

## ROLE OF INFRASTRUCTURE DEVELOPMENT IN SUSTAINABILITY OF RURAL AREAS IN INDIA: A QUALITATIVE PERSPECTIVE

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*The basic requirement for the development of an area, city or country is its infrastructure which includes roads, airports, railways, energy, education, healthcare and transport etc. "Government infrastructure projects and private sector projects" serves in the growth of infrastructure both in rural and urban areas of the country. The development of the nation increases with increase in the development of infrastructure as it provides basic services to the locals who in turn give respect and appreciation. Due to entrepreneurial spirit, investment in infrastructure is not the business of public sector only, but partial and completely private enterprises are coming forward to invest in infrastructure and its development. There are different public and private initiatives for infrastructure development in rural areas of the country. The infrastructure development is very vital for the "economic growth and the sustainability" of the rural area of the country. Role of infrastructure development in sustainability of rural areas in India is explored in present paper which concludes that every sector of the society develops in all aspect with the development of the infrastructure. The development of the nation increases with increase in the development of infrastructure as it provides basic services to the locals who in turn give respect and appreciation.*

**Keywords:** *Infrastructure development, sustainability, rural areas, India, Rural development.*

### INTRODUCTION

"Infrastructure" is the term used for all the basic system of a nation or business that includes "transportation, communication, sewage, water, and electric systems". The sustainable development depends on four independent system of the areas which are "environment, economic, social and political aspects" that covers the issues related to "poverty, biodiversity conservation, agriculture, capacity-building, climate change, desertification and drought, disaster reduction and management, energy, finance, forests, fresh water, health, international law, poverty, sanitation, toxic chemicals, waste management etc." It is essential to address the "ethical issues and concerns of sustainable development" at different levels to influence the lifestyle of people and their responsible behaviour to help them to build up a sustainable future ahead. It is not possible to overemphasise the significance of infra-structure for "economic growth and rural development in a developing economy" like India.

### INFRASTRUCTURE INDICATORS AND RURAL DEVELOPMENT

Sustainability in rural areas and well-being of its population is possible when basic infra structures like "roads, transport, electricity, telecommunications, housing, health, water and sanitation" are developed. This infrastructure development of rural areas promotes the economic growth, improves the living standard of rural population, reduces the poverty by generating the employment in "farm and non-farm sectors" for "earning opportunities, increases productivity, provides access to basic goods and services and improves the health and physical condition of the locals".

The literature had evaluated the role of rural infrastructure in rural development by investigating the influence of specific “infrastructure indicators” in different aspects of “rural development”. Since the data on “rural infrastructural indicators” are not sufficient, it was very difficult to examine the relation amid “rural development” and different “composite indices” of rural infrastructure. There are different indicators such as “roads, telecommunication, power and housing, water and sanitation, health and education” to know the development in rural areas of India (Table1).

Tabel 1.

**Indicators of rural infrastructure**

Infrastructure	1981	1991	2001	2011
A. Rural Roads	NA	57.04	73.91	92.04
1. Road density((road length per 100 sq. km)		(1991)	(2003)	(2008)
2. roportion of surfaced road to total(per cent)	42.4	48.0	53.9	59.8
B. Telecommunications	NA	0.84	2.00	39.90
1. Rural tele-density (number of telephone lines per 100 people		(1993)	(1999)	(2012)
C. Power and Housing				
1. Proportion of households with access to electricity	14.7	30.5	43.5	55.3
2. Proportion of villages electrified	NA	88.05	92.3	94.5
3. Proportion of households with Pucca houses	22.5	(1991)	(1999)	(2013)
3. Proportion of households with Pucca houses	22.5	30.6	41.1	51.4
D. Water and Sanitation				
1. Percentage of gross cropped area electricity	29.0	36.0	44.0	44.6
	(1980-83)	(1990-93)	(2005)	(2007-08)
2. Proportion of households with access to safe drinking water	26.5	55.5	73.2	82.7
3. Proportion of households with access to toilets	NA	9.5	22.8	30.7
4. Proportion of households with access to electricity, safe drinking water and toilets	NA	3.9	10.2	19.2
E. Education and Health				
1. Education opportunity index	21.73	26.38	26.77	49.00
2. Health opportunity index	17.14	15.80	17.29	20.04
Composite Index				
1. Physical infrastructure development index(PIDI)	0.092	0.154	0.255	0.363
2. Social opportunity index(SOI)	0.208	0.225	0.244	0.317
3. Livelihood opportunity index(LOI)	0.273	0.321	0.296	0.332
	(1983)	(1993-94)	(2004-05)	(2009-10)

Source: Atuhor's development based on [22, 23, 24, 25, 26]

Above table is showing the progress on national rural infrastructure. It is observed that the situation is improved year after year but the variation in all the indicators is wide in all the years. In spite of having disparities the difference in the level of the indicators is increased between the years.

In spite of so many public and private projects initiated for rural development of India, the infrastructure facilities are still not sufficient to provide satisfactory progress with differential performance across rural areas of the state. It is important for the government address and focus on additional investments and projects in infrastructure like “electricity, roads, irrigation, housing and telecommunications for achieving growth in agricultural productivity and output, improvements in literacy and life expectancy and reductions in poverty and infant mortality” [5]. There is a significant impact of infrastructure in the formation of “human, social, and cultural capital that offers opportunities to develop economic initiatives and attract external capital, opportunities to modernize the growth of agricultural production, improves the life of inhabitants and

shapes multifunctional and sustainable rural development. In addition, it conditions the possibility of “civilization progress and increase in territorial cohesion”. The study says that there is a direct or indirect influence of infrastructure to attain all the maintainable expansion goals [19].

The studies were conducted to know various indicators of rural infrastructure so as to throw light on the nature of relation amid “infrastructure” and “development” (Table 2).

Table 2.

### Trends in the Development Indicators in Rural India

Development Indicators	1981	1991	2001	2011
<b>Income dimensions</b>				
1. Per capita income from agriculture and allied activities (three year average at 1993-94 prices, In INR)	2234 (1980-83)	2534 (1990-93)	2656 (2000-03)	3146 (2009-12)
2. Value of agriculture output per hectare (three year average at 1990-93 prices, In INR)	5090 (1980-83)	6957 (1990-93)	9285 (1999-2002)	9050 (2005-08)
3. Value of agriculture output per worker (three year average at 1990-93 prices, In INR)	5086 (1980-83)	5993 (1990-93)	7651 (1999-2002)	7091 (2005-08)
<b>Non income dimension</b>				
4. Head count ration of rural poverty (In %)	45.65 (1983)	37.27 (1993)	28.30 (2004-05)	23.65 (2009-10)
5. Literacy rate (In %)	36.01	44.69	59.21	68.91
6. Expectation of life birth	53.7 (1981-85)	58.9 (1991-95)	61.2 (1998-2002)	62.1 (2002-06)
7. Infants mortality rate (Number of deaths by age 1 per 1000 live birth)	114.0	87.0	72.0	48.0

Source: Atuhor's development based on [22, 23, 26, 27]

The above table shows that there is an increase in magnitude of all the development indicators except “rural poverty” and “infant mortality rate” indicating towards process of development. The above observations is considered in combination with increased trends in “indicators of rural infrastructure” and a positive relation amid “infrastructure” and all the “development indicators” can be expected except “rural poverty” and “infant mortality rate”.

As per the study, practically there are three dimensions of “sustainable development” which includes economic, environmental, and social development. The global buzz word, sustainability, has the potential to provide solution to many international, regional and local issues of the society like “overpopulation, diseases, political conflicts, infrastructure deterioration, pollution, and boundless urban expansion with limited resources’ availability” [6]. The roads of rural areas are considered as the “wealth” of the nation which serves as a tool for “social inclusion, economic development and environmental sustainability.” Rural road links the communities and their agricultural field with main transport system and market which in turn reduces the transport cost and also stimulates the process of marketing. Developed rural roads increase production, productivity, crop diversification and profitability of the area but the roads that link remote, hilly and backward areas are not profitable to their private operators. This is the reason why it is very important to develop the rural road infrastructure to expect the participation of private sectors in rural areas and for this the public sector are suggested to initiate the investment in rural road infrastructure without any further delay. This vital component of rural infrastructure which was neglected at the time of reforms need to get financial support where development to started in a time manner so that the disparities in growth and development between urban and rural areas can be prevented [14].

## MATERIALS AND METHODS

In context of the study of infrastructure development, authors collected the data from various research articles and from government of India's rural development policy framework.

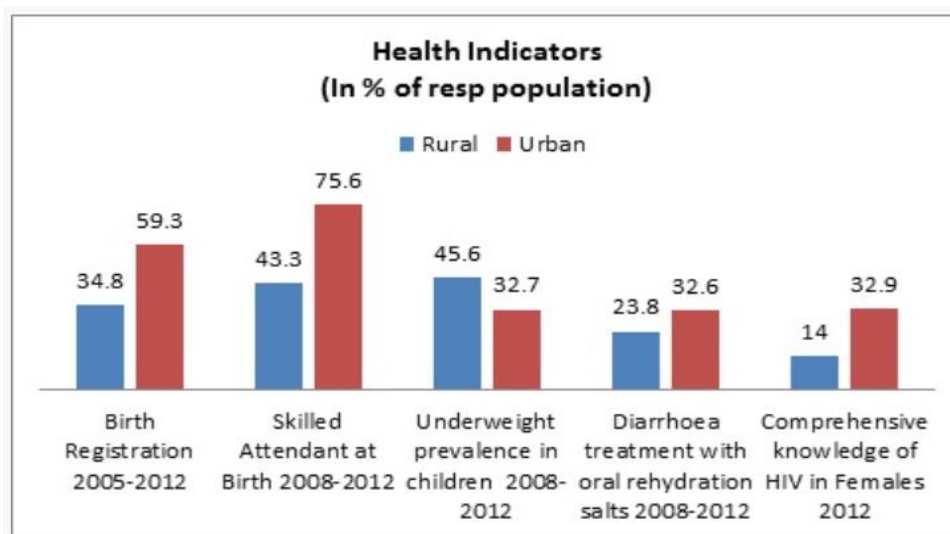
For various tables and figures, the authors analyzed the rural development matrix w.r.t. various indicators and parameters in empirical and qualitative methods. The data from national council for applied economic research and reserve bank of India collected, analyzed, synthesized, represented, and conclusions were formulated in order to provide an overview of the infrastructure development in sustainability of rural populace in India.

## RESEARCH RESULTS

All the basic infrastructural facilities related to road, transportation, education, health, employment is very important for the development of rural areas of the country. The development of the country increases with increase in the development of infrastructure as it provides basic services to the people residing and associated with that region. Sustainability in rural areas and well-being of its population is possible when basic infra structures is provided them with the help of public and private sector organizations. This infrastructure development of rural areas promotes the economic growth and improves the living standard of rural population.

### 1. HEALTH INDICATORS

Health infrastructure is considered to be the most significant among all as it make the facility of "resources, materials and facilities" for an individual which in turn promotes "good health, well-being, provides capacity to communities, states and nation to fight and prevent the diseases", prepare themselves to "respond to emergencies, chronic diseases, severe health problems and illness and challenge to health". "Rural health infrastructure" is viewed as the base for "planning, delivering, evaluating and bringing about improvements in public health". The facility of "public health services" depends on the existence of elementary amenities associated will infrastructure [16].



**Figure 1. Health Indicators, India, 2005-2012**

Source: <https://rural.nic.in>

It is observed in the Figure 1 that there are so many indicators like "infant mortality rate, percentage of anaemic population, different health indicators and access to basic services" in which the rural areas are lagging behind the urban areas. Any rural region of

the country can become better or weak due to its connectivity with other parts through road. As far as transport is considered, Sundarbans region is counted in one of the most back ward regions. Roads can become the most vital infrastructure for the development of Sundarbans in terms of socio-economic aspects because there is a strong impact of transport system on the development of any inter or intra region. Different economic sectors can glorify only if it does not depend on primary sector of the people of that region as it requires better connectivity and accessibility. There is a huge potential in tourism sector that can flourish by boosting the transport system of the area [12].

## 2. EDUCATION

Education infrastructure that contributes to rural development is good when it is “locally controlled, practical, applied, problem-posing, and focused on functional specialization” as it plays a vital role in rural development in developing countries. There is a great impact of good education infrastructure on rural development such as “rural individual, family, community, and society, leading to reduced poverty, income equity, and controlled unemployment”. Educations allows everyone to get knowledge, skills, attitude and values for sustainable development and education infrastructure helps the nation to develop and achieve the sustainability goals. It is found that sustainable development through education includes main “sustainable development issues of teaching and learning. Teaching and learning methods motivate and empower” an individual and change their behaviour to promote competencies like “critical thinking, imagining future scenarios and making decisions” in cooperative manner [2].

## 3. INFRASTRUCTURE

Infrastructure development means provision of basic infrastructure facilities like “construction of roads and highways, availability of transportation, bridges, and ports and telecommunication systems” and in rural areas it is important for development planner and the community social workers to collaborate and integrate with each other to achieve success in rural community development programs [11].

Researcher revealed through his study that basic infrastructure facilities are required for better quality of life in socio-economic aspect. It is important to provide fundamental amenities for rural areas and their sustainable development that includes economic growth which in turn increases the access to health services, education and community development [3]. The balance between urban and rural areas and their quality of life can be maintained if sufficient and infrastructure of good quality is provided [4]. The quality of life in the rural areas and their communities depends on sufficient and efficient basic infrastructure. The basic infrastructure like development of roads provides them a medium of communication and connects with other parts of the society.

The functioning of local business gets facilitated through good access to transport infrastructure as it helps the enterprises to get material for their production of goods, locals are able to get services through service providers and they are also able to meet their daily needs. It is found through their study that the rural areas will get proper infrastructure only through public-private partnership and their financial investments. The economic and social development is highly influenced by transport infrastructure but at the same time slow development of the area increases the outflow of the inhabitants [18]. The employers keep a good concern on socioeconomic development of the area and focus on the activities of local authorities to make the area more attractive and the study says that it is important to invest in transport infrastructure along with promotional activities to develop the tourism sector [15].

“Infrastructure” is the elementary condition for a business to develop in any city or region and a better infrastructure include the sectors like “finance, land acquisition and planning related to technologies, water, telecommunication, and energy” with good “planning and strategies” of development. Many infrastructure projects are launched by public and private sector companies both for infrastructure development as all the aspects of the society develop with the development of infrastructure [17].

It is found in their study that sustainable development of agriculture is significantly promoted by rural road construction and at the same time it shows negative impact on environmental sustainability. These results are different for different regions for example, rural road construction significantly promotes the “sustainable development” of agriculture in eastern and central region but it is not good for western areas. This is the reason why the rural road construction is harmful for the “sustainable development” of the locals and the resource system as well [21].

#### **4. ESSENTIAL AMENITIES**

Different application in rural areas like “power generation, cooking, irrigation and water heating” are effectively served by various renewable source of energy available in nature. “Energy conservation” measures and increased use of “renewable energy source” are promoted to achieve sustainability in energy supply. In last two decades some renewable technologies were arranged in rural and urban areas of the country as it offers number of benefits and contribute to “national energy mix” at “economic, environmental and social costs” and it is expected that it will generate good amount of energy in future. There is a significant importance of adopting “renewable energy technologies” in the rural areas all over the world [8].

After discussing on “health service infrastructure, health education infrastructure and human resources available for health” in India concludes that massive rural health infrastructure of India has the “capacity and potential” to offer more services as compared to present scenario. For this it is important to strengthen the health infrastructure by including different facilities, supplies and human resources that works on real time information systems [10]. It is explored through the study that in India, private and public sectors come together to form health care system but there is lack of health care staff in populated and rural areas of north region. It is suggested to focus on preventive measures, improve living conditions and lifestyle habits for long sustainable gains. Sanitation campaigns leave a huge impact on “reducing young deaths and development disorders in later stage of life” [7].

The primary aim of using “renewable energy” in India to advance “economic development, improved energy security, improved access to energy, and to mitigated climate change”. The use of sustainable energy and access to “affordable, reliable, sustainable, and modern energy” by the people brings in sustainable development in rural areas. India has become one of the top leaders in the world that attracts the market of renewable energy and this is possible due to strong “government support and increased economic situation”. Government is designing policies, programs and providing liberal environment to investors from other countries to invest in “renewable energy” market at a great speed. It is found that the sector of “renewable energy” has the potential to create and generate good number of jobs in local areas in coming years [9].

#### **5. QUALITY OF LIFE THROUGH ANCILLIARY SERVICES.**

The quality of life of the rural population is improved by sustainable rural development as it has developed the capacity that promotes “community participation, health and education, food security, environmental protection and sustainable economic

growth” which in turn helped them to move out of poverty and achieve something out of their potential. It is the main aim of the rural development to improve the quality of life and provide sustainable growth in the effectiveness of agricultural productions. It is essential to maintain the balance between social and economic development so as to gain increased production and productivity in rural areas. Sustainable rural development improves the ecological environment and leads to “growth and happiness” and helps the communities to take part in the development process [13].

The essential production situations like “telecommunication, roads, medical services and educational facilities” are all provided by rural infrastructure and all these production situations increase development in rural settings. There are some vital infrastructures like “portable water, good roads, vibrant markets, public places of convenience” are not sufficient to support the people in their needs to reduce the poverty of rural areas and achieve the development targets as build up United Nations and approved and permitted by Ghana [1].

Rural literacy, life expectancy, level of poverty and infant mortality are improved when better physical and social infrastructure facilities and livelihood opportunities like increased agricultural output, telecommunication that raises a worker’s productivity, better housing facilities, road connectivity that improves the linkage between rural-urban areas are provided to rural areas. These infrastructural facilities give strength to farming sector by linking them to urban areas to avail the material used for their farming and also get better market to sell their agricultural output. Better infrastructure generates employment for the locals to move out of the village and help their families to live a better life [20].

### CONCLUSION

The entire basic infrastructure related to “education, economic development, physical and social infrastructure” are playing vital role in developing the rural areas of the country. The development of rural areas also characterized by its “locally produced economic development” strategies and for this there are so many developmental approaches are adopted by the rural areas all over the world. The main objective of the “infrastructure development in the rural areas” is there “social and economic development” and there are number of developed countries that are actively involved in programs related to rural development. There are so many rural government policies that are working with the aim to develop the undeveloped rural areas and basic infrastructure is playing a key role in this along with “rural systems of supply, production, marketing, personnel maintenance, education, health care, and governance”. Rural infrastructure imparts “social change, improves individual social position and standard of living, activates participation in rural and cultural development, increases critical abilities of rural people to diagnose their needs, assert their rights, and take greater control of decisions affecting their lives, provides trained manpower in rural areas, links rural and urban sectors, provides employment and income opportunities, increases labour force productivity, and develops leadership”.

All the basic developed that are mentioned above are all very essential they indicate towards the process of progress and development of the rural region of any country. And this all is possible by the teamwork and incorporation of the one that plans the development and the social workers. The locals of rural areas are directly and negatively affected by lack of basic infrastructure in their region which leads them towards poverty, declines the agricultural products and hinders the ability to live a life of good quality. Health services and access to education is also negatively affected that influence the rural communities and on the other hand an efficient and better infrastructure improves the access to “communication devices, the growth in economy and the environment

sustainability”. Among all these “electricity, irrigation and roads” are essential for “agricultural productivity and output growth, poverty reduction and human development in terms of improvements in health and education”. Socio economic changes in rural areas are possible through improved accessibility of roads.

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