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Health Infrastructure in Rural India: A Comparative Study

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Abstract
Health services are one of the fundamental sectors of the society and the economy. Providing social health protection and equal access to quality healthcare have significant positive effects on individual and public health, economic growth and development. India has shortage of health care facilities, especially in rural areas, where majority of the population resides. In this context, the present study was carried out with aims to examine the current status of health indicators of major states of rural India and to make a comparative analysis of rural health care infrastructure in India. The study is primarily based on secondary data that has been collected from different sources of Government of India. From the present paper, it was realized that there are inequalities and shortages in the existing rural health care infrastructure in the major Indian states. For meeting the deficiency of rural health infrastructure in terms of government buildings there is an urgent need of investment in the same by the government. Further, focus should also be given towards rationalising the existing health care institutions to improve their service delivery. The principle of the equity should be followed for spreading the health care services across regions.
Keyword: rural health care infrastructure, major Indian states, challenges

Introduction

Being healthy makes us feel brisk and better. Good health helps us to lead a happy and peaceful life. Maintaining good health is significant in order to live our life free from stress and diseases. The improvement of health is also prerequisite for socio-economic development. A well nourished, healthy, educated, skilled and alert labour force is the most important productive asset and this has been widely recognized the world over.

Health indicates a sound body and a sound mind. It is multidimensional in character (some of the main dimensions are birth rate, death rate, infant mortality rate, life expectancy at birth, *etc.*); each of which is effected by many factors like life style, adequate housing, basic sanitation and socio-economic conditions including income, health education, per capita health expenditure, availability and quality of health infrastructure. The widely accepted definition of health is given by World Health Organisation (1948) in the preamble to its constitution: "Health is a state of complete physical, mental and social well-being and not merely an absence of disease or infirmity". But, subsequently, the statement was amplified to include "the ability to lead a socially and economically productive life" (WHO, 1978).

In humans, health is the general condition of a person's mind, body, and the spirit, usually meaning to be free from illness, injury, or pain. Though health has been considered a fundamental human right and that the attainment of the highest possible level of health is a most important worldwide social goal whose realisation requires the action of many other social and economic sectors in addition to the health sector since the Alma Alta Declaration (1978), however expenditure on health in India is quite lower than required and the status of health infrastructure in the country is not robust.

Objectives of the Study

Keeping the above facts in view, the present study has been carried out with the following objectives; (i) to examine the position of health indicators in India, (ii) to analyse the current status of rural health infrastructure, (iii) to examine the gap between required and actual available health infrastructure in rural

India; and (iv) to suggest measures that may be useful to the policy makers both at the micro and macro levels for the improvement of health infrastructure.

Review of Literature

As it appears, many researchers have done substantial amount of work at the state, national level and international level regarding different aspects of health and have come up with different conclusions. So, for better understanding of the present problem, I have reviewed a number of related studies. Most of the literature reviewed is from the decade of 1970's onwards. Some studies have been presented in brief as follows:

At the National Level:

Reddy and Selvaraju (1994) used time-series data sets from 1974-75 to 1990-91 across the 15 major states in India, and found a strong relationship between per capita income and health care expenditure. He concluded that health care expenditure is elastic to changes in income. Arora (1999) examined long-term relationship between income and health with respect to developed economies in the world. The author concluded that the economic growth has been effected by health of the population and he focused that health should be considered as an integral component of the productivity of economies. Pradhan *et al.* (2000) noticed the wide disparities in levels of living for both economic and social indicators in case of rural and urban India. Gupta and Mitra (2001) have concluded that (a) per capita government health expenditure is apparently and positively related to health status, (b) higher per capita income results in better health status, and (c) higher economic growth affects health status on the one hand and better health status strengthen the growth of income on the other. Roy *et. al* (2004) observed the extent of inequalities in health care and nutritional status among the Indian states. He concluded that health services did not reach the disadvantaged sections. Kathuria and Sankar (2005) examined the performance of the rural public health systems of 16 major States in India. The authors found that the health outcomes of Indian states in rural areas were positively related to the level of health infrastructure in terms of access to facilities and availability of skilled professionals, such as doctors. The authors further concluded that there are differences in health infrastructure in states and differences are also found in efficiency in using these inputs.

At the International Level:

As per Senauer and Garcia (1991), child's age, gender, and birth order, all, were found to be important explanatory factors in certain of the nutrition and health relationships. Education of parents also put a positive impact on the long-run health status of preschoolers. David *et.al.* (2001) analysed regional variations in the physical and mental health of patients receiving primary care in the largest inter-grated health care system in the united States. The authors summarized that the substantial differences in the health of patients enrolled in different VA primary clinics could be attributed to socio-demographic and co-morbid factors. Using time series data, Toor and Butt (2005) analysed determinants of health care expenditure in Pakistan. Conventional log-linear model has been used by the author to find short-run and long-run relationship between health expenditure and socio-economic factors in Pakistan. The authors made a conclusion that socio-economic factors such as per capita gross domestic product, urbanisation, literacy rate, crude birth rate, and foreign aid plays an significant role in determining health care expenditure in Pakistan. Riman and Akpan (2010) attempted to find out causal direction and long-run relationship between government health expenditure, poverty and health status, in Nigeria. The results of the paper showed that there was a strong evidence of causal bi-directional relationship between life expectancy and poverty in Nigeria, and that long-run relationship existed between poverty and health status. However, there was an insignificant relationship between health status and government health expenditure. Further, the authors stressed that there should be reduction in the poverty levels and increments in the budgetary allocation in the health sector for achieving an improvement in the health status of the country.

Database and Research Methodology

The present study is based upon the secondary data of 16 major states of India. Sources of data collection relating to health indicators and health infrastructure are Rural Health Statistics, SRS Bulletin, Office of Registrar General, India, Census of India, United Nations Development Programme and Economic Survey of India by Ministry of Finance. A comparative analysis has been done for the various health indicators and health infrastructure across the states as well as with the national average.

Results and Discussion

Interstate Comparison of Health Status

As per the United Nations Development Programmme's (UNDP) Global Human Development Report (HDR) 2021-22, India ranks 132 out of 191 countries and territories on the 2021-22 Human Development Index, tracking the global decline in human development. Ninety percent of countries have registered a reduction in their Human Development Index (HDI) value in 2020 or 2021, reversing much of the progress toward the Sustainable Development Goals.

A comparative study of health indicators among major states of India reveals widespread disparities. Within India, wide disparities exist in health status among states. Life Expectancy at Birth as per Table 1, few states such as Kerala, Himachal Pradesh, Punjab, Maharashtra, Tamil Nadu and West Bengal are far above the country average. On the other hand, Uttar Pradesh, Madhya Pradesh and Assam lag behind. Despite being the largest states by area, Rajasthan and Karnataka have health indicators data just below than the national averages. However, the state of Odisha is at par with the national average. This statistics implies that the health system does make a difference and the different states will have to focus on different health priorities. The life expectancy at birth in rural was as high as 75.3 in Kerala and as low as 63.9 in Uttar Pradesh.

The infant mortality rate is regarded as one of the most reliable and acceptable indicator of health and family welfare. Higher the IMR lower the status of well being of the people. Several empirical studies have established the higher IMR results in higher birth rate. The IMR in rural India shows wide fluctuations across states. Kerala showed a very low IMR (4 per thousand live births) as compared Madhya Pradesh, where it is approx. 12 times higher than the Kerala (47 per thousand live births). In the present study, it was observed that IMR is higher than the national average (during 2020) mainly in the BIMARU states except Bihar state. Similarly, in the state of Assam, the IMR was much high than the national level.

Table 1: Life Indicators of Rural India 2020

Sr. No.	States	IMR	LEB	BR	DR
1	Andhra Pradesh	26	68.4	16.0	7.0
2	Assam	39	65.1	21.9	6.4
3	Bihar	27	68.5	26.2	5.5
4	Gujarat	27	68.2	21.1	6.0
5	Haryana	31	68.7	21.2	6.5
6	Himachal Pradesh	18	72.2	15.7	7.0
7	Karnataka	21	67.5	17.5	7.1
8	Kerala	4	75.3	13.1	7.0
9	Madhya Pradesh	47	64.7	26.0	6.8
10	Maharashtra	20	71	15.3	6.2
11	Odisha	37	67.7	18.7	7.5

12	**Punjab**	19	71.4	14.9	8.3
13	Rajasthan	35	67.5	24.4	5.8
14	Tamil Nadu	15	70.2	14.0	7.2
15	Uttar Pradesh	40	63.9	26.1	6.8
16	West Bengal	19	70.2	16.1	5.3
	All India	31	67.7	21.1	6.4

Source: Rural Health Statistics 2021-22, Govt. of India

A study of birth rate across states revealed the same results that the developed states have better health parameters than the less developed states. The data showed that birth rates were above the national average in the states of Bihar, Uttar Pradesh, Madhya Pradesh, Rajasthan and Assam. Thus as per the rural statistics, the picture depicted here in case of BIMARU states was same as in case of IMR. From the Table 1, death rates were quite high in states of Odisha, Tamil Nadu and Karnataka which could lead to risk of population decline in future. Shockingly highest death rate of 8.3 which was even above the national average of 6.4 is observed in the Punjab state. So the state should pay concentration for providing better health care facilities and should spend more on basic health infrastructure so as to pave a way for economic growth.

Inadequate Health Infrastructure

India's primary health care system is based on Primary Health Centres (sometimes these referred to as Public Health Centres) and its attached Sub Centres. PHCs are the corner stones of rural health care in India as they are the first point of contact with a qualified doctor. Each PHCs is targeted to cover a population of 30,000 in plain areas and 20,000 in hilly, tribal, rural or remote areas. PHCs act as a referral unit for six SCs and have 4-6 bed for patients. The activity of PHCs involves curative, preventive, promotive and family welfare services.

Sub Centres are the most peripherals contact point between primary health care system and community. Each SC is required to be manned by one Auxiliary Nurse Midwife (ANM), one female health worker and one male health worker.

CHCs serve as a referral centres for four PHCs and also provides facilities for obstetric care and specialist consultation. It has to be manned by 4 medical and 21 paramedical and other staff. It has 30 in-door beds with one OT, X-ray, Labour room, Laboratory facilities.

In the present study it was noticed that in the year 2022, 24,935 PHCs, 1,57,935 SCs and 5,480 CHCs were working in the country. Average population covered by per PHC is 36,049 against the norms of 30,000, the average population covered by per SC is 5,691 against the norms of 5,000 population and the average population covered by per CHC is 64,027 against the norms of 1,20,000 population. There exists wide range of variation across the states. Average population covered by per SC in Kerala is 1,888 as compared to 11,753 in Bihar and 8,569 in Uttar Pradesh. Average population covered by per SC in Punjab is 6,058. Bihar has highest population covered by per PHC (73,850) and Kerala has lowest population covered by per PHC is (11,938). In Himachal Pradesh average population covered by per PHC is 12,074 which is less than $1/6^{th}$ of Bihar's average. With regards to CHC, Bihar has only 269 CHCs in 2022 and average population covered by per CHC is 4,09,606 which is far above the national average (1,64,027).

Table 2: Average Population Covered by Functioning SCs, PHCs and CHCs in Rural India in 2022

Sr. No.	State	Sub Centres	Average population covered by Sub centers	PHCs	Average population covered by PHCs	CHCs	Average population covered by CHCs
1	Andhra Pradesh	11073	3,062	1142	29,688	139	243,914
2	Assam	4667	6,427	920	32,604	172	174,395
3	Bihar	9375	11,753	1492	73,850	269	409,606
4	Gujarat	9132	4,008	1474	24,831	344	106,398
5	Haryana	2653	6,585	394	44,338	129	135,419
6	Himachal Pradesh	2114	3,158	553	12,074	93	71,796
7	Karnataka	8757	4,304	2138	17,628	182	207,082
8	Kerala	4933	1,888	780	11,938	211	44,133
9	Madhya Pradesh	10287	5,935	1266	48,224	332	183,889
10	Maharashtra	10673	6,085	1853	35,049	256	253,691
11	Odiaha	6688	5,601	1288	29,085	377	99,366
12	Punjab	2951	6,058	422	42,360	150	119,173
13	Rajasthan	13523	4,371	2133	27,713	616	95,959
14	Tamil Nadu	8713	4,104	1422	25,146	385	92,875
15	Uttar Pradesh	20781	8,569	2919	61,005	829	214,805
16	West Bengal	10357	6,055	915	68,532	348	180,193
	Total All India	157935	5,691	24935	36,049	5480	1 164,027

Source: Rural Health Statistics 2021-22, Govt. of India

From the results, it could be said that all BIMARU states except Rajasthan has showed the same results. Further, it could be concluded that the states of Bihar, Uttar Pradesh Haryana, Assam, Maharashtra, Punjab, West Bengal and Madhya Pradesh are covering more population than the prescribed norms so far as SCs are concerned. Similarly, the average population covered by states of Bihar, Haryana, Madhya Pradesh, Punjab, Uttar Pradesh and West Bengal are more than the prescribed norms for PHCs. As far as CHCs are concerned Assam, Andhra Pradesh, Bihar, Karnataka, Madhya Pradesh, Maharashtra, Uttar Pradesh and West Bengal are depicting the same picture. Whereas Kerala and Himachal Pradesh showing the better results.

Overall from the current study it was concluded that the states of Bihar and Uttar Pradesh need urgent attention from the government as the average population covered by SCs, PHCs and CHCs in both the states are much higher than the norms.

Status of Building Position of Health Sector in Rural India

Basic infrastructure facilities are necessary to provide good health services among citizens. In the rural India the basic health infrastructure facilities are not very well but comparatively better in some states than other states of the country. One of the basic infrastructures in the health sector is building facilities. The current status of building facilities in rural health sector is discussed as below:

Table 3: Building Position for Sub Centres in Rural India

		Total Numbers of Sub Centres Functioning	Sub Centres Functioning in 2022			
Sr. No.	State		Govt. Building	Rented Building	Rent Free Panchayat/Vill. Society Building	Buildings Required to be Constructed
1	Andhra Pradesh	11073	2908	0	8165	8165
2	Assam	4667	3904	645	118	763
3	Bihar	9375	3370	2732	3273	6005
4	Gujarat	9132	6304	466	2362	2828
5	Haryana	2655	1613	251	789	1040
6.	Himachal Pradesh	2114	1658	14	442	456
7	Karnataka	8757	4470	2074	2213	4287
8	Kerala	4933	3165	444	1324	1768
9	Madhya Pradesh	10287	8655	667	965	1632
10	Maharashtra	10673	9708	405	560	965
11	Odiaha	6688	5053	1291	344	1635
12	Punjab	2951	1728	2	1221	1223
13	Rajasthan	13523	10703	856	1964	2820
14	Tamil Nadu	8713	6312	1769	632	2401
15	Uttar Pradesh	20781	17127	3262	392	3654
16	West Bengal	10357	8346	1225	786	2011

Source: Rural Health Statistics 2021-22, Govt. of India

1. ***Building position of SCs***

According to RHS 2021-22, Andhra Pradesh showed the highest deficiency of building and required around 8,165 buildings followed by Bihar where 6,005 buildings are required. The number of buildings required in Karnataka and Uttar Pradesh were also quite high that is 4,287 and 3,654 building respectively. While Assam requires 763 buildings and in Maharashtra 965 buildings are required so, they occupied the better position than above mentioned states.

2. Building position of PHCs

From Table 4, it was observed that the state of Bihar is the most neglected state in terms of rural health infrastructure as the data showed the shortage of 677 buildings for health centres in the state.

Table 4: Building Position for Primary Health Centres in Rural India

		Total Numbers of Sub Centres Functioning	Primary Health Centres Functioning in 2022			
Sr. No.	State		Govt. Building	Rented Building	Rent Free Panchayat / Vil. Society Building	Buildings Required to be Constructed
1	Andhra Pradesh	1142	1126	1	15	16
2	Assam	920	909	5	6	11
3	Bihar	1492	815	266	411	677
4	Gujarat	1474	1303	12	159	171
5	Haryana	394	308	5	81	86
6.	Himachal Pradesh	553	475	3	75	78
7	Karnataka	2138	1988	44	106	150
8	Kerala	780	755	6	19	25
9	Madhya Pradesh	1266	1145	30	91	121
10	Maharashtra	1853	1809	30	14	44
11	Odiaha	1288	1266	0	22	22
12	Punjab	422	361	1	60	61
13	Rajasthan	2133	1967	41	125	166
14	Tamil Nadu	1422	1358	0	64	64
15	Uttar Pradesh	2919	2847	0	72	72
16	West Bengal	915	912	0	3	3

Source: Rural Health Statistics 2021-22, Govt. of India

The number of buildings required to be constructed in the state is much more as compared to the other states in rural PHCs. So, the government should focus on the issue and hence, there is an urgent need to allocate the resources towards it. From the table 4, it was noticed that the state of West Bengal was at a very good position having the minimum requirement of new construction of buildings i.e. only three. The need of new construction of buildings for health centres in other states like Assam, Andhra Pradesh, Odisha and Kerala is modest i.e. 11, 16, 22 and 25 buildings respectively. Thus, it could be said that the basic infrastructure facilities in terms of buildings in the mentioned states was in a better position than others.

3. Building position of CHCs

According to RHS 2021-22 and from the Table 5, it was observed that the states of Andhra Pradesh, Assam, Odisha, Punjab and Tamil Nadu are having the adequate number of government buildings. So, the government can use the resources for providing other health services in these states.

Table 5: Building Position for Community Health Centres in Rural India

		Total Numbers of Sub Centres Functioning	Community Health Centres Functioning in 2022			
Sr. No.	State		Govt. Building	Rented Building	Rent Free Panchayat/Vill. Society Building	Buildings Required to be Constructed
1	Andhra Pradesh	139	139	0	0	0
2	Assam	172	172	0	0	0
3	Bihar	269	224	0	45	45
4	Gujarat	344	317	2	25	27
5	Haryana	129	122	0	7	7
6.	Himachal Pradesh	93	90	1	2	3
7	Karnataka	182	179	0	3	3
8	Kerala	211	209	0	2	2
9	Madhya Pradesh	332	309	8	15	23
10	Maharashtra	256	252	0	4	4
11	Odiaha	377	377	0	0	0
12	Punjab	150	150	0	0	0
13	Rajasthan	616	570	9	37	46
14	Tamil Nadu	385	385	0	0	0
15	Uttar Pradesh	829	824	0	5	5
16	West Bengal	348	347	0	1	1

Source: Rural Health Statistics 2021-22, Govt. of India

On the other hand, there was highest deficiency of government buildings in Bihar and Rajasthan. So, the efforts should be taken by the respective states to increase the investment for the construction of adequate health infrastructure in the rural areas of the said states. Whereas the requirement for government buildings is minimal in case of West Bengal, Kerala, Himachal Pradesh, Karnataka, Maharashtra and Uttar Pradesh.

From the above comparative analysis it could be said that basic infrastructure facilities in case of buildings for Bihar requires urgent attention of the government as the state has shortage of buildings for all the health centres for SCs, PHCs and CHCs. Further, as per the current study, the states of Karnataka and Uttar Pradesh were lacking in SCs buildings whereas the states of Rajasthan, Gujrat and Madhya Pradesh have been facing the shortage of CHCs buildings. However the state of Andhra Pradesh and Assam were lagging in buildings for SCs only.

Challenges in the Health Industry

Following are the some of the reasons for the poor growth of health infrastructure in India.

1. ***Insufficient Financial Resources***

In India, the execution of health programmes always faces a major obstacle of financial resources and this happened just because of poor allocation to the health sector. Moreover, with shrinking budgetary support and fiscal shortage, it is very difficult for the majority of the states to increase their public facilities to serve to the growing health care needs of their population. Thus, lack of adequate finance has become the major cause for the under development of the infrastructural facilities.

2. ***Deficient buildings***

Health sector in India is facing a major challenge of shortage of buildings for the health centres. Another major issue is availability of limited space in buildings (whether government or rented), where majority of the health centres are functioning. Moreover, sufficient provisions for availability of residential accommodation in remote rural areas for medical personnel are not there, this acts as a great obstacle in motivating them to work in such areas.

3. ***Inadequate physical infrastructures***

Many operational difficulties are there in health sector in India and the most pressing problems remains a severe shortage of trained manpower in the sector; this includes doctors, nurses, paramedics and primary health care workers. The situation remains worrisome in rural areas, where almost 65% of India's population resides. Moreover, the funding for drugs supplies, diagnostic facilities, laboratory equipment, urinals, latrines, bathrooms, ambulances, phone etc. are not sufficient in the rural areas of the state.

4. ***Absence of effective personnel and materials planning***

Most of the resources are under utilised because of no personnel planning in most of the hospitals. The existing staff in the various departments should be deployed consistent with the workload and are according to the prescribed norms. Periodic studies of the functioning of hospitals are needed to enable the administrators to manage them effectively.

5. ***Absence of good transport facilities***

Another problem of health infrastructure is the lack of good transport facilities between the villages and hospitals. Transportation is an important social determinant of health in rural communities. The availability of reliable transportation impacts a person's ability to access appropriate and well co-ordinated health care, purchase nutritious food, and otherwise care for themselves. Public transport is a barrier in our country as trains are buses are usually over-crowded and do not possess the proper equipment to help the people travelling to health clinics.

6. ***Imbalance between the rural and urban areas***

The National Rural Health Mission was launched in 2005 to provide accessible, affordable and quality health care in the rural areas. The main provisions of NRHM schemes includes accessible health care system, village health sanitation and nutrition committee, ASHA workers, Rogi Kalyan Samiti, Janani Shishu Suraksha Karyakram, inspite of all these efforts the condition of rural health infrastructure has been deplorable.

Suggestions to improve the condition of Health Infrastructure

On the basis of literature reviewed and comparative analysis of the present study it could be stated that the Indian government strives to provide comprehensive health coverage for all, and the country's rapidly developing health system remains the area of concerns. Still, there are disparities in health and health care system between developed and backward states and the reason behind it could be poor allocation of funds to states or it could be inefficient management of the funds. In this context the following suggestions are made to improve health infrastructure of rural India:

1. To make quality services available to a larger population and wider area in the long run, new health infrastructure need to be created. The focus should also be given towards rationalising the existing health care institutions to improve their service delivery.
2. More funds should be provided to the rural areas for preventive and better health services. The principle of the equity should be followed for spreading the health care services across regions.
3. As the government buildings for health centres are in shortage in many states, so, there is an urgent need to strengthen the basic three tier system of health infrastructure.
4. Awareness seminars should be conducted regularly in the rural areas of the states to make people aware about various health schemes offered by government from time to time.

Conclusion & Policy Implications

The study attempted to examine the position of health indicators in terms of birth rate, death rate, infant mortality rate and life expectancy at birth; and the current status of rural healthcare infrastructure of India. From the present study, it was found that wide disparities existed among rural areas of the major Indian states. As per the study, the state of Kerala has showed the better results in terms of BR, IMR and LEB. Further, it was found that the healthcare infrastructure of major Indian states of rural India are lacking in three tier health system. The prevailing situation of health system in the states of Bihar and Uttar Pradesh is worrisome because of poor rural health infrastructure as the average population covered by SCs, PHCs and CHCs in the above mentioned states were much higher than the prescribed norms.

Subsequently, the current study pointed towards the deficiency of new government buildings for SCs for the states of Andhra Pradesh, Bihar and Karnataka. Further, it was observed that the Building position for PHCs in case of Bihar, Gujarat and Rajasthan also faced the shortage. Moreover, there are inequalities in the existing rural health care infrastructure in the major Indian states, thus, an urgent need arises to take some initiatives to strengthen and restructure the existing health care institution with appropriate infrastructure and latest required amenities.

As per the present study, it was noticed that the states of Andhra Pradesh, Assam, Odisha, Punjab and Tamil Nadu were at good position as they have adequate number of buildings in case of CHCs, so, it could be considered as a good sign for future growth but at the same time there is an urgent need of investment in rural health infrastructure in some of the states namely Rajasthan, Bihar, Gujarat and Madhya Pradesh to meet the deficiency.

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