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The Differential Development And Dilemma in Population Growth: Perspectives from India

Introduction

IN the past certain development indicators have been given a different emphasis by individuals belonging to various disciplines on the basis of their professional orientation. Similiarly, the concept of development has been-narrowly conceived as a major domain of economists, becasue its definition hitherto has highlighted mostly the economic components at the expense of other related aspects of society. Neverthelesss, around the middle of this century, with increrasing realisation of the expanding scope of the meaning of development, new parameters have been slowly added, leading to diversification of the dimensions of development. In this context, one classification has divided development into its primary, secondary and tertiary sectors. The well-known economist, Todaro (1985: 580) has further expanded the scope of the meaning of development. He defined development in terms of three equally important aspects:

1. raising people's living levels, i.e., their incomes and consumption levels of food, medical services, education etc., through 'relevant' economic growth processess,
2. creating conditions conducive to the growth of people's self-esteem through the establishment of social, political and economic systems and institutions which promote human dignity; and
3. increasing people's freedom to choose by increasing varieties of consumer goods and services.

Even these concepts of developments did not cover all the essential facts. Under these circumstances an effort was made recently to rationalise the meaning of development by a group of four authors (Mahadevan, B. R. Abu Laban, S. M. Abu Laban and Sumangala, 1992). According to them 'development is conceived as a multidimensional, diverse and a

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presumably ameliorative upward movement of the entire socio-economic system, giving a differential emphasis to improving appropriate sectors of society on a flexible basis, over time. It may ultimately result in an increase in levels of income, improvement in quality of life, stabilisation of population, and it may also pave the way toward a more egalitarian society'. This expanded meaning of development has been operau'onlized through a systems model, which depicts its sub-systems e.g., the dimensions of inputs, infrastructure, structural changes, social development, economic development, population control and preservation of the eco-system. The output has been trichotomised into economic improvement in per capita income, stabilisation of population and improvement in the quality of life in general.

Indicators of Development

The empirical study of development and the quick assessment of all the parameters of development cannot be considered simultaneously. Therefore, certain high priority indicators representing major dimensions of development should be used to develop viable indicators which reflect the overall development at least in a miniature form. In this context, the existing indicators of development suffer from several deficiencies. This is primarily because the available index viz. PQLI of Overseas Development Corporation (USA) has been conceptualised with a narrow focus. It does not present the latest thinking on overall development. For instance, out of the three parameters of PQLI, two of them primarily belong to the population field and also overlap with each other. When longevity is considered, infant mortality is automatically built in and there is no need to take these two parameters together to represent different dimensions of development since they are highly inter-Co-related. Of course, education is an ideal choice for developing an index, but it represents social development. No representation is given in this index for any direct measurement of the economic parameter although education may indirectly indicate certain economic status. Thus, PQLI canot be considered as a universally acceptable and comprehensive level of measurementt of development. Therefore, mutually exclusive parameters which represent the four major dimensions of development have ben considered now to overcome the limitations of PQLI.

A recent model, viz., "Third World Development and Quality of Life: Towards a Holistic Model" (Mahadevan, *et al.* 1992) conceptualized overall development in a holistic framework. Under this model the core dimensions of development have been characterised as infrastructural facilities, social development, economic development and population regulation. In addition, structural changes-cum-environmental protection and bureaucracy embrace the periphery of the core system. These dimensions of development are expected tc reach the goals of improvement in per capita income and allied economic changes, population stabilisation and improvement in the quality of life. This model in fact provides scope for constructing appropriate and comprehensive indicators of development by choosing contextually suitable variables from different dimensions of development.

Overall Development Indicator (ODI)

The above mentioned holistic model focusses on four indicators belonging to four dimensions which are relatively the least inter-related. They are literacy from social

development, per capita net domestic product from economic development, road length per 100 sq km, representing the infrastructural facilities and IMR from population parameters (IMR also reflects the status of health. It is a vital input for social development and a pre-requisite for making it desirable). These four indicators together reflect the overall development.

The construction of the index covers critical and major dimensions of development in order to reflect the overall progressive changes in a developing economy. All these factors together pave the way for improving the quality of life of population in general. Moreover, it can measure both the short term and long term changes that take place in development. These indicators, therefore, are a balanced mix of essential core features of development in any society. Of course, these changes can be realised only when adequate priority is given to allocation of sufficient funds for development on a realistic basis. It also helps to avoid allocation of disproportionate resources for other sectors of development.

For examining the inter-relationship between development and changes in annual growth of population, the above mentioned overall development indicators (GDI) are taken as antecedent variables and the annual growth of population has been considered as the consequent variable resulting from the impact of development. Using this method the present paper will discuss the problem at the national and regional levels in India. Since the data are available at the national and provincial (state) level, the inter-relationship between development and demographic change (growth of population) has been attempted, However, a district level analysis is not attempted at present in view of non-availability of data.

Development and Demographic Dynamics

Among the developing countries the level of development in India is uinque for several reasons. India today is definitely better placed, except in the matter of population, density and growth, to intensify developmental effort than it was at the time of independence. Yet it cannot be denied that, till very recently the pace of progress remained slow, much less than planned. On the one hand, certain states in India, have attained a very high level of development in social, economic, infrastructual facilities and stabilisation of population. On the other hand, in certain other regions very backward conditions prevail in these aspects. Thus, the level of development is divergent across regions. Therefore, it is difficult to examine the development of India for the country as a whole without considering the diversity of development among several major states of this country. Hence, the development of India has been conceptualised and classified the states on the basis of the above mentioned development parameters into two categories viz., developed and less developed states. When the four components of Overall Development are applied to the above classified Indian states, nine major states fall under under-developed states. The states which have the level of literacy, per capita net domestic product, road road length per 100 sq km, far above the national average and IMR below the national average are considered as developed states and states which have the values on these aspects below the national average are termed as under developed states. Since the present national average on development of these four indicators constitutes a transitional level for low and high development, it is taken as a cut off point for classifying states into two categories of differential development. Another consideration accepted for classifying states into developed and under-developed is the

percentage of people below the poverty line. Most of the these states have only a quarter or less of their population living below the poverty line except for Maharashtra and Kerala. Even these two states have a much low population fall below the poverty line than the all India average. In addition, the mean female age at marriage also has gone up above the legally prescribed higher age at marriage in India (18 years). In fact, female age at marriage reflects the improvement in status of women. Therefore, consideration of this additional indicator confirms the earlier criteria of development adopted in the dichotomous classification of developed and under-developed states in India. The percentage of population below the poverty line and female age at marriage together supplement and confirm the appropriateness of assigning the status of development to nine states mentioned above. Moreover, the prevailing general notion among the people confirms that these nine states are considered as fairly developed according to the standards existing in developing countries. In comparison to some of the developed countries, however, India's development is not on par with them. When this criteria is applied to the developed regions the following states viz., (1) Punjab; (2) Himachal Pradesh; (3) West Bengal; (4) Maharashtra; (5) Karnataka and (6) Tamil Nadu qualify as developed states. However, (7) Haryana; (8) Gujarat and (9) Kerala, by and large, come under the developed categories except for slight deficiencies in one or two parameters. Haryana and Kerala lag behind the national average with resect to literacy and economic development respectively. Gujarat is lagging behind in infrastructural facilities and in regulating IMR below national average. Among these nine states, there are of course great variations in one or more parameters which can be seen from Tables A and B.

TABLE 1A: ODI ACCORDING TO DEVELOPED STATES IN INDIA

si. No.	*States*	*Infrastructure (road length per 100 sq km)*	*Per capita net domestic product*	*Literacy*	*IMR*	*Average annual exponential growth rate of population*
1.	Punjab	94.9	1652	57.1	68	1.85
2.	Himachal Pradesh	38.2	855	63.5	83	1.77
3.	West Bengal	64.8	860	57.7	71	2.20
4.	Maharashtra	59.8	1039	63.1	63	2.26
5.	Kamataka	60.0	799	56.0	73	1.88
6.	Tamil Nadu	110.5	828	63.7	80	1.39
7.	Haryana	56.6	1233	55.3	85	2.33
8.	Kerala	290.9	639	90.6	27	1.31
9.	Gujarat	33.8	860	60.9	107	1.89
	India	49.3	771.5	52.1	95	2.11

SOURCE: Registrar General of India, *Provisional Population Totals, 1991, Series-1, Paper-1. Note:* Data on development is related to 1988 period.

When we rank states according to literacy, Kerala stands first followed by Tamil Nadu, Himachal Pradesh, Maharashtra, Gujarat, West Bengal, Punjab, Karnataka and Haryana. Regarding per capita net domestic product, Punjab stands first followed by Haryana, Maharashtra, Gujarat, West Bengal, Himachal Pradesh, Tamil Nadu, Karnataka and Kerala. In terms of the third parameter viz., Road length per 100 sq. km., Kerala comes first followed by Tamil Nadu, Punjab, West Bengal, Karnataka, Maharashtra, Haryana, Himachal Pradesh and Gujarat. Regarding the fourth parameter i.e., decline in IMR, Kerala stands first followed by Maharashtra, Punjab, West Bengal, Karnataka, Tamil Nadu, Himachal Pradesh, Haryana and Gujarat (see Table 1-A).

When we add Haryana, Gujarat and Kerala along with the developed states, Kerala stands first in respect of literacy, infrastructure and decline in IMR. Similarly, Haryana is also a developed state. However, Gujarat does not manifest such unique feature on several aspects though it is a fairly developed state like others.

When we consider the under-developed states in India, the criterion for their consideration is based on the developmental transition of the national average on the above mentioned four indicators. Out of the eight major under-developed states in India a few of them are extremely backward viz., Uttar Pradesh, Madhya Pradesh, Rajasthan, Bihar and Assam and the remaining viz., Orissa, Andhra Pradesh and Jammu and Kashmir are somewhat better placed in development on most of these indicators. When these dimensions are considered individually all of them are backward in the field of education. However, Orissa is relatively better in this respect. In the field of per capita net domestic product, though all of them are placed below the national average, Andhra Pradesh alone is very much closer to it. Under this category the most backward among these states is Bihar. In the case of infrastructural

TABLE l.B: GDI ACCORDING TO UNDER DEVELOPED STATES IN INDIA

Sl. No.	*States*	*Infrastructure (Road length per 100 sq km)*	*Per capita net domestic product (PNDP)*	*Literacy**	*IMR*	*Average annual exponential growth rate of population**
1.	Assam	76.7	605	53.4	102	2.12
2.	Bihar	48.1	482	38.5	101	2.11
3.	Orissa	78.5	535	48.6	123	1.78
4.	Jammu & Kashmir	5.8	684	15.9**	73	2.58
5.	Uttar Pradesh	55.6	607	41.7	132	2.24
6.	Madhya Pradesh	26.2	583	43.5	118	2.37
7.	Rajasthan	24.4	646	38.8	107	2.47
8.	Andhra Pradesh	48.0	758	45.1	82	2.14
	India	49.3	771.5	52.1	95	2.11

SOURCE: Registar General of India, *Provisional Population Totals, Paper-1, Series-f, 1991.*
* 1981 figures.

facilities, most of them rank above the national average in terms of road length per 100 sq km, except for Jammu & Kashmir followed by Rajasthan and Madhya Pradesh. However, the very poor facilities in Jammu & Kashmir are because a large area of the state has inaccessible hills and, therefore, this may not truly reflect a backward condition.

As regards the last and fourth indicator of development under consideration viz. IMR, Jammu & Kashmir followed by Andhra Pradesh alone attained an IMR lower than the national average. Uttar Pradesh followed by Orissa and Madhya Pradesh are the most backward states with respect to this vital aspect. Thus, after four decades of independence, these eight states are mostly backward in the field of social development like education and health and economic development though considerable progress has been made in improving the infrastructural facilities. Hence, according to most of the indicators, these eight states are under-developed as shown Table IB .

The Link Between Development and Population Growth

The link between development and population growth assumed global importance at the time of the world population conference held in Bucharest in 1974. Nevertheless, a more comprehensive conceptualization of development did not crystallize because of the complexity of this concept. It has been conceived narrowly by different scholars on the basis of their professional background and hence it did not consider bias free indicators or provide an empirically viable index to associate development with population parameters. Defective and/or distorted development indicators may not explain the real nature of development. As stated earlier, four major multi-dimensional indicators of development have been selected here in relation to the annual growth of population in the developed and under-developed states in India (see Tables 1A and IB).

Among the developed states, Kerala (1.31%) and Tamil Nadu (1.39%) have attained the lowest annual growth rate of less than 2.11 per cent of national average which deserves in-depth consideration. When we examine the possible linkages of these four indicators of development with this low growth rate of population, two factors emerged which are common to these two states viz., extensive infrastructural facilities of road length and a higher level of literacy. With respect to infrastructure, Kerala stands first among the states followed by Tamil Nadu. As regards literacy, once again Kerala (90.6%) stands first followed by three other states almost at equal level viz., Maharashtra (63.05%), Tamil Nadu (63.72%) and Himachal Pradesh (63.54%). If literacy is the number one consideration of low growth rate of population, Maharashtra (2.26%) also should have attained a similar growth rate but her growth rate is much higher than the national average of 2.11 per cent. As far as infrastructure is concerned Maharashtra is very backward with only 59.8 per cent road length per sq km, compared to Kerala (290.9) and Tamil Nadu (110.5). In the field of per capita net domestic product, Maharashtra (1039) is far ahead of Tamil Nadu (828) and Kerala (639). Therefore, economic development and attainment of education alone may not lead to faster decline of growth rate of population as seen in Tamil Nadu and Kerala. The fourth indicator of development viz., infant mortality also did not explain the lowest growth rate of population in Tamil Nadu since their IMR is 80 per thousand live births as against

63 in Maharashtra and 27 in Kerala. Next to Tamil Nadu and Kerala, two other developed states viz., Punjab (1.85%) and Himachal Pradesh (1.77%) have similar low growth rate of population but not West Bengal (2.20%). How did this low growth rate happen in these states? When we examine the growth rate in relation to the above four indicators of development not much consistency and uniformity of influence is noticed. The only factor almost similarly noticed in these states is the more or less similar level of literacy of 57 to 63 per cent in these states. This level is not very high as in the case of Kerala but closer to Tamil Nadu and Maharashtra. Regarding the per capita domestic products, Punjab (1652) alone is on top and the other two states viz., Himachal Pradesh and West Bengal are only marginally superior to Tamil Nadu (828). Regarding the length of road per 100 sq km, as in the case of PNDP, Punjab has the third highest facility (95) and significantly more length of road compared to Himachal Pradesh (38) and West Bengal (65). In this context, Punjab followed by West Bengal have the third and fourth position in respect of length of road, but Himachal Pradesh is poor in this aspect because of the many hilly regions in this state and not because of inadequacy of roads in the populated places. The fourth indicator viz. IMR once again is more favourable in Punjab (68) but IMR is much higher in Himachal Pradesh (83) and West Bengal (71). Thus, in Punjab, the highest per capita income, third highest infrastructural facilities and the third lowest IMR together contributed to the low growth of population. With respect to Himachal Pradesh and West Bengal once again per capita income and moderately better education would have together contributed to the low growth of population. These six developed states are far ahead of the national level development in most of the four parameters mentioned above except in the case of the low domestic product of Kerala and the inadequate infrastructural facilities of Himachal Pradesh.

Among the three remaining relatively developed states viz., Haryana (2.33%), Gujarat (1.89%) and Karnataka (1.88%), the annual growth rale of population has exceeded only in the state of Haryana compared to the national average of 2.11 per cent. In fact it is surprising to observe high rate of growth of population in a state that has attained optimum level of development. Haryana (1233) has the second largest per capita NDP next to Punjab. Her literacy (55.3%) is slightly higher than the national average (52.11%) and the infrastructure (56.6) and IMR (85) are slightly above the national average. Haryana is economically developed, inadequate development in literacy, infrastructure and decline in IMR have caused the highest level of population growth rate (2.33%) among the developed states. Therefore, economic development alone is not a high priority indicator of development for reducing the growth of population. Although Karnataka (1.88%) and Gujarat (1.89%) have similar growth rates of population, Karnataka is significantly ahead of Gujarat in improving infrastructural facilities and reducing infant mortality. On the other hand, in the field of education and PNDP, Gujarat is far ahead of Karnataka. The dfferential developmental patterns of these two states also exceptionally showed that attainment of improvement in any two of the four developmental factors alone will not contribute to a rapid decline of growth of population everywhere.

In the light of the preceding differential nature of development on four major indicators among the relatively developed states generally two crucial indicators emerged as relevant for the fast decline of growth rate of population, *viz,Infrastructural facilities coupled with literacy.* Of course, the parallel improvement in the field of PNDP and decline of IMR will be an added advantage in slowing down the rate of growth of

population. Thus, attainment of development in the economic field alone will not solve the problem of growth of population. A judicious mix of development at least in three out of the four above mentioned indicators of development may be the answer for realising a demographic transition (appreciable decline in growth rate of population) in a developing country like India.

Under-developement and Growth of Population

When the four criteria of development, as stated above, were applied to the other weight states, they could not show a higher level of development on at least three out of four indicators. This formed a critical criteria adopted for classifying the eight states mentioned in Table IB as under-developed states, hi addition, the percentage of people below the poverty line and female age at marriage are also taken into account as additional indicators. Of course, there are certain exceptions to these in one or two states, though their overall development is low. The states of Assam, Bihar, Orissa, Jamrnu & Kashmir, Uttar Pradesh, Madhya Pradesh, Rajasthan and Andhra Pradesh did not satisfy most of the indicators even up to the level of the national average. Therefore, they are relatively backward in most aspects considered here. No doubt a few of these states, do manifest either one or the other indicator which is equal to or above the level of the same factor among the developed states. But that alone does not qualify them as developed. In this context, Assam, Orissa and Uttar Pradesh have relatively better infrastructural facilities alone. On the other hand, Jammu and Kashmir and Andhra Pradesh attained a somewhat lower level of infant mortality (see Table IB).

When the linkages of developmental indicators have been examined in relation to annual growth of population among these states, there is an expected trend of higher growth of population equal to or higher than the national average among six states. For instance, the population growth is highest in Jammu & Kashmir (2.58%) followed by Rajasthan (2.47%), Madhya Pradesh (2.37%),Uttar Pradesh (2.24%), Bihar (2.11%), Andhra Pradesh (2.14%) and Assam (2.12%) However, in Orissa state atone the annual growth rate is significantly lower (1.78%) compared to the national level (2.11%). The very high rates of Jammu & Kashmir and Rajasthan may be due to immigration of people from neighbouring states and countries and not exclusively due to population growth. The exceptionally tow growth of population in Orissa is largely due to the slightly improved infrastructural facilities. Another indicator exclusively favourable for Andhra Pradesh is the highest level of per capita NDP (758) which is highest among underdeveloped states. For Orissa higher female age at marriage would have also contributed to the lower growth of population but not for Andhra Pradesh. On the other hand, for Andhra Pradesh alone low proportion of population below the poverty line may also contribute a positive influence in reducing growth rate. Thus, Orissa is an exceptional state with low growth rate which is even lower than several developed states mentioned above. This state has definitely two favourable indicators of development like that of developed states besides other allied socio-economic indicators cited above. Even the states which are classified as underdeveloped can reduce the growth rate when social development, infrastructure and economic development reach an optimum level.

For future, which dimensions of development in India deserve high priority for stabilizing the population? The density and size of population of the state and the level of development

depend largely on four development indicators considered here. In addition, the female age at marriage and the present level of couple protection rate may have to be considered. On the basis of these parameters, the following states may be given the highest priority viz., Uttar Pradesh, Bihar, Madhya Pradesh, Jammu and Kashmir, and Rajasthan, for future efforts in the field of family planning. This is because the total population of these five states in 1991 together accounts for 271 millions. This is greater than the total population of USA (235 millidns). It is more than double the population of Brazil (130 millions) and triple the population of Mexico (75 millions). Itis also 18 times higher than the total population of Australia in 1983 (World Development Report, 1985). If these states do not get high priority in all these programmes, there will be no hope of reducing the growth of population in India The tardy development in these aspects among these stales continues to stagnate the national birth rate of 32 per 1000 live births and the annual growth rate (around 2.35%) for the past one decade.

Future investment and efforts should also be in the field of development and family planning in the four developed states viz., Haryana, Gujarat, Karnataka, and Maharashtra where growth is still high. Even West Bengal may also be considered among the high priority states in view of its exceptionally high density of population.

Relative Influence of Demensions of Development on Population Growth: A Path Analysis

In order to ascertain the order of importance and direction of causal relationships of the four major dimensions of development viz., (a) infrastructure, (b) literacy, (c) per capita domestic product, and (d) infant mortality for the annul growth rate of population in different states, a path analysis was adopted separately for developed and under-developed states. Conceptually, the path model has been set here keeping the infrastructure as a foundation variable, which is expected to influence the other three independent variables.

The nature of causal relatonship among the independent variables and their influence on population growth is presented in Fig. 1. Based on the causal relationship among the independent variables and its influence on population growth different paths were established. Based on them the following structural equations were evolved:

$$Y_0 = P_{01} X_1 + P_{02} X_2 + P_{03} X_3 + P_{04} X_4 \quad \text{(i)}$$

$$X_4 = P_{41} X_1 + P_{42} X_2 + P_{43} X_3 \quad \text{(ii)}$$

$$X_3 = P_{31} X_1 + P_{32} X_2 \quad \text{(iii)}$$

TABLE 2.A: CORRELATION MATRIX— DEVELOPED STATES

	Xi	X2	X_3	X^4	*Yo*
Xi	1.0000	—0.2961	0.9068	—0.8517	—0.6787
X_2	—0.2961	1.0000	—0.5077	0.1654	0.4129
X_3	0.9068	—0.5077	1.0000	-0.7432	—0.6808
X_4	-0.8517	0.1654	—0.7432	1.0000	0.3756

TABLE 2B: CORRELATION MATRIX—UNDER-DEVELOPED STATES

X_1	X1 1.0000	X_2 —0.3783	X_3 0.8213	X_4 0.4699	Y_0 -0.9037
X_2	— 0.3783	1.0000	-0.2542	—0.5790	0.4481
X_3	0.8213	—0.2542	1.0000	0.5521	—0.7067
X_4	0.4699	—0.5790	0.5521	1.0000	—0.3960

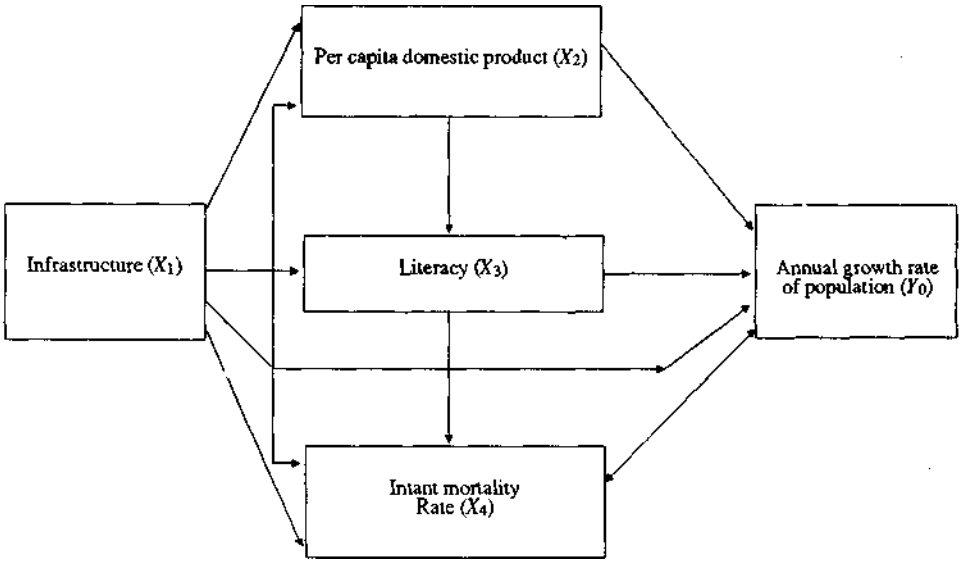

Fig. 1 Path Diagram TABLE 3A: DIRECT, INDIRECT AND TOTAL EFFECTS OF VARIABLES—DEVELOPED STATES

Variable	*Direct Effect*	*Indirect Effect*	*Total Effect*
Infrastructure (X1)	—0.6719	-0.0068	—0.6787
Per capita Net Domestic Product (X2)	0.1549	0.2580	0.4129
Literacy (X3)	—0.0473	—0.6335	—0.6808
Infant Mortality (X_4)	0.3756	-	0.3756

The correlation matrices separately for developed and under-developed states are presented in Tables 2A and 2B. Path coefficients were found by solving the above structural equations (see Figures 2a. and 2b) and based on these values the direct, indirect and total

TABLE 3B: DIRECT, INDIRECT AND TOTAL EFFECTS OF VARIABLES— UNDERDEVELOPED STATES

Variable	*Direct Effect*	*Indirect Effect*	*Total Effect*
Infrastructure *(Xi)*	—0.9042	0.0005	—0.9037
Per Capita Net Domestic Product *(Xz)*	0.1835	0.2646	0.4481
Literacy *(X-j)*	—0.0115	—0.6952	—0.7067
Infant Mortality (X.t)	—0.3960	-	—0.3960

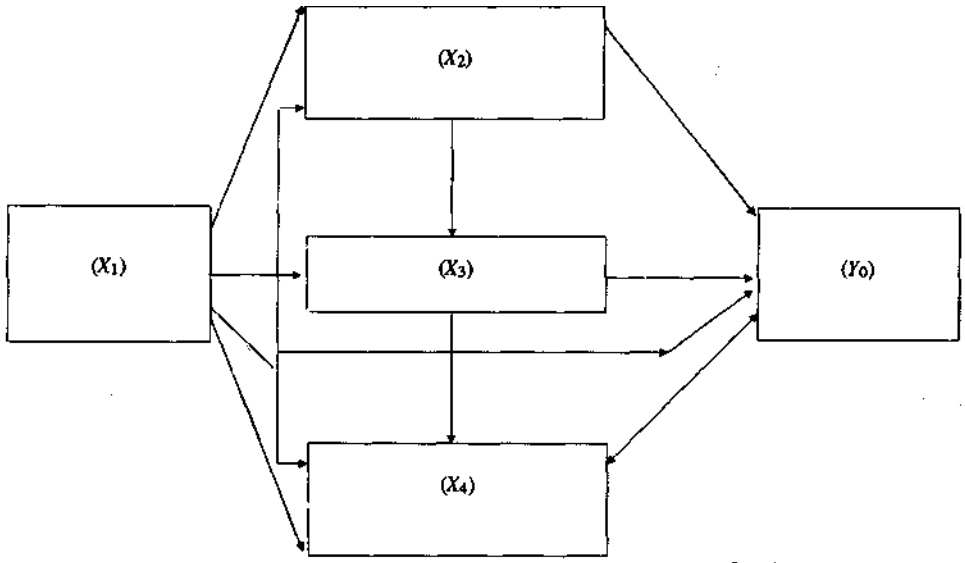

Fig. 2a Path Diagram with Path Coefficients— Developed States

effects of each of the four selected independent variables on population growth were calculated and presented in Tables 3A and 3B.

Findings and Discussion

(a) *Infrastructure.* Among the under-developed states the infrastructure emerged as the most important determinant of population growth. It showed negative relationship with growth of population (—0.9037). It also showed the second highest influence in explaining the level of growth of population among the developed states next to literacy and the nature of relationship in both the places remain negative. Regarding the nature of causal relatonhip of this factor on growth rate, differential patterns emerged between developed and underdeveloped states. The indirect effect of infrastructure among developed and underdeveloped states is significantly less compared to its direct effect, the type of relationship

remains uniformly negative in the case of direct effect. All these evidently support the assumption that infrastructure is the principal direct determinant of the growth rate of population both in developed and under-developed states, but its extent of influence of course is varied. While it has the highest direct influence (—0.9042) in the under-developed states, it is significantly less (—0.6719) among the developed states. The reason for less direct influence of infrastructure among the developed states may be due to the fact that it operates through other determinants of development and need not operate exclusively through its direct influence as seen in the case of its influence among the under-developed states. Therefore, opportunity for infrastructure to influence population growth in under-developed states is very high because other dimensions of development are yet to emerge.

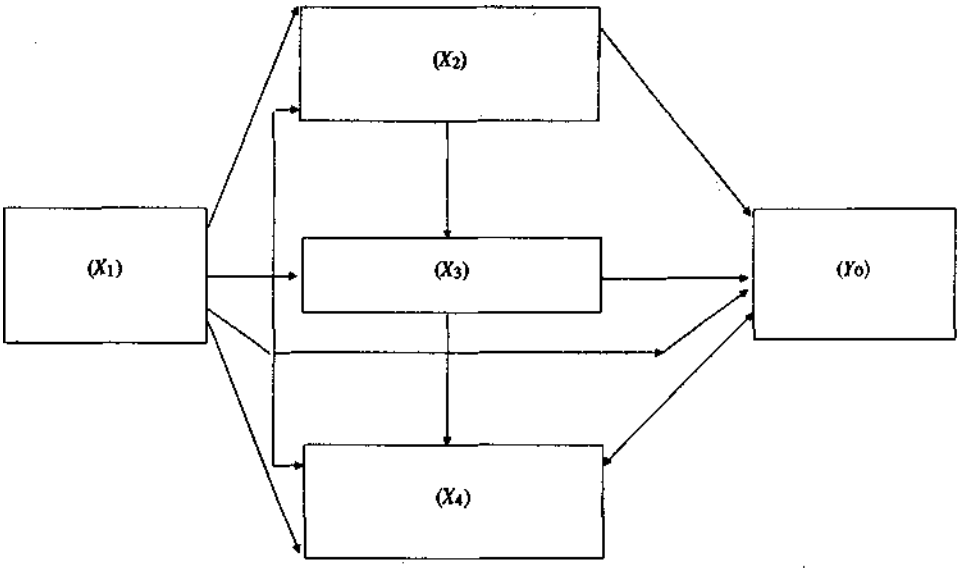

Fig. 2b Path Diagram with Path Coefficients— Under Developed States

(b) *Literacy.* The second most important factor that has significant influence among the under-developed and the principal determinant of population growth among the developed states is literacy. However, the degree of its influence on population growth varies in these two regions. While literacy significantly influenced population growth through indirect influence in both the regions, its contribution is significantly more in under-developed region (—0.6952) than in developed one (—0.6335). Though it ranked as the second determinant of population growth among the under-developed states, its degree of influence is significantly more than the path coefficient seen among the developed states. It is natural that literacy will have several parallel routes of influence with many dimensions of development in both the regions.

(c) *Per capita Net Domestic Product.* Per capita net domestic product has emerged as the third most important determinant of population growth and it is found to have a positive relationship among both devloped and under-developed states. This factor has relatively equal effect in under-developed (0.4481) and developed regions (0.4129). It has greater indirect influence among the developed (0.2580) and the under-developed (0.2646) states as compared to direct influence in both the places. Among the developed as well as under-developed states there is scope for per capita domestic product to influence most of the other dimensions of development and, therefore, it may influence population growth rate through all the other areas of development.

(d) *Infant Mortality.* Unlike the three preceding major developmental variables, infant mortality does not seem to be equally important in explaning growth rate of population in the developed (0.3756) and under-developed (—0.3960) states. For the growth of population, infant mortality is a component along with migration, fertility and other mortality. However, it does not have the multifaceted influence of the other three factors. It showed unexpectedly a positive influence on growth of population in developed regions and its negative influence in developing regions is expected. No doubt, it has a significant level of influence on population growth but not to the extent of the other factors. The unexpected findings of infant mortality in this content may be because it has lesser influence at the macro level but greater influence at the micro level in the family. This is to be explored in future studies.

Thus while testing the relative and combined influence of these four major parameters of development on population growth in developed as well as under-developed regions, most of these four factors emerged as significant determinants of population growth. Certain major differences are also noticed in their direct and indirect influence on population growth. Their order of importance emerged as followes, viz., (a) infrastructure, (b) literacy, (c) per capita domestic product, and (d) infant mortality. Since these four different types of development indicators have emerged as important causal factors for population growth, it can be concluded that multi-dimensional and heterogenous factors of development influence the population growth on a holistic basis, but in varying degrees in developed as well as under-developed regions. Neverthless the paramount importance of infrastructure and literacy equally emerged as the most important factors that influence population growth irrespective of the level of development of regions/states. Therefore, these data fully supported the theoretical formulations recently proposed viz., 'Holistic Model on Development' (Mahadevan, *et al.* 1992) in this field. Thus the Indian data, when applied to this model of development and population growth, produce results which fully support the model and convincingly explain the empirical feasibility of predicting the interrelationship between development and population growth.

References

Goverment of India, *The Seventh Five Year Plan 1985-90,* Vol. I & H., Planning Commission, New Delhi.

Government of India, *Family Welfare Programme in India Year Book - 1986-87.* Ministry of Health and Family Welfare, Department of Family Welfare, New Delhi.

Mahadeven, K., Abulaban B. R., Sharan, Abu Laban and Sumangala, M., 1992, *Third World Development and Quality of Life: Towards a Holistic Model in Methodology for Population Studies and Development.* Sage, New Delhi. Mahadevan, K. and Sumangala, M., 1987, *Social-Development, Cultural Change and Fertility Decline.* Sage, New
Delhi.
Mahadeven, K. (ed.), 1989, *Fertility Policies of Asian Countries.* Sage, New Delhi. ____(ed), 1989, *Women and Population Dynamics.* Sage, New Delhi. Mahadeven, K., 1991, *Health Policy Strategy and Child Survival: Experiences from Asian Countries.* B. R.
Publishing Corporation New Delhi. Mahadeven, K., 1990. *Ecology, Economy, Matriliny and Fertility of Kurichiyas.* B. R. Publishing Corporation,,
New Delhi
The Registrar General of India, 1991 *The 1991 Census, Provisional Population Totals,* Paper-I, Series-I. Todaro, Michael P.,1985, *Economic Development in the Third World,* 3rd Edn. Orient Longman.