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Research Paper

ROLE OF INFRASTRUCTURE IN ECONOMIC DEVELOPMENT OF INDIA

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ABSTRACT

Economic development refers to the economic transformation of a country or a region that leads to improvement of well being and economic capabilities of its residents. Economic development is different from economic growth as growth mere focuses on expansion of activities which is suitable for developed economies. However economic development is concerned with structural change in economy. Economic growth without economic development creates inequality. The development of various sectors in any country depends on large extent on infrastructure of the country. Infrastructure is basic physical and organisational structure needed for the operation of an economy or an enterprise. As infrastructure plays a significant role in economic development, it has been accorded high priority in various five year plans of the country. Overtime remarkable improvement is witnessed in India, but much more remains to be done. This paper assesses the contribution of infrastructure in development of the country. Development and infrastructure has been analysed in terms of multiple indicators.

KEY WORDS: *Economic growth, economic development, infrastructure, per capita income, poverty ratio, literacy rate, infant mortality rate, teledensity etc.*

1. INTRODUCTION

Economic development refers to economic transformation of a country or a region that leads to improvement in economic and social well being of its people. In the beginning of 18th century economic growth and economic development were considered synonymous to each other. In the Mercantilist era the growth and development of countries were decided on the basis of gold reserve or gold bullion they accumulate. So the primary motive in these economies was to have surplus trade i.e. more exports in comparison to imports, so that they can have inflow of gold. The experiences of the Asian, Latin American and African economies were however quite different from the already advanced economies. A mere expansion of trade is not enough for the economies which have not achieved a satisfactory level of development. This led to the bifurcation between the concepts of economic growth and economic development.

Economic growth is concerned with an expansion of economic activities whereas economic development is wider concept incorporating structural changes in the economy. Economic development is concerned with issues like improving the quality of life, eradicating poverty, unemployment, increasing per capita incomes, reducing inequality of income and wealth and improving infrastructure. Economic development is long term process as it requires the change in the structure of economy, economic growth without economic development will lead to concentration of wealth or will create inequality.

The basic physical and organisational structure needed for the operation of society or an enterprise is known as 'infrastructure'. The infrastructure plays significant role in the development of directly productive activities like agriculture, industries etc. Infrastructure can be divided on different basis as economic and social, hard and soft etc. Economic infrastructure includes transport and communication, power, roads, banking etc. On the other hand social infrastructure includes education, health etc. Since infrastructure development requires lumpy investment with long gestation lag and concomitant uncertainties of future private entrepreneurs would not generally be inclined to make such investments. As a result, it has always been considered the responsibility of state to provide basic infrastructure. For developing countries like India, the arrangement of this huge amount of investment is challenging although in recent years provision of infrastructure is being made by public-private partnership (PPP) basis.

India has a glorious past; it was one the prosperous countries of the world during ancient period and was called Golden bird for its wealth. Britishers used India as a source of cheap raw material and a market for expensive finished goods.

Colonisation of the country led to overall backwardness of its economy. At the dawn of independence Indian economy was grappling with the vices of poverty, illiteracy and unemployment. During colonial period significant infrastructure development was done by British to further their own interest. To facilitate trade they developed railways, roads, ports so that the movement of goods could be easily done; for agriculture they developed canals as agriculture was important to meet their demand for raw materials. But the infrastructure inadequacies and inefficiency in its use still exists in the country, the removal of which is *sine-qua-non* for speedier development to take place.

The present paper aims at analysing the relationship between economic development and infrastructure in recent years on the basis of some selected indicators.

2. STATUS AND CHANGING PATTERN OF DEVELOPMENT AND INFRASTRUCTURE IN INDIA

The development of various sectors in any country depends on large extent on infrastructure of the country. Various development economists in their theories advocated significant investment for the development of infrastructure if the DPAs have to flourish. Rosenstein- Rodan in his 'Big Push Theory' argued that the big push or high minimum amount of investment is required to overcome the obstacles to development in underdeveloped economies. Hirschman in his famous unbalanced growth theory advocated two sequences of development, namely, development via excess capacity of Social Overhead Capital (SOC) and development via shortage of SOC.

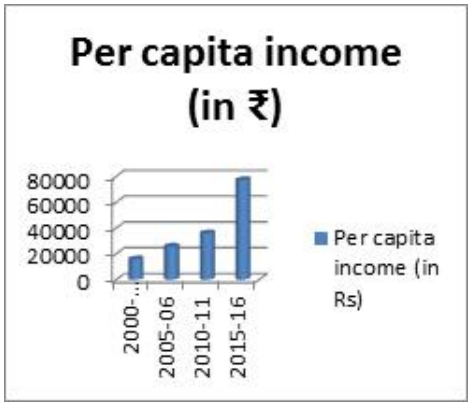
Table no. 1 : showing % GDP investment in India over the year

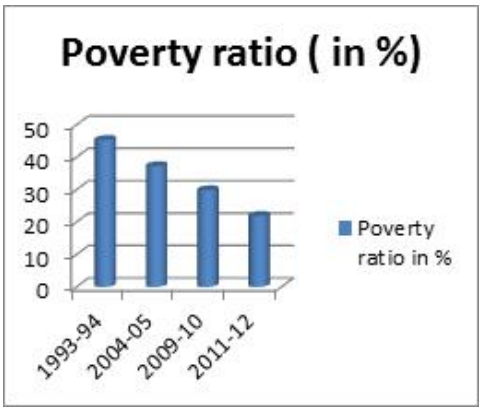
YEARS	INVESTMENT PROJECTED IN (Rs. Crores)	% of GDPMP
2005-06	2,04,000	5.3
2007-08	3,03,807	6.0
2009-10	3,89,266	7.25
2011-12	5,95,913	9.34
2013-14	8,87,454	7.62
2015-16	12,85,573	8.38
2016-17	15,89,308	9.0

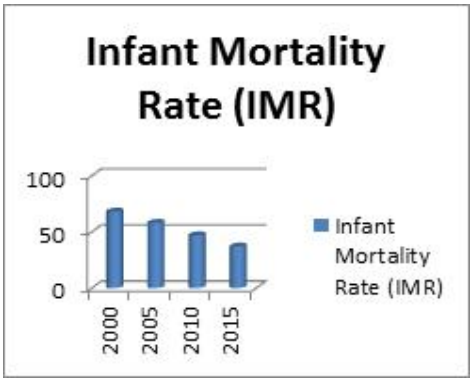
Source: planning commission, government of India

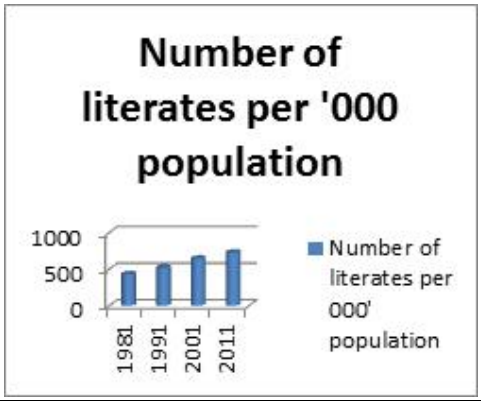
Although infrastructure development has been accorded high priority in various five year plans of the country, the actual investment has been less than desirable. However due to renewed emphasis on infrastructure development in last 15 years, investment in infrastructure has gone up substantially. Investment during year 1999-2000 was ₹ 1,23,000 crores which was 4.8% of GDP which increased to ₹ 4,79,117 crores in the year 2011-12 which was 8.19% of GDP. Infrastructure investment is projected to be ₹ 12,85,573 crores during year 2015-16 which was 8.38% of GDP .Compared to an investment of ₹ 9,06,074 crores in the tenth five year plan (2002-07) which was 5.02% of GDP investment for eleventh five year plan (2007-12) was ₹ 24,24,277 crores which was 7.462% which is further projected to increase to ₹ 55,74,663 crores in the twelfth plan (2012-17) which is 8.138% of GDP.

3. DEVELOPMENT INDICATORS









3.1 Per Capita Income:-

Per capita income is the average income earned per person in a given area in a specified year. It is calculated by dividing total income of area by its population. India's per capita income for the year 2015-16 is $ 1,709.4 which is much lower than the world's average per capita income of $ 10,150.8. Developed countries have very high level of per capita income. For example, per capita income of USA was $ 57,466.8 for the year 2015-16. World Bank has categorized different economies on the basis of their per capita income. High income economies include USA, UK, Norway, Sweden, Canada, Australia etc. Middle income economies include China, Sri Lanka, South Africa, India etc. Lower income economies include Niger, Mozambique, Madagascar, Liberia etc. According to Human development report (HDR) 2016, Gross national income (GNI) per capita of India is $ 5,663 on purchasing power parity (PPP) basis and is grouped as a medium human development country. Per capita income has increased significantly from past; in 1990-91 it was ₹ 15,565 which increased to ₹ 77,435 in 2015-16. Per capita income in India varies significantly from state to state. Goa is having highest per capita income of ₹ 2, 70,150 followed by Haryana and Uttarakhand. Bihar is having lowest per capita income of ₹ 34,168 followed by UP ₹ 48,520.

3.2 Poverty Ratio:-

Poverty is the scarcity or the lack of a certain amount of material possessions or money. In other words poverty is inability to afford an adequate standard of consumption; this standard is subject to variation between countries. In India poverty line itself is subject to conflict. Some economists advocated that poverty line should be decided on the basis of minimum consumption i.e minimum intake of 2,400 calories per capita in rural area and 2,100 calories in urban area. Whereas, some economists advocated that poverty line should be decided on the basis of income which needs to be reviewed over the period of time. There is significant reduction in poverty ratio in India. It reduced from 45.3% in 1993-94 to 21.9% in 2011. It is much more than the average of world's head count poverty ratio of 10.7%. In developed countries like Russia poverty is negligible i.e. 0.1%. In India Chhattisgarh is having highest poverty ratio of 39.9% while Goa has lowest poverty ratio of 5.09%.

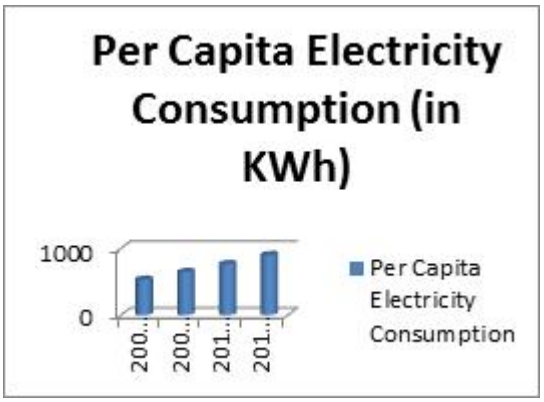
3.3 Infant mortality rate:-

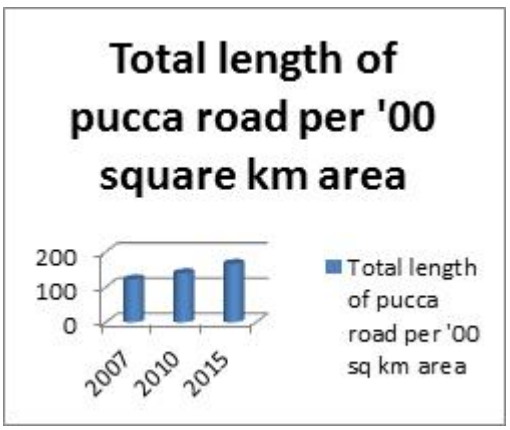
Infant mortality refers to deaths of young children, typically those less than one year of age. It is measured by the infant mortality rate (IMR), which is the number of deaths of children under one year of age per 1000 live births. With the improvement of health infrastructure there has been significant reduction in IMR over last few decades. IMR was 191.26 in 1951 which reduced to 37 in 2015. IMR of the world on an average is 43 per thousand which is more than IMR of India. This shows improvement in health sector. Within India, Goa and Manipur are having lowest IMR of 9 followed by Kerala 12 and Tamil Nadu 19 in 2015. Madhya Pradesh is having highest IMR of 50 followed by Assam 47, Uttar Pradesh 46 and Rajasthan 43.

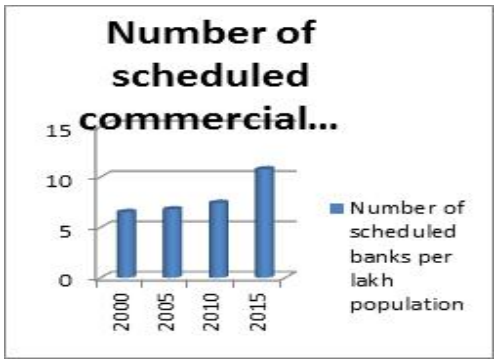
3.4 Number of literates per ’ooo population:-

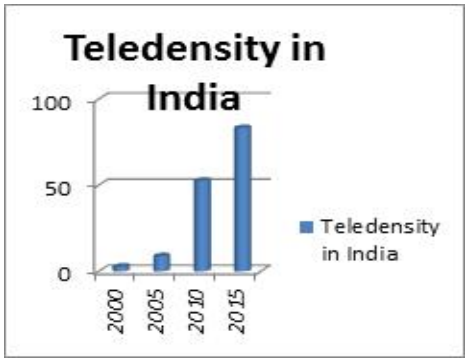
Literacy is traditionally understood as the ability to read, write, and to use simple arithmetic. Literate in India means any person who is able to write his name in any language. However in modern days literacy is concerned with the ability to use language, numbers, images, computers, and other basic means to understand, communicate, gain useful knowledge and use the dominant symbol systems of a culture. According to 2011 census number of literates per ’000 population were 730 which shows significant improvement after independence i.e. number of literates per ’000 population were 183 in 1951. Number of literates per ’000 population of world is 863 which is more than India's literacy rate. Number of literates in most of the developed countries and some developing countries like China is almost equal to unity. In India number of literates per ’000 population is highest in Kerala i.e. 940 followed by Mizoram 913, Goa 887 and Himachal Pradesh 828. Bihar has lowest number of literates per’000 population i.e. 618 followed by Arunachal Pradesh 654, Rajasthan 661 and Jharkhand 664.

4. ECONOMIC INFRASTRUCTURE INDICATORS









4.1 Per capita electricity consumption:-

Non availability of energy can act as constraint in economic growth of country. India is world's seventh largest energy producer and fifth largest energy consumer. It is often said that there is direct relation in economic growth and per capita energy consumption. Per capita electricity consumption in developed countries is significantly higher than India for example, Iceland's per capita electricity consumption was 53,832 KWh in 2014. USA's per capita electricity consumption was 12,987 for 2014 which is way ahead of India's per capita electricity consumption of 806 in 2014. World's average per capita electricity consumption is 3126. Per capita electricity consumption in India has increased from 532.9 KWh in 2004-05 to 901.3 in 2015-16. In India Goa has highest per capita electricity consumption of 3,511.6 KWh followed by Haryana 1871.1 and Punjab 1,793.2. Bihar has lowest per capita electricity consumption of 228.8 KWh followed by Jharkhand 229.5 and Assam 265.4.

4.2 Total length of pucca road per 'oo square km area:-

Road network provides the arterial network to facilitate trade, transport, social integration and economic development Total length of roads in India increased 11 times from 3.99 lakh km to 46.90 lakh km in 2011. The total length of pucca road per'00 square km area increased from 122.18 in 2007 km to 166 km in 2015. In India, Kerala has highest road density of 517.77 km followed by Punjab 167.18 and Uttar Pradesh 161.98 in year 2011. Jammu & Kashmir has lowest road density of 12.14 per'00 sq.km followed by Arunachal Pradesh 25.74 and Madhya Pradesh 64.01.

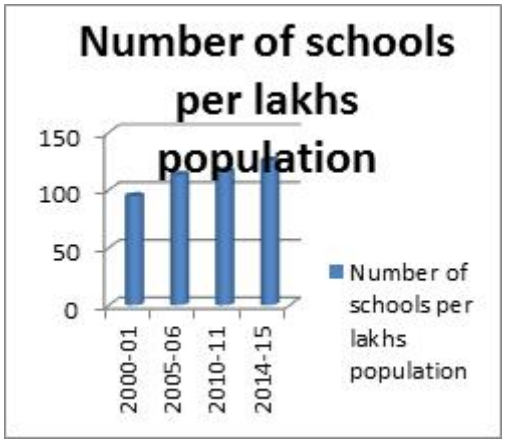
4.3 Number of scheduled commercial banks per lakh population:-

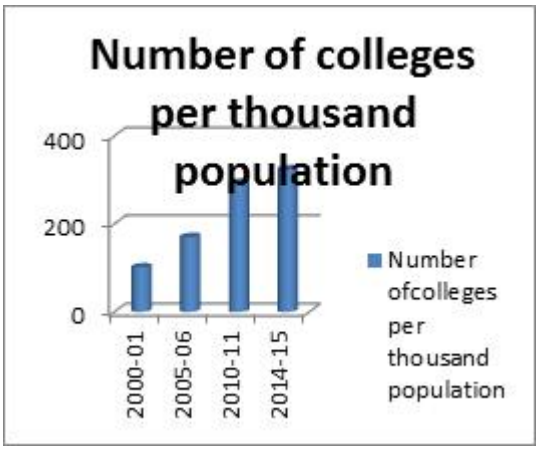
Scheduled commercial banks are those banks which are included in second schedule of Reserve Bank of India Act , 1934. RBI in turn includes only those banks in schedule which satisfy the criteria laid down by 42(6)(a). Number of scheduled commercial bank increased from 60,515 in 1990 to 1,30,482 in 2015. Number of scheduled commercial banks per lakh population has increased from 6.52 banks in 2000 to 10.78 banks in 2015. In India, Punjab with 21.74 banks per lakh of population occupies the highest place followed by Himachal Pradesh 21.56 and Uttarakhand 19.03. Bihar with 5.97 banks per lakh population occupies lowest position.

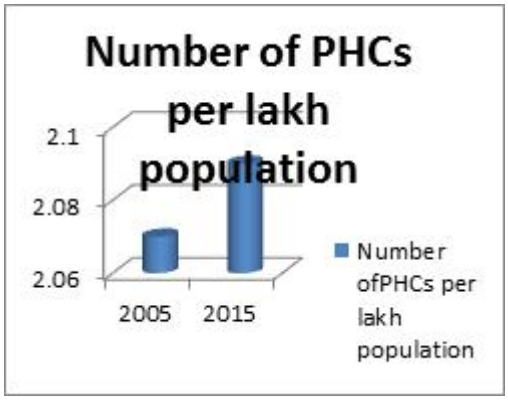
4.4 Teledensity:-

Telephone density or teledensity is the number of telephones connection for every hundred individuals living within particular area. It varies widely between nations for example, teledensity in Hong kong is 189, Russia 179, Saudi Arabia 170 and India 83. Teledensity also vary between urban and rural areas within countries. For example teledensity in urban areas of India is 170 and in rural area it is only 52.

5. SOCIAL INFRASTRUCTURE INDICATORS







5.1 Number of schools per lakh population:-

Total number schools in the country were 14,45,807 in 2015. Uttar Pradesh has highest number of schools i.e 2,43,014followed by Madhya Pradesh and Maharashtra. Total number of schools per lakh population of India was 94.4 schools in 2000 which increased to 125.35 in 2015. In India Himachal Pradesh has highest number of schools per lakh population i.e 264 schools followed by Uttarakhand. Kerala has lowest number of schools per lakh population i.e. 49.15 followed by Bihar.

5.2 Number of colleges per lakh population:-

Total number of colleges in India were 39,071 in 2015. Uttar Pradesh has highest number of colleges i.e 6491 followed by Maharashtra and Karnataka. Total number of colleges per lakh population is highest in Karnataka i.e 4.9 colleges followed by Himachal Pradesh and Kerala. Bihar has lowest colleges per lakh i.e only 0.7 followed by Jharkhand and Assam.

5.3 Number of primary health centres (PHCs) per lakh population:-

Primary health centres sometimes referred as Public health centres are state owned rural health care facilities in India. They are part of government funded public health system in India and are most basic units of this system. Total numbers of PHCs were 23,236 in 2005 which increased to 25,308 in 2015. The total number of PHCs per '000 population was 2.09 in 2015. Himachal Pradesh has highest number PHCs per lakh population i.e 7.35 followed by Karnataka and Rajasthan. West Bengal and Jharkhand have lowest number of PHCs per lakh population i.e 0.99 followed by Punjab and Bihar.

6. RELATIONSHIP BETWEEN ECONOMIC DEVELOPMENT AND INFRASTRUCTURE: MULTIPLE REGRESSION ANALYSIS

India as a whole and its 19 major states has been taken as operational area of the present study. Selected variables are composite index of development (CID), composite index of economic infrastructure (CIEI) and composite index of social infrastructure (CISI). CID has been taken as the dependent variable & CISI and CIEI are taken as independent variable. CID is based on vector of 4 indicators comprising (i) per capita income, (ii) Poverty ratio, (iii) Infant mortality rate (IMR), (iv) Number of literates per '000 population. CIEI is based on vector of 4 indicators comprising (i) Per capita electricity consumption in KWh, (ii) length of pucca road per '00 sq.km of area, (iii) number of scheduled commercial banks per lakh population, (iv) teledensity. CISI is based on vector of 3 indicators comprising (i) number of Primary health centres (PHCs) per '000 population, (ii) number of schools per '000 population, (iii) number of colleges and universities per '000 population. Simple index method has been used to arrive at the composite indices. To understand the role of infrastructure in development we will be making use of multiple regression analysis. It is expected that there is direct relationship between the two i.e. better infrastructure availability lead to greater development.

State wise index values of composite index of social infrastructure, composite index of economic infrastructure and composite index of development are as follows in Table number 2;

States	CISI	CIEI	CID
Andhra Pradesh	124.76	111.15	133.83
Assam	129	95.42	76.93
Bihar	58.75	60.46	68.025
Chhattisgarh	136.17	79.68	82.18
Gujarat	87.62	119.5	125.27
Haryana	96.26	139.44	142.58
Himachal Pradesh	244.3	146.49	164.51
Jammu & Kashmir	174.54	88.77	129.33
Jharkhand	65.21	48.105	82.82
Karnataka	150.16	123.5	123
Kerala	103.8	185.38	226.05
Madhya Pradesh	112.62	72.3	74.42
Maharashtra	93	110.5	142
Odisha	123.5	93.975	80.4
Punjab	92.03	168.14	165.14
Rajasthan	133.56	87.25	103
Tamil Nadu	93.2	133.6	160.41
Uttarakhand	151.48	130.8	141.73
Uttar Pradesh	94	80	84.43
India	100	100	100

Source: Author's calculation

On the basis of the above Himachal Pradesh, Uttarakhand, Jammu & Kashmir, Karnataka are some states having CISI more than the average of country while states like Bihar, Uttar Pradesh, Maharashtra are having CISI lower than the country. CIEI is highest in Kerala followed by Punjab, Himachal Pradesh and Uttarakhand on the other hand CIEI is lowest in Bihar followed by Madhya Pradesh, Chhattisgarh and Uttar Pradesh. CID is highest in Kerala followed by Punjab, Himachal Pradesh and Tamil Nadu and lowest in Bihar followed by Madhya Pradesh, Assam, Odisha, Chhattisgarh and Uttar Pradesh.

Infrastructure and Development: A Multiple Regression Analysis

Dependent variable- CID

Independent variables	standardized coefficient	Significance
Constant	6.775	
CISI	-.004	.971
CIEI	.914	.000
Adjusted R^2	.813	

Source: *Author's calculation from table number 2*

Notes: CID stands for composite index of development, CISI stands for composite index of social infrastructure, CIEI stands for composite index of economic infrastructure.

As can be observed from the table, the coefficient of CISI is negative but insignificant. In case of this study social infrastructure is not making a significant contribution to the economic development. It may be concluded that the level of social infrastructure has still not reached the point where it can play a decisive role in the economic development. Further, a limitation of this study is that only some indicative indicators have been incorporated. In case of economic infrastructure its highly significant contribution (P value=0.000) to development is discernible. Thus economic infrastructure is resulting in significant development of the country. Economic infrastructure should be further upgraded and extended, whereas social infrastructure which leads merely not to the economic development but also to social transformation seems to be inadequate and should be made available throughout the country for a far reaching and all encompassing socio-economic development.

CONCLUSION

On the basis of this study it can be concluded that although availability of economic and social infrastructure has increased overtime but still a lot more needs to be done. On the basis of state wise cross section data multiple regression analysis shows that economic infrastructure is making a significant contribution to economic development of the country. However, for the benefits of development to reach each and every individual in the country social infrastructure needs to be strengthened and its efficacy needs to be increased.

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APPENDIX

1. Table showing various development indicators

States	NDP& per capita (in ₹)	Poverty ratio (in %)	IMR	Number of literates per '000 population
Andhra Pradesh	78,039	9.2	37	669
Assam	45,692	32	47	722
Bihar	25,400	33.7	42	618
Chattishgarh	64,841	39.9	41	702
Gujrat	1,09,846	16.6	33	780
Haryana	1,24,302	11.16	36	755
Himachal Pradesh	1,05,269	8.1	28	828
Jammu and Kashmir	52,831	10.35	26	671
Jharkhand	48,550	36.96	32	664
Karnataka	1,08,908	20	28	754
Kerala	1,15,848	7.05	12	940
Madhya Pradesh	44,110	31.65	50	693
Maharashtra	1,13,379	17.35	21	823
Odisha	54,926	32.6	46	729
Punjab	96,638	8.26	23	758
Rajasthan	64,002	14.71	43	661
Tamil Nadu	1,06,034	11.28	19	801
Uttarakhand	1,16,557	11.26	34	788
Uttar Pradesh	35,694	29.43	46	677
India	74,193	21.92	37	730

Source: Niti Aayog & RBI handbook

2. Table showing various infrastructure indicators of India

States	Per capita electricity consumption (in KW)	Length of pucca road per'00 sq. Km area	Number of scheduled commercial banks per lakh population	Teledensity	Number of schools per lakh population	Number of colleges per lakh population	Number of PHCs per lakh population
Andhra Pradesh	1140	86.53	12.73	86.4	125.33	4.5	2.16
Assam	254.3	308.26	6.76	57.64	209.45	1.5	3.26
Bihar	180.7	138.74	5.97	564.36	76.15	0.7	1.81
Chhattisgarh	831.2	69.51	8.83	64.36	209	2.3	3.10
Gujarat	1465.4	79.68	12	100.6	72.37	2.8	2.06
Haryana	1704.4	94.38	17.42	858.58	86.13	3.5	1.82
HimachalPradesh	1295.6	86.15	21.56	127.66	264.06	4.3	7.5
Jammu Kashmir	971.2	12.14	13.072	80	228.34	2.4	5.09
Jharkhand	212.6	29.99	8.4	54.36	142.16	0.8	0.99
Karnataka	949.6	146.92	15.35	101.89	101.29	4.9	3.85
kerala	630.5	517.77	18.53	102.33	49.15	4.1	2.47
Madhya Pradesh	680.3	64.01	8.27	64.23	196.15	2.6	1.61
Maharashtra	1100	133.414	10.52	87.06	86.45	3.5	1.61
Odisha	585.4	166.23	10.52	69.09	163.02	2.3	3.11
Punjab	1699	167.18	21.74	106.1	104.7	3.1	1.54
Rajasthan	845.8	70.51	9.38	83.36	155	3.4	3.04
Tamil Nadu	1219	147.89	13.66	118.13	79.28	3.3	1.9
Uttarakhand	1136	64.58	19.03	NA	236.48	3.6	2.57
Uttar Pradesh	409	113.53	7.89	65.83	121.62	2.6	1.75
India	750.8	142.68	10.78	83.4	119.43	2.7	2.09

Source: Niti Aayog & RBI handbook