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IMPLICATIONS OF INFRASTRUCTURE ON HUMAN DEVELOPMENT IN NORTH EAST INDIA: A REVIEW

T Thangjahao Haokip[1] and Reimeingam Marchang[2]

Abstract

Development of infrastructure has implications for the improvement of human development indicators such as health, education, and living standards. The rough topography and geographical isolation of North East India have necessitated the adequate availability of infrastructure. This study is based on systematic reviews and meta-analyses of studies conducted on infrastructure and human development topics. It analyses the infrastructural conditions of the region from empirical studies and government reports in comparison with national levels. People living in areas where infrastructure access is easier tend to have better health conditions, education levels, and living standards. In the region, Assam has the best railways and post offices, and the state has the highest concentration of industries. Tripura has the highest road density and also records the fastest growing per capita income and literacy rate in NER. The literacy rate and longevity are better in Mizoram and Tripura, and these states are included in the NE circle, where teledensity is higher. However, most of the NE states have inadequate infrastructure that affects their incomes and other human development indicators.

Keywords: *Infrastructure, human development, health, education, income, and region.*

Introduction

Infrastructure is essential for the improvement of socio-economics in a society. It is the foundation of any region that acts as the equipment required for a particular system to function (Basumatary, 2013). In India, infrastructure includes amenities such as electricity, gas, water supply, telecom, roads, industrial parks, railways, ports, airports, and storage (Planning Commission, 2001). Human development focuses on the richness of human lives, which is measured by the human development index (HDI). As per the United Nations Development Programme (2016), the HDI is a composite index for measuring average achievement in three basic dimensions, such as long and healthy life, knowledge, and the living standards of people. Its indicators include life expectancy at birth, expected years of schooling, mean years of schooling, and gross national income (GNI) per capita. Singh (2015) stated that human development comprises both social and economic factors. The social factors: educational status is measured through literacy rate, mean years of schooling, and dropout rate, and health status through infant mortality rate, maternal mortality rate, and life expectancy. The economic factor, the standard of living is measured through per capita income. It is the most prominent explanation for social factors.

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A positive change in the infrastructural sector in a country causes a similar change in human development dimensions such as healthy life, educational attainment, and the living standards of the people. For example, people living in areas where there are good road conditions have a higher chance of accessing healthcare centres in times of need. Among various infrastructures, the present study includes transportation and communication, considering their contribution to human development. The analysis mainly dwell on the conditions and contributions of these infrastructures. North East India (NEI) or North-eastern region (NER) has been described as one of the most underdeveloped regions in India due to its isolated geographical location and rough topography. It comprises eight states, namely Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura. If infrastructure development has a positive impact on human development, what is the condition of it in NER to improve its human development aspects? Therefore, the study aims to prove a hypothesis – the lack of infrastructure in NER is one of the main reasons that is impeding human development. Its main objective is to find out the implications of infrastructure for human development conditions in the region.

Methodology

The study adopted systematic reviews and meta-analyses from different studies conducted on similar research topics. It is a descriptive study of the related studies that were examined and substantiated by periodical reports of government departments. The infrastructural conditions and their availability status are measured in terms of people's accessibility levels. Its variables are measured in terms of density or ratio per population or geographical area. The variables of human development include longevity, child and maternal mortality rates, educational status, and per capita income. The study analyses the variables from the existing empirical studies concerning the region. It also compared the regional status of infrastructure and human development aspects with an average of all India's levels to draw inferences.

Results

How Infrastructure has Implications on Human Development

Infrastructure is a contributing factor to social and economic development, especially to human development indicators. A study of transportation infrastructure in the northeast Mega-region in the United States by Chen and Haynes (2015) emphasised a mature transportation system that refers to a system that is completed and at a developed rather than at a construction stage. The impact of transportation infrastructure happens when the competitive nature of public investment leads to better connectivity and accessibility. Positive economic growth is likely to be achieved when heavy public investment occurs in one region relative to other regions. Kim (2006) specifies that the good infrastructure of South Korea helps it to raise productivity and lower input costs, and it is indispensable to achieve the main development targets. Prioritisation of investment in infrastructure is extremely important for the attainment of the main development targets. Dash (2017) stated that South Korea is considered a successful country and is believed to have reached the status of a developed economy because the growth rate of GDP has been on par with developed nations. Some of the factors are

government-led infrastructure, industry targeting policies, and large firm orientation. Moreover, effective measures have been taken to promote investment in human resource development. Omoruyi (2017) stated that infrastructure is indispensable to achieve the main development targets in developing countries like Nigeria. Nigeria's roads carry more than 90 per cent of domestic passengers and freight. Thus, infrastructure is the beginning and a key to fostering development such as industrialisation, equitable income distribution, and other social and economic factors.

A study by Sahoo, Dash, and Nataraj (2010) on infrastructure development and economic growth in China from 1975 to 2007 found that to sustain high economic growth and increased competitiveness in manufacturing, both in the private and public sectors, massive development of infrastructure has a significant positive impact. China is known as one of the fastest-growing and developing countries in the world, due to its infrastructural development that contributes to its economy. Nayyer (2012) stated that the development of primary, secondary, and tertiary sectors in India is highly dependent on the size and quality of infrastructure. The presence of education and health services creates positive externalities for employment. Improving transport facilities can increase agriculture productivity by providing greater knowledge of modern tools and the sale of products.

Studies in developed and developing countries show that a positive change in infrastructure has a positive impact on health conditions, educational attainment, and decent living standards. The geographical isolation and rough topography of NER require good transportation and communication infrastructure for proper connectivity with other regions and to improve the indicators of human development.

Transportation and Human Development in NER

Railway and road transport systems are the main modes of transport for transporting goods and passengers in India. They play the most important role in the country's progress and their availability should be accessed and affordable by every section of society. According to the Ministry of Railway (2011), the railway in NER was more than 125 years old when the first passenger railway system came into being in 1881 between Dibrugarh and Sadiya. In 1958, a new railway zone, namely the Northeast Frontier Railway, was carved out of the North-eastern Railway with headquarters at Maligaon, Guwahati. Later on, it was extended to Dimapur (Nagaland), Itanagar (Arunachal Pradesh), and Agartala (Tripura). Although connectivity to all state capitals of NER is one of the main objectives, the capital cities of Manipur, Meghalaya, Mizoram, Nagaland, and Sikkim states are not connected and some are under construction. The lack of railway connectivity in NER has led people to depend on road transport, which is costlier than railways. Consequently, this has led to a rise in the prices of commodities that raised people's spending in their daily lives.

India has one of the largest road networks in the world, consisting of national highways, state highways, major district roads, and village roads. In the Eleventh Five Year Plan of India, road projects are at the top of the list targeted for major investments (Montgomery, 2008). In NER, according to the Planning Commission (2012), a mega road programme, the Special Accelerated Road Development Program in the North East (SARDP-NE), was launched in 2005 for the development of national highways and state roads. In rural areas, a road development scheme, Pradhan Mantri Gram Sewak Yojana

(PMGSY), under the Ministry of Rural Development (MoRD), has been implemented across the country. Besides, there are some massive road development interventions in the region. As per Rajendram (2014), the Look East Policy, which was upgraded to Act East Policy in 2014, has been a major part of India's international engagement since its economic opening in 1991. It aims to stabilise economic, institutional, and security relations and has a desire to develop NER. The overland connectivity route passes through four North-eastern states with a share of a 1,643 km long land border with Myanmar. However, the implementation works are under construction, so they do not have an impact on economic development.

After various interventions, the road conditions still appear poor in NER. According to the North Eastern Council Secretariat (2015), the total road length of NER was 376,819 km. and the total geographical area was 262,179 sq.km. In India, the same were 4,690,342 km. and 3,287,263 sq.km respectively. Based on these figures, the road density (i.e., road length per 100 sq.km of geographical area) of NER is 143.7 km per 100 sq.km and that of all India is 142.7 km per 100 sq.km. It shows more or less the same. However, in terms of surfaced road length, the region has much poorer road conditions when compared to all of India. The surfaced road is a road that covers metal wherein it is motor-able in all seasons. According to the Ministry of Road Transport and Highways (2016), the surfaced road density of NER was 61 km per 100 sq.km of geographical area, which was considerably lower than India's 101 km per 100 sq.km. Among the NE states, Tripura has the highest road density of 192 km, followed by Nagaland with 103 km, Sikkim with 87, Assam with 82 km, and Manipur with 70 km, which are also higher than NER. The road density of 48 km in Meghalaya, 34 km in Mizoram, and 22 km in Arunachal Pradesh are lower than the regional average.

A lack of transport and communication facilities in Arunachal Pradesh deny people the chances for job, education and healthcare (Ramya, 2012). Similarly, the poor availability of surfaced roads in most of the NE states affected transportation costs and time spent. It hinders people from accessing workplaces, healthcare centres, educational and financial institutions. The road development programmes in the region could be a triggering factor. However, the sparser distribution of population and the delays in release of funds and implementation of these programmes hinder road development in the region.

Communication and Human Development in NER

Good communication is vital for development as it can provide more equal dissemination of information and allow focusing on activities in the weaker parts of society. Access to its reliable network service has a positive impact on the social and economic lives of people. As per Avgerou (2008), the information system in developing countries is a coexistence of implementation in its system associated with organisational and social change. As it goes beyond national boundaries and supports global economic and political activities, it acquires general significance for innovation. Among the developing countries, India is the most successful in the outsourcing business and the efforts of its software firms. The information system contributes to the improvement of health services, education, and state governance for inclusive growth. India's communication development performs two key functions, such as

transforming roles as it seeks social changes for a higher quality of life and socialising roles as it seeks to maintain some of the established values of society (Roy, 2015).

Among the various systems or mediums of communication for transmitting information, the present paper includes the post office as one of the oldest services and telecommunication as the most widely used by people in the present generation, especially in the region due to a lack of other mediums. As per the Department of Posts (2020), NER is divided into three postal circles, namely, the Assam circle, the North Eastern (NE) circle, and Sikkim is under the West Bengal circle. The post office (PO) density (i.e. ratio) as of March 2019 shows one PO (head, sub, and a branch post office) and geographical area as well as population. In India, each post office served 20.9 sq.km of area and 8,511 people. In NER, it served an area of 19.5 sq.km and 7,769 people in Assam circle, 79.2 sq.km and 5,155 people in the NE circle, and 33.9 sq.km and 5,155 people in Sikkim state, which is part of the West Bengal circle. Except for the Assam circle, the other two postal circles have served a larger geographical area as compared to the national level. The better population served by each post office in NER was due to its sparse distribution of the population. However, the larger geographical coverage makes people travel longer distances and hinders the accessibility of post office facilities such as courier, mailing, savings, insurance, and other facilities that are offered.

Telecommunication services are widely used by people to improve their social and economic lives. In NER, telecommunication circles follow the same as postal circles. As per the Telecom Regulatory Authority of India (2015), the teledensity (i.e. total telecommunication subscribers per population) as of October 2015 was 57 per cent in Assam, 79 per cent in the other NE circle, and 81 per cent in all India. As of January 2019, it has increased to 67 per cent in the Assam circle, 84 per cent in the NE circle, and 92 per cent in all of India (TRAI, 2019). The teledensity shows that access to telecommunication services was poorer in the region, especially in the Assam circle, when compared to all of India. The condition hinders NER in bringing diverse neighbourhoods together, sharing ideas and opportunities, and other socio-economic activities.

Human Development Conditions in NER

The human development conditions of a region or nation express the status of development of that region or nation. In India, the Directive Principles of State Policy envisage human development through the promotion of public health care, universalisation of education, and raising the standard of living. The United Nations Development Programme (2016) stated that India's HDI, with a value of 0.624, comes under the medium category of human development. It stood at the 131strank among the UN members and the 3rd rank among the SAARC countries. The HDI value of 0.484 of NER was much lower than the value of all India. Besides, there were variations in HDI values within the NE states. Bhagowati (2012) estimated HDI for the NE States by using indicators such as per capita state income, households in pucca and semi-pucca houses, access to electricity, population above the poverty line in 2001, literacy rates in 2011, the infant mortality rate in 2009, hospital beds available per population in 2009, and access to safe-drinking in 2001. Based on these eight indicators, India's HDI value was 0.335. The HDI value of Sikkim stood at the top among the NE states with a value of 0.377, which was also higher than all of India's average values. Except for Sikkim, the HDI values of other NE states, such as Arunachal

Pradesh 0.321, Mizoram 0.323, Meghalaya 0.286, Nagaland 0.275, Manipur 0.262, Tripura 0.262, and Assam 0.243 were lower than the all India average.

Health is intrinsically important and it is accepted that a development programme is incomplete if it fails to promote health care facilities in a country (Tripathi, 2016). The health conditions in rural areas are more vulnerable, mostly due to the lack of connectivity between health centres and habitations. Shrivastava, Shrivastava, and Ramasamy (2013) opined that the rural tribal populations of India are neglected and they are highly vulnerable to diseases, with a high degree of malnutrition and mortality. Traditional practices and superstitions are prevailing due to lack of access to a proper building, healthcare services, facilities, and the non-availability of health staff. Doctors and staff are reluctant to work in backward areas, and medical staff from respective communities and areas are not sufficient. Longevity is one of the main health indicators of human development. As per the Ministry of DoNER (2011) in the NER Human Development Report 2011, the average life expectancy of the region was given 62.8 years in 2004 and that of all India was 66.6 years. It also varies between the states of NER. It was 62.8 years for Assam in 2010 (Planning and Development Department, 2014), 54.1 years for Arunachal Pradesh in 2009 (Planning Commission, 2009), 73 years for Tripura in 2001 (Tripura HDR, 2007), 73 years for Nagaland (Department of Planning and Coordination, 2004), 60 years for Meghalaya in 2008 (Planning Department 2009) and 76.5 years for Mizoram (Institute for Human Development, 2013). In short, the life expectancy of Mizoram, Nagaland, and Tripura is better than the national average. Bhagowati (2012) argued that life expectancy, which is a good health indicator for the population, has not been included in the selected list of indicators and is neglected in the region.

Education provides opportunities for people to reflect on the critical social, cultural, moral, economic, and spiritual issues facing humanity. Education is the process of the acquisition of knowledge and also about preparing for life (Ramchandran and Naorem, 2016). According to NEC and the Ministry of DoNER (2008), the educational status of the region in terms of literacy rate was higher than the national average in 2001. Similarly, the average literacy rate of 75 per cent in NER was slightly higher than in India's 74 per cent in 2011 (NEC Secretariat, 2015). But there are concerns about higher education and quality education that have to be translated into employability or productivity. Marchang (2014) argued that the educational status as per the literacy rate of Sikkim in NER was better when compared to the national average. However, the high level of literacy does not necessarily mean having attained a higher level of education. Instead, attainment of education in secondary and above is prevailing in urban areas where the educational infrastructure is better available. It shows the necessity of expanding the social infrastructure, particularly educational and skill development institutions, for people to attain higher and professional education. This could improve the skills and productivity of workers and increase their income and provide better employment opportunities.

Srinivasan and Srinivasan (2017) stated that the livelihoods of the people in NER lie at the bottom of the pyramid and income opportunities have been vulnerable and always lower than those available in the rest of the country. The economy of NER is mainly based on agriculture and allied activities, seasonal employment, and low wages that determine people's income. This implies that the region is poorer in living standards, which further impedes the health and educational status of the people.The standard of living is generally measured by the income of a person. As per the Ministry of

DoNER (2018), the per capita income of NSDP 2014-15 at constant prices in the base year 2012 of all India was Rs. 72,862. Some of the NE states have a higher per capita income than India's average. Sikkim ranked at the top with Rs. 180,675, followed by Arunachal Pradesh with Rs. 87,966 and Mizoram with Rs. 85,056. However, the majority of the NE states have lower per capita incomes when compared to the all India average. It was lowest in Manipur with Rs. 44,101 and Assam with Rs. 44,809, followed by Meghalaya with Rs. 55,936, Tripura with Rs. 58,888, and Nagaland with Rs. 60,372. The low per capita income in Assam and Manipur was due to the rising population, slow economic growth, and a risky investment climate (Lyngdoh, 2015). The economic blockade of the national highways, through which most goods are brought into Manipur, was one of the main reasons for having India's highest poverty rates, high youth unemployment, and low growth in Manipur (Shah, 2017). This shows that blockades on road transportation hinder people's income and standard of living.

Discussion

The greater part of the empirical studies on the implications of infrastructure have centred on human development as well as the nation's development. In NER, the inadequate availability of transportation and communication infrastructures hinders its human development aspects. The states where these infrastructures are better have better facilities to improve their human development. On the one hand, Assam shares the longest railway route among the NE states. On the other hand, the state constitutes 80 per cent of the region's medium and large industries that provide more employment opportunities. (Purkayastha, 2004).

The study found that the states which have better road systems also have higher per capita incomes. In line with the argument, good access to roads can improve education, health, and markets for farmers, and income levels (Estache and Garsous 2012). The per capita income was the highest in Sikkim, where there is a sufficient supply of electricity in NER. Hydroelectric power, tourism, pharmaceuticals, and tea have the maximum growth potential in Sikkim (Mishra and Jha, 2014). The condition implies that better access to economic infrastructure has a positive effect on per capita income, which is an indicator of human development.

Among the NE states, states such as Sikkim and Tripura have higher per capita income than the national average. The per capita income of Tripura based on the year 2011-12 was Rs. 69,474 and ranked fifth in NER during 2014-15and it increased to Rs. 105,044 and ranked second in 2017-18 (Directorate of Economics and Statistics, 2018). The state has been recorded as one of the fastest-growing in the region. The surface road density appeared better in Tripura and Nagaland as compared to other NE states as well as at the national level. It appears that the good condition of the transport system is one of the contributing factorsfor rising income. This does not necessarily mean that better road density is the only factor. In Nagaland, despite its better road density in NER, the farmers in rural areas need better transport facilities. Moreover, the estimated average years of life expectancy at birth in some states, like Mizoram, Nagaland, and Tripura, is higher than the national level. However, it was lower in a majority of the NE states, especially in rural areas where road connectivity is lacking.

The educational status in terms of literacy rate in the region has also been on par with national levels during the last two decades. However, the NER was found to be lagging behind in quality

education that leads to a lack of skilled human resources, and lacks higher educational institutions as compared to the national level (Das and Mukherjee, 2017). It further affects the creation of employment opportunities to improve the livelihood conditions of the people. The development of transportation and communication infrastructure is crucial in NER for improving people's health, education, and income levels. To improve these infrastructures, sufficient investment is required. However, investment in infrastructure by private investors is unlikely to happen due to the huge capital requirements and the slow return of profit. Therefore, the central and state governments of NER are responsible for the region's development.

Conclusion

The study found that the condition of transportation and communication infrastructure in NER is relatively poorer when compared to all of India in terms of its density per geographical area. Poor road transport conditions in terms of surface road density affect the plying of vehicles in all seasons. It adversely affects people's access to health, education, and the workplace. Besides, the lack of telecommunication services is another challenge. There was poorer teledensity in NER, especially in the Assam circle, as compared to the national level. Unreliable telecommunication services in some rural areas hinder the daily social lives and economic activities of the people. It is therefore unable to capture the attention of the government for development interventions.

Human development dimensions are better in states where there is adequate and easier access to transportation and communication infrastructure. The region is expected to achieve better human development indicators if the infrastructure is adequately available. Unfortunately, its geographical isolation and rough topography have always remained hindering factors for the region's development. Instead, it could be one of the main reasons for drawing the attention of policymakers. Since the construction cost of infrastructure is high and takes a long period, it requires public investment, especially in NE states. Thus, the study suggests a need to ponder the political factors and causes of infrastructural challenges in NER to suggest policy implications for inclusive development.

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