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## **Mortality Decline in India: An Analysis of Regional and Temporal Variations**

### **Introduction**

SEVERAL studies were attempted to study the mortality change in India experienced in the 1950s and 1960s. Nevertheless, studies which attempted to investigate the mortality decline during the 1970s and 1980s seem to be few. For instance, Preston and Bhat (1984) studied the mortality decline in India during 1970s using different data sources and concluded that the mortality declined faster in 1970s. Another study by Jain *et al.* (1985) inferred the similar findings that mortality reduction was faster in 1970s. Roy and Lahiri (1987) attempted to study the levels and trends in mortality in India and its major states covering the period between 1970 to 1983 using the data from Sample Registration System (SRS). Their study proclaims that the improvement in mortality was slow during the period 1971-78 and faster during the period 1979-83.

The present study deals with decline in mortality in India and its regional and temporal variations observed during the period 1970-86. This has been accomplished by estimating both life expectancy at birth as well as growth rate of mortality change by different age groups in India and its major states between 1970 to 1986. Further, this paper also deals with the contribution of various age groups for the increase in the life expectancy at birth during the same period. For the purpose of the study, annual estimates of age-specific death rates covering the period 1970 to 1986 have been taken from the annual year book of sample registration system published by the Registrar General of India, New Delhi.<sup>1</sup>

### **2. Mortality Trends in India**

#### *2.1 Trends in Life Expectancy at Birth*

Table 1 shows the trends in the life expectancy at birth in India and its major states for the period, 1972-76, 1977-81 and 1982-86.<sup>2</sup> It is observed from this table that during the

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1. The coverage of Sample Registration System (SRS) reviewed by the Panel in India (Bhat, Preston and Dyson 1984) suggests that it is nearly complete. Also a direct check of coverage of registration in 1986 showed that the coverage in births and deaths registration was 98 percent (Registrar General, 1988).

2. The average of the annual age specific death rate of the corresponding period has been taken for constructing life table. The states, namely Bihar and West Bengal, were excluded from the analysis due to non-availability of data.

period 1970-86, the life expectancy at birth for males has increased by about 5 years for India as a whole from 49.5 years in 1972-76 to 54.9 years in 1982-86. When we subdivide this increase into the periods 1972-76 to 1977-81 and 1977-81 to 1981-86, the level of increase is higher during the period 1972-76 to 1977-81 (6.5%) than the period 1977-81 to 1982-86 (4.5%), which exhibits that the pace of overall mortality decline of males in India has slowed down in the late 1970s and early 1980s compared to early 1970s. A similar trend is also observed in the mortality decline of females. Also, it is significant to note that the percentage increase in life expectancy at birth is higher for females than males during the period 1972-76 to 1981-86 which indicates the faster decline in female mortality compared to males over the same period. For instance, the female life expectancy at birth increased from 48.6 in 1972-76 to 55.4 years in 1982/86, denoting a rise of 13.84 percent, whereas for males, the increase was only 10.96 percent. Analogous to males, the increase in life expectancy for females is higher (7.63%) during the first period (1972-76 to 1977-81) than the second (6.21%) period (1977-81 to 1982-86).

As regards the mortality decline in the rural and urban areas, most of the increase in life expectancy at birth at the all India level during 1972-76 to 1982-86 is due to increase in the life expectancy at birth in the urban areas for both males and females. The mortality decline in the rural areas during 1970s was slow and it was stagnant during the early 1980s. The life expectancy at birth in rural areas increased only by about less than a year for males and a year for females between 1972-76 and 1982-86. On the other hand, the increase in life expectancy at birth in the urban areas has been four years for males and seven years for females in the same period. Similar to India as a whole, the mortality decline in the urban areas for both males and females was faster during the first period 1972-76 to 1977-81, than the second period 1977-81 to 1982-86. In general, the mortality decline in the second period (1977-81 to 1981-86) has slowed down in India as a whole. This is also true in both urban and rural areas.

### 2.1.1 *Regional variation of change in life expectancy at birth*

There are large variations observed in the level of life expectancy at birth and also its pattern of changes over time among various states in India (see Table 1). The highest life expectancy at birth for both males and females was observed in Kerala (65.78 for males and 71.94 for females) and the lowest in Uttar Pradesh (50.58 for males and 48.12 for females) in 1982-86. The life expectancy at birth has increased for both males and females in all the States during 1972-76 to 1982-86. However, a varying pace of mortality decline is also observed among the States in India since 1970s. For example, the highest increase in life expectancy at birth for males has been noted in Andhra Pradesh (19 per cent) followed by Orissa (14 per cent). On the other hand, for females, highest increase in life expectancy at birth is observed in Andhra Pradesh (22 per cent) followed by Uttar Pradesh (19 per cent). Table 1 also reveals that the mortality decline has slowed down after 1977 in the states of Andhra Pradesh, Assam, Gujarat, Karnataka, Kerala, Orissa, Tamilnadu and Uttar Pradesh in the case of males. Similarly, mortality decline was slow for females after 1977 in the states namely Andhra Pradesh, Assam, Gujarat, Kerala, Punjab and Uttar Pradesh. Nevertheless, the increase in the life expectancy at birth for females is faster during 1980s as compared to males.

TABLE 1 : TRENDS IN LIFE EXPECTANCY AT BIRTH IN INDIA AND ITS MAJOR STATES, 1970-86

Country/ States	Male			Rate of change (%) contribution to			Female			Rate of change (%) contribution to		
	1972/ 76	1977/ 81	1982/ 86	First	Second	Total	1972/ 76	1977/ 81	1982/ 86	First	Second	Total
Andhra Pradesh	47.91	52.52	56.81	9.62	8.95	18.58	48.62	55.51	59.39	14.17	7.98	22.15
Assam	45.36	52.46	51.04	15.65	-3.13	12.52	44.92	50.92	51.20	13.36	0.62	13.98
Gujarat	48.91	51.96	54.75	6.24	5.70	11.94	49.54	54.13	57.15	9.27	6.10	15.36
Haryana	56.81	56.68	61.60	-0.23	8.66	8.43	52.85	53.61	57.22	1.44	6.83	8.27
Karnataka	55.18	57.23	59.13	3.72	3.44	7.16	55.05	58.03	62.09	5.41	7.38	12.79
Kerala	60.80	64.08	65.78	5.39	2.80	8.19	63.73	68.62	71.94	7.67	5.21	12.88
Madhya Pradesh	47.63	48.58	51.16	1.99	5.42	7.41	47.47	46.91	51.86	1.18	10.43	9.25
Maharashtra	53.57	56.53	59.75	5.53	6.01	11.54	55.15	57.91	62.40	5.00	8.14	13.15
Orissa	45.68	50.81	51.85	11.23	2.28	13.51	44.83	43.89	52.12	-2.10	18.36	16.26
Punjab	58.85	60.55	62.48	2.89	3.28	6.17	56.59	60.86	64.01	7.55	5.57	13.11
Rajasthan	48.75	50.46	53.03	3.51	5.27	8.78	47.85	51.14	54.56	6.88	7.15	14.02
Tamilnadu	50.33	53.78	56.83	6.85	6.06	12.91	53.18	54.14	57.91	1.81	7.09	8.89
Uttar Pradesh	45.04	48.98	50.58	8.75	3.55	12.30	40.15	45.34	48.12	11.93	6.92	19.85
India Rural	47.85	48.40	48.64	1.15	0.50	1.65	46.82	47.53	47.82	1.52	0.62	2.14
Urban	57.60	59.92	61.08	4.03	2.01	6.04	58.02	61.66	63.68	6.27	3.48	9.76
Total	49.47	52.69	54.89	6.51	4.45	10.96	48.62	52.33	55.35	7.63	6.21	13.84

First : 1972/76-1977/81; Second : 1977/81-1982/86; Total : 1972/76-1982/86

## 2.2 Contribution of Change in Age Specific Mortality on Change in Life Expectancy at Birth

### 2.2.1 Males

Tables 2 and 3 show the contribution of different age groups on the increase in life expectancy at birth for males during the period 1972/76-1977/81 and 1977/81-1982/86 respectively in India and its major states.<sup>3</sup> It is revealed from Table 2 that the states (Andhra Pradesh, Assam, Gujarat, Karnataka, Kerala, Maharashtra, Orissa, Tamilnadu and Uttar Pradesh) which had shown significant increase in the life expectancy at birth during the period 1972/76-1977/81 were contributed by the decline in child mortality (0-4) and decline in mortality of ages 50 and above. This is also true in the urban areas. Also it is important to note that, contribution of decline in child mortality is higher than the decline in the

3. For decomposing the changes in the life expectancy at birth by contribution of various age groups, Arriaga's method was applied. For more details of the method, see Arriaga (1984).

mortality at the ages 50 and above in majority of the states. However, in the states of Karnataka, Orissa and Tamilnadu, decline in the mortality at the ages 50 and above appreciably contributed to increase in the life expectancy at birth during the period 1972/76-1977/81. Surprisingly, the infant mortality has been negatively contributing to increase in the life expectancy at birth in Orissa. Also in Tamilnadu and Karnataka, the mortality decline at the ages (1-4) is negatively contributing for the increase in the life expectancy at birth. It is important to note that the contribution of decline in the ages 5-34 is low for the increase in the life expectancy at birth during the period 1972/76-1977/81 in India and its major states.

Analogous to the period 1972/76-1977/81, the increase in the life expectancy at birth in the next period 1977/81-1982/86 was also contributed by a decline in the child mortality (0-4) and mortality of ages 50 and above in India as well as in majority of the states (see Table 3). It is important to note that, in Tamilnadu, the decline in the mortality at the ages (1-4) is positively contributing to the increase in the life expectancy at birth, whereas decline in infant mortality is negatively contributing to the increase in life expectancy at birth during the period 1977/81-1982/86. Inquisitively, the positive contribution of adult mortality on the increase in the life expectancy at birth has been very low and in fact it is negatively contributing to increase in the life expectancy at birth in many states. The states which are noticeable are Kerala and Punjab where the adult mortality in the ages (25-34) and (15-49) respectively is negatively contributing to the increase in life expectancy at birth.

TABLE 2 : EFFECT OF MORTALITY CHANGES IN VARIOUS AGES ON INCREASE DM LIFE EXPECTANCY AT BIRTH BETWEEN 1972/76-1977/81, MALES

Country/ States	Contribution by various ages (per cent)								Total Change
	< 1	1-4	5-14	15-24	25-34	35-49	50-64	65+	
Andhra Pradesh	12.83	32.64	9.90	1.91	9.08	10.51	13.98	9.16	4.61
Assam	21.49	26.18	16.34	2.33	3.32	13.28	9.89	7.14	7.11
Gujarat	33.14	25.63	-5.58	0.40	0.81	7.58	8.37	29.65	3.06
Haryana	2.00	-595.52	75.15	-34.32	128.43	285.14	263.46	-24.33	-0.13
Karnataka	31.00	0.07	7.58	1.37	7.48	20.44	11.82	20.25	2.06
Kerala	30.86	24.32	7.43	1.08	5.48	5.66	10.21	14.00	3.29
Madhya Pradesh	10.28	-46.16	8.72	34.16	11.66	37.18	29.32	14.85	0.96
Maharashtra	21.40	35.03	5.04	5.00	3.57	10.53	6.44	12.98	2.96
Orissa	-1.10	36.55	11.78	4.09	5.82	12.55	9.30	21.01	5.13
Punjab	42.25	19.67	3.58	-4.22	14.10	13.66	1.18	9.79	1.70
Rajasthan	57.65	-10.96	0.72	0.92	11.24	14.88	7.81	17.74	1.71
Tamil Nadu	33.40	-0.56	6.95	3.16	6.02	12.19	17.63	21.21	3.43
Uttar Pradesh	32.43	34.13	3.38	0.11	3.61	5.72	7.19	13.43	3.94
India Rural	139.79	-98.81	13.81	2.48	8.18	1.86	6.02	26.67	0.54
Urban	31.53	32.51	9.01	0.33	-0.11	11.86	10.46	4.40	2.33
Total	24.80	25.41	8.72	2.54	3.92	9.44	10.81	14.35	3.22

TABLE 3 : EFFECT OF MORTALITY CHANGES IN VARIOUS AGES ON INCREASE IN LIFE EXPECTANCY AT BIRTH BETWEEN 1977/81 -1982/86, MALES

<i>Country/ States</i>	<i>Contribution by various ages (per cent)</i>								<i>Total Change</i>
	<i>&lt;1</i>	<i>1-4</i>	<i>5-14</i>	<i>15-24</i>	<i>25-34</i>	<i>35-49</i>	<i>50-64</i>	<i>(55+</i>	
Andhra Pradesh	36.62	26.18	5.90	3.83	3.21	7.07	10.30	6.88	4.29
Assam	-25.62	89.79	33.76	-1.00	2.00	-0.03	-20.14	21.25	-1.42
Gujarat	36.47	27.18	8.87	-0.29	7.18	15.56	14.08	-9.06	2.80
Haryana	19.66	22.40	7.51	-1.33	2.04	11.00	9.97	28.75	4.91
Karnataka	24.23	7.18	27.00	5.28	2.65	10.01	21.84	1.79	1.89
Kerala	46.93	17.83	8.69	2.60	^»38	4.06	1.89	22.38	1.70
Madhya Pradesh	44.10	20.92	17.31	-4.21	1.42	3.32	13.98	3.16	2.58
Maharashtra	28.83	16.21	12.73	2.26	3.79	6.79	20.46	8.93	3.21
Orissa	71.46	-84.11	20.08	10.94	4.68	43.34	45.49	-11.87	1.04
Punjab	85.16	24.10	4.82	-0.02	-11.49	-17.25	-11.84	26.52	1.93
Rajasthan	27.61	41.49	13.84	5.03	-1.54	4.95	8.59	0.03	2.57
Tamilnadu	-15.46	105.74	10.06	2.85	-1.57	0.03	4.63	-£.28	3.07
Uttar Pradesh	63.01	45.54	10.35	-2.57	-8.13	0.56	8.60	-17.36	1.60
India Rural	450.64	-404.15	26.12	8.32	2.40	4.58	0.98	11.11	0.24
Urban	41.14	14.60	6.17	0.92	1.54	17.55	17.62	0.47	1.17
Total	51.58	13.09	5.82	1.17	1.01	9.27	14.09	3.96	2.20

### 2.2.2 Females

Tables 4 and 5 show the contribution of different ages on the increase in the life expectancy at birth for females during the period 1972/76-1977-81 and 1977/81-1982/86 respectively for India and its major states. It is observed from the tables that the states which had shown notable increase in life expectancy at birth during 1970-86 were contributed by decline in child mortality and mortality at the ages 50 and above. As observed for males, mortality in the ages (1-4) is negatively contributing to the increase in the life expectancy at birth in the states of Karnataka and Tamilnadu during the period 1972/76-1977/81; also the same is observed in the states of Haryana and Orissa during the period 1977/81-1982/86. It is revealed from Tables 4 and 5 that in the states, namely Gujarat, Orissa and Uttar Pradesh, the decline in the mortality at the old ages seems to be negatively contributing to increase in the life expectancy at birth during the period 1977/81-1982/86. Curiously enough, the contribution of decline in the mortality at the adult ages is low for the increase in the life expectancy at birth.

TABLE 4 : EFFECT OF MORTALITY CHANGES IN VARIOUS AGES ON INCREASE IN LIFE EXPECTANCY AT BIRTH BETWEEN 1972/76-1977/81, FEMALES

Country/ States	Contribution by various ages (per cent)								Total
	<1	1-4	5-14	15-24	25-34	35-49	50-64	65+	Change
Andhra Pradesh	9.07	32.74	8.87	9.71	5.09	7.56	13.02	13.93	6.89
Assam	24.69	17.53	12.91	8.81	12.01	0.10	10.02	13.92	6.00
Gujarat	22.76	24.58	2.85	-0.71	4.98	10.26	3.59	31.68	4.59
Haryana	-0.32	35.56	-7.07	-19.88	2.09	26.12	22.90	40.59	076
Kamalaka	21.75	-7.87	5.20	12.20	8.30	15.81	17.00	27.63	2.97
Kerala	22.21	28.79	3.88	2.01	5.79	8.24	8.03	21.05	4.89
Madhya Pradesh	-17.00	290.49	-25.85	11.29	-31.00	-12.12	-67.83	-47.98	-0.56
Maharashtra	23.53	27.07	9.66	-2.09	-3.31	7.11	3.02	35.02	2.76
Orissa	5.19	-199.29	-30.68	-30.32	-9.71	141.04	311.43	-87.65	-0.94
Punjab	16.89	19.48	-0.94	-1.18	9.54	3.65	10.51	42.06	4.28
Rajasthan	30.46	24.07	2.06	5.69	2.46	3.75	14.48	17.04	3.29
Tamilnadu	30.32	-0.57	6.95	1.12	6.63	14.25	22.69	18.62	3.81
Uttar Pradesh	22.75	41.65	6.43	2.38	2.35	4.95	12.05	7.42	5.19
India Rural	104.35	-72.80	7.74	5.80	3.12	10.50	11.32	29.97	0.71
Urban	20.75	36.33	8.60	2.48	4.83	11.11	7.56	8.34	3.64
Total	21.33	26.19	8.20	5.01	6.10	7.88	10.01	15.28	3.72

TABLE 5 : EFFECT OF MORTALITY CHANGES IN VARIOUS AGES ON INCREASES IN LIFE EXPECTANCY AT BIRTH BETWEEN 1977/81-1982/86, FEMALES

Country/ States	Contribution by various ages (per cent)								Total
	<1	1-4	5-14	15-24	25-34	35-49	50-64	65+	Change
Andhra Pradesh	42.34	17.93	7.39	1.12	5.44	7.76	7.21	10.80	3.88
Assam	132.60	-186.56	-38.42	-25.72	-16.47	199.52	149.99	-114.93	0.28
Gujarat	35.79	39.57	6.46	5.94	9.14	6.36	-1.36	-1.90	3.02
Haryana	24.76	-26.23	23.62	9.86	6.03	7.54	9.63	44.78	3.61
Kamalaka	11.86	23.54	15.15	4.97	9.32	6.13	20.68	8.36	4.06
Kerala	26.23	11.28	8.41	3.67	3.10	6.91	14.88	25.51	3.32
Madhya Pradesh	23.27	36.23	5.96	4.06	7.27	8.52	6.91	7.78	4.95
Maharashtra	21.56	16.17	7.41	6.29	9.56	8.21	16.96	13.84	4.49
Orissa	9.04	-3.23	7.73	1.49	7.11	30.91	46.97	-0.02	8.23
Punjab	53.45	28.00	6.04	7.32	-4.34	3.59	-6.91	12.86	3.14
Rajasthan	0.00	63.44	11.68	4.65	5.10	8.03	5.13	1.98	3.43
Tamilnadu	-12.73	62.47	6.34	1.45	5.35	11.99	23.75	1.38	3.80
Uttar Pradesh	34.43	82.73	0.45	7.17	2.48	-1.87	-6.10	-19.29	2.78
India Rural	359.43	-346.17	12.21	12.08	27.33	11.71	6.23	17.17	0.29
Urban	24.72	16.53	1.34	0.62	6.71	9.56	17.64	22.89	2.02
Total	37.93	25.00	3.91	3.46	5.60	7.60	10.78	5.73	3.02

### 2.3 Mortality Decline by Age Group

Since the life expectancy at birth measures the overall level of mortality, we have also studied the mortality decline by ages in order to find out which ages are accountable for slowing down of the mortality decline during the 1980s. For the purpose, we have estimated the growth rate of age-specific death rates for the two periods 1970/78 and 1979/86 by applying the method of Kinked exponential growth function.<sup>4</sup> The reason for taking the year 1979 as a kink is that this is the year a large reduction in mortality had occurred between 1978 and 1979. Also, significant changes in the samples of SRS had taken place around this time (See Bhat and Navaneetham 1992). The estimates of mortality decline (growth rate) by age group for males and females for India as a whole and rural and urban residence are given in Table 6.

It is observed from Table 6 that the mortality of children in the age group (0-14) has declined significantly in India as well as in rural and urban areas during the period 1970-78. Among these ages, the age group (0-4) has shown continuous decline during the period 1979-86 as well. Although significant decline was observed in the adult mortality (age group 15-34) during 1970/78 in rural areas, it has not declined significantly in the urban areas during the same period. The mortality decline in the age group 35-49 was statistically significant in the rural areas during the period 1970-78, whereas in the case of urban areas the decline in mortality was during the period 1979-86 and was also statistically significant. Further, it is observed that in the rural areas, the mortality in the age group (50-64) declined significantly during 1979-86. The foremost observation found in the mortality changes of males in the all India level is that the child mortality declined significantly during the period 1970-86 and adult mortality (15-34) remained constant during the period 1979-86.

As regards the mortality decline of females, it is observed from Table 6 that the child mortality declined significantly during 1970-86 in India in both rural and urban areas. The table also reveals that the mortality decline was statistically significant for all the age groups between the ages 5-49 during the period 1970-78 in India as well as in the rural and urban areas. As observed in the case of males, mortality had not declined significantly during the period 1979-86 for the ages 5-34 in the rural areas and for ages 5-24 in the case of urban areas. In the rural areas, mortality in the ages 50 and above has shown significant reduction during the period 1970-86. On the other hand, in the urban areas, there was virtually no decline in mortality in these ages.

To elucidate the mortality decline by ages for its temporal and regional variations, we have summarized the estimated growth rates in Table 7.

4. We observed that the mortality decline was not uniform during the period 1970-86 by looking at the growth trends of the two periods, namely 1970-78 and 1979-86. The usual method is to estimate the growth rate separately for these two periods, assuming discontinuity in the growth rate between two periods. However, Boyce (1986) has shown that the assumption of discontinuity can lead to misleading growth rates and suggested a new method of estimating the growth rates without the above assumption. We have used the Boyce method for estimating growth rate for the periods viz., 1970-78 and 1979-86. For more details and methods, refer to Boyce (1986).

TABLE 6 : ESTIMATES OF MORTALITY DECLINE (PER CENT) BY AGES DURING 1970-78 AND 1979-86 IN INDIA

Age group	Rural		Urban		Total	
	1970-78	1979-86	1970-78	1979-86	1970-78	1979-86
<b>Males</b>						
<M	1.93 *	3.10 *	3.66 *	2.49 *	2.12 *	3.36 *
5-14	3.11 *	1.69	5.56 *	0.54	3.18 *	2.12 *
15-24	2.32 *	0.42	-0.04	0.10	.95 *	0.28
25-34	1.90*	1.28	1.41	-0.03	.82 *	1.06
35-49	1.69 *	2.02	0.31	2.65 *	.47	2.21 *
50-64	1.13	2.17 *	1.33	0.60	.18	1.91 *
65+	1.55 *	0.75	0.81	-0.15	.46	0.62
All ages	2.29 *	2.08 *	1.70 *	1.57 *	2.23	2.21 *
<b>Females</b>						
0-4	2.08 *	3.35 *	4.17	2.47 *	2.25	3.61 *
5-14	2.50 *	1.42	5.12	0.81	2.75	1.69
15-24	2.41 *	1.22	1.83	0.24	2.48	1.20
25-34	2.92 *	1.77	3.40	2.74 *	3.22	2.31 *
35-49	2.27 *	2.75 »	2.85	2.61	2.02	2.98 *
50-44	1.89 *	2.38 *	1.01	1.79	1.32	2.39 *
65+	2.53 *	0.29	1.28	0.91	2.12 *	0.54
All ages	2.56 *	2.53 »	2.61 *	2.01 *	2.37 *	2.77 *

\* Significant at 5 per cent level.

From Table, 7 the major Findings can be listed as follows:

- (i) In majority of the states, the mortality among children (0-14) declined significantly for both the sexes during the period 1970-86. The reduction is faster during 1980s compared to the earlier periods, 1970s. The reduction is faster in the southern states, namely, Andhra Pradesh, Kerala and Tamilnadu for both males and females during 1979-86. However, the three states namely, Assam, Karnataka and Orissa had observed significant decline in mortality in the ages (0-4) during 1970s, and it has remained constant during 1980s.
- (ii) The adult mortality (15-24) remained constant for males during the period 1979-86 in all the states and the negative signs of percentage change in mortality in some of the states indicate that mortality in these states had increased. In the case of females, there was no decline in the mortality of adults (15-24) during the same period except in the four states, namely, Haryana, Kerala, Maharashtra and Punjab.
- (iii) Mortality of females declined significantly during the period 1970-78 and 1979-86 in the reproductive ages (25-49) in most of the Indian states, whereas mortality of males in the age group (25-49) had shown significant decline only in the states of Andhra Pradesh, Gujarat and Haryana during the latter period, 1979-86.
- (iv) As regards the mortality decline at the old ages 50-64 and 65 and above, a number of states showed significant decline during the period 1970-78 in the age group 65 and above. However, the mortality had not declined significantly in the ages 65 and above during 1979-86 in all the states except Haryana and Kerala.

TABLE 7 : ESTIMATES OF GROWTH RATE OF CHANGE (SIGNIFICANT) IN MORTALITY BY STATES IN INDIA

Age group	<i>States showing mortality decline significantly during the specified period</i>							
	1970-78 (Males)		1979-86 (Males)		1970-78 (Females)		1979-86 (Females)	
(M)	Andhra Pradesh	(2.3)	Andhra Pradesh	(6.7)	Andhra Pradesh	(3.2)	Andhra Pradesh	(5.8)
	Assam	(4.5)	Gujarat	(3.7)	Assam	(3.0)	Gujarat	(3.8)
	Gujarat	(3.7)	Haryana	(6.4)	Gujarat	(4.3)	Haryana	(6.7)
	Karnataka	(3.2)	Kerala	(6.8)	Karnataka	(2.6)	Kerala	(8.6)
	Kerala	(6.5)	Madhya Pradesh	(3.1)	Kerala	(8.6)	Madhya Pradesh	(4.1)
	Maharashtra	(4.2)	Maharashtra	(4.3)	Maharashtra	(3.9)	Maharashtra	(3.9)
	Orissa	(2.7)	Punjab	(5.5)	Orissa	(2.3)	Punjab	(4.6)
	Tamilnadu	(1.3)	Tamilnadu	(7.9)	Punjab	(4.0)	Rajasthan	(3.1)
	Uttar Pradesh	(2.6)	Uttar Pradesh	(3.2)	Rajasthan	(3.0)	Tamilnadu	(5.2)
					Tamilnadu	(1.6)	Uttar Pradesh	(4.9)
					Uttar Pradesh	(2.9)		
5-14	Andhra Pradesh	(4.7)	Andhra Pradesh	(5.6)	Andhra Pradesh	(6.2)	Andhra Pradesh	(5.1)
	Assam	(7.9)	Haryana	(7.4)	Assam	(7.4)	Karnataka	(10.0)
	Karnataka	(4.2)	Karnataka	(8.8)	Kerala	(5.1)	Kerala	(9.9)
	Kerala	(6.3)	Kerala	(5.0)	Tamilnadu	(3.1)	Maharashtra	(6.2)
	Orissa	(4.7)	Madhya Pradesh	(7.1)			Orissa	(8.6)
	Tamilnadu	(4.0)	Maharashtra	(8.6)			Tamilnadu	(6.2)
			Tamilnadu	(6.8)				
15-24	Madhya Pradesh	(5.1)	Nil		Andhra Pradesh	(4.9)	Haryana	(6.3)
/	Maharashtra	(3.2)			Assam	(7.4)	Kerala	(5.4)
					Karnataka	(4.4)	Maharashtra	(4.8)
							Punjab	(6.4)
25-34	Andhra Pradesh	(5.2)	Gujarat	(5.5)	Andhra Pradesh	(3.7)	Gujarat	(5.8)
	Kerala	(4.6)			Assam	(7.4)	Kerala	(5.0)
	Maharashtra	(3.8)			Kerala	(5.1)	Madhya Pradesh	(6.2)
	Punjab	(5.7)			Punjab	(8.8)	Maharashtra	(5.9)
	Tamilnadu	(4.0)			Tamilnadu	(4.8)	Rajasthan	(4.1)
35-49	Andhra Pradesh	(2.5)	Andhra Pradesh	(3.2)	Andhra Pradesh	(4.7)	Rajasthan	(3.2)
	Orissa	(3.6)	Gujarat	(4.3)	Gujarat	(3.9)	Assam	(4.6)
	Punjab	(3.2)	Haryana	(6.7)	Karnataka	(4.1)	Haryana	(6.7)
	Rajasthan	(3.2)			Kerala	(8.0)	Maharashtra	(4.1)
					Madhya Pradesh	(4.2)	Tamilnadu	(5.9)
					Maharashtra	(2.2)		
					Tamilnadu	(2.8)		
50-64	Andhra Pradesh	(2.5)	Andhra Pradesh	(3.2)	Andhra Pradesh	(3.7)	Karnataka	(5.4)
	Assam	(3.2)	Gujarat	(2.4)	Gujarat	(1.8)	Kerala	(4.4)
	Karnataka	(1.7)	Maharashtra	(3.4)	Rajasthan	(4.5)	Maharashtra	(5.4)
	Tamilnadu	(2.6)			Tamilnadu	(3.7)	Orissa	(4.3)
							Tamilnadu	(5.5)
65+	Andhra Pradesh	(1.8)	Haryana	(4.9)	Andhra Pradesh	(3.0)	Haryana	(5.6)
	Assam	(2.5)	Kerala	(1.3)	Assam	(4.3)	Kerala	(1.9)
	Gujarat	(3.8)			Gujarat	(3.6)		
	Karnataka	(1.2)			Karnataka	(2.3)		
	Kerala	(1.4)			Kerala	(2.9)		
	Orissa	(4.5)			Orissa	(2.9)		
	Rajasthan	(2.7)			Punjab	(5.1)		
	Tamilnadu	(2.6)			Rajasthan	(3.1)		
					Tamilnadu	(2.4)		

Note : Figures in brackets are percentage decline.

### 3. Summary and Conclusions

In this paper an attempt is made to study the trend in mortality in India and its states using the data from the Sample Registration System (SRS). The main findings from the analysis are as follows. The overall mortality decline has been slowed down during the period 1977/81-1982/86 as compared to the period 1972/76-1977/81. This was manifest from the lower rate of change in life expectancy at birth during the period 1977/81-1982/86. Also, during the course of increase in life expectancy at birth, the rate of increase is found higher for females than males between the periods 1977/81 and 1982/86. Although mortality has declined more rapidly among children under 15 years of age during 1980s, the lower rate of change in life expectancy at birth may have been resulted by inertia in the adult mortality. The analysis of trends in mortality by ages manifests that the child mortality (0-4 age group) declined significantly for both males and females during the entire period 1970/86. However, the mortality decline in this age group was swift during the period 1979-86 as compared to the earlier period 1970-78. The faster decline in child mortality may be attributed to implementations of Maternal and Child Health Programme in the country. Further, the mortality of adults (in the age group 15-34 for males and in the age group 15-24 for females) has been constant in India as well as in many parts of the country during the period 1979-86. However, for females, it declined more rapidly in the age span 25-49 during the same period in most of the states. The prime reason for the decline in mortality in the reproductive ages among females could be decline in the maternal mortality during 1980s (Bhat, Navaneetham and Rajan 1992). Inquisitively, the state of Kerala also has a higher adult mortality, especially for males, similar to other states. Also, the mortality at the old ages 65 and above had shown significant decline in many states of India during the period 1970-78 and it had remained constant during the period 1979-86. As regards the sex differential in mortality decline, females mortality declined faster than males in all the states during 1970-86. Also, the decline in mortality of females is common in all the states except Haryana and Uttar Pradesh in 1980s.

The important question which can be encountered from the above analysis is that what are the significant factors contributing for slow down in the mortality of adult ages? Though it is difficult to give an exhaustive list of causes for the stagflation of mortality in the adult ages in these states, among the prominent ones believed to affect the mortality levels are, abuse of alcohol, smoking and increase of unhygienic conditions due to poor sanitation. Further, the improvement in the quality of data, particularly changes in the sampling frame of SRS in 1978 might have also been responsible for portraying the static picture of the mortality level. However, this needs further research in order to investigate the possible reason for the stagnation in the adult mortality in India.

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