The Impact of Infrastructural Facilities on the Poverty of Farmers in Bidur Municipality, Nepal

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Abstract: Poverty is one of the major problems in Bidur Municipality, Nepal. The municipality has higher rate of poverty compared to the other municipalities. The municipality has been suffering from poor infrastructural facilities. Therefore, this study identifies the significant aspect of infrastructures which might affect poverty. Since the concept of poverty is broad and has been discussed from many perspectives, the per capita income was taken to identify poverty in this study. Correlation and Multiple Regression Analysis were employed. Results showed that 30% of the people lived below the poverty line, which is higher than national urban poverty. Among the different infrastructural facilities, paved roads were found to be the most dominating factor that has an impact on the poverty in the Municipalities. However, other influencing factors such as vocational training and employment in non–agricultural sector were also significant in improving the poverty line of farmers in the municipality. Future research should be focused on studying the impact of paved road construction in other municipalities that may help to reduce poverty within the farmer's community when more economic opportunities are created.

Keywords: Income; poverty; farmers; infrastructure

1. Introduction

Nepal is a socio–diversified country and, faced more than a decade long conflict until November, 2006. Due to the conflict, economic growth in the fiscal year 2010 was to be only 3.5%. Agricultural growth remained lower than anticipated due to low manufacturing growth. However, it has been improved compared to conflict period. Over the last decade, Nepal has made considerable progress towards reducing poverty, with the headcount poverty rate falling dramatically from 42 to 31% between FY 1995/96 and FY 2003/04. However, it is difficult to sustain because political problems have not entirely been resolved. Poverty is defined as lack of basic human needs: adequate and nutritious food, clothing, housing**,** clean water, and health services. However, this definition of poverty should include two different aspects, namely (a) low income, which is insufficient to maintain a dignified life and (b) low human capabilities, which restricts a citizen's options to lead a life of his or her choosing (UNDP, 2001). This study deals with only monetary aspects of poverty and monetary poverty is measured by income.

Fox (1994) defines infrastructure as "those services derived from the set of public works traditionally supported by the infrastructure sector to enhance private sector production and to allow for household consumption". However, this study considers irrigation, drinking water and sanitation, road and energy as the basic infrastructures. As the purpose of this research is to measure

income poverty and identify the dominant infrastructure for income poverty in the context of Bidur Municipality of Nepal, hypothesizes poor infrastructure is one of the primary causes for income poverty. This aspect has been considered primary for the analytical purpose.

Generally, infrastructure has been found as a major determinant of economic growth and productivity convergence across regions. An infrastructure is significant for poverty reduction in development countries (Seetanhah *et al.,* 2009). Several previous studies show a causal relationship between infrastructures and poverty. A number of studies point out a significant impact of infrastructure on poverty reduction through economic growth. The following is a summary of past empirical studies.

Jacoby (1998) studied Nepal's case and discovered that extensive rural road networks resulted in substantial benefits with the poor capturing an appreciable share. However, the poor's share was often not large enough to significantly reduce income inequality as the benefits from road extension could be greater for landholdings among the rich. Thus, the distribution of benefits from road extension appeared to be ambiguous. The relevant question to ask is whether the benefits of a hypothetical road project are sufficiently large and distributed to reduce overall income inequality with benefits accruing more to the poor than the non poor.

This research is concerned with positive impact on poverty. Regarding to the cost benefit ratio of road construction, the cost side is heavier than benefit, which is not financially viable in short time. However,

road is necessary for economic development in every country. The government should have taken responsibility for road construction because of large cost which is not affordable by poor people. According to the World Bank's evaluation of rural electrification project in India and Bangladesh, rural electrification raises the use of irrigation, thereby significantly reducing poverty incidence (Songco, 2002). The beneficiaries also feel an improvement in their lives, and productive activities, thus, lessening their vulnerability to shocks. That is an awkward expression to people's income and poverty reduction. However, the problems are not only availability, but equal distribution. We can see this type of infrastructure supporting more to the elite people who are leading in the society. Poor people could not be benefited from those facilities due to less power. Majority of poor people have poor housing and living condition.

Similarly, access to irrigation infrastructure is also important tool for poverty reduction in the society. Irrigation plays a vital role for crops production and household income. In the case of Janakalyan, Kalleritar and Yampaphat villages of Nepal, crops production suddenly increased to 97%, 43%, and 19% respectively after irrigation infrastructure; and the economic situation in their houses improved (Angood *et al.,* 2002)**.** It implies that irrigation facility is one of the important tools for poverty reduction. Besides, access to social facilities such as education, public health services and clean water is another challenge which causes low human resources quality in terms of education attainment and health. It indicates that in term of social services,

providing public health center closer to the community, could indirectly help in poverty reduction (Arsyad, 2010; Arsyad and Kawamura, 2009). Therefore, it is necessary to have a development plan in encouraging employment creation and demand for labor (Darma and Arsyad, 2010) for poverty alleviation especially in rural/agriculture area. It is important to note that, he agriculture provides export earnings and it gives a source of employment for millions of rural smallholder families which are very strongly associated with poverty rates (Arsyad and Ali, 2009) in developing countries.

The research study by World Bank conducted in Cambodia and Indonesia in 2007 has found the universal implementation of improved sanitation and hygiene. Its impacts are mitigated except health for which 45% of the losses are mitigated. The sanitation sector is generally contributing to 2% of GDP. A sum of 80% of the population has access to safe drinking water, 39% have access to sanitation (CBS, 2004) which shows that the availability of drinking water and sanitation is still poor in Nepal.

The previous study of World Bank in 1998 conducted in Nepal showed that poverty is one critical issue and has been affected from various factors. Some of the studies have focused the different aspect for analyzing the poverty. However, there is not any research on the role of infrastructure to poverty reduction in Bidur Municipality of Nepal. This study is an examplanary case study showing the significance of infrastructure on reduction of income poverty. Previously, the importance of infrastructure for economic development and poverty reduction has been discussed. However, Nepal has poor

infrastructure facility in the society. The more important issue is distribution method of infrastructures. According to the Local Self Governance Act 1999 of Nepal; every municipality should have minimum level of infrastructures such as drinking water, road transportation, educational institutions and health. However, access to infrastructure is one of the major problems in this society. There are some basic infrastructure facilities which are not enough; and only few elite people are benefited.

Out of 28% high productive lands, hardly 10% has irrigation facility. Due to lack of irrigation, the land does not yield enough production. Therefore, most of the farmers are suffering from scarcity of food and hunger. On the other hand, 11% households have been suffering from lack of electricity even though 38 megawatt electricity power has been generated in the municipality. Out of 112 km road network in the municipality, only 18% is blacktopped (Bidur Bulletins, 2006), which is lower by 12% compared to the 30% of the national average. The drinking water and sanitation sectors are also in weak condition and only 89.985% have those facilities; and rest of the houses still suffered from drinking water. There are only 65.9% houses with toilets.

It shows that drinking water and sanitation facility are also in poor condition in this municipality. Therefore, the specific objectives of this study are three-folds, namely (a) to identify the poverty situation in Bidur Municipality, (b) to identify the association of infrastructure and poverty, and (c) to assess the impact of infrastructure on farmers poverty reduction.

2. Materials and Methods

2.1 Sample and Data Collection

A total of 66 households samples were selected to gather primary data and information from 5 out of 11 wards. The baseline survey consisted of personal interviews from the sample households.

2.2 Data Analysis

The Foster-Greer-Thorbec Poverty Index was used to identify the poverty situation in this sampled community. Most income-based measurements were used to interpret income poverty. The poverty headcount index (HCI) was defined as the number of people who are poor or the proportion of the households living below the poverty line. This index was used in measuring the proportion of households whose income was below the $1 per capita which was used as the poverty threshold for this study. Pearson Correlation and Multiple Regression Analysis (MRA) methods were used to analyze the infrastructures that were used as the explanatory variable. The MRA was used to identify the direct as well as indirect impact of infrastructure on poverty by equation below:

$$Y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \mu$$

where:
Y = Predictor variables
X_1 = Road
X_2 = Energy
X_3 = Irrigation
X_4 = Drinking water & Sanitation
X_5 = Occupation
X_6 = Skills
β = beta coefficient
μ = Error term

A descriptive statistical analysis was used to determine the poverty headcount index, correlation and multiple regressions for the appropriate results.

3. Results and Discussion

3.1 Income Structure

Bidur Municipality is an urban city with her economic as well as social activities is similar to the rural areas surrounding the area. The average family household members were 5.78 as it is greater than national average as 5.5 (CBS, 2004). Most of the houses have 4-8 family members which represent a big family structure. The sex ratio of male and female was 52:48 with an average family size a bit larger than the national level. The distribution of income within the households was unsatisfactory. The large sector of the economy was occupied by agriculture and the rest was industrial and others. There are only some traditional handicraft industries and small scale enterprises. Beside this, there are no more industries and employment opportunities in the municipality. The survey results showed that 67% of the population is economically active (16-60 ages). It reveals that there is labor surplus and they can use those surplus labor to labor markets. However, there is no space for using those human resources properly and it is a huge burden for this municipality due to lack of proper labor absorption.

Income structure shows that 33, 32, and 15% of the income were self employment, wage employment and crop production, respectively (Table 1). The major incomes contributors come from self employment especially own business. The large number of households was self employed. Moreover, the crop's income is an important source even though the percentage of income from crops

is a bit smaller than self- employment. The remittance is also important income source which contributes to the household's income of 9%. Those household members who have been migrated out from the country for jobs send higher remittance. However, this is a temporary source of income. The remittance has highly contributed to reduce poverty.

Table 1. Income sources of household in bidur municipality

Agricultural Sources	Income Rs.000	Non-Agriculture Sources	Income Rs.000
Crops income	1609 (15%)	Self-Employment income	3604 (33%)
Livestock income	495 (5%)	Wage Employment income	3481 (32%)
Paid Worker's income	97 (1%)	Remittance income	1005 (9%)
		Other income	559 (5%)
Average Annual Household Income		Rs. 164.39	
National average Annual Household Income		Rs. 328.692	
Sample Size		33	

Sources: Household survey, 2009

The weights of agricultural and non–agricultural income sources are 21:79. The income source of non–agricultural is higher than agricultural income. However, agricultural income is also important source for poverty reduction in the society. The household average annual income is Rs.164, 390 in the community. It is quite low compared with national level (Rs. 328, 692, NRB Household Survey 2005/06). It tells that this society is prevailing from poverty with an overall context of Nepal. However, the minimum annual average household income is Rs.30,000 and maximum Rs.492,000, respectively. It clearly shows the disparity of income distribution among the households in the community.

Eleven percent households have no electricity facility. This means that those households, who do not have electricity in their houses, are poorer. Similarly, not having proper access to road transportation is also a problem. More than 31% houses have no access to paved road. Next important finding is that 42% households are out of irrigation facility; and the agriculture production is highly affected. Therefore, more than 58% of the households have not enough food in their houses. The water and sanitation sectors are also in poor condition. More than 26% households have no toilets in their house. Moreover, large numbers of households suffer from lack of drinking water.

3.2 The Analysis of Poverty Situation

The result of poverty head–count index shows that 30% of the households in this community are poor which is higher than the national urban poverty rate of 10%. As mentioned before, municipality is an urban area and according to census, it has 15% population under the poverty line which is smaller than found in this study. It therefore implies that this society is more severely affected compared to national level. This is a bit natural because majority of people are involved in agricultural work, however an agricultural production is not enough for

them. The average agricultural land of poor is less than that of rich people. According to the Land Reform Act 2021 B.S., every household can have a maximum agriculture land size of 70 Ropanee (1 Ropanee= 5476 ft^2). However, majority of the people have smaller size of agriculture land which means that the farmers here have less production.

The result shows that the farming community in the study area is financially poor which forms an important finding of this study. However, being a semi–urban society, the daily lifestyle of these farmers are not so tough and difficult since commodities such as firewood, fresh water and forest products are always and freely available to them. In addition, commodities exchange system exists among the communities where some households with insufficient food can borrow from their neighbors who have extra food and they will pay back after every new harvesting season. This implies that the poor income farmers can survive enough for their daily livelihood despite being financially poor. Thus, the degree of poverty is actually not significant amongst the farmers in this Municipality.

3.3 Infrastructure and Poverty

Pearson Correlation analysis took into account of 42 total different variables within the seven different dimensions to identify the significant variables on income poverty. Only seven variables are found significant with the income poverty at the 5% significant level as shown Table 2. The distance to paved road is one of the important findings of this study. It is negatively correlated with the households income ($r = -0.296$, $p \leq 0.05$) which implies that the longer the distance to paved road, the lower is the income. Households living far from the paved road have lower income than those who lived closer to it. Households who live closer to paved roads earn more money through the small scale business operating from their houses. In contrast, households far from the paved roads have small chances to do such business and then, they are suffering from lower income.

Table 2. Infrastructure and income poverty in Bidur municipality

	(Y)	(OCC-1)	(SK-1)	(AR-1)	(AE-1)	(AE-2)	(ADS-1)
Income (Y)	1						
Non-agriculture work(OCC-1)	0.394**	1					
Vocational Training(SK-1)	0.421**	0.120	1				
Dis. to paved road(AR-1)	-0.296*	-0.120	-0.150	1			
Electricity(AE-1)	-0.241*	-0.180	-0.150	-0.110	1		
Satisfied with elec.(AE-2)	0.255*	0.240*	0.130	0.110	-0.691**	1	
Drainage (ADS-1)	0.270*	0.138	0.174	-0.088	-0.305*	0.293*	1

**Correlation is significant at the 0.01 level (2-tailed) and *correlation is significant at the 0.05 level

In addition to the paved roads infrastructure, access to electricity and households income is negatively correlated (r = 0-.241, p≤0.05). This means that households with no electricity have little income compared to those farmers with electricity. This study found out that more than 11% of the surveyed households did not have electricity in their house because they just could not pay for the electricity tariff. Normally, electricity charge in Nepal is a little more expensive than India and poor households could not afford to pay electricity bills. However, electricity is the basic requirement for economic growth but it should be affordable for poor people in the community.

Another contributing factor affecting the rate of poverty in the Municipality is sanitation and health. Results indicated that access to drainage and income are positively correlated (r = 0.270, p≤0.05). Households having a good and proper drainage system within their communities have higher income compared to those who could not afford to have one. Usually, these well earned farmers are healthier.

The rate of poverty within the Municipality is also affected by the level of vocational training gained and experienced.

The correlation analysis showed that vocational training and household income have a strong positive correlation (r = 0.421, p≤0.01). This is a common phenomenon within the Municipality because households having more number of vocationally trained manpower have higher possibility for more income.

Working on non–agricultural sectors and household income are positively correlated (r = 0.394, p≤0.01) where those working in non–agriculture sectors have higher chance for a better income. Thus, non–agricultural works are highly attractive than agricultural works in this community.

3.4 Identifying the Impact of Infrastructure on Income Poverty

Using the earlier model stated in this paper, a total of six independent and one dependent variables were used to identify the impact of infrastructure on income poverty. It is significant with household's income (Table 3). Results indicated that only 3 variables are significant, namely working on non–agriculture, distance to paved road, and vocational training. It means that this model of null hypothesis (H_{01}) is rejected at the significance level of $p \leq 0.05$ whereas, $R^2 = 0.35$.

Table 3. Standard multiple regression of infrastructure on income poverty in Bidur municipality of Nepal

Variables	(Y)	(SK-1)	(OCC-1)	(AR-1)	B	β	p≤0.05
Household Income(Y)	1				113,819.3		0
Vocational Trainings (SK-1)	0.423	1			10,768.0	0.35*	0
Non-agriculture work (OCC-1)	0.393	.117	1		66,255.1	.33*	0
Distance to Paved road (AR-1)	-0.297	-0.146	-0.105	1	-50,384.9	-.21*	.05
Intercept, R-square	-	-	-	-	-	0.35	-

Note: B= Non-standardized Coefficients, β= Standardized Coefficients and (Y)= Household Income, as Dependent variable

It seems that the vocational trainings has the significant direct positive impacts on household income with β= 0.423. Those households, which have higher number of vocationally trained members, have 42% higher possibility of higher income compared to the ones without it. This implies that vocational training is necessary for income poverty reduction in this society. For example, the income gap between those farmers with and without vocational training was Rs 10,768. Based on Table 4, it is clearly evident that 70% households were without vocation training and 30% of the poor farmers have some forms of vocational training even though they are poor. Obviously, vocational training is important as training creates highly skilled manpower.

The regression analysis showed that working in non-agriculture sectors has a positive impact on the household income as β= 0.393. It shows that farmers working and employed in the non-agriculture sectors have higher incomes than those who work in the agricultural sectors. Households engaged in non-agriculture work have 39% higher income than those who were not engaged in non-agriculture work. Table 4 shows that out of the poor households, 70% were involved in agricultural based activities while only 30% did involve in non–agricultural work such as being a government servant, employed on own business, or paid worker in the company or private job, have more income.

Distance to access the paved roads (AR, 1) shows an impact on the household income (–0.293). Its beta coefficient on poverty is significant and fairly stable across the measured specifications. To have an idea of the magnitude of these results, it is noted that longer distance to paved road is reducing 29% of household income in Bidur Municipality. The result of unstandarized shows one kilometer distance is creating almost fifty thousand rupees difference of income in that society. It implies that longer distance to paved road is one of the most important causes for poverty.

Table 4. The relationships between significant variables and income poverty

Non-agricultural work	Yes	No	Total
Non–poor	(11)24%	(35)76%	(46)100%
Poor	(4)20%	(16)80%	(20)100%
Distance to Paved Road	Less than 0.5 km	More than 0.5 km	Total
Non–poor	(31)67.5%	(15)32.5%	(46)100%
Poor	(6)30%	(14)70%	(20)100%
Vocational Training	Less than 50% FM	More than 50% FM	Total
Non–poor	(16)34%	(30)66%	(46)100%
Poor	(6)30%	(14)70%	(20)100%

The road infrastructure is a critical factor in reducing poverty in almost every remote area in the third world developing countries. However, only paved road has regular transportation service and it creates the different economic opportunities in this community. Table 4 shows that almost 70% of the household who have access to paved road are richer than the 30% poor farmers who have little access to use paved roads. It also implies that paved roads have played a vital role in eradicating poverty in the study site. Some of the households have access to only non-paved roads and majority of them are poor. Without roads, the poor farmers were not able to sell their agricultural and industrial products in the market. In India, it has been shown that roads alone account for 7% of the growth in aggregate output of the rural areas (Louis, 2002). Therefore, it can be suggested that more road infrastructures should be provided in such Municipality to reduce poverty amongst the farmers.

4. Conclusion

It can be concluded that 30% of the farming community lived below the poverty level which is a serious problem in this municipality. Infrastructural activities such as paved road and electricity managed to increase the poor standard of living in the community. In addition, working in non–agriculture sectors with some vocational training also helps to reduce the poverty line of the farmers in such municipality. This study implies that more investment in providing better infrastructures to such farming community is deem required. Moreover, investment policy should support and motivate to invite the domestic as well

as foreign investment in transport and irrigation infrastructure sector which may influence the human skill and opportunity to reduce poverty, especially in the farmer's community. One very important necessity is peace and political stability, non–violent solution of the conflict is essential for the farmer's poverty reduction.

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