

Impact of roads on income and employment of rural households in West Bengal

Joyoti Gayen and Debashis Sarkar

Department of Agriculture, Visva-Bharati, Sriniketan-731236, Birbhum, West Bengal, India

ABSTRACT

It has been observed in several studies that lots of deprived communities are remote by distance, terrible road conditions, lack of or bust bridges and scarce transport. These conditions make it difficult for rural people to get their sell to market and finding jobs to place of work, to grip health emergencies, to admit children to school, and to obtain public services. In view of this, an attempt has been made in this study to consider the impact of rural roads on income and employment of the households in West Bengal. It has been found that better roads and railway systems lead to access and opportunities leading to diversified livelihood and accordingly diversified income are generated. The study also reveals that there is both quantitative and qualitative divergence in employment of the households between near and away from main road & rail station. The area which has high road and high population density positively influences the educational level too. Better access to education is materialised due to proximity of main road and rail station. The Gini coefficient is higher in case of those households who are near to main roads and rail station as well as a high Simpson index reflecting a diversified rural livelihoods mainly because of better access in income niche and implying a variation and heterogeneity in income.

Keywords: Rural roads, education, employment, income, income inequality, Gini coefficient, Simpson index

Rural roads are the basic infrastructure requirement and play a vital role in socio-economic upliftment of rural community. They contribute significantly in

rural development by creating opportunities to access goods and services located in nearby villages or major town/market centres. Provision of rural roads increases mobility of men and materials thus facilitating economic growth. These, in turn, assist in reducing poverty and leads over all social development. People are the ultimate stakeholders of any livelihood strategy.

The term 'Infrastructure' has been variously defined by scholars. Infrastructure generally includes both physical and social overhead capital. Infrastructure development is often divided into two categories

Access this article online	
Publisher	Website: http://www.ndpublisher.in
	DOI: 10.5958/2321-5771.2016.00014.4

Address for correspondence

Joyoti Gayen : Department of Agriculture, Visva-Bharati, Sriniketan-731236, Birbhum, West Bengal, India

E-mail: joyoti_gn@rediffmail.com

viz., (i) directly productive economic infrastructure/ physical infrastructures that are basic to the carrying out of a wide variety of economic activities and (ii) social infrastructure which results in creating a healthy working environment as well as facilitating human capital formation in rural areas. Physical infrastructures or economic infrastructures like roads, railways, ports, airports, power & telecommunication strengthen the economy, boost investments, attract prospective entrepreneurs and help in alleviation of poverty and unemployment through numerous positive backward and forward linkage effects on the primary, secondary and tertiary sectors of the economy. Infrastructure increases the flow of information, opening new opportunities and reducing asymmetries and other market imperfections.

Without physical access, rural communities face obstacles in social services delivery such as health, education, and related social services (Escobal and Ponce, 2002). A place is accessible when people can reach there in an acceptable time, and the risk of not getting there on time would be heavy (Tighe, 2006). Rural roads play a role in the provision of physical access. Physical access further plays an important role in reaching a number of the Millennium Development Goals (Barret *et al.* 2001). The benefits of improved access can be short lived if the rural roads are not managed and maintained. In most instances rural roads are defined as those roads with less than 50 vehicles a day, ranging from engineered roads and bridge that link to towns and villages, to motorable tracks, trails and paths. In general these roads serve dispersed households and populations, often with an agricultural or natural resource based land use structure (Donngos *et al.* 2007). Rural roads and transport are essential for sustaining agricultural development. Despite considerable past investments, the burden of managing and maintaining African roads is still high as many roads remain rough and impassable throughout the years (Donngos *et al.* 2007).

A study (Fan *et al.* 1999) carried out by the International Food Policy Research Institute on linkages between government expenditure and poverty in rural India has revealed that an investment of ₹ 1 crore in roads lifts 1650 poor persons above the poverty line. Public

investment on roads impacts rural poverty through its effect on improved agricultural productivity, higher non-farm employment opportunities and increased rural wages. Improvement in agricultural productivity not only reduces rural poverty directly by increasing income of poor households, it also causes decline in poverty indirectly by raising agricultural wages and lowering food prices. Similarly, increased non-farm employment and higher rural wages also enhance incomes of the rural poor and consequently, reduce rural poverty. This study estimated that while the 'productivity effect' of government spending on rural roads accounts for 24 per cent of total impact on poverty, increased non-farm employment accounts for 55 per cent and higher rural wages accounts for the remaining 31 per cent. Further, of the total productivity effect on poverty, 75 per cent arises from the direct impact of roads in increasing incomes, while the remaining 25 per cent arises from lower food prices (15 per cent) and increased wages (10 per cent). Similar results are found in other developing countries. The study by the same institute (Fan *et al.* 2000) in China revealed that with every 10,000 Yuan (about \$1200) spent on rural roads eleven persons are lifted above the poverty line. Living Standard Survey in Vietnam showed that populations living within 2 km of all-weather roads have lower poverty rates as noted in the draft Vision Document for Rural Roads, 2006 (MoRD, 2006). Statistical evidence apart, the link between poverty and lack of accessibility is quite apparent. Nearer home, a household survey (APERP, 1997) conducted in the state of Andhra Pradesh indicated that the rural road improvements lead to substantial reduction in freight charges, increase in household income. In this background, an attempt has been made in this study to consider the impact of rural roads on income and employment of the households.

DATABASE AND METHODOLOGY

The study has been conducted based on both primary and secondary data. Secondary data has been collected from different sources i.e. Census and Statistical Abstract (Government of West Bengal). The primary data has been collected from two districts. At the first stage, the road density of all districts of West Bengal has been calculated based on the secondary data. Then all

the districts have been sub-divided into two groups i.e. high and low road density. Howrah district with high road density and Purulia district with low road density have been selected randomly. In the next stage, the list of blocks of the selected districts has been collected and one block from each district i.e. Uluberia-I from Howrah and Para from Purulia have been selected randomly. Accordingly, the list of all villages of the selected blocks has been collected and sub-divided into two groups i.e. (i) proximity to main road & rail station along with presence of paved road and mud road within the villages and (ii) away from main road & rail station and which do not have paved road within the village. Then two villages from each group i.e. four villages from each district have been selected randomly. Finally, the list of households of the selected villages has been collected and 40 households from each village i.e. 160 households from each district have been selected randomly. Thus, 320 households have been selected as the ultimate sample unit of the study. The primary data has been collected using structured questionnaires and the data has been analysed by employing descriptive statistics.

RESULTS AND DISCUSSION

The road network is commonly considered a prime index of development. Road transportation can be a market of economic development of an area as it provides the basic infrastructure for any kind of investment and the harnessing of its economic potential (Lampe,

1985). In rural areas the road network has special significance since it provides the only mode of transport and communication. Nevertheless, the main aim of road development provides infrastructural facilities and social transformation (Gerald, 1986). It provides exposure of new techniques, methods and ideas to modify traditional practices. Therefore, development of a road network is indicated as the most important felt need for benefits to trickle down to local inhabitants (Singh and Chauhan, 1984; Werner and Lucious, 1992). In general, inaccessibility and lack of other infrastructure has plaid the advancement of education. Level of education exhibited in Tables 1 and 2 portray that irrespective of district the households have better educational status that have proximity to main road and rail station. It can be tinted that high road density influences the educational level. Howrah is better placed than Purulia in terms of level of education because the road density in general in the former is high than that of later. The percentage of population in the category of graduate & above is higher both the districts due to proximity to main road & rail station. It has been found that the number of students in absolute terms (both male and female) availing to higher secondary schools, colleges and other technical/diploma institutions is higher in those villages that are situated near main road and rail connectivity and having paved road within the villages (Table 2).

Table 1: Level of education of the respondents

Level of Education	Howrah		Purulia		All	
	Proximity to main road & rail station	Away from main road & rail station	Proximity to main road & rail station	Away from main road & rail station	Proximity to main road & rail station	Away from main road & rail station
Illiterate	6.25	10	20	30	13.13	20
Literate	15	11.25	12.5	1.25	13.75	6.25
Up to Primary	16.25	41.25	13.75	21.25	15	31.25
Up to middle school	26.25	15	23.75	25	25	20
Secondary	18.75	11.25	17.5	13.75	18.13	12.5
Higher Secondary	10	6.25	8.75	5	9.38	5.63
Graduate & above	7.5	3.75	3.75	2.5	5.63	3.13
Technical/Diploma	-	1.25	--	1.25	-	1.25

Source: Field Survey (2015)

Table 2: Distribution of family members of the respondents by level of education

Level of Education	Howrah		Purulia		All	
	Proximity to main road & rail station	Away from main road & rail station	Proximity to main road & rail station	Away from main road & rail station	Proximity to main road & rail station	Away from main road & rail station
Literate	26	20	48	39	74	59
Up to Primary	82	78	78	54	160	132
Up to middle school	98	127	91	105	189	232
Secondary	65	56	62	58	127	114
Higher Secondary	30	23	29	26	59	49
Graduate and above	17	11	15	11	32	22
Post Graduate	3	1	2	1	5	2
Technical/Diploma	1	1	0	1	1	2
Total	322	317	325	295	647	612

Source: Field survey (2015)

Most early research into the subject linked transport infrastructure to poverty reduction, but defined poverty in terms of a region or rural economy, without disaggregating to the village or household level. It has also been emphasized that the rural areas are typically car and truck dependent, and characterized by a higher need for mobility and longer trip lengths. Public transport is not used as much in rural areas as it is in urban areas and a significant per cent of the rural people do not have access to cars, and, therefore, find it difficult to reach some services. To overcome the problem of social exclusion, governments should provide and maintain transportation infrastructure for rural communities, and this should include roads and bridges, as they are of prime importance to rural people.

Table 3 shows that the more number of households near to main road & rail station are engaged in business and non-agricultural labour, whereas the households reside away from main road & rail station are in agriculture and allied activities. If one can rank the employment of the households of Howrah district residing near to main road & rail station on the basis of occurrence, it can be originated that business, non-agricultural labour, artisans, others, agricultural labour and service are the types of employment that have been found next to agriculture and agriculture allied activity. Similarly, the

status of employment of the households residing away from the main road & railway station are agriculture & allied activities, agricultural labour, non agricultural labour, service, business, others who are engaged in unorganised sector and artisans respectively in terms of order of merit. So, there is a qualitative divergence in employment of the households between near and away from main road & rail station. This occurrence is also factual in Purulia too. When we consider both the districts together we find that percentage of family members engaging themselves in activities like non agricultural labour, business, artisan, others and service is higher in villages who are residing near main road and rail station along with paved road within the villages other than those residing at remote places having no paved road or only with mud road. This needs to be mentioned that by and large the employment of the households near to main road & rail station is pointed to other than agriculture. On the contrary, the households away from main road & rail station are resolute in agriculture & allied activities. Thus the household income is diversified by enabling the individuals to have income sourced from the diversified sources. Irrespective of the districts, it has been also observed that a very high level of employment diversification in those villages situated near main roads, railway connectivity and paved road within the villages (Table 4).

Impact of Roads on Income and Employment of Rural Households in West Bengal

Table 3: Types of employment of the household

(in %)

Types of employment	Proximity to main road & rail station			Away from main road & rail station			Overall		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Howrah									
Agril & allied activities	12.84	10.89	23.74	41.59	12.83	54.42	26.29	11.80	38.10
Agril. Labour	7.39	1.56	8.95	15.04	4.42	19.47	10.97	2.90	13.87
Non-Agril Labour	16.34	0.78	17.12	5.75	0.44	6.19	11.39	0.62	12.00
Business	18.68	3.89	22.57	5.31	0.44	5.75	12.42	2.28	14.70
Artisan	3.50	6.61	10.12	1.77	1.77	3.54	2.69	4.35	7.04
Service	6.61	1.17	7.78	5.31	0.88	6.19	6.00	1.04	7.04
Others	5.45	4.28	9.73	2.65	1.77	4.42	4.14	3.11	7.25
Total	70.82	29.18	100.00	77.43	22.57	100.00	73.91	26.09	100.00
Purulia									
Agril & allied activities	12.02	17.05	29.07	28.93	23.55	52.48	20.20	20.20	40.40
Agril. Labour	3.88	6.98	10.85	10.33	8.68	19	7.00	7.80	14.80
Non-Agril Labour	18.99	2.71	21.71	11.16	0.83	11.98	15.20	1.80	17.00
Business	11.63	1.16	12.79	4.13	0.00	4.13	8.00	0.60	8.60
Artisan	8.91	2.33	11.24	2.89	1.24	4.13	6.00	1.80	7.80
Service	4.26	1.94	6.20	5.37	0.41	5.79	4.80	1.20	6.00
Others	4.65	3.49	8.14	1.65	0.83	2.48	3.20	2.20	5.40
Total	64.34	35.66	100.00	64.46	35.54	100	64.40	35.60	100.00
All Districts									
Agril & allied activities	12.43	13.98	26.41	35.04	18.38	53.42	23.19	16.07	39.27
Agril Labour	5.63	4.27	9.90	12.61	6.62	19.23	8.95	5.39	14.34
Non-Agril Labour	17.67	1.75	19.42	8.55	0.64	9.19	13.32	1.22	14.55
Business	15.15	2.52	17.67	4.70	0.21	4.91	10.17	1.42	11.60
Artisan	6.21	4.47	10.68	2.35	1.50	3.85	4.37	3.05	7.43
Service	5.44	1.55	6.99	5.34	0.64	5.98	5.39	1.12	6.51
Others	5.05	3.88	8.93	2.14	1.28	3.42	3.66	2.64	6.31
Total	67.57	32.43	100.00	70.73	29.27	100.00	69.07	30.93	100.00

Source: Field Survey (2015)

Table 4: Simpson diversification index

District	Proximity to main road & rail station	Away from main road & rail station
Howrah	0.829	0.651
Purulia	0.817	0.666
All	0.827	0.660

Table 5: Comparison of monthly income of the household

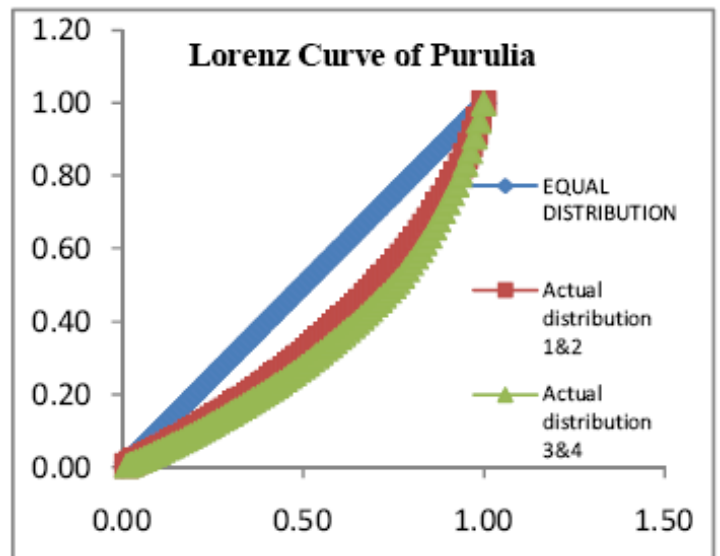
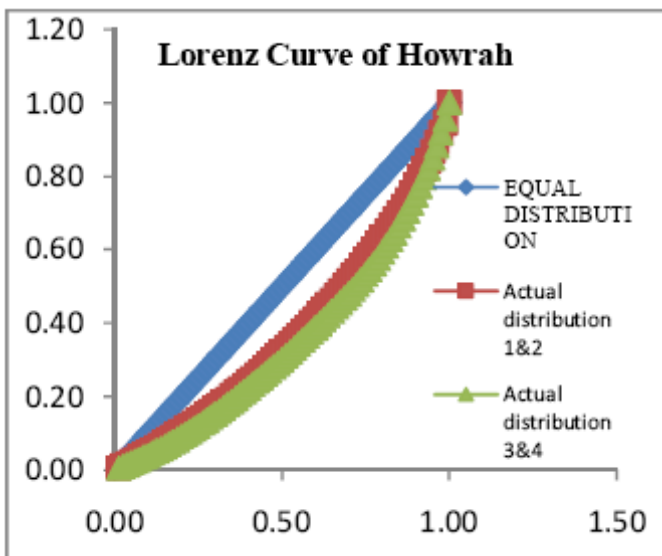
District	Average monthly income (₹)	
	Proximity to main road & rail station	Away from main road & rail station
Howrah	10534.75	8379.44
Purulia	10391.26	8335.89
All Districts	10463.00	8357.67

Table 6: Mean, standard deviation and coefficient of variation of monthly income of the household

District	Proximity to main road & rail station			Away from main road & rail station		
	Mean	SD	CV	Mean	SD	CV
Howrah	10534.75	6585.74	62.51	8379.44	4195.67	50.07
Purulia	10391.26	7380.64	71.03	8335.89	4860.93	58.31
All Districts	10463.00	6994.86	66.85	8357.67	4540.55	54.33

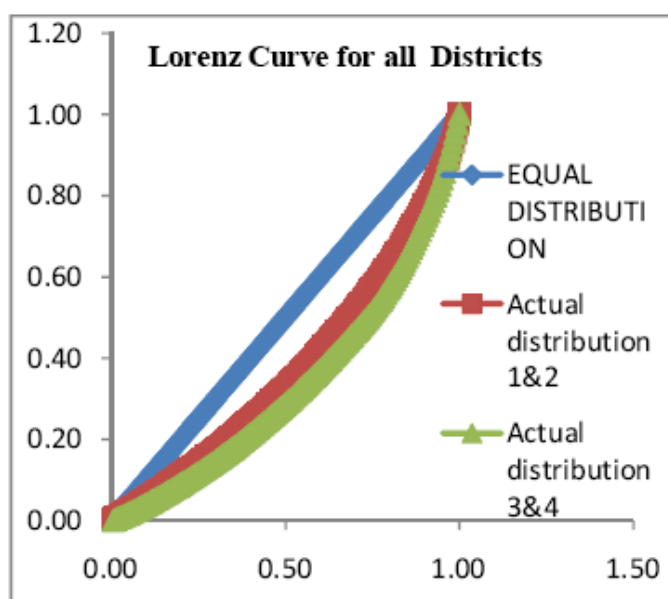
Table 7: Gini-Coefficient of income

District	Proximity to main road & rail station	Away from main road & rail station
Howrah	0.304	0.231
Purulia	0.334	0.281
All Districts	0.320	0.257



NB: 1&2 denotes away from main road and rail station whereas 3&4 denotes proximity to main road & rail station

Fig. 1: Lorenz Curve of Howrah and Purulia



NB: 1&2 denotes away from main road and rail station whereas 3&4 denotes proximity to main road & rail station

Fig. 2: Lorenz Curve for all Districts

Again irrespective of the district, monthly income of the households which have proximity to main road & rail station is somehow better than that of the households away from main road & rail station (Table 5). It has been mentioned earlier that the road infrastructure is somehow better in Howrah than Purulia. And the analysis pointed out that the average monthly income of the households is comparatively better in Howrah than Purulia irrespective of near or away from main road & rail station. So the argument tinted that the road infrastructure has somehow disposed to arrest better monthly income.

Table 6 provides mean, standard deviation (SD) and coefficient of variation (CV) of monthly income of the households. SD provides a measure of the variation or discrepancy. It exhibits that variation of income or the degree of heterogeneity in the results is greater in case of households those who are near to main road & railway station in both Howrah and Purulia than the households who are away from main road & rail station. Result of CV also shows that the relative measure of variation is higher in case of households which are located near to main road and railway station in Howrah district. Inter district comparison shows variation of income is much more prominent in Howrah in case of those households

having good communication system due to nearness to road. Again degree of homogeneity in income is more in case of households near to main road & rail station in Howrah than that of Purulia.

When one can observe the Lorenz curves (Fig. 1 & 2) and Gini coefficients (Table 7) of these two types of households who are either away from main road and railway station or have proximity to main road and railway station, it has been substantiated that variation in income is greater in those households that are located in the vicinity of main road and this phenomenon is factual both in case of Purulia and Howrah district. The Gini coefficient is higher in case of those households who are near to main roads and rail station mainly because of better access in income niche and implies variation and heterogeneity in income. Inequality is slightly higher in case of households having better communication both in Howrah and Purulia due to an assortment pattern of income of the households. Obstinate, households have low income which have relatively worse off transport system due to away from main roads and rail station. This holds both in case of Purulia and Howrah. Therefore, there are several evidences for conclusion that better roads and railway system leads to better access and opportunities leading

to diversified livelihood and accordingly diversified income is generated. Since rural road connectivity is a key component of rural development and it promotes access to economic and social services, thereby generating increased employment more specifically non-agriculture employment as well as non-agricultural productivity, which in turn expands opportunities and real income through which poverty can be reduced.

CONCLUSION

It has been indicated in ample of studies that lots of deprived communities are remote by distance, terrible road conditions, lack of or bust bridges and insufficient transport which lead to difficulties for households to transport their commodities to market and finding all round employment along with enthralling to health emergencies, admission of children to school and to attain public services. Above foregoing discussions have highlighted that better roads and railway system leads to better access and opportunities in capturing the diversified livelihood, accordingly diversified income can be generated. It has been amply proved that there is a qualitative divergence in employment of the households between near and away from main road & rail station. It also appears that the area which has high road and high population density, it can certainly influence the educational attainment too. The study also reveals that better access to education is materialised due to nearness of main road and rail station. The Gini coefficient is higher in case of those households who are near to main roads and rail station mainly because of better access in income recess which implies a slight variation and heterogeneity in income.

REFERENCES

- APERP. 1997. Rural Transport Survey 1997, Andhra Pradesh Economic Restructuring Project, World Bank, Washington D.C.
- Barret, C.B.; Reardon, T.; Webb, P. 2001. Non-farm income diversification and household livelihood strategies in rural Africa: Concepts, dynamics and policy implications. *Food Policy* **26**: 315-331.
- Donngos, C., Edmonds, G., Johannessen, B. 2007. Rural Roads Maintenance: Sustaining the Benefits of Improved Access. International Labour Organisation (ILO), Bangkok.
- Escobal, J., Ponce, C. 2002. The Benefits of Rural Roads: Enhancing Income Opportunities for the Rural Poor .GRADE Working Paper 40-I, Lima, 52p.
- Fan, S., P. Hazell, and S. Thorat. 1999. Linkages between Government Spending, Growth and Poverty in Rural India. *Research Report 110*. Washington, DC: IFPRI
- Gerald, G. 1986. Nepal's road network: A stimulus for economic development, *Applied Geography and Development* **28**: 84-95.
- Lampe, K.J. 1983. Rural development in mountainous areas: Why progress is so difficult, Mountain, *Research and Development* **3**(2): 125-129.
- MoRD. 2006. *Rural Roads Development Plan: Vision—2025 (Draft)*, Ministry of Rural Development, Government of India, New Delhi.
- Singh, S. and Chauhan, V.S. 1984. Regionalisation for Rural Development and Planning, Independent Publishing Pvt. Ltd., Meerut.
- Tighe, D. 2006. Roads and Poverty Reduction. Paper presented at the International Seminar on Rural Road Transport, Siem Reap, Cambodia, 15-16 May. From www.ruralroads.org/doc/roadsandpovertyreduction.
- Werner, F. and Lucious, G.K. 1992. The influence of transportation infrastructure on the regional pattern of agriculture in West Africa, using as an example the impact of the minor road network in the Dan Hills region of the Ivory Coast, *Applied Geography and Development* **39**: 30-47.