
Spatio-Temporal Change in Health Care Status in India: A Geographical Analysis

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Abstract

Health is an important indicator of socio-economic development of a country. Health not only determines the social well being and quality of life of the people in an area, but also regulates the opportunities available to them for participation in economic activities. Present study used four indicators to show the spatio-temporal change in healthcare status in India. These four indicators are; infant mortality rate, under 5 mortality rate, maternal mortality ratio and life expectancy at birth. India reports better in IMR, U5MR and MMR than the world average while life expectancy in India is lower than the world average. Study found that there are huge regional differences in the spatial pattern of the selected indicators. Study also found that states like U.P, Odisha, Bihar, M.P, Rajasthan and Assam have poor healthcare status while Goa, Kerala, Himachal Pradesh and Tripura show better healthcare status.

Keywords: Health, Development, Spatial Pattern, Healthcare Indicator

Introduction:

Health is regarded as a vital component in the growth and development of any country. Health not only determines the social well being and quality of life of the people in an area, but also regulates the opportunities available to them for participation in economic activities (Hassan and Daspattanayak, 2008). In the level of health and in measures for health improvement the developing countries lag far behind from the rest of world. There is a serious shortage of hospitals, doctors, nurses and medicines in the developing countries. Akhtar (1993) observed that in a developing country, like India, one of the serious laps in the planning process has been the lack of understanding of spatial or regional structure of health care system. A child born in a developing country is over 13 times more likely to die within the first five years of life than a child born in an industrialized country (U.N, 2012). This shows the situation of poor health care facilities in the developing countries. Institutional and safe delivery is an important component of maternal and child health which reduces maternal as well as infants death. Infant mortality, under 5 mortality, maternal mortality and life expectancy are the main indicators to access a quality of health care in a country.

Objectives:

The present paper has the following objectives;

- I. To find out the spatial pattern of healthcare status indicator in India.
- II. To find out the temporal change in healthcare status indicator in India.

Data Base and Methodology:

Present study is based on secondary data sources, which are obtained from various sources like; India Human Development Report, Human Development Report, HLEG Report, NFHS Reports and SRS Bulletin, Millennium Development Goal Reports, MDG India Country Report, W.H.O. Reports, and Census of India. After collecting data from different sources, the spatial pattern of the healthcare indicators are shown on map. Quartile method is used for showing the pattern of different states. After showing temporal changes, the spatial pattern is also shown.

Indicators of Health Care Status in India:

There are four indicators used to show the spatio-temporal change in healthcare status in India. These four indicators are; infant mortality rate, under 5 mortality rate, maternal mortality ratio and life expectancy at birth. These are discussed as below;

Infant Mortality Rate:

Millennium Development Goal (MDG) 4 includes both infant mortality rate (IMR) and under 5 mortality rate (U5MR). The IMR and U5MR are widely recognized as important indicators of the level of child health and overall development. Infant mortality is considered as an important indicator to assess socio-economic and health conditions of a region or state which is associated with national socio-economic development of a country. Infant Mortality Rate refers to the number of deaths in the first year of life per 1,000 live births. It reflects the probability of a child dying before attaining age one year due to poor health care of either the child or mother. About 1.5 million children die in India every year before their first birthday (MOSPI, 2009). No doubt that there is improvement in IMR over the years but it has not improved as per need in developing countries. Infant mortality rate in the world was 51 in 2001 and in 2011 it has been 37 with a decline of 14 numbers. IMR in India has also declined in this period, which was 64 in 2001 and it reached at 47 with a decline of 17 points (Table 1). It shows that IMR in India is declining more than that of the world as a whole, but it is still higher in India than the world as a whole.

Under 5 Mortality Rate:

Under-five mortality rate (U5MR) is defined as the probability of a child dying between birth and the fifth birthday. The U5MR refers to the number of children under five years old who die in a year, per 1,000 live births in the same year. U5MR was 73 in the world in 2001 (which also differs from one to another country) and has declined up to 51 in 2011. While it was 88 in 2001 and 61 in 2011 in India. It shows that U5MR in India declined more than that of the world as a whole, but it is still higher in India than the world as a whole.

Table 1: Health Indicators in the World and India, 2000-2010

S. No.	Indicators	World		Change	India		Change
		2000	2010	2000-10	2000	2010	2000-10
1	IMR (2001 and 11)	51	37	-14	64	47	-17
2	U5MR (2001 and 11)	73	51	-22	88	61	-27
3	MMR	320	210	-110	390	200	-190
4	Life Expectancy	66	70	4	62.5	65	2.5

Source: W.H.O. (2013)

Maternal Mortality Ratio:

Alike infant mortality, improving maternal health is also one of the eight Millennium Development Goals (MDGs) adopted at the 2000 Millennium Summit. The maternal mortality ratio (MMR) is the ratio of the number of maternal deaths during a given time period per 100,000 live births during the same time-period. W.H.O. defines maternal death as “the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes”. The two targets for assessing progress in improving maternal health (MDG 5) are reducing the maternal mortality ratio (MMR) by three quarters between 1990 and 2015, and achieving universal access to reproductive health by 2015. MMR in the world is recorded 320 in 2000 and 210 in 2010, which shows that there is noticeable improvement in this period. MMR in India has declined significantly in this period with 190 points in the last 10 years, which is a good sign in terms of mother's health (Table 1).

High maternal mortality is a matter of great concern in the world, especially in developing countries. Ninety nine percent of maternal deaths occur in developing countries, where a large proportion of women give birth without the aid of skilled health personnel (UNFPA, 2002). There is a spatial variation in maternal mortality all over countries. For example, a woman die during pregnancy or child birth is as low as 1: 5,500 (one in 5,500) in Australia and New Zealand and as high as 1:11 (one in 11) in the countries of Eastern Africa (WHO, 2001).

An estimated 3,58,000 maternal deaths occurred worldwide in 2008, a 34% decline from the levels of 1990. Despite this decline, developing countries continued to account for 99% (355 000) of the deaths. Sub-Saharan Africa and South Asia accounted for 87% (313 000) of global maternal deaths. Eleven countries, including Afghanistan, Bangladesh, the Democratic Republic of the Congo, Ethiopia, India, Indonesia, Kenya, Nigeria, Pakistan, Sudan, and the United Republic of Tanzania, comprised 65% of all maternal deaths in 2008 (W.H.O. 2010). More than 500,000 women in developing countries die every year in childbirth or during pregnancy (U.N, 2012). For the first time in 2006, annual deaths of children under five dropped below 10 million (U.N, 2012).

Life Expectancy:

Life expectancy is the most important measure of health. Life expectancy is the number of years a person would be expected to live, starting from birth. Life Expectancy is an important indicator of development and the Human Development Index (HDI) of a country. Life expectancy in India is 65, which shows its average picture in the world. There is steady increase in life expectancy over the past centuries has been attributed to improved nutrition, better hygiene, access to safe drinking water, effective birth control and immunization and other medical interventions (Clarke, 2008). Life expectancy at birth increased over the years. Life expectancy in the world was 66 in 2000 which is 70 in 2010. Life expectancy in India is also improved but the pace is slow compared to the world as a whole, which is 65 in India in 2010. It reveals that life expectancy in India is lower than that of the world (Table 1).

Spatio-Temporal Change in Health Care Status in India:

There has been made an attempt to analyse the spatio-temporal change in the indicator of health care status.

India has registered significant progress in improving life expectancy at birth, reducing infant and maternal mortality over the years. Crude death rate and infant mortality rate have declined over the years; as a result life expectancy has increased considerably. Table 2 shows the trend of birth rate, death rate, infant mortality rate and maternal mortality ratio from 1951-2009. The birth rate was 40.8 in 1951 and it is 22.5 in 2009. The death rate was 25.1 in 1951, which is decreased by 18 points till 2009. Infant mortality rate decreased nearly 3 times between 1951 and 2009. Maternal mortality ratio was 1321 in 1951 which has decreased more than 6 times till 2009. It is also noted that all these indicators are continuously decreasing from 1951 to 2009. The birth rate declined by 17 points. Death rate and IMR have declined almost 3 times in this period, while maternal mortality ratio declined more than 6 times.

Table 2: Trends of Health Care Indicators in India, 1951-2009

Indicators/Years → ↓	1951	1971	1981	1991	1999	2005	2009
Birth rate	40.8	36.9	33.9	29.5	26.1	23.8	22.5
Death rate	25.1	14.9	12.5	9.8	8.7	7.6	7.3
Infant mortality rate	148	129	110	80	70	58	50
Maternal mortality ratio	1321	853	810	424	407	254	212

Source: HLEG (2011)

Table 3: Under Five Mortality Rate in India, from 1988-92 to 2009

Place of residence/ reference period ↓	NFHS 1*	NFHS 2*	NFHS 3*	2009
Urban	74.6	63.1	52	41
Rural	119.4	103.7	82	71
Combined	109	95	74	64

Source: Compiled by author based on NFHS 3 and SRS (2011) *: All estimates are for the five years preceding the survey (approximately 1988–92 for NFHS 1, 1994–8 for NFHS 2, and 2001–5 for NFHS 3).

It is noticed that U5MR in India decreased from 1988-92 to 2009. U5MR in urban area is decreased slower than in rural areas. It decreased by 33.6 points in urban areas, whereas it decreased with 48.6 points in rural areas and at combined level it decreased by 45 points during 1988-92 and 2009. Figure 3.2 shows a trend of under 5 mortality rate (U5MR) in India. It shows that U5MR has declined rapidly in the last two decades. Urban U5MR has declined at a slower pace because health care facilities were better in urban areas, while rural U5MR declined rapidly during this period, due to increasing health facilities in rural areas in last two decades (Table 3).

The birth rate, death rate and infant mortality rate in India in 2000 is shown in table 4. It shows that there is an inequality in the spatial pattern of these indicators. The lowest birth rate is noticed in Goa, while the highest birth rate is recorded in Uttar Pradesh. The death rate is the lowest in Chandigarh, while the highest in Orissa. The IMR rate is lowest in Kerala and highest in Orissa.

Table 4: Birth rate, Death rate, and Infant Mortality Rate in India, 2000

S. No.	State/U.T	Birth Rate	Death Rate	Infant mortality Rate
1	Andhra Pradesh	21.3	8.2	65
2	Arunachal Pradesh	22.3	6	44
3	Assam	26.9	9.6	75
4	Bihar	31.9	8.8	62
5	Chhattisgarh	26.7	9.6	79
6	Goa	14.3	7.4	23
7	Gujarat	25.2	7.5	62
8	Haryana	26.9	7.5	67
9	Himachal Pradesh	22.1	7.2	60
10	Jammu & Kashmir	19.6	6.2	50
11	Jharkhand	26.5	9	70
12	Karnataka	22	7.8	57
13	Kerala	17.9	6.4	14
14	Madhya Pradesh	31.2	10.2	88
15	Maharashtra	20.9	7.5	48
16	Manipur	18.3	5.6	23
17	Meghalaya	28.5	9.2	58
18	Mizoram	16.9	5.2	21
19	Nagaland	N.A.	N.A.	N.A
20	Orissa	24.3	10.5	96
21	Punjab	21.5	7.3	52
22	Rajasthan	31.2	8.4	79
23	Sikkim	21.8	5.7	49
24	Tamil Nadu	19.2	7.9	51
25	Tripura	16.5	5.4	41
26	Uttar Pradesh	32.8	10.3	83
27	Uttaranchal	20.2	6.9	50
28	West Bengal	20.6	7	51
29	Andaman & Nicobar	19.1	5.1	23
30	Chandigarh	17.5	3.9	28
31	Dadra & Nagar Haveli	34.9	7.8	58
32	Daman & Diu	23.7	6.6	48
33	Delhi	20.3	5.1	32
34	Lakshadweep	26.1	6	27
35	Pondicherry	17.8	6.5	23
	India	25.8	8.5	68

Source: SRS Bulletin, 2001, N.A= Data not available

The spatial pattern of birth rate in 2000 in India has been shown in figure 1(a). It shows that the birth rate in the northern plain of India is higher than peninsular India and the state

located in the Himalayas. There are two exceptions to the above statement; one is Punjab and the second is Meghalaya. Punjab shows a low birth rate which is located in the plain region and Meghalaya shows high birth rate which is not situated in this plain region.

The spatial pattern of birth rate in 2010 in India has been shown in figure 1(b). It shows that the central belt of India from Rajasthan to Bihar along with Assam and Meghalaya have high birth rate, while the southern Indian states show the low birth rate. Punjab, Manipur, Tripura, Jammu & Kashmir and Himachal Pradesh also have low birth rate.

The spatio-temporal pattern change in birth rate in India from 2000 to 2010 has been shown in figure 1(c). It reveals that north-western states including Uttar Pradesh, Sikkim and Meghalaya show high decline in birth rate in this period. Jammu & Kashmir, Uttarakhand, Chhattisgarh, Jharkhand and Mizoram show very low changes in birth rate. Southern states including Gujarat and Arunachal Pradesh and Tripura also have low change in birth rate.

State wise birth rate, death rate, and infant mortality rate (IMR) in India in 2010 has been shown in table 5. It shows that there is regional inequality in the spatial pattern of all selected indicators from one state to another state. The birth rate, death rate, growth rate and IMR are noted as 22.1, 7.2, 14.9 and 47 respectively in 2010. The highest birth rate is noticed in Uttar Pradesh, while the lowest in Goa, which is half that of Uttar Pradesh. The death rate is highest in Odisha and lowest in Nagaland. The growth rate is highest in Bihar and lowest in Goa in the Indian states. IMR is highest in Madhya Pradesh and lowest in Goa. IMR in Madhya Pradesh is 6 times more than Goa.

The spatial pattern of death rate in 2000 in India has been shown in figure 2(a). It shows that BIMRU states along with Orissa, Assam and Meghalaya have very high death rate; and the peninsular states along with Gujarat, Haryana also have high death rate (except Kerala). While states situated in Himalayan region have low death rate which include; Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh, Manipur, Mizoram and Tripura. Along with these states, Punjab and West Bengal have also low death rate.

Figure 1

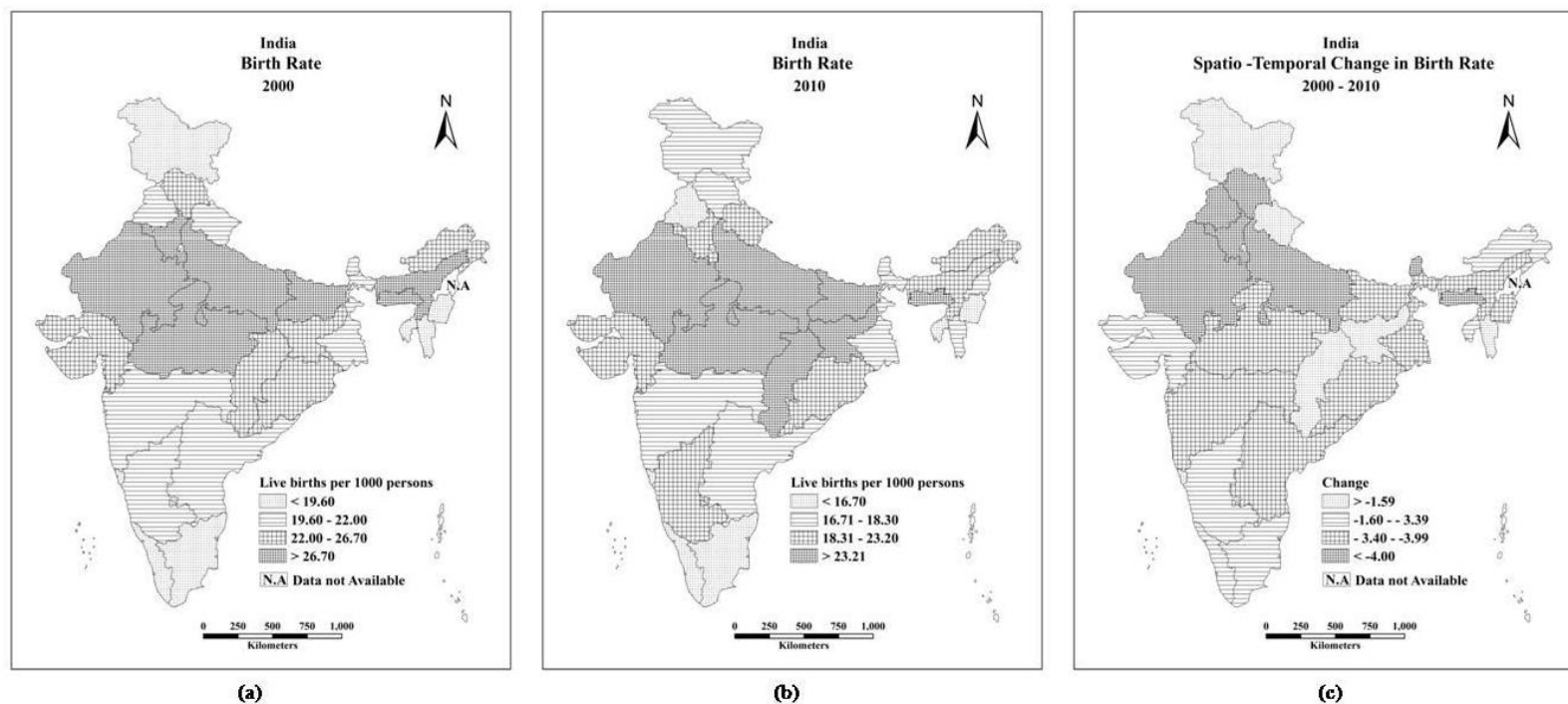


Table 5: Birth rate, Death rate and Infant Mortality Rate in India, 2010

S. No	State/U.T	Birth Rate	Death Rate	Infant Mortality Rate
1	Andhra Pradesh	17.9	7.6	46
2	Arunachal Pradesh	20.5	5.9	31
3	Assam	23.2	8.2	58
4	Bihar	28.1	6.8	48
5	Chhattisgarh	25.3	8	51
6	Goa	13.2	6.6	10
7	Gujarat	21.8	6.7	44
8	Haryana	22.3	6.6	48
9	Himachal Pradesh	16.9	6.9	40
10	Jammu & Kashmir	18.3	5.7	43
11	Jharkhand	25.3	7	42
12	Karnataka	19.2	7.1	38
13	Kerala	14.8	7	13
14	Madhya Pradesh	27.3	8.3	62
15	Maharashtra	17.1	6.5	28
16	Manipur	14.9	4.2	14
17	Meghalaya	24.5	7.9	55
18	Mizoram	17.1	4.5	37
19	Nagaland	16.8	3.6	23
20	Odisha	20.5	8.6	61
21	Punjab	16.6	7	34
22	Rajasthan	26.7	6.7	55
23	Sikkim	17.8	5.6	30
24	Tamil Nadu	15.9	7.6	24
25	Tripura	14.9	5	27
26	Uttar Pradesh	28.3	8.1	61
27	Uttarakhand	19.3	6.3	38
28	West Bengal	16.8	6	31
29	Andaman & Nicobar	15.6	4.3	25
30	Chandigarh	15.6	3.9	22
31	Dadra & Nagar Haveli	26.6	4.7	38
32	Daman & Diu	18.8	4.9	23
33	Delhi	17.8	4.2	30
34	Lakshadweep	14.3	6.4	25
35	Pondicherry	16.7	7.4	22
36	India	22.1	7.2	47

Source: SRS Bulletin, 2011

The spatial pattern of death rate in 2010 in India has been shown in figure 2(b). It shows that Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Orissa, Meghalaya and Assam have very high death rate; and death rate in peninsular states along with Punjab and Himachal Pradesh, Bihar and Jharkhand is also high. While in the rest of the states/U.Ts, the death rate is low. Figure

2(c) shows the spatio-temporal pattern change in death rate in India from 2000 to 2010. It reveals that the death rate has declined highest in central India, which includes Rajasthan, Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Bihar, Jharkhand and Orissa. The death rate in neighboring states of the above states is also declined noticeably; which includes Haryana, Maharashtra, West Bengal and Assam. The death rate declined low in northern most and southern states. The death rate in Gujarat, Sikkim and Arunachal Pradesh is also declining with a low pace.

The temporal change in birth rate, death rate, and infant mortality rate from 2000 to 2010 has been shown in table 6. It reveals that birth rate has decreased in all the states and U.T (except Mizoram). Mizoram is the only state where the birth rate has increased. The birth rate has declined highest in Lakshadweep followed by Dadra & Nagar Haveli and Himachal Pradesh. The birth rate in these states/U.Ts has declined more than 5 points. The birth rate in the Uttarakhand has declined lowest in the country, followed by Pondicherry and Goa. Birth rate has declined by 3.7 points in India as a whole. In terms of death rate, it has declined highest in Dadra & Nagar Haveli followed by Uttar Pradesh and Bihar, while it is declined lowest in Sikkim followed by Arunachal Pradesh and Tamil Nadu. There are also 4 states/U.Ts where death rate have not declined; these are Chandigarh, Lakshadweep, Kerala and Pondicherry. The death rate has declined by 1.3 points in India. Alike above indicators, infant mortality is also decreased considerably in India. It has declined in all the states and U.T (except Andaman & Nicobar and Mizoram). Infant mortality has declined highest in Odisha followed by Chhattisgarh and Jharkhand and the lowest decline in Pondicherry and Kerala.

Figure 2

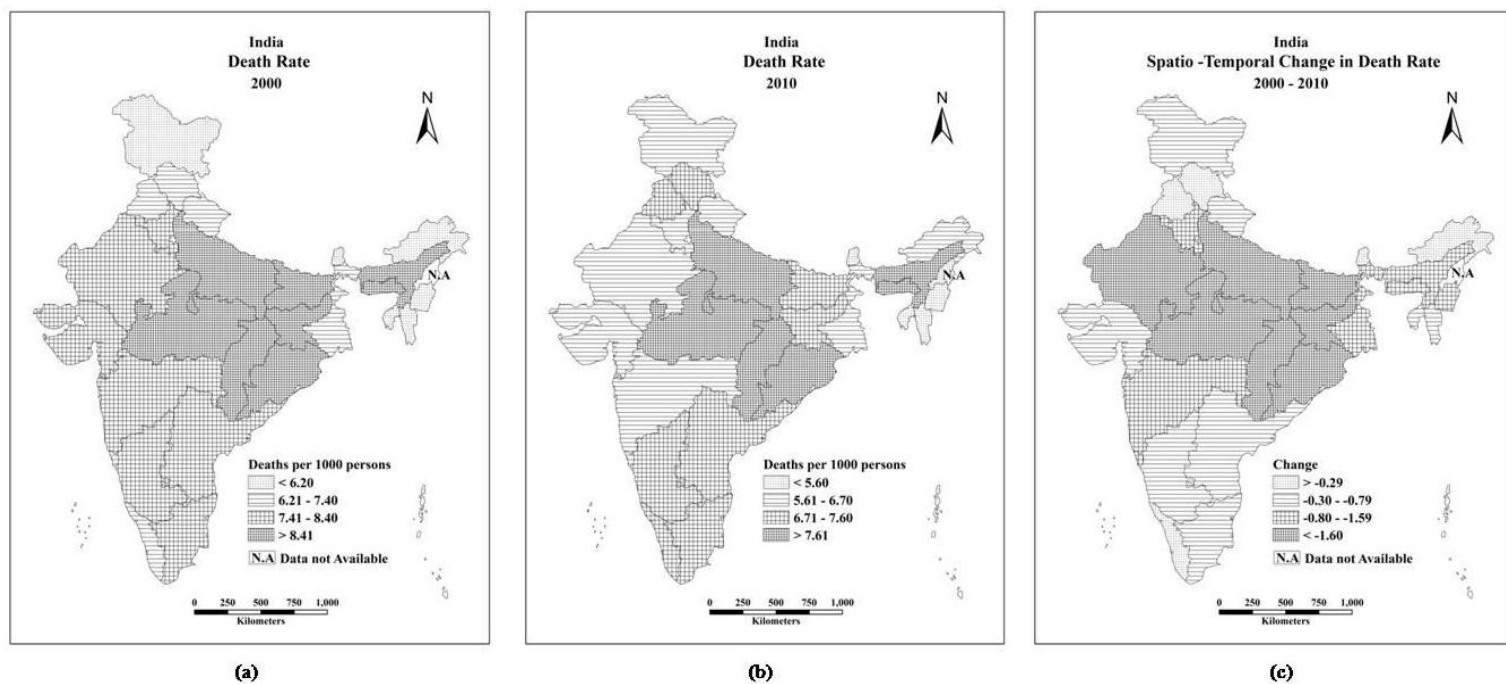
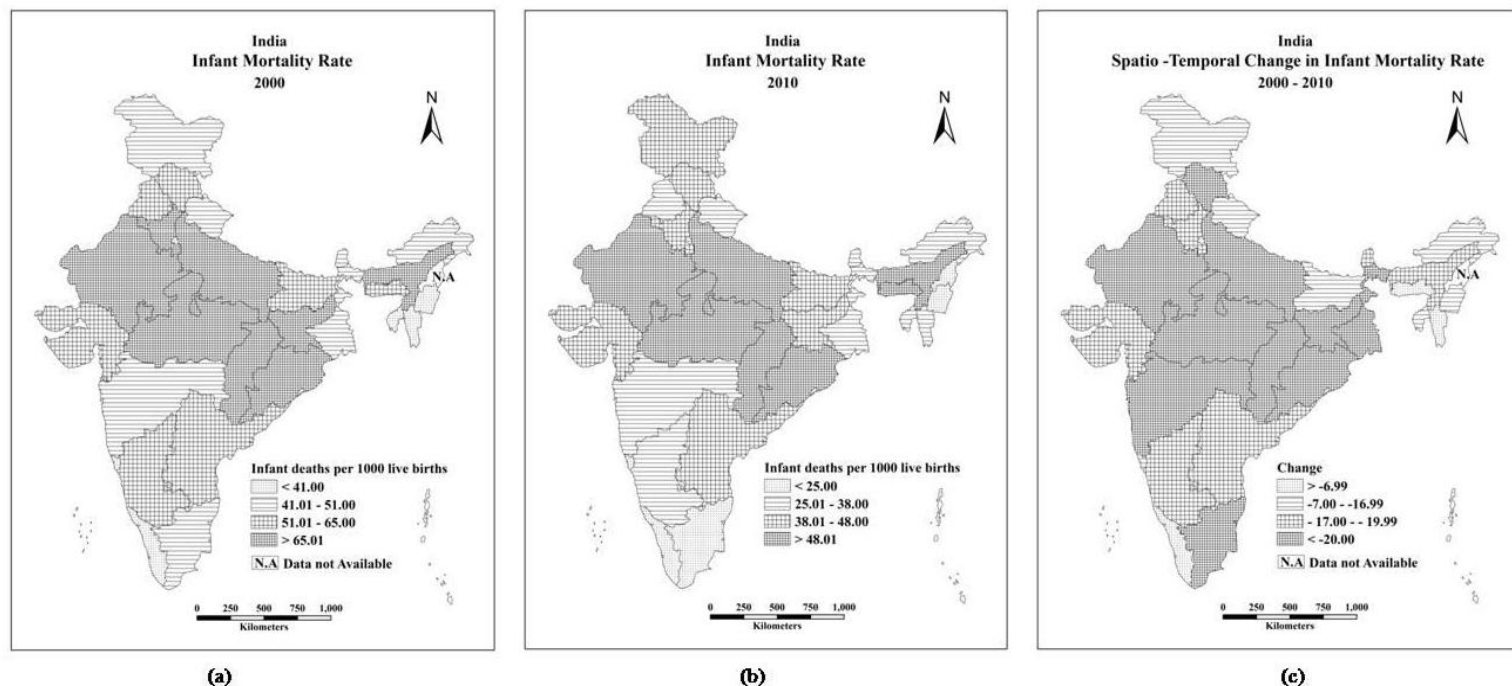


Table 6: Change in Birth rate, Death rate and Infant mortality rate in India from 2000 to 2010

S. No.	State/U.T	Birth Rate	Death Rate	Infant mortality Rate
1	Andhra Pradesh	-3.4	-0.6	-19
2	Arunachal Pradesh	-1.8	-0.1	-13
3	Assam	-3.7	-1.4	-17
4	Bihar	-3.8	-2	-14
5	Chhattisgarh	-1.4	-1.6	-28
6	Goa	-1.1	-0.8	-13
7	Gujarat	-3.4	-0.8	-18
8	Haryana	-4.6	-0.9	-19
9	Himachal Pradesh	-5.2	-0.3	-20
10	Jammu & Kashmir	-1.3	-0.5	-7
11	Jharkhand	-1.2	-2	-28
12	Karnataka	-2.8	-0.7	-19
13	Kerala	-3.1	0.6	-1
14	Madhya Pradesh	-3.9	-1.9	-26
15	Maharashtra	-3.8	-1	-20
16	Manipur	-3.4	-1.4	-9
17	Meghalaya	-4	-1.3	-3
18	Mizoram	0.2	-0.7	16
19	Nagaland	N.A.	N.A.	N.A
20	Odisha	-3.8	-1.9	-35
21	Punjab	-4.9	-0.3	-18
22	Rajasthan	-4.5	-1.7	-24
23	Sikkim	-4	-0.1	-19
24	Tamil Nadu	-3.3	-0.3	-27
25	Tripura	-1.6	-0.4	-14
26	Uttar Pradesh	-4.5	-2.2	-22
27	Uttarakhand	-0.9	-0.6	-12
28	West Bengal	-3.8	-1	-20
29	Andaman & Nicobar	-3.5	-0.8	2
30	Chandigarh	-1.9	0	-6
31	Dadra & Nagar Haveli	-8.3	-3.1	-20
32	Daman & Diu	-4.9	-1.7	-25
33	Delhi	-2.5	-0.9	-2
34	Lakshadweep	-11.8	0.4	-2
35	Pondicherry	-1.1	0.9	-1
	India	-3.7	-1.3	-21

Source: Based on table 4 and N.A= Data Not Available

Figure 3



The spatial pattern of infant mortality rate in 2000 in India has been shown in figure 3(a). It shows that the infant mortality rate is very high in the central part of India from Rajasthan in west to Assam in east (except West Bengal). Infant mortality rate is lowest in Kerala in the south and Tripura, Mizoram and Manipur in the north-east. Figure 3(b) shows the spatial pattern of infant mortality rate in 2010 in India. It shows that infant mortality rate is also high in the same states which were in 2000 in this category. It excludes only Haryana and Jharkhand from this category and includes Meghalaya state. Infant mortality rate is lowest in Kerala and Tamil Nadu in the south and Nagaland and Manipur in the north eastern part of the country.

The spatio-temporal pattern of change in infant mortality rate in India from 2000 to 2010 has been shown in figure 3(c). It reveals that infant mortality has declined the highest in the central part of the country, which includes Rajasthan, Uttar Pradesh, Madhya Pradesh, Maharashtra, Chhattisgarh, Jharkhand, Orissa and West Bengal. This category also includes Himachal Pradesh in the north and Tamil Nadu in the south. Infant mortality has declined lowest in Kerala, which is located in the south and Meghalaya and Mizoram in north-east India.

Life Expectancy in India:

The life expectancy at birth in India during 1999-2001 has been shown in table 7. It is noted that life expectancy in India is 62.95 years, which varies throughout India whether it is related to male or female. For example, total life expectancy (including male and female) is 62.95 and female life expectancy is 64.1 while male life expectancy is 61.8. Delhi has the highest male life expectancy (69.6), while Chhattisgarh has the lowest (56). Female life expectancy is highest in Kerala (75.2) and the lowest is noticed in Assam. Combined life expectancy is highest in Kerala (72.25) and lowest in Chhattisgarh (58).

It is found that life expectancy during 2006-10 in India is 66.9 years, which varies throughout India whether it is related to male or female. For example, total life expectancy (including male and female) is 66.9 and female life expectancy is 68.1 while male life expectancy is 65.8. Kerala has the highest male life expectancy (72), while Chhattisgarh has the lowest (61). Female life expectancy is also highest in Kerala (76.8) and the lowest is noticed in Assam. Combined life expectancy is highest in Kerala (74.5) and lowest in Assam (62.2) (Table 8).

Table 7: Life Expectancy in India, 1999-2001

S. No.	State/U.T	Male	Female	Total
1	Andhra Pradesh	61.4	65.9	63.65
2	Assam	57.6	58.8	58.2
3	Bihar	63.6	62.7	63.15
4	Chhattisgarh	56	60	58
5	Delhi	69.6	72.8	71.2
6	Gujarat	62.6	66.7	64.65
7	Haryana	64.4	66.3	65.35
8	Himachal Pradesh	67.3	70.9	69.1
9	Jammu & Kashmir	61	62	61.5
10	Jharkhand	62	60	61
11	Karnataka	62.5	68.1	65.3
12	Kerala	69.3	75.2	72.25
13	Madhya Pradesh	58	59.3	58.65
14	Maharashtra	64.4	68.1	66.25
15	Orissa	58.3	59.8	59.05
16	Punjab	66.2	68.9	67.55
17	Rajasthan	62.1	65.2	63.65
18	Tamil Nadu	64.1	67.1	65.6
19	Uttar Pradesh	59.5	59.4	59.45
20	Uttaranchal	60	64	62
21	West Bengal	64.7	67.4	66.05
22	NE (excluding Assam)	65.1	69.1	67.1
	India	61.8	64.1	62.95

Source: Population Projections for India and States 2001-2026, Office of the Registrar General & Census Commissioner, India, Census of India 2001

Table 9 shows the temporal change in life expectancy in India from 1999-2001 to 2006-10. It reveals that life expectancy is increased in all the states. Male life expectancy has increased highest in Chhattisgarh, followed by Gujarat and Uttar Pradesh, and lowest in Delhi, followed by Himachal Pradesh and Punjab. On the other hand, female life expectancy is increased highest in Uttar Pradesh followed by Orissa and Jammu & Kashmir and lowest in Kerala, followed by Delhi and Himachal Pradesh. In terms of increase of total life expectancy, Uttar Pradesh ranks first followed by Chhattisgarh and Orissa.

Table 8: Life Expectancy in India, 2006–10

S. No.	State/U.T	Male	Female	Total
1	Andhra Pradesh	65.4	69.4	67.4
2	Assam	61.6	62.8	62.2
3	Bihar	67.1	66.7	66.9
4	Chhattisgarh	61	64	62.5
5	Delhi	71.4	74.8	72.9
6	Goa	N.A	N.A	69.5
7	Gujarat	67.2	71	69
8	Haryana	67.9	69.8	68.8
9	Jharkhand	66	64	65
10	Karnataka	66.5	71.1	68.8
11	Kerala	72	76.8	74.5
12	Madhya Pradesh	62.5	63.3	62.9
13	Maharashtra	67.9	71.3	69.5
14	Orissa	62.3	64.8	63.5
15	Punjab	68.7	71.6	70
16	Rajasthan	66.1	69.2	67.6
17	Tamil Nadu	67.6	70.6	69.1
18	Uttar Pradesh	64	64.4	64.2
19	West Bengal	68.2	70.9	69.5
20	Arunachal Pradesh	68.1	71.8	69.9
21	Himachal Pradesh	69.8	73.3	71.5
22	Jammu & Kashmir	65	67	65.9
23	Manipur	68.1	71.8	69.9
24	Meghalaya	68.1	71.8	70
25	Mizoram	68.1	71.8	70
26	Nagaland	68.1	71.8	69.9
27	Sikkim	68.1	71.8	69.8
28	Tripura	68.1	71.8	69.9
29	Uttrakhand	64	68	65.9
30	Andaman & Nicobar	N.A	N.A	69
31	Chandigarh	N.A	N.A	69.9
32	Dadra & Nagar Haveli	N.A	N.A	N.A
33	Daman & Diu	N.A	N.A	N.A
34	Lakshadweep	N.A	N.A	N.A
35	Pondicherry	N.A	N.A	69
	India	65.8	68.1	66.9

Source: India Human Development Report (IHDR), 2011

N.A= Data Not Available

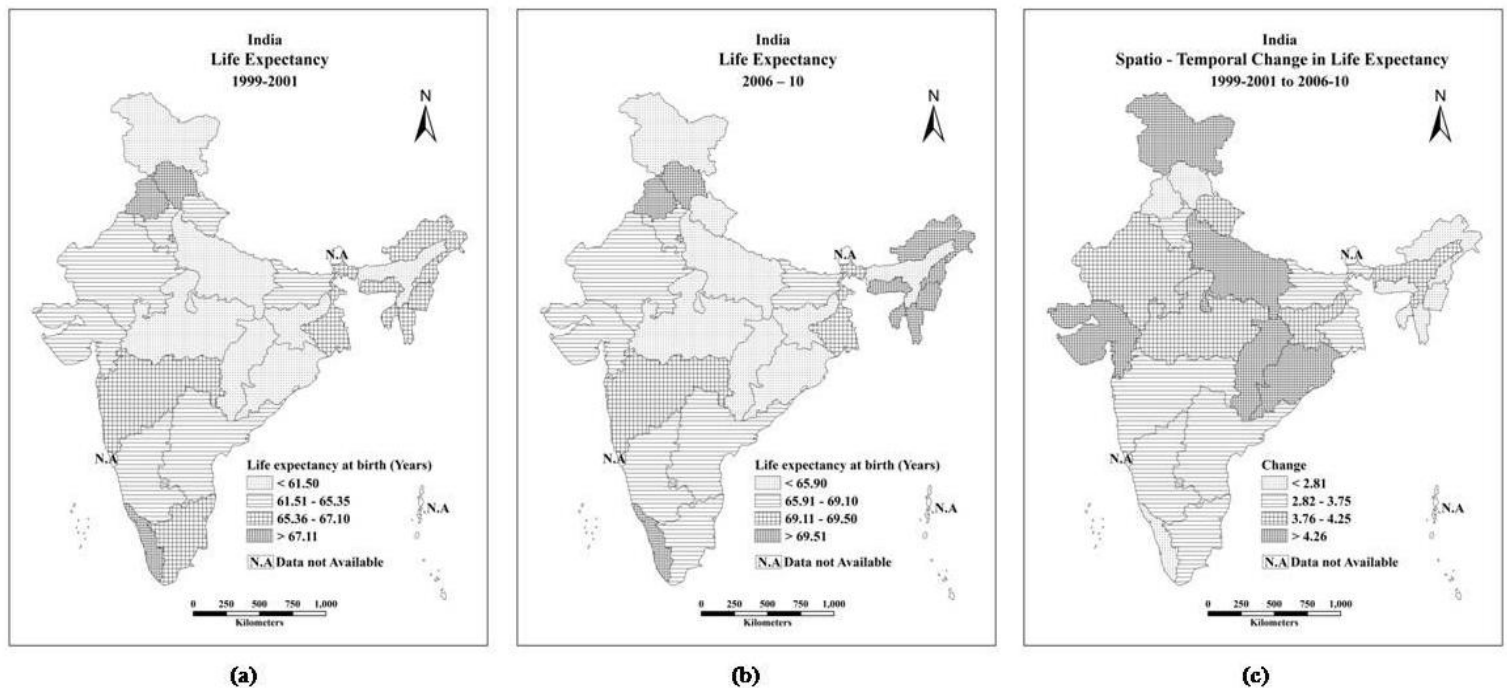
Table 9: Change in Life Expectancy from 1999-2001 to 2006-10

S. No.	State/U.T	Male	Female	Total
1	Andhra Pradesh	4	3.5	3.75
2	Assam	4	4	4
3	Bihar	3.5	4	3.75
4	Chhattisgarh	5	4	4.5
5	Delhi	1.8	2	1.7
6	Gujarat	4.6	4.3	4.35
7	Haryana	3.5	3.5	3.45
8	Himachal Pradesh	2.5	2.4	2.4
9	Jammu & Kashmir	4	5	4.4
10	Jharkhand	4	4	4
11	Karnataka	4	3	3.5
12	Kerala	2.7	1.6	2.25
13	Madhya Pradesh	4.5	4	4.25
14	Maharashtra	3.5	3.2	3.25
15	Orissa	4	5	4.45
16	Punjab	2.5	2.7	2.45
17	Rajasthan	4	4	3.95
18	Tamil Nadu	3.5	3.5	3.5
19	Uttar Pradesh	4.5	5	4.75
20	Uttarakhand	4	4	3.9
21	West Bengal	3.5	3.5	3.45
22	NE (excluding Assam)	3	2.7	2.81
	India	4	4	3.95

Source: Based on table 7 and 8

The spatial pattern of life expectancy in India during 1999-2001 has been shown in figure 4(a). It shows that life expectancy is very high in Himachal Pradesh and Punjab in northern India and Kerala in south India. Low life expectancy states are located in central parts of the country, which are Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Jharkhand and Orissa. Low life expectancy also exists in Jammu & Kashmir and Assam. Figure 4(b) shows the spatial pattern of

Figure 4



life expectancy in India during 2006-10. It shows that the pattern of life expectancy is almost the same in the country which was in 1999-2001. There are only two changes in this pattern, which are Tamil Nadu and Uttarakhand. Tamil Nadu was in high category during 1999-2001 but now during 2006-10 it is under low category and Uttarakhand was under low category during 1999-2001 and now it is under very low category during 2006-10. Life expectancy in north-eastern states has also made improvement (excluding Assam).

The spatio-temporal pattern of change in life expectancy in India from 1999-2001 to 2006-10 has been shown in figure 4(c). It reveals that there is high improvement noticed in Uttar Pradesh, Gujarat, Orissa, Chhattisgarh and Jammu & Kashmir. Punjab, Himachal Pradesh and Kerala have low improvement in life expectancy. North-eastern states also have made low improvement (excluding Assam).

Conclusion:

In the above discussion it is concluded that healthcare status in India is improving but at a slow pace. Infant mortality rate decreased during 2001 and 2011 but it is still higher than the world average. It is also noticed that there are huge regional differences in the pattern of infant mortality rate across the country. Under 5 mortality rate in the country has also decreased but it is still higher than the world average, but the positive point is that it decreased in India at a higher pace than the world average. The Maternal Mortality Ratio which was 390 in 2000, has decreased notably by 190 points. The Maternal Mortality Ratio in India was higher than the world in 2000 but it is lower than the world average in 2010. Life expectancy in India also increased during 2000 and 2010, but it is still lower than the world average. It is the only indicator where India's progress is lower than the world average. While in terms of IMR, U5MR and MMR, India reports better than the world average. Along with this temporal data, the spatial pattern of these indicators shows that there are huge regional differences in the different states. Present study found that states like U.P, Odisha, Bihar, M.P, Rajasthan and Assam have poor healthcare status while Goa, Kerala, Himachal Pradesh and Tripura show better healthcare status. Finally, it can be concluded that the healthcare status in India is improving but the pace is slow.

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