

**Final Report**

**Impact of the Second Rural Transport Improvement Project (RTIP-II)**

**Submitted By**

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## **Executive Summary**

Transport infrastructure investment is crucial for inclusive economic growth. As transport is a significant factor in determining success, improved and reliable passenger and freight services assist households' mobility, enterprises' business growth, community and market access, and individual well-being. However, many poor people worldwide live in rural areas isolated by distance from employment, and other development facilities, including education and health. With the financial assistance of the World Bank, the Government of Bangladesh initiated the implementation of rural infrastructure development projects in the 1990s through the Local Government Engineering Department (LGED). These projects aim to improve and rehabilitate the high-priority rural infrastructure in the selected districts. Based on the past success, the World Bank extended its credit facilities for the Second Rural Transport Improvement Project (RTIP-II). The objective of the project was to reduce rural poverty and stimulate the economic development of rural communities through rural accessibility in project areas and strengthen institutional capacity for sustainable rural road maintenance. The project/intervention encompassed specific objectives for the betterment of households, transport users and owners, enterprises, markets, and communities.

### **Data and Sampling Framework**

Following the baseline report guideline, this study chooses 100 roads for union and upazila in the intervened areas, and the same number for the control areas. In addition, a total of 11.3 km of waterways in Cumilla district earmarked for dredging is considered as treatment. In contrast, 14.7 km of waterways in the same areas are assumed as the comparison group. A mixed-method approach is used throughout the data collection process. Both quantitative and qualitative surveys are employed. In addition, similar to the baseline survey, interviews and discussions are conducted.

The endline survey was conducted in 2022 on the same sites as the baseline survey. Approximately 8,000 households in 400 communities, 4,000 business enterprises, and 100 growth center markets were followed up along 100 upazila roads and 100 union roads from the baseline survey. Due to challenges in tracing transport users and owners from the baseline survey, data for 1,000 transport users and 1,000 transport owners were collected along the 100 upazila roads and 100 union roads during the endline survey. Following the baseline survey, we also administered a follow-up survey to approximately 2,000 households in 33 communities along the 26 km length of the Titas River.

## **Methodology**

The study majorly employs a quasi-experimental difference-in-difference (DID) method to control for unobservable characteristics and identify the causal impact of the RTIP-II intervention. The coefficient of interest is the DID estimator ( $\delta$ ), which represents the effect of the intervention. The various study outcomes of interest involve transport costs, farm input prices, agricultural wages, agricultural output prices, and household outcomes such as income earnings, per capita expenditure, poverty, inequality, food security, asset accumulation and credit, farm production and profitability, migration and remittances, unanticipated shocks and coping strategies, mobilities for the education of boys and girls for schooling, etc. The DID estimate is expected to be positive or negative depending on the nature of outcome variables but is expected to be statistically significant, indicating that the intervention effectively enhances the desired outcomes. In addition, depending on the outcome variable, district (or other locational) fixed effects are incorporated in models to account for time-invariant differences across geographical locations.

## **Key Findings**

### ***i. Household***

The RTIP-II intervention has several salient implications when considering its impact on a multitude of socioeconomic factors. In terms of education, the years of schooling in both project and control areas have increased by about 0.9 years. The other indicators of educational achievement also exhibit similar patterns demonstrating no significant project impact on educational outcomes as the changes in control and project areas are very similar. Although poverty reduction is a key project objective, this study does not find significant project impacts. Moderate poverty from baseline to post-intervention period has increased by 7.56 percentage points (25.04% to 32.60%) in control areas and by 5.14 percentage points (27.64% to 32.78%) in project areas. Extreme poverty has also increased in control and project areas by 4.48 percentage points (10.72% to 15.20%) and 2.05 percentage points (12.62% to 14.67%). Though it looks like poverty has increased at a slower pace in project areas, the differences are statistically insignificant. A similar pattern is observed for the poverty gap and the squared poverty gap measures. The findings also suggest that consumption Gini coefficients in both periods for both groups are around 0.3 while the income Gini coefficient ranged from around 0.42 to 0.46. Results show that the project has reduced consumption Gini by 0.023, which is significant at a 10% significance level. The income Gini has increased after the intervention but is statistically insignificant. Results from the decomposition of income Gini coefficient suggest that wage and salary income is the largest source of income for both areas, and its contribution has increased in the post-intervention period for both treatment and control groups. Additionally, income from

wages and salaries is found to be inequality-reducing. Remittance income is the second largest source, but it is inequality increasing. Nonfarm income is also found to be mostly inequality increasing while farm income is mostly inequality reducing.

There are no significant changes in the impact of households' food security situation with regard to subjective assessment of food security. However, the intervention significantly increases the number of months of availability of sufficient food by 32% for quartile 1 (poorest) income group, and 18% for quartile group 2. The beneficiary households are shielded against food deficit for about 9 months after the intervention. In addition, within the same group comparison before and after the intervention, the percentage of the extreme coping strategies adopted by beneficiaries, such as skipping entire meals, decreases after the intervention. Further, the household members occasionally practiced the consuming less food strategy, while they frequently coped with food deficit by borrowing food from neighbors and relatives.

Findings from the dynamics of asset growth and the credit market reveal that; a) land is placed at the dominant position in the structure of assets in both treatment and control groups, b) total asset ownership is found to rise systematically and rapidly with the level of education of the head of the household both in treatment and control groups, c) households with higher income quantile, are more endowed with per capita asset and the asset endowment gap has narrowed in the post intervention period, d) the DID treatment effects on total assets, physical assets, land, non-land assets are positive and statistically significant, i.e., road intervention has increased total assets by 6%, e) improvement of road connectivity reduces the gap between asset holdings and the DID value of Gini-coefficient of assets shows inequality decreased due to the improvement of the road.

The credit market participation dropped after the improvement of the rural road connectivity, and the average total outstanding loan decreased after the RTIP-II intervention. Since income and assets increased in the post-intervention period or due to road connectivity, it is implied that households are now more financially sound due to improved road connectivity.

Road infrastructure is a vital component of the agricultural transformation. This study finds that the program intervention positively affects the cropping intensity and increases it by 3%. There has been a significant increase in land under double crops. This indicates that land is being cultivated intensively after the intervention. A significant 7% increase in farm households owning or operating plots of land of higher quality is observed under the program intervention. This implies a significant expansion of the total operating land by bringing seasonal fallow lands under cultivation. Operating crop acreage has also increased through the cultivation of different crops within the existing cropping pattern. Among other

salient findings, we can see that the estimated effects of the program intervention on crop diversity are positive and significant (3.5%), indicating that this program encourages farmers to increase crop diversification. The intervention was successful in diversifying farm households' cultivation of different crops, including high-value crops rather than only rice. Crop diversification represents a key pathway for intensifying agricultural production and improving communal sustainability. In addition, the program intervention led to a significantly higher market orientation as production plans followed market signals and helped to produce more marketable commodities. Thus, this program might allow smallholder farmers to transform from subsistence to commercial farming. However, there is an insignificant effect on aggregate net returns and crop output market participation of the farm households. A better road can reduce transport costs but prices have not fallen significantly outside of transport costs. This indicates that access to markets may improve, but also generate a rise in demand that sustains market price levels. However, a decline in transport costs can also be expected to lead to greater input use and increased agricultural production. If agricultural production increases, it will also increase labor demand in agriculture. But intervention leads to a large reallocation of workers out of agriculture which increases production costs. The situation could be improved by production shifting to less labor-intensive crops, adopting new technology, and mechanization.

The study finds that the two major motivations for migration due to road improvements by RTIP-II involve "better earning opportunities" and "seeking employment" comprising about 95% to 98% responses from migrated individuals in both rounds. Among other findings, the study observed that the incidence of migration is not significantly affected by the rural roads and waterways development under the RTIP-II, except for the case of overseas migration where the likelihood of migration increases by 2.2% in the project areas. This supports the view that improvement in rural road networks may reduce the incidence of migration in developing countries, although it can increase in the short-run. The likelihood of sending remittance by both in-country migrants and overseas migrants is negative, with the estimates being statistically insignificant. However, the possibility of sending in-kind remittances from abroad increased by 33% due to the RTIP-II intervention, with this result being significant at the 5% level. Further, the motivation for migration at the household level showed a positive association when the migrants thought that migration to a different destination would result in better earning opportunities. Hence, we can find a shift in the motivation for migration as more migrants seek better earning opportunities than just opportunities due to road improvements. A household would not encourage its member to migrate unless there is a better opportunity in another destination that offers higher earnings after accounting for the migration costs.

The key findings from the chapter on shocks and coping mechanisms necessitates the importance of explaining certain phenomena through a broad, encompassing perspective. The likelihood of shocks has increased by 3% due to the development of transport infrastructures under the RTIP-II. After further decomposing the incidence of shocks by types, we find that increased incidence has been captured mainly by the shock of abnormally high prices of agricultural inputs. In terms of loss incurred due to shocks, the study finds that road improvements under the RTIP-II have reduced the extent of monetary loss suffered by 13.7%. This significantly stresses the improved conditions of resilience as investment in roads connectivity has positively impacted livelihoods. By delving further into resilience, the study finds that RTIP-II road improvements have reduced the likelihood of coping by receiving unconditional help from friends/relatives by 2% and increased the possibility of coping by obtaining credit from formal institutions by 4%. This phenomenon can be described as a shifting dependence structure, as improved road connectivity has perhaps increased access to institutional credit.

The chapter on mobility finds that the overall distance traveled by motorized-transport has decreased across all mobility-related parameters due to the RTIP-II intervention. Distance traveled with motorized transports to accessing healthcare services has reduced by 29.5% after transport infrastructure road improvements. However, considering the travel cost and time, we find a positive association between the outcomes and the intervention. For general-purpose mobility, the travel time/km has increased by 20% for motorized transport users, with the travel cost increasing by 44%. This phenomenon for motorized transport is also observed for market access and health-related mobility. The additional time requirement might be due to growing traffic congestion along the improved roads. An alternative explanation could be that the number of stoppages on the way and the speed of movement of the hired transport are beyond the control of the passengers. We observe a 19% reduction in travel time to local markets after the improvements of transport infrastructures in the case of non-motorized transport.

#### ***ii. Transport Users and Owners***

This study examines the causal effects of improved rural road infrastructure on transport users and owners. The impact on transport users' likelihood of taking a specific vehicle is insignificant for the local market and administrative offices. These findings imply that the project roads offer multifaceted options for transport users to choose their preferred mode of transport. We also find that improved roads increased daily or weekly frequency to the local markets while increasing monthly and yearly movements for the Upazila HQ and District HQ. The treatment effects on the total duration required to go to Upazila HQ, District HQ, and Upazila Health Complex are negative and statistically significant (6 minutes, 29 minutes, and 7 minutes respectively), indicating that the RTIP-II helps to reduce travel time. The impacts

on travel convenience, transport convenience, and business expansion are positive and statistically significant (25%, 43%, and 94% respectively), indicating that the project roads increase the user's comfort and business activities.

Findings on the transport owners show the impact of having an electric rickshaw is positive (106%) and statistically significant, while others are insignificant. This finding indicates that project roads significantly increase the likelihood of owning an electric rickshaw by 106%. The RTIP-II also increased part-time and full-time employment opportunities in the transport sector by 31% and 11% respectively. Further, the mileage run by transport vehicles during the rainy season and dry season increased by 27% and 48% respectively and movements for agricultural and non-agricultural freights increased by 17% and 32% respectively. These developments indicate that project roads enhance economic activities for transport owners in rural areas. These findings are also consistent with the positively significant impacts on transport owners' gross operating surplus, with the intervention significantly increasing gross operating surpluses by 41% for passenger vehicle owners and 49% for freight vehicle owners. Overall, the RTIP-II project significantly affects transport users and owners in rural areas across the country.

### **iii. Enterprise**

Findings reveal that the project roads help enterprises reduce their business-related travel time/km by 8%. However, the estimated impacts are insignificant for transaction distance and frequency but significant for transaction time. It is found that inventories of raw materials and products of the enterprises increase significantly located along/near the project roads. For example, the product inventory of the enterprises located along/near the project roads increases by 38% compared to those in the control area. The potential reasons behind the increase in inventory are likely to be increased investment (25%) and sales (10%). When entrepreneurs anticipate selling more products, they are likely to increase their inventory to meet customer demand.

The estimated effect also shows that the project road increases wages and benefits for hired employees but not employment. Findings also suggest that project roads increase deferred sales by 21%. These findings indicate that the project roads offer multifaceted avenues for enterprises that could increase the number of customers or the number of months operated in a year. We also find that the project roads significantly increase sales receipts and gross operating surpluses by 11% and 29%, respectively. Overall, the RTIP-II projects significantly increase business values and positively affect enterprises in rural areas across the country.

### **iv. Market**

The study finds that the number of kancha shops has decreased by 31%. One may argue that road development enhances smooth connectivity that, in turn, makes entrepreneurs

confident in the prospects of their businesses. Hence, the entrepreneurs themselves or their land owners build solid structures replacing the dilapidated kancha structures. The number of effective banks and government healthcare facilities has decreased by 21% and 18%, respectively. This can be explained by the technological change which has enabled for banking services to be provided through mobile/online platforms, thereby reducing the need for the physical presence of banks. Improved road connectivity has presumably made it possible to access better healthcare opportunities outside the locality. The study also finds that wholesale business turnover has substantially decreased by 90%, and the number of wholesale sellers has decreased by 54%. Declining dependence on local wholesalers from improved road connectivity might have enabled other avenues for absorbing consumer demand. Alternatively, local wholesalers might have a less competitive advantage over established wholesalers in upazilas/towns as access to a larger market has presumably increased due to improved road connectivity. Employment in the local markets has decreased by 39%. The increase in people's mobility enables them to look for better jobs in other non-local establishments.

#### ***v. Community***

Rural road improvement has significant impacts on rural employment, food prices, and daily wages. The number of establishments and village connectivity has increased after the intervention. Road improvements attract new capital investments and encourage the entry of formal, manufacturing firms. This leads to an increase in local labor demand, and as a result, village people respond by increasing their employment in manufacturing and transitioning out of agriculture, sales, and services. In addition, non-farm wage employment has risen by 16% for males after the intervention. The consequent shortage can absorb the low-skilled, marginal workers, and these people could gain to a great extent. This employment scenario results in greater access to non-farm earnings opportunities and reduced dependence on agricultural wage work. The intervention does not significantly affect the daily wages rate except for the non-farm wages rate for males. The following reason might explain this as follows. Due to connectivity, rural people can easily move between locations, which may mute the variation in the relative wages of the project and control area. The project intervention reduces the relative prices of major food items: sugar by 3.2%, vegetables by 8.3%, and cooking oil by 9.2%. With road connectivity, there is an integrated market for foods, which allows food commodities to move spatially from surplus to deficit areas.

Moreover, we found that more than twice the number of households are now using non-motorized transport in 2022 costs, and good agricultural productivity triggered a reduction in food prices after project intervention. Total earnings increases may also contribute directly to a rise in welfare, depending on the nature and magnitude of changes in labor demand and supply. Finally, connectivity brings about employment opportunities for the local community,



expanding opportunities for reaching out to other communities and enriching local markets, establishments, and industries.