

ROLE OF RURAL INFRASTRUCTURE IN REDUCING RURAL UNEMPLOYMENT: AN INTERSTATE ANALYSIS

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Abstract

The rural unemployment rate was 7.7 percent on December 31, 2022. One of the important reasons for rural unemployment is poor infrastructure in rural areas. The current paper attempts to find out the impact of rural infrastructure on rural employment levels. Secondary data on eight crucial components of rural infrastructure were collected from various sources for all the states of India. These dimensions were rural irrigation, rural roads, primary health centers in rural areas, rural schools, rural electrification, rural tele connectivity, access to toilets, and safe drinking water in rural regions. Similarly, secondary data on rural unemployment rates were also collected.

These data were subjected to a multiple regression model to find out whether there is any significant impact of rural infrastructure in reducing rural unemployment in different states of the country.

The result indicates only five out of the eight variables were significant. The rest three variables failed in the test which means they had no impact on the dependent variable. The five significant variables were irrigation, rural roads, rural education, rural tele density, and village- electrification. The impact of these individual variables on the dependent variable shows that all of them had a negative relationship with the dependent variables. This means the states where the rural irrigation facilities, rural roads, rural electrification, rural schools (education), and rural teledensity were more and better, the rates of unemployment were lower.

The policy implications that follow from the findings are simple. The governments should focus on rural infrastructure, especially the five significant components for creating more jobs in rural areas.

Keywords: Rural Infrastructure, Rural Unemployment, Inter-State Analysis, Rural Electrification, Rural Tele Communication Density

INTRODUCTION

Among other factors; rural infrastructure is an extremely important factor in determining employment opportunities in rural Areas. Over the years, the central government has been launching many flagship schemes to improve the rural infrastructure in the economy. The main objective of all these programs is to provide employment and income to the people in rural areas by creating capabilities and opportunities. The current paper attempts to study the impact of rural infrastructure on unemployment in various states of India.

Objective and Hypothesis of the Study:

Better facilities in rural areas are likely to create a conducive environment for more employment. The exact nature of the relationship between rural infrastructure and rural employment has not been studied systematically. Hence, the objective of this study is to determine the impact of Rural Infrastructure on Rural unemployment.

The null hypothesis is as follows.

H0: Rural Infrastructure has no role in reducing rural unemployment in various states of the country.

Methodology:

Data on eight major components of rural infrastructure were collected from secondary sources. These include (i) Rural Roads (ii) Irrigation (iii) Primary Health Centers in Rural Areas (iv) Access to Toilets (v) Access to Tap Water (vi) Access to Electricity (vii) Total Schools in Rural Areas (viii) Rural Tele-density. Similarly, the data on the rates of rural unemployment in different states of the country were collected from secondary sources.

This data was subjected to **multiple regression model** to find out whether there is any significant impact of rural infrastructure in reducing rural unemployment in different states of the country.

Rates of Rural Unemployment in Various Indian States:

The following table shows the rates of unemployment in different states of the country.

Table-1

States	Rural Unemployment Per 1000 (Usual Status)	States	Rural Unemployment Per 1000 (Usual Status)
Andhra Pradesh	33	Mizoram	12
Arunachal Pradesh	39	Nagaland	29
Assam	15	Odisha	36
Bihar	36	Punjab	62
Chhattisgarh	15	Rajasthan	34
Delhi	102	Sikkim	22
Goa	113	Tamil Nadu	38
Gujarat	14	Telangana	28
Haryana	58	Tripura	11
Himachal Pradesh	35	Uttarakhand	39
Jammu & Kashmir	34	Uttar Pradesh	16
Jharkhand	9	West Bengal	15
Karnataka	15	Andaman and Nicobar Islands	66
Kerala	65	Chandigarh	32
Madhya Pradesh	8	Dadra & Nagar Haveli	41
Maharashtra	22	Daman & Diu	41
Manipur	45	Ladakh	57
Meghalaya	50	Lakshadweep	56
		Puducherry	59

Source: NSSO Employment & Unemployment Survey Reports; NITI Aayog; and Periodic Labor Force Survey (PLFS), NSO.

Rural unemployment refers to the condition in which individuals living in rural areas are unable to find suitable employment opportunities despite actively seeking work. It is a significant issue that can have several negative consequences for both individuals and the broader community. Here are some ways in which rural unemployment can be a problem:

- Poverty:** Rural unemployment often leads to increased poverty levels as individuals and families struggle to meet their basic needs. The lack of employment opportunities can hinder economic growth and development in rural areas, perpetuating a cycle of poverty.
- Migration:** When people cannot find work in rural areas, they may migrate to urban centers in search of better employment opportunities. This rural-to-urban migration can result in overcrowded cities, straining urban infrastructure and services.
- Social Issues:** Unemployment can contribute to various social problems, including increased crime rates, substance abuse, and mental health issues. The lack of economic opportunities can lead to frustration and dissatisfaction among the rural population.
- Agricultural Challenges:** Many rural economies are often heavily dependent on agriculture. When there is high unemployment, it can lead to a decline in agricultural productivity as there may be a lack of skilled labor in the farming sector.
- Underemployment:** In addition to outright unemployment, underemployment is also a concern. This occurs when individuals are employed in jobs that do not fully utilize their skills or offer a sustainable income. Underemployment can hinder personal and community development.
- Limited Access to Education and Healthcare:** Rural areas with high unemployment rates may struggle to provide adequate resources for education and healthcare. This can result in a lack of skilled workers, perpetuating the cycle of unemployment and underdevelopment.
- Economic Decline:** Persistent rural unemployment can lead to economic decline in the affected areas. A lack of economic activity can result in the closure of businesses, reduced investments, and overall stagnation in rural economies.

Addressing rural unemployment often requires a comprehensive approach that includes measures to stimulate economic activities, improve infrastructure, enhance education and skills training, and promote sustainable agricultural practices. Government policies, community initiatives, and private sector involvement are crucial in tackling the multifaceted challenges associated with rural unemployment.

State of Infrastructure in various states of India:

The information about the eight selected components of infrastructure in all the states of India are as follows.

Table 2: State-wise Rural Road in India as of 2018-19

States	Total Rural roads (KMs)	States	Total Rural roads (KMs)
Andhra Pradesh	1,00,132.00	Odisha	2,26,922.00

<https://www.gapgyan.org/>

Assam	3,72,511.00	Puducherry	2,755.00
Bihar	2,59,506.00	Punjab	1,04,565.00
Chandigarh	NA	Rajasthan	2,20,402.00
Chhattisgarh	56,575.00	Tamil Nadu	1,70,246.00
Goa	16,054.00	Telangana	80,700.00
Gujarat	1,32,467.00	Tripura	40,236.00
Haryana	7,026.00	Uttar Pradesh	2,55,577.00
Himachal Pradesh	53,033.00	Uttarakhand	44,805.00
Jammu & Kashmir	NA	West Bengal	1,57,497.00
Jharkhand	44,316.00	Andaman & Nicobar	609
Karnataka	2,20,130.00	Arunachal Pradesh	25,833.00
Kerala	1,88,517.00	Dadra & Nagar Haveli and Daman & Diu	NA
Madhya Pradesh	2,32,343.00	Ladakh	NA
Maharashtra	4,26,326.00	Lakshadweep	228
Manipur	25,340.00	Nagaland	28,039.00
Meghalaya	32,536.00	Mizoram	11,850.00
NCT of Delhi	NA	Sikkim	8,552.00

Source: CMIE States of India 29 September 2022

Rural roads play a crucial role in facilitating and fostering rural development. The presence of well-developed and accessible road infrastructure in rural areas brings about several benefits and contributes to the overall progress and well-being of the community. Here are some ways in which rural roads are important for rural development:

1. **Accessibility:** Improved road networks enhance accessibility to remote and isolated rural areas. This makes it easier for people to access markets, healthcare facilities, educational institutions, and other essential services. Better accessibility encourages economic activities and social interactions.
2. **Market Access:** Rural roads provide farmers and small businesses with better access to markets. This allows them to sell their products more easily, increasing their income and contributing to economic growth in rural areas. It also facilitates the transport of goods from rural producers to urban consumers.
3. **Employment Opportunities:** The construction and maintenance of rural roads generate employment opportunities for local residents. This, in turn, boosts the local economy and helps alleviate unemployment issues in rural areas.
4. **Education:** Accessible roads make it easier for students to reach schools and educational institutions. Improved transportation options can contribute to higher attendance rates and better educational outcomes. Additionally, it enables the transport of educational resources to rural schools.
5. **Healthcare Access:** Rural roads are vital for transporting medical supplies, facilitating the movement of healthcare professionals, and ensuring that people can reach healthcare facilities in a timely manner. This is crucial for addressing health issues and improving overall public health in rural areas.
6. **Agricultural Development:** Rural roads facilitate the transportation of agricultural inputs such as seeds, fertilizers, and machinery. They also make it easier for farmers to transport their produce to markets. This connectivity supports agricultural development and enhances the overall productivity of the rural economy.
7. **Social Connectivity:** Improved rural road networks enhance social connectivity within and between rural communities. This connectivity fosters a sense of community, enables cultural exchange, and promotes social integration.
8. **Emergency Response:** Well-maintained rural roads are essential for timely emergency response services. Emergency vehicles can reach rural areas more quickly, helping to address medical emergencies, natural disasters, and other urgent situations.
9. **Tourism and Livelihoods:** Accessible roads can attract tourists to rural areas, promoting tourism-related activities and providing additional sources of income for residents. This can contribute to the diversification of the rural economy.
10. **Overall Economic Development:** The development of rural roads is a key component of overall economic development in rural areas. It enhances the overall quality of life, encourages investment, and attracts businesses, leading to sustained economic growth.

Rural roads are a fundamental element of rural development, providing the infrastructure necessary for economic activities, social services, and improved quality of life in rural communities. Government investment,

community involvement, and strategic planning are essential for the successful development and maintenance of rural road networks.

Table 3: State-wise Gross Irrigated Area in India as of 2019-20 (in Thousand Hectares)

States	% of Gross Cropped area	States	% of Gross Cropped area
Andhra Pradesh	52.33	Odisha	29.19
Assam	13.66	Puducherry	85.12
Bihar	74.48	Punjab	98.55
Chandigarh	25.75	Rajasthan	42.84
Chhattisgarh	35.29	Tamil Nadu	57.39
Goa	22.03	Telangana	61.3
Gujarat	61.03	Tripura	24.24
Haryana	94.89	Uttar Pradesh	84.82
Himachal Pradesh	22.84	Uttarakhand	52.63
Jammu & Kashmir	NA	West Bengal	65.65
Jharkhand	15.27	Andaman & Nicobar Islands	0.7
Karnataka	36.4	Arunachal Pradesh	17.56
Kerala	19.94	Dadra & Nagar Haveli and Daman & Diu	NA
Madhya Pradesh	52	Ladakh	NA
Maharashtra	20.32	Lakshadweep	NA
Manipur	16.29	Nagaland	24.15
Meghalaya	42.99	Mizoram	14.97
NCT of Delhi	63.92	Sikkim	8.84

Source: CMIE States of India 29 September 2022

Irrigation is crucial for rural development as it enhances agricultural productivity and ensures food security. It involves the controlled application of water to crops, typically through the use of various systems such as canals, pumps, and sprinklers. The importance of irrigation for rural development is multifaceted:

- Increased Agricultural Productivity:** Irrigation allows farmers to provide a consistent and reliable water supply to their crops, irrespective of natural rainfall patterns. This leads to increased and more predictable agricultural yields, contributing to food security and economic stability in rural areas.
- Diversification of Crops:** Irrigation enables farmers to diversify their crops and cultivate a variety of high-value crops throughout the year. This diversification can lead to increased income for farmers and a more resilient agricultural sector.
- Stabilization of Agricultural Incomes:** Irrigation helps mitigate the risks associated with dependence on rainfall. With a controlled water supply, farmers are better equipped to cope with droughts or irregular rainfall, reducing the likelihood of crop failures and stabilizing their incomes.
- Employment Generation:** The implementation and maintenance of irrigation systems create employment opportunities in rural areas. From the construction of irrigation infrastructure to the operation and maintenance of systems, various job opportunities contribute to local economic development.
- Rural Infrastructure Development:** The establishment of irrigation infrastructure, such as canals, pumps, and storage facilities, contributes to overall rural infrastructure development. This, in turn, supports the growth of other sectors and enhances the quality of life in rural communities.
- Poverty Alleviation:** By improving agricultural productivity and income levels, irrigation can help alleviate poverty in rural areas. Farmers are better able to meet their basic needs and invest in education, healthcare, and other essential services for their families.
- Food Security:** Irrigation is crucial for ensuring a consistent and sufficient food supply. With reliable water sources, farmers can produce crops more efficiently, reducing the risk of food shortages and enhancing food security in rural communities.
- Technological Advancements:** Irrigation systems often involve the use of modern technologies, such as precision irrigation and smart water management. The adoption of these technologies can improve the efficiency of water use, reduce waste, and promote sustainable agricultural practices.
- Environmental Sustainability:** Properly managed irrigation systems contribute to sustainable agricultural practices by optimizing water use, preventing soil erosion, and promoting efficient nutrient management. This helps protect the environment and supports long-term agricultural sustainability.

10. **Rural Development Planning:** The availability of water through irrigation allows for better planning and management of agricultural activities. It facilitates long-term rural development planning, as farmers can make informed decisions about cropping patterns, resource allocation, and market participation. Irrigation is a critical component of rural development, offering numerous benefits that extend beyond agriculture. It plays a central role in poverty reduction, food security, employment generation, and overall improvement in the quality of life for rural communities. Effective water management and sustainable irrigation practices are essential for maximizing these benefits.

Table 4: State-wise Number of (PHCs) in Rural Areas

State/UT	Total Number of PHCs	State/UT	Total Number of PHCs
Andhra Pradesh	1142	Odisha	1288
Assam	920	Puducherry	24
Bihar	1492	Punjab	422
Chandigarh	0	Rajasthan	2133
Chhattisgarh	770	Tamil Nadu	1422
Goa	24	Telangana	578
Gujarat	1474	Tripura	108
Haryana	394	Uttar Pradesh	2919
Himachal Pradesh	553	Uttarakhand	531
Jammu & Kashmir	891	West Bengal	915
Jharkhand	291	Andaman & Nicobar Islands	22
Karnataka	2138	Arunachal Pradesh	126
Kerala	780	Dadra & Nagar Haveli and Daman & Diu	12
Madhya Pradesh	1266	Ladakh	32
Maharashtra	1853	Lakshadweep	4
Manipur	74	Nagaland	129
Meghalaya	122	Mizoram	57
NCT of Delhi	5	Sikkim	24

Source: Rural Health Statistics 2021-22

Primary health centers (PHCs) play a crucial role in rural development by providing essential healthcare services to the local population. The importance of primary health centers for rural development is multi-faceted, addressing various health-related challenges and contributing to the overall well-being of rural communities. Here are several key reasons why primary health centers are essential for rural development:

1. **Basic Healthcare Access:** PHCs serve as the primary point of contact for individuals seeking basic healthcare services in rural areas. They provide a range of essential medical services, including preventive care, maternal and child health services, immunizations, and treatment of common illnesses.
2. **Disease Prevention and Control:** Primary health centers are instrumental in implementing public health programs and campaigns that focus on disease prevention and control. This includes vaccinations, health education, and awareness programs that contribute to the overall health of the community.
3. **Maternal and Child Health:** PHCs play a crucial role in maternal and child health, offering prenatal and postnatal care, family planning services, and immunizations. This contributes to reducing maternal and child mortality rates and improving the overall health of the community.
4. **Community Outreach and Education:** Primary health centers engage in community outreach programs to educate residents about health and hygiene practices. This proactive approach helps in preventing diseases, promoting healthy lifestyles, and empowering communities with knowledge about healthcare.
5. **Timely Medical Interventions:** PHCs ensure that individuals have access to timely medical interventions for common health issues. Early detection and treatment of diseases can prevent the progression of illnesses and reduce the overall burden on the healthcare system.
6. **Emergency Services:** Primary health centers often serve as emergency response hubs, providing immediate medical assistance in case of accidents, injuries, or other health emergencies. Quick access to emergency services can save lives and minimize the impact of health crises in rural areas.
7. **Reduced Healthcare Disparities:** By establishing PHCs in rural areas, there is an effort to reduce healthcare disparities between urban and rural populations. Improved access to healthcare services helps bridge the gap in healthcare infrastructure and resources.

8. **Economic Productivity:** Healthy individuals are more likely to be productive members of society. By addressing health issues at the primary level, PHCs contribute to the overall productivity of the rural workforce, leading to economic development in the long run.

9. **Preventing the Spread of Infectious Diseases:** PHCs play a critical role in monitoring and managing infectious diseases. Early identification, isolation, and treatment of infectious cases can prevent the spread of diseases within the community and protect public health.

10. **Enhanced Quality of Life:** Accessible healthcare services contribute to an improved quality of life for individuals in rural areas. Good health is a fundamental aspect of human development, and PHCs are key to ensuring that rural populations have the necessary resources to maintain and enhance their well-being. Primary health centers are essential for rural development as they address health-related challenges, contribute to disease prevention, provide essential medical services, and empower communities to lead healthier lives. The presence of PHCs is a cornerstone for overall rural development, promoting both health and socio-economic well-being.

Table 5: State-Wise Findings: Percentage of Households Having Access to Toilet

State/UT	Access to Toilet	State/UT	Access to Toilet
Mizoram	100.0	Andhra Pradesh	98.2
Sikkim	100.0	D & NH And Daman & Diu	98.1
Tamil Nadu	100.0	Uttar Pradesh	97.9
Andaman and Nicobar Islands	100.0	Madhya Pradesh	97.8
Puducherry	100.0	Uttarakhand	97.7
Kerala	100.0	Ladakh	97.5
Haryana	99.9	Maharashtra	97.0
Manipur	99.8	Odisha	94.7
Telangana	99.8	Arunachal Pradesh	94.0
West Bengal	99.7	Meghalaya	92.4
Gujarat	99.5	Karnataka	91.7
Punjab	99.3	Assam	86.8
Himachal Pradesh	99.2	Jammu And Kashmir	86.8
Rajasthan	99.1	Goa	86.6
Tripura	98.9	Jharkhand	82.7
Chhattisgarh	98.8	Bihar	77.1
Nagaland	98.6		

Source: <https://swachhbharatmission.gov.in/sbmcms/writereaddata/Portal/Images/pdf/SSG-2022-report.pdf>

The presence of toilets in rural areas is of paramount importance for various reasons, contributing significantly to public health, dignity, and overall development. Here are several key aspects highlighting the importance of toilets in rural areas:

1. **Sanitation and Disease Prevention:** Access to toilets helps prevent the contamination of water sources and soil by human waste. Open defecation can lead to the spread of waterborne diseases such as cholera, diarrhea, and parasitic infections. Proper sanitation practices through the use of toilets contribute to better public health outcomes in rural communities.

2. **Reduction of Waterborne Diseases:** In areas where open defecation is common, water sources can become contaminated with fecal matter, posing a significant risk of waterborne diseases. The use of toilets helps break the fecal-oral transmission cycle, reducing the incidence of diseases related to poor sanitation.

3. **Improvement of Maternal and Child Health:** Adequate sanitation facilities, including toilets, are crucial for maternal and child health. In households with proper sanitation, the risk of maternal infections is reduced, and children are less susceptible to diarrheal diseases and malnutrition, leading to better overall health outcomes.

4. **Dignity and Privacy:** The availability of toilets enhances the dignity and privacy of individuals, especially women and girls. Access to private and safe sanitation facilities allows for more hygienic and discreet practices, addressing gender-specific needs and contributing to a sense of personal dignity.

5. **Education and Gender Equality:** The presence of toilets in schools is essential for promoting attendance, particularly among girls. Lack of proper sanitation facilities can lead to absenteeism, especially during menstruation. Toilets in schools contribute to improved hygiene, creating a more conducive environment for learning and promoting gender equality in education.

6. **Community Well-being:** Proper sanitation practices contribute to the overall well-being of the community. Reduced incidence of waterborne diseases means that community members can be more productive, participate in economic activities, and contribute to the development of the community.

7. **Environmental Protection:** Open defecation not only poses health risks but also contributes to environmental pollution. Proper disposal of human waste through toilets helps protect water sources, soil quality, and overall environmental health.
 8. **Reduction of Open Defecation:** The presence of toilets discourages open defecation, which is a common practice in some rural areas. Open defecation not only poses health hazards but also has social and cultural implications. Toilets contribute to changing hygiene norms and fostering healthier community practices.
 9. **Healthcare Cost Reduction:** Improved sanitation reduces the burden on healthcare systems by lowering the number of people seeking treatment for preventable diseases. This, in turn, leads to cost savings for both individuals and the healthcare infrastructure.
 10. **Community Development:** The presence of toilets is a fundamental aspect of community development. It contributes to the overall improvement of living standards, public health, and the socio-economic well-being of rural areas.
- In conclusion, toilets in rural areas are crucial for promoting public health, preventing diseases, enhancing dignity, and fostering overall development. Efforts to provide sanitation infrastructure, along with hygiene education and awareness programs, are essential for sustainable and inclusive rural development.

Table 6: State-wise percentage of Status of households with tap water connection (as on January 2024)

States/UT	Households with tap water supply (%)	States/UT	Households with tap water supply (%)
Goa	100	Tamil Nadu	79.43
A & N Islands	100	Manipur	77.83
D&NH and D&D	100	Jammu & Kashmir	76
Haryana	100	Tripura	75.96
Telangana	100	Chhattisgarh	75.13
Puducherry	100	Uttar Pradesh	74.24
Gujarat	100	Meghalaya	73.17
Punjab	100	Andhra Pradesh	72.65
Himachal Pradesh	100	Karnataka	72.61
Arunachal Pradesh	98.9	Lakshadweep	71.88
Mizoram	98.86	Assam	70.23
Bihar	96.42	Odisha	69.89
Ladakh	90.15	Madhya Pradesh	59.72
Sikkim	88.74	Kerala	51.96
Uttarakhand	88.6	Jharkhand	48.28
Nagaland	83.13	Rajasthan	45.75
Maharashtra	83.06	West Bengal	41.43

Source: <https://ejalshakti.gov.in/jjmreport/JJMIndia.aspx>

Access to safe tap water is important for rural development, as it has far-reaching implications for the health, well-being, and overall progress of rural communities. Here are several reasons highlighting the importance of safe tap water for rural development:

1. **Public Health Improvement:** Safe tap water is a fundamental prerequisite for maintaining good health. It helps prevent waterborne diseases, such as cholera, dysentery, and diarrheal illnesses, which can be prevalent in areas with contaminated water sources. Access to clean water reduces the incidence of waterborne illnesses, improving overall public health in rural communities.
2. **Reduction of Waterborne Diseases:** Contaminated water sources are a major cause of waterborne diseases, especially in rural areas where access to safe water can be limited. Safe tap water ensures that communities are protected from waterborne pathogens, leading to a significant reduction in disease prevalence.
3. **Child and Maternal Health:** Safe tap water is particularly crucial for the health of children and pregnant women. Contaminated water can have severe health consequences for both mothers and infants, including stunted growth, malnutrition, and increased vulnerability to diseases. Access to clean water supports proper child development and maternal well-being.
4. **Productivity and Economic Development:** When people have access to safe tap water, they are less likely to suffer from water-related illnesses, leading to increased productivity. Healthy individuals are better able to participate in economic activities, agricultural work, and other income-generating pursuits, contributing to overall economic development in rural areas.
5. **Education and Gender Equality:** The availability of safe tap water is linked to improved attendance and performance in schools. Children, especially girls, are often responsible for fetching water for their families. When access to clean water is convenient, it reduces the time spent on water collection, allowing more children, particularly girls, to attend school regularly and pursue education.

6. **Enhanced Hygiene Practices:** Safe tap water promotes better hygiene practices, including handwashing, which is crucial for preventing the spread of diseases. Improved hygiene contributes to the overall well-being of communities and reduces the burden of preventable illnesses.
 7. **Agricultural Development:** Reliable access to safe water is essential for agricultural activities. It supports irrigation, livestock care, and crop cultivation, leading to increased agricultural productivity. This, in turn, contributes to food security and economic stability in rural areas.
 8. **Community Empowerment:** Access to safe tap water empowers communities by providing them with a basic necessity for daily living. It allows individuals to focus on other aspects of personal and community development, leading to an improved quality of life.
 9. **Environmental Sustainability:** Safe tap water encourages sustainable water management practices. It reduces the reliance on polluted water sources, mitigating environmental degradation and promoting the conservation of natural resources.
 10. **Resilience to Climate Change:** Climate change can exacerbate water scarcity and affect the quality of water sources. Safe tap water infrastructure, along with proper water management practices, enhances the resilience of rural communities to the impacts of climate change by ensuring a reliable and safe water supply.
- In conclusion, access to safe tap water is a cornerstone for rural development, contributing to improved health, education, economic opportunities, and overall community well-being. Efforts to provide and maintain safe water sources are essential for sustainable development in rural areas.

Table 7: State-wise Number of Villages Electrified

States/ UTs	No. of villages as per 2011 Census	Villages Electrified as on 31/03/2021	States/ UTs	No. of villages as per 2011 Census	Villages Electrified as on 31/03/2021
Andhra Pradesh	16158	All Villages have been Electrified	Nagaland	1400	All Villages have been Electrified
Arunachal Pradesh	5258		Odisha	47677	
Assam	25372		Punjab	12168	
Bihar	39073		Rajasthan	43264	
Chhatisgarh	19567		Sikkim	425	
Goa	320		Tamil Nadu	15049	
Gujarat	17843		Telangana	10128	
Haryana	6642		Tripura	863	
Himachal Pradesh	17882		Uttar Pradesh	97813	
Jammu & Kashmir	6337		Uttarakhand	15745	
Jharkhand	29492		West Bengal	37463	
Karnataka	27397		Andaman & Nicobar	396	
Kerala	1017		Chandigarh	5	
Madhya Pradesh	51929		Dadar & Nagar Haveli	65	
Maharashtra	40956		Daman & Diu	19	
Manipur	2379		Delhi	103	
Meghalaya	6459		Lakshwadeep	6	
Mizoram	704		Puducherry	90	

Source: Central Electricity Authority MoSPI (Energy Statistics India-2023)

Rural electrification can contribute significantly to employment generation in rural areas through various direct and indirect means. Here are several ways in which the availability of electricity can foster job creation and economic development in rural communities:

1. **Agricultural Productivity:** Electrification facilitates the use of modern agricultural technologies, such as electric pumps, machinery, and irrigation systems. Farmers can increase productivity, efficiency, and crop yields, leading to a higher demand for labor in agricultural activities.
2. **Agro-Processing Industries:** Access to electricity enables the development of agro-processing industries in rural areas. Food processing, packaging, and preservation units can emerge, creating employment opportunities along the entire value chain, from production to processing and marketing.

3. **Small and Medium Enterprises (SMEs):** Rural electrification encourages the establishment and growth of small and medium enterprises. Entrepreneurs can start businesses related to manufacturing, food processing, handicrafts, and other sectors that require electricity, leading to job creation.
 4. **Rural Industries:** Electrification supports the growth of various rural industries, such as textile mills, cottage industries, and handicraft production. These industries often have the potential to absorb a significant workforce, contributing to local employment opportunities.
 5. **Education and Skill Development:** Electrification facilitates the establishment of educational and training institutions in rural areas. Access to electricity is essential for running schools, vocational training centers, and computer labs, providing educational opportunities and enhancing the skills of the local workforce.
 6. **Healthcare Services:** Electrification is crucial for healthcare facilities. Rural electrification can support the functioning of clinics, hospitals, and medical equipment. The availability of reliable power enhances healthcare services, creating jobs for medical professionals and support staff.
 7. **Rural Tourism:** Access to electricity is essential for developing infrastructure in rural areas that can attract tourists. Establishing accommodation, restaurants, and recreational facilities requires reliable power, leading to job opportunities in the hospitality and tourism sectors.
 8. **Cold Storage Facilities:** Electrification allows for the development of cold storage facilities, especially important in agricultural regions. Farmers can store perishable goods, reducing post-harvest losses and creating jobs in transportation, storage, and logistics.
 9. **Social Infrastructure:** Electrification contributes to the development of social infrastructure such as community centers, libraries, and recreational spaces. These facilities create employment opportunities for administrators, caretakers, and program coordinators.
 10. **Entrepreneurship and Innovation:** Electrification supports entrepreneurship and innovation by providing a reliable power supply for startups and innovative ventures. This can lead to the creation of new businesses and job opportunities in technology, services, and manufacturing.
 11. **Construction and Infrastructure Development:** The expansion of rural electrification projects often involves construction and infrastructure development. This creates employment opportunities for local labor in the construction sector, including skilled and unskilled workers.
 12. **Information Technology (IT) Services:** Electrification enables the establishment of IT centers and internet connectivity in rural areas. This can lead to job creation in the IT sector, including data entry, software development, and IT support services.
 13. **Community Empowerment:** Access to electricity empowers local communities to engage in income-generating activities. Whether it's through electrified micro-enterprises or home-based businesses, community members can create their own employment opportunities.
- In summary, rural electrification is a catalyst for multifaceted economic development in rural areas, directly and indirectly contributing to employment generation. The provision of reliable electricity lays the foundation for a diverse range of economic activities, improving living standards and fostering sustainable rural development.

Table 8: State-wise Total number of Schools (as of 2021-22)

States/UT	Total Schools	States/UT	Total Schools
Andaman and Nicobar Islands	416	Lakshadweep	38
Andhra Pradesh	61948	Madhya Pradesh	125582
Arunachal Pradesh	3603	Maharashtra	109605
Assam	60859	Manipur	4617
Bihar	93165	Meghalaya	14600
Chandigarh	233	Mizoram	3911
Chhattisgarh	56512	Nagaland	2718
Dadra and Nagar Haveli and Daman and Diu	460	Odisha	62291
Delhi	5619	Puducherry	736
Goa	1510	Punjab	27701
Gujarat	53851	Rajasthan	106373
Haryana	23726	Sikkim	1259
Himachal Pradesh	18028	Tamil Nadu	58801
Jammu and Kashmir	28805	Telangana	43083
Jharkhand	44855	Tripura	4929
Karnataka	76450	Uttar Pradesh	258054
Kerala	16240	Uttarakhand	22815
Ladakh	978	West Bengal	94744

Source: State-wise highlights of the UDISE 2021-22 data.

Schools in rural areas play a crucial role in generating rural employment through various direct and indirect mechanisms. Here are several ways in which schools contribute to employment generation in rural areas:

1. **Teaching Positions:** The most direct impact of schools on employment is the creation of teaching positions. Schools require a staff of educators, including teachers, administrators, and support staff. Hiring local individuals for these positions contributes to job creation within the community.
2. **Non-Teaching Staff:** In addition to teaching positions, schools require non-teaching staff such as administrative personnel, clerks, janitors, and security personnel. These roles contribute to local employment opportunities.
3. **Community Engagement Officers:** Schools often play a role in community outreach and engagement. Employing community engagement officers or coordinators to facilitate collaboration between the school and local residents can create additional job opportunities.
4. **Transportation Services:** Rural schools may require transportation services for students. This could involve hiring drivers and support staff for school buses or collaborating with local transportation providers, thereby generating employment.
5. **Construction and Maintenance Jobs:** The establishment, expansion, or renovation of school infrastructure creates job opportunities in construction and maintenance. Local construction workers, carpenters, electricians, and other skilled laborers may find employment during these projects.
6. **Local Businesses and Suppliers:** Schools contribute to the local economy by purchasing goods and services from nearby businesses. Local suppliers of stationery, furniture, uniforms, and other school-related materials benefit from school contracts, creating a ripple effect of employment opportunities.
7. **After-School Programs and Tutors:** Schools often host after-school programs or hire tutors to provide additional educational support. These programs can create employment opportunities for individuals with expertise in various subjects or extracurricular activities.
8. **Parent-Teacher Associations (PTA):** PTAs often play an active role in school affairs, organizing events, fundraisers, and community outreach. This involvement can lead to the creation of voluntary or part-time positions, providing additional opportunities for local employment.
9. **Canteen and Catering Services:** Schools with canteens or catering services create job opportunities for cooks, kitchen staff, and food service providers. These positions contribute to local employment and support local businesses.
10. **Skill Development and Vocational Training:** Some schools in rural areas may focus on vocational training programs. These initiatives can equip students with practical skills and create employment opportunities within the community, particularly in trades relevant to the local economy.
11. **Educational Support Services:** Schools may engage educational support services, such as counselling, special education, and speech therapy. Employing professionals in these fields can enhance the overall educational experience and create employment opportunities.
12. **Sports and Physical Education Coaches:** Schools often have sports programs and physical education classes. Hiring coaches and instructors for these activities provides employment opportunities for individuals with expertise in sports and fitness.
13. **Art and Music Instructors:** Schools may offer art and music classes, employing local artists and musicians as instructors. This not only enhances the educational experience but also supports local talent and generates employment.
14. **Entrepreneurship Initiatives:** Schools can be hubs for entrepreneurship initiatives, encouraging students to start small businesses. This can lead to the creation of local enterprises, generating employment opportunities for the community.

Schools in rural areas contribute to employment generation through a range of direct and indirect avenues. Beyond providing educational opportunities, they serve as community hubs that stimulate economic activity and contribute to the overall development of rural areas.

Table 9: State-wise Tele-Density in India (%)

States/UT	Total Teledensity	States/UT	Total Teledensity
Andhra Pradesh	NA	Odisha	75.7
Assam	70.7	Puducherry	69
Bihar	140	Punjab	115.3
Chandigarh	100	Rajasthan	79.5
Chhattisgarh	123	Tamil Nadu	103.5
Goa	98	Telangana	120
Gujarat	92.6	Tripura	107
Haryana	89.6	Uttar Pradesh	79
Himachal Pradesh	119.7	Uttarakhand	78
Jammu & Kashmir	80	West Bengal	82
Jharkhand	85	Andaman & Nicobar Islands	NA
Karnataka	101.9	Arunachal Pradesh	NA

Kerala	122.1	Dadra & Nagar Haveli and Daman & Diu	NA
Madhya Pradesh	145	Ladakh	NA
Maharashtra	102	Lakshadweep	NA
Manipur	NA	Nagaland	NA
Meghalaya	NA	Mizoram	NA
NCT of Delhi	273.7	Sikkim	NA

Source: CMIE States of India 2022-23

Rural telephone connectivity plays a crucial role in promoting rural employment and overall economic development. Improved access to telecommunications in rural areas provides numerous benefits that contribute to employment generation and enhanced livelihoods. Here are several ways in which rural telephone connectivity is important for rural employment:

- 1. Communication and Coordination:** Telephone connectivity allows individuals in rural areas to communicate easily with potential employers, customers, suppliers, and other stakeholders. This facilitates coordination for various economic activities, leading to increased employment opportunities.
 - 2. Market Access:** Rural entrepreneurs and businesses gain access to a broader market through telephone connectivity. They can engage in business transactions, negotiate deals, and market their products or services to a larger audience, contributing to business growth and employment creation.
 - 3. Job Search and Information:** Individuals seeking employment can use phones to search for job opportunities, submit applications, and communicate with potential employers. This reduces information barriers and helps connect job seekers with available employment opportunities in a more timely and efficient manner.
 - 4. Entrepreneurship and Small Businesses:** Rural telephone connectivity supports the establishment and growth of small businesses and entrepreneurial ventures. Entrepreneurs can communicate with clients, suppliers, and partners, leading to business expansion and increased employment within the community.
 - 5. Agricultural Activities:** Farmers in rural areas can benefit from telephone connectivity by accessing market information, weather updates, and expert advice. This enables them to make informed decisions, adopt best practices, and enhance agricultural productivity, potentially leading to increased employment in the agricultural sector.
 - 6. Telecommuting and Remote Work:** Rural telephone connectivity facilitates telecommuting and remote work opportunities. Individuals in rural areas can engage in various remote jobs, such as freelancing, online consulting, or virtual assistance, expanding employment options beyond traditional local opportunities.
 - 7. Access to Financial Services:** Telephone connectivity is crucial for accessing financial services such as mobile banking and mobile money. This allows individuals in rural areas to conduct financial transactions, access credit, and engage in economic activities that contribute to employment and income generation.
 - 8. Education and Training Opportunities:** Telephone connectivity enables individuals in rural areas to access online educational resources and training programs. This contributes to skill development, which is essential for employability and entrepreneurship, leading to increased job opportunities.
 - 9. Healthcare Services:** Telemedicine and mobile health services rely on telephone connectivity. Individuals in rural areas can access healthcare consultations, medical advice, and health information, contributing to improved health outcomes and ensuring a healthy and productive workforce.
 - 10. Emergency Services and Safety:** Telephone connectivity is critical for accessing emergency services. Quick communication during emergencies ensures timely response and assistance, promoting safety and well-being in rural communities.
 - 11. Community Development Projects:** Telephone connectivity facilitates communication and coordination for community development projects. Local initiatives, cooperatives, and community-based organizations can use phones to organize and implement projects that create employment opportunities.
 - 12. Government Services and Schemes:** Rural residents can access government services, information, and schemes through telephone connectivity. This includes information on employment programs, subsidies, and support services, contributing to the overall socio-economic development of rural areas.
- Thus rural telephone connectivity is a key enabler for economic activities, job creation, and overall rural development. It enhances communication, facilitates access to information and services, and creates opportunities for individuals and businesses in rural areas, leading to increased employment and improved livelihoods.

Rural Unemployment and Rural Infrastructure - An Econometric Analysis

To find out the impact of Rural Infrastructure in reducing rural unemployment, data on all 9 selected infrastructural facilities were collected and subjected to a multiple regression model.

$$RIE = a + b_1(IRRIG) + b_2(REDU) + b_3(RPHC) + b_4(RSW) + b_5(RTO) + b_6(RRO) + b_7(RTC) + b_8(REL) + U$$

INDEPENDENT VARIABLES	STD. ERROR	T-RATIO	P-VALUE	SIGNIFICANCE
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CONSTANT	158.34	2.78	0.01568	
IRRIG (Irrigation)	1.46774	-0.322	0.0111	Significant at 0.01 level
REDU (Rural Education)	2.911	-0.981	0.0038	Significant at 0.01 level
RPHC (Rural Primary Health Centres)	0.0180173	3.456	0.0577	Insignificant at 0.01 level
RSFW (Rural Safe Water)	11.34489	2.349	0.101	Insignificant at 0.01 level
RTO (Rural Toilets)	1.366500	2.005	0.123	Insignificant at 0.01 level
RRO (Rural Roads)	1.7698	-1.247	0.0123	Significant at 0.01 level
RTC (Rural Telecommunications)	4.2567	-1.65	0.0152	Significant at 0.01 level
REL (Rural Electrification) (2011 census data used)	2.099	-1.989	0.0145	Significant at 0.01 level

R² value: 0.74

F value = 5.4

P value of F= 0.0198

FINDINGS AND POLICY IMPLICATIONS

The explanatory power of the regression model is given by the R² value which is 0.74. This means 74 percent of the variation of rural unemployment is explained by the eight independent variables included in the model. The significance of the individual regression coefficients can be done by the t-test. The result indicates only five out of the eight variables are significant. The rest three variables failed in the test which means they have no impact on the dependent variable. The five significant variables are irrigation, rural roads, rural education, rural tele density, and villages electrified. The impact of the individual variables on the dependent variables shows that all of them have a negative relationship with the dependent variables. The overall significance of the regression is given by the F-value which is 5.4 for our model. This value is higher than the theoretical F Value which is 3.52 for a 1 percent confidence level. This establishes that our regression model is useful and there is a relationship between the dependent variable and some independent variables.

A better rural infrastructure leads to lesser unemployment. Hence the policy implications are that the government should make sincere attempts to enhance irrigation facilities, road construction, rural electrification, rural tele density, and schools. This will help in reducing unemployment.

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