

Relationship between Economic Development and Population Ageing: An Empirical Study on Selected States of India

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Abstract

The existing literature suggests that there is some relationship between population ageing and economic development; as population ageing is faster in developed countries relative to the developing countries. The authors in the paper tried to explore this fact in the context of the selected states of India. The authors measured the level of the economic development in all states of India at three points of time - 1981, 1991, and 2001. The level of economic development was measured by constructing an Index of Development assigning appropriate weight to the variables by applying Factor Analysis. On the basis of the values of the Index of Development, all the states were ranked, and then the top five states and the bottom five states, i.e., the most developed states and the least developed states in the year 2001 were taken as base year to examine the pattern of population ageing in those selected states. Next, the authors estimated the ageing of the population in the selected states at three points of time, 1981, 1991, and 2001 by applying the measures - Ageing Index and Rate of Demographic Ageing. Finally, the percentage change in the level of economic development of the selected states over the periods 1981-2001 (20 years) was arrayed against percentage change in the process of population ageing over the same period in the same set of states to have a clear idea about the connection between economic development and population ageing. The results of the study present some interesting findings. Firstly, there is convergence in growth of economic development in the selected states. Secondly, the population ageing was found to be faster in relatively developed states of the country. Although not very consistent, the results reveal a pattern that suggests that the different states of India, irrespective of their level of economic development, are at different stages of population ageing.

Keywords : population ageing, economic development, development index, ageing index, rate of demographic ageing

JEL Classification: J 10

Population ageing is the most prominent global demographic trend of the 21st century. The conceptual meaning of “population ageing” is increase in the proportion of median age, a decline in the proportion of child population, or a rise in the fraction of the elderly population in the total population of a country or region. In short, population ageing is the summary term for shifts in the age distribution (i.e., age structure) of population towards older ages. A century ago, the elderly constituted only 2%-3% of the total population of the world, now the number of older persons has tripled over the last 50 years, and it is projected to be more than triple again over the next 50 years. This pattern is expected to continue over the next few decades, eventually affecting the entire world. Indisputably, population ageing is going to become a serious issue in the upcoming decades.

Evidence shows that the process and pattern of population ageing is distinctly different in the developed and developing countries of the world. The elderly population is now growing at a faster rate in the less-developed regions. Increase in the median age is one of the indicators of population ageing. The median age of the population, among the countries currently classified by the United Nations as more developed i.e. the countries which had a population of 1.2 billion in 2005 rose from 29.0 in 1950 to 37.3 in 2000, and is projected to rise to 45.5 by 2050. The corresponding figures for the world as a whole are 23.9 for 1950, 26.8 for 2000, and 37.8 for 2050. In Japan, one of the fastest ageing countries in the world, there were 9.3 numbers of people younger than 20 years for every person older than 65 years in 1950. By the year 2025, the ratio is predicted to be 0.59 people younger than 20 for every person older than 65. The available literature suggests that there exists a relationship between economic development and population ageing. Some researchers found that the rate of population ageing is faster in developed regions than that

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in the less-developed regions, while the others found an opposite picture. Many empirical evidences clearly indicate that as economic development increases, the rate of population ageing gains momentum because of the decisive impact of the former upon the death rate. However, since decline in fertility rate is slower in comparison to death rate and there are country and region wise variations in household response lag to declining death rate, no conclusive observations can be made on the basis of only some empirical evidences. The issue needs further investigation with varied data sets representing different regions and countries to throw probing light on the connection between economic development and rate of population ageing. The present paper is a humble attempt in that direction, and the study is designed accordingly.

Evidences From Literature : A Review

Bloom, Canning, and Fink (2008) in their working paper "Population Aging and Economic Development" explored the effect of population ageing on economic growth. On the basis of United Nations' world's population projection based on fertility rate assumption and different population census data, the authors claimed that world's aged population will increase more than 20% from 1950 to 2050, though this increase varies for developed and developing countries as developed countries experienced a faster ageing than developing countries. Male babies are born in a greater number than female babies, but the death rate of male babies and of adult men is higher than that of their female counterparts resulting in a larger share of women among the elderly. There are three main factors behind the change of global aged population : (i) declining fertility rates in recent years, (ii) recent increase in life expectancy, and (iii) past variations in birth rates and death rates.

In a report titled "The Graying of the Great Powers' Demography and Geopolitics in the 21st Century," Jackson & Howe et al. (2008) discussed about the geopolitical implications of global ageing, mainly viewing the situation of today's developed countries and future changes in developing countries. Some major findings are as follows. The world is entering a demographic transformation of population ageing. Out of the 16 nations of Western Europe, 8 have a median age of 40 years or higher today in comparison to a national median age higher than 30 years at the beginning of the twentieth century. By 2050, 6 nations will have a median age of 40 years or higher. The coming transformation is both certain and lasting because anyone over the age of 45 years in the year 2050 has already been born and can, therefore, be counted. The transformation will affect different groups of countries at different times. Though nearly every country in the world is projected to experience slower population growth and population ageing, but there exists diversity. Most of the youngest countries of today, such as sub-Saharan Africa are projected to experience the least ageing compared to the oldest countries of today like those in Europe. The transformation has long term economic, social, and political consequences that can affect the developed world. For this, the demographic size of the developed world may change. The growth rates of the working age population and, therefore, the GDP of the developed country will fall far below their historical trend, which declines their growth rates. As economic growth slows down, the economic performance of the developed countries also starts deteriorating. For the developing world, the transformation brings more varied consequences - some countries march towards greater prosperity and stability by converting their declining fertility into higher savings rates, greater human capital development, efficient and open markets, rising income and living standard, and stable democratic institutions, while some other countries face new security threats.

Bloom, Canning, and Finlay (2009), in their working paper "Population Aging and Economic Growth in Asia" stated that the economic consequences of population ageing depend on behavioral responses of the shift in age structure from youth aged to old aged population. According to the authors, decline in fertility, increase in life expectancy rate, and change in age structure of cohort sizes are the main reasons of population ageing in Asia. From 1960 to 2005, Japan experienced the highest life expectancy rate in the world, with 78.7 for men and 85.6 for women, whereas China had a prevalent absolute increase in life expectancy in the world. Decrease in total fertility rate from 6.05 in 1960 to 2.63 in 2005 resulted in rise in working age share in many Asian countries primarily, but further decline in fertility rate from the replacement rate caused a decrease in the working age group and increase in old age shares in population age structure, for which labor supply, savings, and income per capita of a society as a whole have declined. The authors were of the view that variation in fertility rate at a point of time has an effect on the share rather than the size of aged population in the age structure at that point of time. They also thought that rapid decrease in fertility and mortality rates in the past yielded high population ageing in Asian countries in 1960 to 2005, which will

be not of the same trend towards ageing in the future because of decrease in intensity of population ageing factors like fertility and mortality rates. Using regression analysis method, they tried to find out the effect of population ageing on economic growth for Asian countries, and reached a conclusion that population ageing has some depressing effect in the short run, but has no effect on economic growth in the long run because different behavioral effects of demographic changes compensated the negative effect of population ageing in the long run.

The report of the Second World Assembly on Ageing (United Nations, 2002) declared that the proportion of persons defined as older is projected to increase globally from 10% in 1998 to 15% in 2025. This increase will be the greatest and most rapid in developing countries, where the older population is expected to quadruple during the next 50 years. There is a clear difference between developed and developing countries in respect of this kind of demographic change. In certain developed countries and countries in economic transition, the number of older persons already exceeds the number of children, and birth rates have fallen below replacement levels. In some developed countries, the number of older persons will be more than twice than that of children by 2050. For developing countries, the proportion of older persons is expected to rise from 8% to 19% by 2050, while that of children will fall from 33% to 22%. Such a global demographic transformation has reflective consequences for every facet of the social, economic, political, cultural, psychological, and spiritual aspects of an individual and country ; but for developing countries, this demographic shift presents a major resource challenge.

The available statistical information presents a very interesting picture of population ageing all over the world. In 1950, there were 205 million persons aged 60 years or above throughout the world. At that time, only three countries had more than 10 million people aged 60 years or above : China (42 million), India (20 million) and the United States of America (20 million). Fifty years later, the number of persons aged 60 years or above increased over three times to 606 million. In 2000, the number of countries with more than 10 million people aged 60 years or above increased to 12, including 5 with more than 20 million older people: China (129 million), India (77 million), the United States of America (46 million), Japan (30 million), and the Russian Federation (27 million). Over the first half of the current century, the global population aged 60 years or above is projected to expand by more than three times to reach nearly 2 billion in 2050. By then, 33 countries are expected to have more than 10 million people aged 60 or above, including five countries with more than 50 million older people: China (437 million), India (324 million), the United States of America (107 million), Indonesia (70 million), and Brazil (58 million). The older population is growing faster than the total population in practically all regions of the world - and the difference in growth rate is increasing (United Nations, 2002a).

Over the last half century, the number of people aged 60 years or older increased globally by an average of 8 million persons every year. Of this increase, 66% occurred in the less-developed regions, and 34% occurred in the more developed regions of the world. As a result, the proportion of the world's population over 60 years living in the less-developed regions rose from slightly over half (54%) in 1950 to 62% in the year 2000. Over the next half century, this trend will intensify. In the more developed regions, the number of persons aged 60 years or above will increase by about 70%, from 231 million in 2000 to 395 million in 2050. In contrast, in the less-developed regions, the older population will more than quadruple during the same period, from 374 million to 1.6 billion. By 2050, nearly four fifth of the world's older population will be living in the less-developed regions of the world (United Nations, 2002a). In 1950-1955, the average annual growth rate of persons aged 60 years or above was practically the same in the more and in the less-developed regions (near 1.8 percent). From that time onwards, the rates have tended to decline in the more developed regions and have tended to increase in the less-developed regions. Currently, the average annual growth rate of the population of persons 60 years or above in the less-developed regions (2.5 percent) is almost three times than that of the more developed regions (0.9 percent). In the least-developed countries, the growth rate of the older population is projected to continue increasing at least until the end of the coming half century. Almost one-fifth of the population in the more developed regions, but only 8 percent in the less developed regions, were aged 60 years or older in 2000, up from 12 percent and 6 percent respectively in 1950. Although the regional differences in the percentage of older people are expected to decrease over the next 50 years, the difference will remain large through mid-century. By 2050, 1 in every 3 persons living in the more developed regions is likely to be of the age of 60 years or older and about 1 in every 4 persons is projected to be aged 65 years or older. In the less-developed regions, nearly 1 in every 5 persons is projected to be aged over 60 years, while 1 in every 7 persons is projected to be aged over 65 years.

India is the second largest country after China in terms of the number of elderly persons. There were about 19.8

million or 5.5% of the total population that was elderly in the year 1951, which increased to 43 million elderly constituting 6.5% of the population in 1981, 57 million or 6.7% of the population in 1991. It is projected that the number of elderly to be around 124 million accounting for nearly 10.2% of the population in 2016, 179 million i.e. about 13.3% by 2026, and 301 million or 17.3% of the total population by 2051. As per the report of the United Nations, a country will be termed as 'ageing' where the proportion of people over 60 reaches 7%. By 2000, India exceeded that proportion and reached to 7.7% , and is expected to reach 12.6% in 2025. Increase in the life expectancy and decrease in fertility and mortality rate causes the ageing problem in India like other parts of the world. In 1950-51, the life expectancy at birth of Indian people was around 32 years. Gradual improvement in medical facilities and public health system increased the average life of the Indian people and life expectancy at birth reached to 60 years by 1990. Total fertility rates decreased from 5.97 in 1950 to 3.56 in 1990. In 1961, the Crude Birth Rate (CBR) was 41.7 per 1000 people, which decreased to 23.7 per 1000 people in 2001. In the same period, the Crude Death Rate (CDR) decreased from 22.8 to 8.4.

India is a vast country having 28 states and 7 Union Territories. There are also a wide range of fluctuations among the states of India in Birth rate, Death rate, Infant mortality rate, Fertility rate, and Density of population. The density of population is low at only 13 in Arunachal Pradesh, 43 in Andaman and Nicobar Islands, 109 in Himachal Pradesh; it is high at 881 in Bihar, 819 in Kerala, and 903 in West Bengal. According to the data provided by Registrar General of India, in 1971, the life expectancy in Assam was 45.5 years, 46.2 years for males, and 44.8 years for females. In the year 2001, the ratio became 58.96 years and 60.87 years respectively. In Kerala, the life expectancy at birth increased from 62 years in 1971 to 72.9 years in 1991, where females showed a better improvement with 63.3 years to 75.6 years in this period. The Infant mortality rate decreased from 86 in 1961 to 68 in 2001 for the state Assam, whereas for Haryana, the rate increased from 46 in 1971 to 55 in 2001. In this case, Kerala showed an impressive result with the reduction in Infant mortality rate from 42 in 1961 to 13 in 2001. In Tripura, it showed a fluctuating trend with 35 in 1961, 27 in 1971, 130 in 1981, 82 in 1991, and 39 in 2001. Total fertility rate in Tripura decreased impressively from 5.9 in 1991 to 2.1 in 2001, whereas in Assam, it decreased slightly from 3.4 to 3.3, and in Kerala, it remained the same at 1.8 in the same period. For Maharashtra, the infant mortality rate increased from 90 in 1961 to 119 in 1981, further it decreased to 41 in the year 2001. This diversity will presumably have an impact on the ageing process and ,therefore, there is a need to study the problem of population ageing region-wise or state-wise by categorizing the same on the basis of economic growth and development. The present study attempts to analyze this by studying population ageing in the developed and less developed states of India.

Design of the Present Study

The level of the economic development of all the major states of India and Tripura (excluding Assam, which could not be considered due to lack of its census data for the year 1981) i.e. 15 states of India at three points of time 1981, 1991, and 2001 was measured. The level of economic development was measured by constructing an Index of Development by assigning appropriate weights to the variables representing development by applying the Factor Analysis procedure. On the basis of the values of the Index of Development, all the states were ranked and then the top five states and the bottom five states, i.e., the most developed states and the least developed states in the year 2001 were taken to examine the relationship between the ageing process and economic development. As economic development is a continues process and takes time to attain a visible level of attainment, we thought that the estimates of development of 2001 would be more revealing of the development process, and, therefore, the year 2001 was taken to select the most developed and the least-developed states of India. Next, population ageing was measured for the selected states at three points of time - 1981, 1991, and 2001, by applying the measures 'Ageing Index' and 'Rate of Demographic Ageing'. Finally, the percentage change in the level of economic development of selected states over the periods from 1981-1991 and 1991-2001 were arrayed against percentage change in the process of population ageing over the same periods in the same sets of states of 2001 to have a clear idea about the connection between economic development and population ageing.

The economic development of a state is defined by a set of development indicators. The selected indicators are Per Capita NSDP (X_1), Population above Poverty Line (X_2), Percentage of Total Workers (X_3), Literacy Rate (X_4), Household with Pucca House (X_5), Household with Access to Safe Drinking Water (X_6), Household with Electricity Connection (X_7), Sex Ratio (X_8), and Infant Survival Rate (X_9). These are all development indicators since two

deprivation indicators namely Population Below Poverty Line and Infant Mortality Rate are changed to development indicators namely, Population above Poverty Line and Infant Survival Rate respectively as per the need of the study. The states selected for the study are Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh, and West Bengal. The selected variables are made unit free by standardization of the same with the formula :

$$\text{Standardized Value} = \text{Original Value} / \text{Standard Deviation}$$

The Principal Component Method of Factor Analysis was applied to assign weights to each of the 9 variables.

Results and Analysis

The results of the Factor Analysis by applying Principal Component Method in terms of factor loading and communalities are shown in the Table 1, Table 2, and Table 3.

Table 1: Factor Analysis Results for 1981						
Var	Factor-1	Factor-2	Factor-3	Communalities	Weight	Weight (%)
X ₁	0.928	0.145	0.253	0.947	0.413	16.01
X ₂	0.8	0.031	0.182	0.674	0.356	13.8
X ₃	-0.196	0.126	0.920	0.901	0.129	5.01
X ₄	0.253	0.859	-0.207	0.845	0.2	7.76
X ₅	0.807	0.093	0.096	0.669	0.359	13.92
X ₆	0.785	-0.265	-0.298	0.775	0.349	13.54
X ₇	0.922	0.178	0.147	0.902	0.41	15.90
X ₈	-0.532	0.789	0.210	0.949	0.184	7.13
X ₉	0.047	0.768	-0.339	0.706	0.179	6.94
Var Explained	44.508	23.317	14.053	Total	2.581	100
Cumm. Var Explained	44.508	67.825	81.878			
Source: Estimated by the authors. Extraction Method: PCA, Extracted Factor: 3, KMO Measure: 0.532 (Significant at 1%), Bartlett's Test=Chi-Square value: 90.646 (Significant at 1%)						

In case pertaining to the year 1981, three factors were derived from 9 aspects of economic development. The KMO measure and Bartlett's test were found to be significant at 1 percent level and hence, application of Factor Analysis in the case is justified. The three factors derived together could explain 81.88 percent of the total variance. Therefore,

Table 2: Factor Analysis Results for 1991						
Var	Factor-1	Factor-2	Factor-3	Communalities	Weight	Weight (%)
X ₁	0.946	-0.098	0.058	0.908	0.4323	16.07
X ₂	0.873	0.092	0.006	0.771	0.3910	14.53
X ₃	0.023	0.137	0.969	0.958	0.1328	4.94
X ₄	0.464	0.768	-0.239	0.862	0.1842	6.85
X ₅	0.844	-0.089	0.053	0.723	0.3857	14.34
X ₆	0.554	-0.709	0.091	0.819	0.2532	9.41
X ₇	0.922	0.049	0.193	0.889	0.4214	15.66
X ₈	-0.169	0.928	0.269	0.961	0.2226	8.27
X ₉	0.585	0.397	-0.337	0.614	0.2674	9.94
Var Explained	45.701	23.987	13.707	Total	2.6906	100
Cumm.Var Explained	45.701	69.688	83.395			
Source: Estimated by the authors. Extraction Method: PCA, Extracted Factor: 3, KMO Measure: 0.529 (Significant at 1%), Bartlett's Test = Chi-Square value: 95.197 (Significant at 1%)						

these are sufficient for explaining the variations in the original variables (as shown in the Table 1). The composite index of economic development is estimated by multiplying the original values of the development variables by their respective weights and taking the weighted average of these with the formula :

$$CIED = \frac{\sum W_i Z_i}{\sum W_i}$$

Where,

CIED = Composite Index of Economic Development ;

W_i = Weight of the i th indicator (variable) of Economic Development derived by Factor Analysis ;

Z_i = The standardized value of the i th indicator of economic development.

In a similar manner, the weights to the same set of development indicators were assigned by applying Factor Analysis for the year 1991 and 2001, the results of which are shown in the Table 2 and Table 3. With the help of these weights, the CIED of the same states is estimated for the year 1991 and 2001. According to the values of CIED of the states, all 15 selected states were ranked from 1st to 15th rank, the 1st having the largest score of CIED, and the 15th having the smallest score - a larger value of CIED implying higher economic development. The first five states

Table 3: Factor Analysis Results for 2001						
Var	Factor-1	Factor-2	Factor-3	Communalities	Weight	Weight (%)
X_1	0.917	0.12	-0.051	0.858	0.412	16.17
X_2	0.882	0.179	-0.185	0.845	0.396	15.55
X_3	0.352	0.446	0.804	0.97	0.093	3.65
X_4	0.702	-0.622	0.012	0.88	0.315	12.38
X_5	0.746	0.353	-0.157	0.706	0.335	13.16
X_6	-0.024	0.88	-0.143	0.795	0.253	9.93
X_7	0.920	0.227	0.194	0.936	0.413	16.22
X_8	0.094	-0.818	0.427	0.86	0.049	1.94
X_9	0.623	-0.582	-0.299	0.817	0.28	10.99
Var Explained	44.873	28.787	11.537	Total	2.545	100
Cumm.Var Explained	44.873	73.661	85.198			
Source: Estimated by the authors. Extraction Method: PCA, Extracted Factor : 3, KMO Measure: 0.55 (Significant at 1%), Bartlett's Test=Chi-Square value: 103.35 (Significant at 1%)						

Table 4: Comparative Picture of Economic Development in Selected States of India (1981-2001)							
Category	States	Value of Development Index in 1981	Rank in 1981	Value of Development Index in 1991	Rank in 1991	Value of Development Index in 2001	Rank in 2001
Most Developed States	Punjab	7.66	1	9.71	1	10.35	1
	Haryana	6.95	3	9.08	2	10.06	2
	Maharashtra	6.78	4	9.03	4	10.05	3
	Kerala	6.68	5	8.94	5	10.02	4
	Gujarat	7.02	2	9.03	3	9.99	5
Least Developed States	Madhya Pradesh	5.80	11	7.85	11	8.93	11
	Tripura	5.73	12	7.72	13	8.83	12
	Uttar Pradesh	5.63	13	7.72	12	8.66	13
	Bihar	5.49	14	7.37	15	8.14	14
	Orissa	5.41	15	7.47	14	8.14	15
Source: Estimated by the authors							

Table 5: Population Ageing in Selected States from 1981 to 2001							
Category	States	Ageing Index (AI) (60+)			Rate of demographic ageing (RDA) (60+)		
		1981	1991	2001	1981	1991	2001
Most Developed States	Punjab	21.15	22.61	28.77	7.8	7.84	9
	Haryana	15.18	19.62	21.54	6.34	7.7	7.49
	Maharashtra	16.66	19.34	27.19	6.39	6.87	8.73
	Kerala	21.46	29.69	40.21	7.5	8.82	10.48
	Gujarat	15.35	17.92	21.05	5.95	6.39	6.91
Least Developed States	Madhya Pradesh	15.64	17.03	17.65	3.65	6.63	6.8
	Tripura	17.91	18.37	21.62	7.05	7.01	7.27
	Uttar Pradesh	17.98	17.03	17.15	6.84	6.86	7.01
	Bihar	16.32	15.33	15.77	6.8	6.26	6.23
	Orissa	16.12	12.23	24.89	6.39	4.37	8.26

Source: Estimated by the Authors

Table 6: Change in Economic Development and Change in Population Ageing over a period of 20 Years				
Category	States	% change in A.I (1981-2001)	% change in RDA (1981-2001)	% change in Development Index value (1981- 2001)
Most Developed States	Punjab	36.03	15.38	35.08
	Haryana	41.90	18.14	44.75
	Maharashtra	63.21	36.62	48.23
	Kerala	87.37	39.73	50.00
	Gujarat	37.13	16.13	42.31
Least Developed States	Madhya Pradesh	12.85	86.30	53.97
	Tripura	20.71	3.12	54.10
	Uttar Pradesh	-4.62	2.49	53.82
	Bihar	-3.37	-8.38	48.27
	Orissa	54.40	29.26	50.46

Source: Estimated by the Authors

occupying 1st, 2nd, 3rd, 4th, and 5th ranks in economic development in 2001 and the last five states occupying 11th, 12th, 13th, 14th, and 15th ranks in 2001 were selected as the base for the study. The corresponding score and ranking of all these 10 selected states in the years 1981 and 1991 provided the base for drawing a comparative picture of economic development in these states during the period from 1981-2001. These particulars are shown in the Table 4.

The rate of population ageing in the selected states in 1981, 1991, and 2001 was estimated by applying standard measures of population ageing- Ageing Index (AI) and Rate of Demographic Ageing (RDA) for the population aged 60+ years. The estimated values of these measures are shown in the Table 5. Finally, the percentage change in the level of economic development of selected states over the periods from 1981-1991 and 1991-2001 were arrayed against percentage change in the process of population ageing over the same periods for the same set of states to have a clear idea about the connection between economic development and population ageing. This comparative picture is presented in the Table 6.

Findings

The change in the value of Development Index of the states that has occurred over a period of 20 years from 1981 to 2001 and the corresponding change in the values of the measures of Population Ageing over the same period of time are shown for each state in the Table 6. This establishes a connection between the change in the process of economic

development and the change in the process of population ageing. A picture of a longer period is drawn since transition in the process of economic development and population ageing is better reflected there.

The results of the study present a very interesting picture. The estimated Development Index values (Table 4) show that in the first category representing the most developed states, Punjab retained its top most position at three points of time i.e. 1981, 1991, and 2001; Haryana, Maharashtra, and Kerala marginally improved their ranking in 2001, but the state of Gujarat fell to attain the 5th position in ranking in 2001 from being ranked 2nd in 1981. In the second category of states representing the least developed states, Madhya Pradesh retained its 11th position for all the three points of time 1981, 1991, and 2001; whereas Tripura, Uttar Pradesh, and Bihar fluctuated a little bit according to the level of development. In terms of the Development Index values, every state improved their score in 2001. The figures in Table 6 reveal a most interesting point. There appears to be a slow convergence of growth since the rate of economic development is faster among least developed states in comparison to the most developed states under consideration. From the Table 5, it is further observed that in case of RDA, there appears to be a slower ageing process in least developed states in comparison to the most developed states. The AI values also, more or less, substantiate this fact although there is no consistent pattern of this phenomenon. Another interesting point to note is that although Orissa is one of the least developed states of India, it has a higher rate of population ageing, particularly in 2001, as compared to many developed states.

The Table 6 reveals that as per AI values, the change in ageing process is very fast in developed states of India amidst slower change in economic development in these states. In the less developed states, although the change in economic development process is fast in a positive sense, the change in ageing process is low, exhibiting even a negative change in case of Uttar Pradesh and Bihar.

Conclusion

The overall result suggests that, irrespective of their level of economic development, different states of India have been facing different stages of population ageing. This is mainly because the nation building process is still continuing in India, and as a result of that, the process of economic development has not stabilized even in the most developed states of the country. The benefits of high economic development such as low fertility, high returns of critical level of education, industrialization, etc. have not, therefore, resulted in a consistent pattern of high rate of population ageing in the states of India.

Implications for Policymakers and Scope for Future Research

The findings have meaningful implications for policymakers. Definite policies need to be chalked out to expedite the ongoing process of convergence of growth among the states of India. Faster convergence of growth at a very high level will lend definite direction to the process of faster population ageing at the state level as a result of an increase in life expectancy, lower fertility, and mortality rate. Adequate policies should also be framed for early development of old age care and security services in the country.

Since both population ageing and economic development are slow and lengthy processes, further studies, by taking into account larger number of states and a longer period of time, say, 50 years should be taken up to establish the pattern and relationship between economic development and population ageing. Moreover, since economic development is a polysynaptic concept, more indicators of development may be taken into consideration in future studies to judge the level of economic development in the states of India.

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Notes

Definitions of the indicators of population ageing :

- 1) **Ageing index** is defined as the number of persons 60 years old or above per hundred persons under the age of 15 years.
- 2) **Rate of demographic ageing** is the percentage of people aged 60 or above to the total population of a definite year.