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**INFRASTRUCTURE AND STATUS OF HEALTH SECTOR IN INDIA: AN INTER-STATE ANALYSIS****S V Hanagodimath**

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**Abstract:**

Health Infrastructure Index and Health Status Index for 15 Indian states are analysed and also linked to see the association between them in this study. The study found that inter-state disparities in health status index has decreased, which needs to be appreciated. On the other hand, inter-state disparities in health infrastructure index has increased, which needs to be addressed with proper policies and programmes by central as well as state governments. States like Uttar Pradesh, Rajasthan, Orissa and Madhya Pradesh are in the bottom position in both health infrastructure and health status indices. Hence, these states have to be given a special and focused attention in the formulation and implementation of health schemes. The study found a positive association between health infrastructure index and health status index, but it does not have higher level of statistical significance. No doubt, public expenditure on health should be increased to develop the health infrastructure facilities to improve the health status of the people. Further, creation of awareness about the balanced diet, maintenance of good hygiene, proper child care, and development of good mental and physical health is also more important.

**Introduction:**

Among the Human Development indicators, health is one of the most important indicators along with education and income. United Nations development programme's (UNDP) human development index (HDI) measures the health (decent standard of living) with the life expectancy at birth. This is a proxy indicator to represent the overall health infrastructure and status of any community/society/region. Health condition of the any nation/state is determined by the many factors, among them health infrastructure facilities like, number of doctors, number of nurses, number of bed and so on are important. Health is also affected by many socio-economic indicators like income, employment, gender, age caste, food patter, working condition, sanitation, hygiene and so on. Health infrastructure plays a very important role. In Indian, there are number of studies which have analysed the various issues of health sectors like public and private expenditure on health, government programmes and policies on health sector, growth and development of health infrastructure facilities and status, health level of different regions/communities and so on. Among the studies, Dadibhavi and Bagalkoti (1994), Grossman (1976), Seth (2005), Anita (1988), Armugam (2005), Bhargava, Jamison, Lau, Murray (2001), Malhotra Neena and Shweta (2006), Prabhu (2001) Bloom, Channing, and Sevilla. (2004), Chopra Vipal (2006), Aushik, Klein, Arbenser (2006) and so on are important. However, there are a very few studies, which have examined impact/association of health infrastructure on health status for Indian states with using different indicators. Recently, Hanagodimath (2008) has constructed indices for health sector for Indian states. The present study having used the data from Hanagodimath (2008), attempted to analyse the health infrastructure index and health status index for Indian states.

**2. Methodology:**

Two indices have been constructed in health sector by Hanagodimath (2008), they are health infrastructure index (HII) and health status index (HSI). Three indicators are used to construct **Health Infrastructure Index (HII)** namely – '*Number of hospitals and dispensaries per lakh population*', '*Number of beds per lakh population*', '*Number of primary health centres (PHCs,) sub centres (SCs) per lakh population*'.



The formulas of Infrastructure Index and status indices,

$$\text{Health Infrastructure Index} = \frac{X_s}{X_n} * 100$$

Where,  $s$  is state,  $n$  is nation and  $X$  is variable

This formula is used to normalise the indicators. Further, the average value of these three indicators is considered as the HII.

To construct the **Health Status Index** four indicators are used namely, '*Infant mortality rate rural*', '*Infant mortality rate urban*', '*Life expectancy at birth rural*', '*Life expectancy at birth urban*'

$$\text{Health Status Index} = \frac{\text{Actual Value} - \text{Minimum Value}}{\text{Maximum value} - \text{Minimum Value}}$$

This formula is used to normalise the indicators. Further, average of normalised four indicators is treated as HSI. The maximum and minimum values are 0 and 150 respectively for Infant mortality rate; 85 and 25 are the maximum and minimum values for Life Expectancy at Birth. Further, the average value of these four indicators is considered as the HSI.

### 3. Health Infrastructure Index of States in India:

In table 1, information related to health infrastructure index has been provided. It is observed from the table that in the year 1991 Gujarat was in the first position and Bihar was in the last position. Whereas, in the 2001, Kerala occupied the first position, Gujarat found in the second position. Bihar continued in the last position even in year 2001. Kerala, Gujarat, Maharashtra and Punjab are in the top position in both the time periods. Madhya Pradesh, Haryana and Bihar are observed in the bottom position in the same periods.

**Table 1: Health Infrastructure Index of India**

States	1991		2001	
	Index	Rank	Index	Rank
Andhra Pradesh	70.57	10	120.02	5
Assam	81.72	7	96.56	8
Bihar	54.85	15	57.20	15
Gujarat	222.01	2	323.07	1
Haryana	57.79	14	58.58	13
Karnataka	90.57	5	97.39	7
Kerala	251.41	1	249.18	2



Madhya Pradesh	60.07	13	57.41	14
Maharashtra	197.47	3	181.89	3
Orissa	61.74	12	90.04	9
Punjab	150.70	4	138.38	4
Rajasthan	75.08	8	62.68	12
Tamil Nadu	86.61	6	108.38	6
Uttar Pradesh	64.11	11	72.44	10
West Bengal	71.65	9	64.72	11
India	100.00		100.00	
Coefficient of Variation (%)	61.68		65.50	

Source: Hanagodimath (2008)

However, states like Rajasthan, Karnataka, West Bengal, Kerala, Assam and Madhya Pradesh have experienced the negative change in their ranks from 1991 to 2001. Four states namely, Maharashtra, Punjab, Tamil Nadu and Bihar have continued in the same positions. Gujarat, Uttar Pradesh, Haryana, Orissa and Andhra Pradesh are the five states, which have shown the positive change in their ranks in HII in the reference period. Rajasthan is the state, which has registered the highest negative change in its rank from 8<sup>th</sup> in 1991 to 12<sup>th</sup> in 2001. Andhra Pradesh has improved its rank from 10<sup>th</sup> to 5<sup>th</sup> in the same period. Coefficient of variation has been calculated to see the inter-state disparity, which is presented in the last row of the table. It is found that inter-state disparity in HII has increased from 61.68 per cent in 1991 to 65.50 per cent 2001.

#### 4. Health Status Index of states in India:

Health status indices of 15 Indian states for the year 1991 and 2001 have been presented in table 2. It is found from the table that Kerala is in the first position and Madhya Pradesh is in the last portions in both the time periods. Kerala, Haryana, West Bengal and Punjab are in the top position in 1991. In the year 2001, except Haryana remaining states have maintained their top position. Uttar Pradesh, Orissa and Madhya Pradesh are found in the bottom position in both the time periods. Significant higher deterioration is observed in Haryana (from 2<sup>nd</sup> to 8<sup>th</sup>) and Andhra Pradesh (from 5<sup>th</sup> to 9<sup>th</sup>). Rajasthan has also skipped from 11<sup>th</sup> to 12 positions.

**Table 2: Health Status Index of India**

States	1991		2001	
	Index	Rank	Index	Rank
Andhra Pradesh	0.65	5	0.62	9



Assam	0.53	12	0.62	11
Bihar	0.60	9	0.66	7
Gujarat	0.56	10	0.63	10
Haryana	0.68	2	0.63	8
Karnataka	0.61	8	0.66	6
Kerala	0.76	1	0.85	1
Madhya Pradesh	0.40	15	0.55	15
Maharashtra	0.62	7	0.70	5
Orissa	0.46	14	0.55	14
Punjab	0.63	4	0.72	2
Rajasthan	0.55	11	0.57	12
Tamil Nadu	0.66	6	0.70	4
Uttar Pradesh	0.48	13	0.57	13
West Bengal	0.65	3	0.69	3
All India	0.59		0.64	
Coefficient of Variation (%)	15.78		12.09	

Source: Hanagodimath (2008)

States like, Kerala, West Bengal, Gujarat, Uttar Pradesh, Orissa and Madhya Pradesh have maintained their position in both the study period. On the other hand, Assam, Punjab, Tamil Nadu, Maharashtra, Karnataka and Bihar have improved their ranks in HSI. It is happy to note that inter-state disparity in HSI has decreased from 1991 to 2001. It can be observed through the decreased coefficient of variation from 15.78 per cent to 12.09 per cent.

#### **Categorization of States:**

Using the geographic mean method for the index values, states have been categorized into four groups for the year 2001. With respect to HSI Gujarat and Kerala are observed in the advanced category, while Uttar Pradesh, Rajasthan, Haryana, Madhya Pradesh Bihar and West Bengal are in the under developed category. With respect to HSI, Kerala and Punjab are in the advanced category, whereas, Uttar Pradesh, Rajasthan, Orissa and Madhya Pradesh are in the under developed category. Remaining states are observed in second and third groups (table 3).



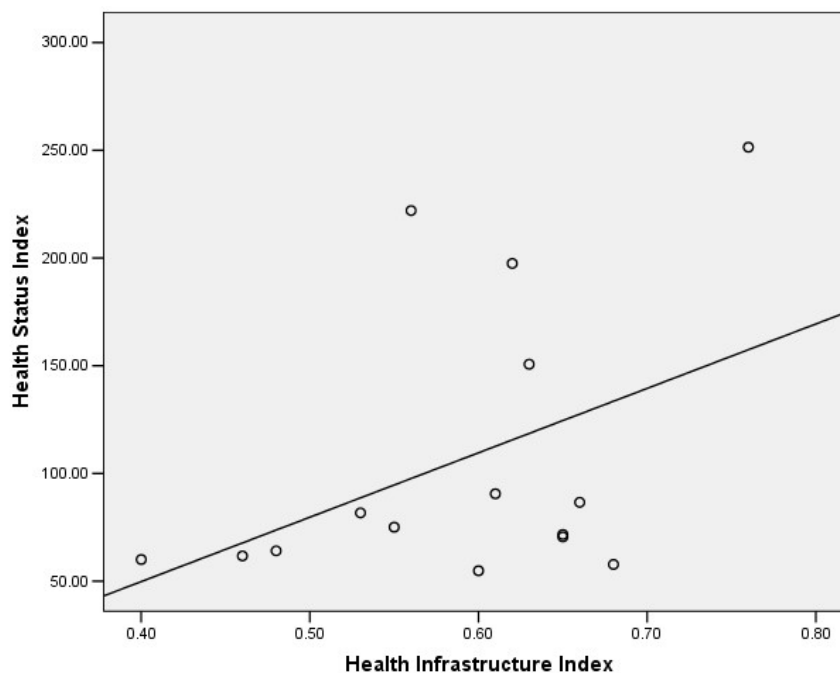
**Table 3: Grouping of the States in terms of Health Status and Health Infrastructure Indices - 2001**

Particulars	Group I – Advanced	Group II – Above Average	Group III – Below Average	Group IV – Under developed
<b>Health Infrastructure Index</b>	Gujarat Kerala	Maharashtra Punjab Andhra Pradesh	Tamil Nadu Karnataka Assam Orissa	Uttar Pradesh Rajasthan Haryana Madhya Pradesh Bihar West Bengal
<b>Health Status Index</b>	Kerala Punjab	Maharashtra Tamil Nadu West Bengal Karnataka Bihar	Haryana Gujarat Andhra Pradesh Assam	Uttar Pradesh Rajasthan Orissa Madhya Pradesh

**Association of HII and HSI:**

To see the association between health infrastructure index and health status index a scatter diagram has been prepared and presented in figure 1. It is found from the figure that there is a positive association between health infrastructure and health status. Correlation coefficient is 0.427, which is the expected sign but statistically not significant. It means, to improve the health status, infrastructure is a necessary but not a sufficient condition.

**Figure 1: Association of Health Infrastructure Index and Health Status Index for Indian States, 2001**





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**Conclusion:**

From the ongoing analysis it is clear that inter-state disparities in health status index has decreased, which needs to be appreciated. On the other hand, inter-state disparities in health infrastructure index has increased, which needs to be addressed with proper policies and programmes by central as well as state governments. States like Uttar Pradesh, Rajasthan, Orissa and Madhya Pradesh are in the bottom position in both health infrastructure and health status indices. Hence, these states have to be given a special and focused attention in the formulation and implementation of health schemes. The study found a positive association between health infrastructure index and health status index but it does not have higher level of statistical significance. No doubt, public expenditure on health should be increased to develop the health infrastructure facilities to improve the health status of the people. Further, creation of awareness about the balanced diet, maintenance of good hygiene, proper child care, and development of good mental and physical health is also more important.

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