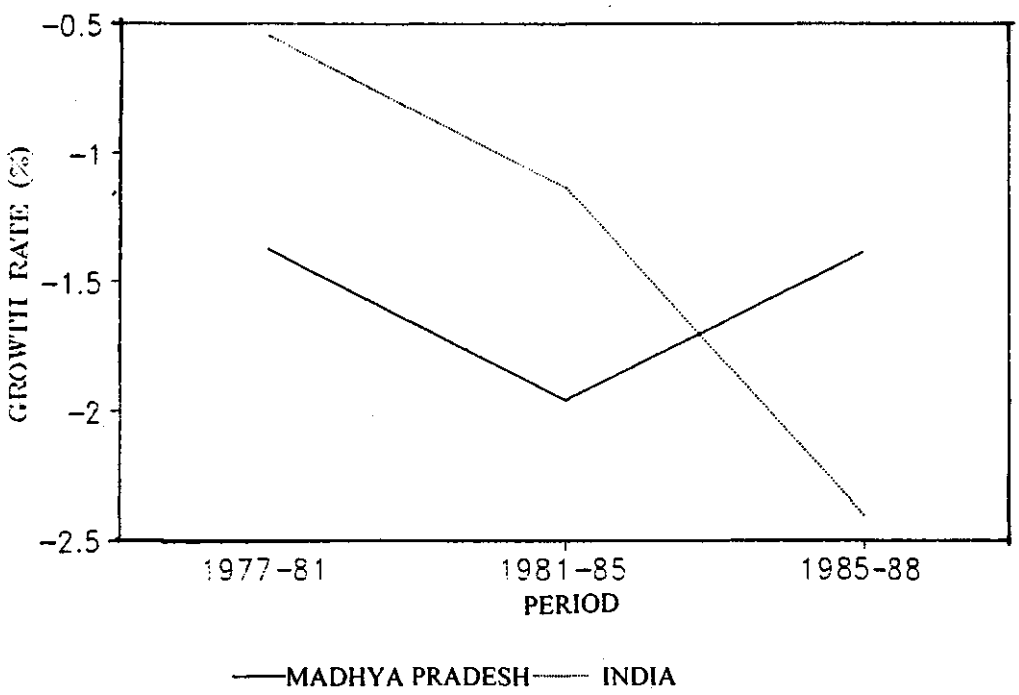

Fig. 3. Growth Rate of Total Fertility Rate—India and Madhya Pradesh

only afterwards mainly because of the trend in the age structure effects on crude birth rate and general fertility rate. Very interestingly, there has been a steep decline in the fertility level in the state at the same time when there was a steep increase in the total number of births. But this steep decline in the level of fertility has been off-set by a very rapid positive increase in the age structure effects on crude birth rate and general fertility rate. Thus, increase in the growth rate of number of births in Madhya Pradesh during 1979-83/1983-87 has been due to the changes in the age structure of the population and not due to any increase in the levels of fertility.

The age structure effects seem attributable mainly to the accelerated growth of female population in the reproductive age group. This accelerated growth may be due to the influx into the reproductive period of the cohorts born in the 1950s and 1960s — the period of so-called 'population explosion'. In addition, decreasing proportion of young population, caused by fertility decline, has also raised the proportion of other age groups, including the reproductive period.

But the age structure effects do not explain the short-term rise of growth rate of number of births in the country as well as in the state. At best they can be considered as a medium term trend contributing significantly to the relatively high level of growth rate of number of births.

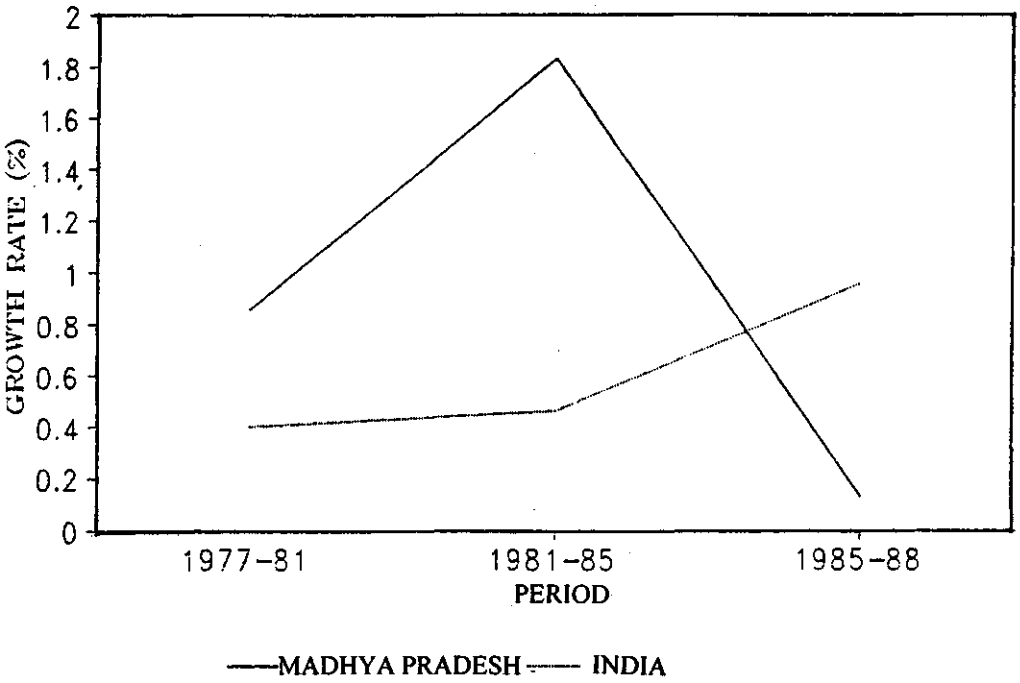

Fig. 4. Age Structure Effect of CBR Growth Rate: India and Madhya Pradesh.

Conclusions

The analysis presented in the foregoing pages reveals that main reason for relatively slow transition in fertility in Madhya Pradesh lies primarily in the age structure of its population. Levels of fertility in the state have shown a declining trend but this trend could not be translated into a declining trend in the total number of births mainly because the age structure of the population of the state has been conducive to larger number of births than those predicted by the levels of fertility. Dominance of age structure effects in fertility transition in the state is clear from the fact that the growth of age structure effects on crude birth rate as well as on general fertility rate and growth of total number of births covary. This is in quite contrast to the country as a whole where growth in the total number of births covary with the growth in level of fertility and not with the age structure effects on crude birth rate or general fertility rate. In fact, absolute decline in the fertility level as measured through total fertility rate has been almost same for the country as well as for the state. But because of the differing age structure effects on the crude birth rate and general fertility rate, growth pattern of number of births has been entirely different for the country as a whole and for the state.

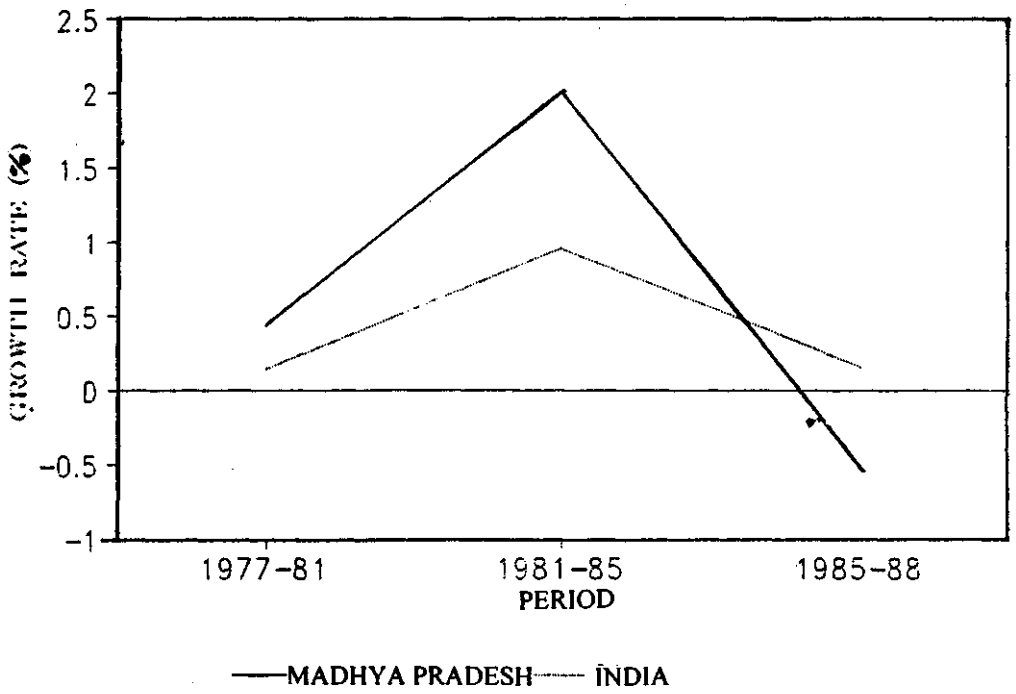

Fig. 5. Age Structure Effect of GFR Growth Rate: India Madhya Pradesh Interestingly, after 1983-87, growth rate of age structure effects on crude birth rate in the state has slowed down considerably. In case of general fertility rate, this growth rate has even turned negative suggesting that the age structure effects on general fertility rate has become conducive to lesser number of births than those predicted by the prevailing levels of fertility. However, at the same time, the rate of decline in fertility level has also slowed down considerably. As a result, total number of births in the state continues to increase though at a slower rate. For the country as a whole, on the other hand, growth of age structure effects continue to increase but this increase in age structure effects co-exists with decrease in fertility levels. Since fertility transition in the country depends largely upon the growth rate of fertility levels, growth rate of total number of births in the country continues to decline.

One may ask at this stage: what are the future prospects of fertility transition in the state? To answer this question, it may be pointed out that the age structure effects on general fertility rate in Madhya Pradesh have become negative. This shows that the reduction in the total number of births that takes place in the state will depend upon the trend in the levels of fertility as measured by the total fertility rate. The current trend appears to be a slow down in the decline in the levels of fertility. If this slow down persists in future too, there is little hope for a rapid fertility transition in the state. But if the tempo in the reduction in fertility levels is maintained, the age structure effects on the general fertility rate as well as on the crude birth rate will lead to an even more rapid transition in fertility.

For the country as a whole, on the other hand, age structure effects on crude birth rate and on general fertility rate are positive and are increasing. In such a situation, much will depend upon the reduction in fertility levels. In fact, the magnitude of the reduction should be such that it should be able to compensate for both the positive effect of population growth as well as the positive age structure effects on crude birth rate and general fertility rate. If the magnitude of fertility decline is not sufficient enough, there will be little hope in a rapid reduction of number of births that takes place in the country every year.

On the whole, prospects for a rapid fertility transition appear to be more positive in Madhya Pradesh as compared to the country as a whole mainly because of the difference in the age structure of the two populations. Much will depend upon the future trend in fertility levels since, the age structure effects on crude birth rate and general fertility rate appear to have become conducive to lesser number of births not larger number of births.

Reference

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