FINDINGS OF THE SOCIO-ECONOMIC IMPACT STUDY OF THE ROAD MAINTENANCE AND REHABILITATION PROGRAMME IN PAPUA NEW GUINEA

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ABSTRACT

The World Bank funded Road Maintenance and Rehabilitation Programme commenced in 2000 in Papua New Guinea. Criteria for funding the selected roads were that the economic return from the rehabilitation must be at least 12 percent. Also such things as traffic volumes, health, and educational and agricultural aspects were taken into consideration, because they are expected to have economic returns later. The Road Maintenance and Rehabilitation Project is expected to speed up national development by providing better roads and transportation systems in the country. The roads are also seen to reduce poverty. Some economic changes can be seen quite soon, such as increased employment possibilities and incomes, or after several years or even after one generation, for example, as a healthy and educated labor force

The purpose of the Socioeconomic Impact Study (SIS) was to evaluate the impacts of the road rehabilitation on the households' income and expenditure, on access to health and education services and the reduction of poverty in the selected sample and control villages in the six participating provinces of Manus, East and West New Britain, Oro, Central, and Morobe starting in 2004 and ending in 2009. The study villages were divided into the sample villages by the main roads and the control villages away from the main road. This paper covers the final round of the study and combines and compares the previous data, and the data collected in 2009.

In 2009, 387 households were interviewed in 22 villages, 172 households in ten sample and 215 households in the twelve control villages. The same households were interviewed also in the previous study rounds. In the survey households, subsistence farmer was reported as occupation by 70 percent of the respondents and 30 percent report some other occupation than subsistence farmer. The main income sources of the households are vegetable and cash crop sales and salaries and wages. In the sample villages, the vegetable sales bring 27 percent, cash crop sales 26 percent and salaries and wages 29 percent of all incomes. The respective percentages in the control villages are 41, 29 and 13.

Paper is presenting the main findings of the study divided for findings on i) Impact on the road use, ii) Impact on public transportation, iii) Impact on the income sources, iv) Impact on the accessability and impacts on the poverty.

It is clear, based also on this study data, that the good roads are necessary preconditions for socioeconomic development.

1. BACKGROUND

Papua New Guinea faces a variety of challenges in terms of improving the livelihoods of its people. The role of roads, or better said, the lack of roads, is related to many of the challenges that hamper its possibilities to achieve for example the Millenium Development Goals**.** The SIS studies in Papua New Guinea shed lights on the complex context in which road maintenance and rehabilitation work in Papua New Guinea takes place, and analyses the impacts that these measures can have in terms of the overall development of the country. The Road Maintenance and Rehabilitation Project (finanzed by Government of PNG and the World Bank) is expected to speed up national development by providing better roads and transportation system in Papua New guinea. The roads are also seen to reduce poverty. Some economic changes can be seen quite soon, such as increased employment possibilities and incomes, or after several years or even after one generation, for example, as a healthy and educated labor force.

The paper is based on a survey, which was conducted in 2004 and repeated in 2007 and 2009. The survey data is complemented with qualitative data gathered by rapid rural appraisal (RRA) methods, including interviews of key informants in the 32 villages that were part of the study. The villages were divided into two sample villages located near the project road, where the road improvement works were scheduled to take place and two control villages, which were in the same area, but suffered from long distance or hard terrain, and where the respondents were assumed not to benefit directly from the road improvement. The main indicators, which were analysed in terms of the livelihood impacts were related to livelihood patterns and income generation, access to social services and infrastructure and poverty and food insecurity. Cross-cutting themes of gender equity and the environment were also included in the analysis.

The purpose of the Socioeconomic Impact Study (SIS) was to evaluate the impacts of the road rehabilitation on the households' income and expenditure, on access to health and education services and the reduction of poverty in the selected sample and control villages in the six participating provinces of Manus, East and West New Britain, Oro, Central, and Morobe in Papua New Guinea starting in 2004 and ending in 2009. The study villages were divided into the sample villages by the main roads and the control villages away from the main road.

This paper covers the final round of the study and combines and compares the previous data, and the data collected in 2009.

2. PROJECT PROVINCES

2.1. Manus Province

Manus is Papua New Guinea's smallest province, both in terms of population and land area, but has a vast sea area. The province consists of a group of islands, known as the Admiralty Islands and a scattering of low-lying atolls, mostly uninhabited with the northern border reaching the equator. Manus, the largest of the islands, is rugged and heavily timbered with central hills rising to over 700 meters and many sharp ridges and streams. The estimated rural population of Manus in the year 2000 was 37 000, which is one percent of the national rural population.

The islands are connected by a bridge crossing the Loniu Passage. The airport is at Momote on Los Negros Island. There is a good quality road from Momote airport to Lombrum and Lorengau, a provincial capital and a network of minor roads in the eastern part of Manus Island. However, outboard motor boats and canoes are the most common means of transport in the province. 55 percent of Manus population had access to roads in year 1995.

Rehabilitated Road in Manus Province included for socio-economic evaluation is Somare (East-West) Highway, sample villages are Sapon and Lundret and control villages are Bulihan and Karun.

2.2. East New Britain Province

East New Britain includes roughly 15 100 km2 of the island of New Britain, in the northeast of PNG with the estimated rural population of 247 000 in the year 2000. The topography of the Province is predominantly very hilly with very deep ravines in places, but there are also areas of generally undulating and gentle sloping and low-lying areas. In the northeast the Gazelle Peninsula are fertile hills and plains that surround Rabaul volcanoes. The soil is mainly volcanic deposits. The area is densely settled and well developed. There are many several rivers in Gazelle Peninsula. The Warangoi River is one of the major rivers. The Duke of York Islands is 20 km northeast of Kokopo, and Watom Island is 10 km north of Rabaul. The south of the province is dominated by the Nakanai Mountains, narrow coastal plains and the active volcanic peaks. The provincial rural population growth rate is a very high 4.2 percent per year. The highest population densities are on the volcanic hills and plains of the Gazelle Peninsula, in the Duke of York Islands, with and average of 220 person/km2. There is a significant in-migration in the northeast of Gazelle Peninsula, with people from many parts of PNG seeking better access to services, more productive environments and wage employment opportunities provided by the towns and plantations.

The northeast of the Gazelle Peninsula has an extensive network of sealed roads. There are few roads in the south of the province. Outboard motor boat and canoe travel are common in coastal areas. People in the northeast of the Gazelle Peninsula require less than one hours' travel to reach Kokopo, while those in the west Baining Mountains, in the Duke of York Islands and Watom Island require less than four hours travel. People in the inland mountains of Pomio District are very remote and require more than one day's travel.

Rehabilitated Road in East New Britain Province included for socio-economic evaluation are Vunadirdir-Kerevat-Vudal Road and Vunadirdir Road, which is not rehabilitated. Sample villages are Turagunan and Napanar 3 and control villages are Gunanur and Liaga.

2.3. West New Britain Province

West New Britain occupies 20 800 km2 of New Britain Island in the northeast of PNG. The northeast coast, from Talasea to Sule, is dominated by plains and floodplains with fertile volcanic soils. This area has been densely settled since the early 1970s through formal settlement schemes based on oil palm production. The interior of the province are dominated by the Nakanai Mountains and the Whiteman Range with coastal plains and valleys along the south coast. The Bali Witu Island group is 160 km northwest of Kimbe in the Bismark Sea, while Lolobau Island is 8 km of coast from Sule. The estimated rural population of West New Britain in the year 2000 was 99 000, which is 2.5 percent of the national rural population. West New Britain is one of the three provinces with the largest urban centers, where net migration is concentrated due to commercial activities of oil palm. The provincial rural population growth rate is high at 3.3 percent per annum.

The northeast coastal plains from Talasea to Sule have extensive network of good roads that service the oil palm settlement schemes. West New Britain is one of the three provinces (besides of Central and New Ireland) where the lengths of road per head of population are the greatest. There are numerous logging roads in the south coast valleys, inland of Kandrian, and around Cape Gloucester. These roads, and in particular the bridges, are short-term constructions that deteriorate when maintenance stops. Outboard motor boat and canoe travel are common in coastal areas.

Rehabilitated Road in West New Britain Province included for socio-economic evaluation are Hoskins Road and New Britain Highway and sample villages are Karapi and Gigipuna and control villages Gule and Baia.

2.4. Oro Province

Oro Province occupies 43 700 km2 on the north coast of the mainland of PNG with the estimated rural population of 110 000 in the year 2000. The centre of the Province is dominated by the volcanic plains and fans that surround Mt Lamington. The volcanic plains and fans have moderate population densities of 36 persons/km2 and are used extensively for plantation and smallholder oil palm production. The floodplains and swamps to northwest and southeast, and the Owen Stangley Range, are largely unoccupied. Areas around the provincial capital of Popondetta have significant in-migration.

There are road links between Popondetta, the province capital, Tufi, Ioma, Kira, Kokoda and Afore with PMV buses travelling regularly between the district. There are few roads elsewhere in the province. Outboard motor boat and canoe travel are common in the coastal areas and on the northern floodplains.

Rehabilitated Road in Oro Province included for socio-economic evaluation is Kokoda Highway and sample village is Ombisusu and control village is Evasusu.

2.5. Central Province

Surrounding the National Capital District is Central Province, a narrow coastal strip, which rises to the 4000 m high Owen Stanley Ranges which form its northern border and divides and isolates the Province from the north. Coastal hills, plains and swamps cover the lowlands of the province. The National Capital of Port Moresby has a powerful influence on the economy and the movement of people in this province. Good roads allow people to commune long distances to work in Port Moresby from coastal villages that have among the highest housing standards in the country, and also have electricity supplies and running water. The peri-urban areas around the city are densely settled with people from all over the country. The estimated rural population of Central Province in the year 2000 was 167 000, which is four percent of the national rural population. Areas around Port Moresby, Bereina and Kwikila have significant in-migration of people, while the Tapini, Sogeri and Efogi areas have significant out-migration.

The coastal areas of the province have network of good roads, although some are in poor condition and thus are inhibiting the transportation of the market produce and cash crops to the markets (for example rubber can not be transported to the market due to no road access). Logging activities have impacted the some of the roads negatively and deteriorated them. The Hiritano Highway runs from Port Moresby to Bereina and on to Kerema in Gulf Province. Outboard motor boat and canoe travel are common along the coast. People within a 40 km radius of Port Moresby require less than an hours' travel to reach the city, while most others on the coastal plains and hills require less than four hours' travel.

Rehabilitated Roads in Central Province included for socio-economic evaluation are Magi Highway and Hiritano Highway. For Magi Highway sample village is Saroa and control village Londari and for Hiritano Highway sample village is Veikabu and control village is Doramoku.

2.6. Morobe Province

Morobe Province occupies 33 525 km2 in the central north of PNG and curves around the waters of the Huon Gulf. The Saruwaged Mountains, rising from the sea at the tip of the Huon Peninsula are blanketed by tangled and impenetrable rainforest. To the southwest, the fertile Markham Valley rests between equally awesome ranges while the waters between Huon Peninsula and New Britain are dotted with volcanic islands. The capital city of Lae, known as the "Garden City", with its 80 000 inhabitants, is the second largest city in Papua New Guinea. The estimated rural population of Morobe in the year 2000 was 307 000, which is 7.6 percent of the national rural population. Population densities are highest on Malai and Tuam islands, near Umboi Island, with 400 person/km2.

Despite its large size and mountainous terrain, there is a good road network in Morobe Province and access to services is generally good. A network of roads (The Highlands Highway) connects Lae with Madang to the northwest, through the Markham Valley to the Highlands in the west and south to the Highland areas around Wau and Bulolo. As the Port of Lae services both international and coastal shipping it is possible to reach most northern coastal centers by boat. Small boat transport is common in all coastal areas. 80 percent of Morobe population had access to roads in year 1995.

Rehabilitated Road in Morobe Province included for socio-economic evaluation is Bukawa Road and the sample village is Tikeleng and the control village is Musom Tale.

2.7. Western Province

Western occupies 97 000 km2 in the southwest of PNG and is the largest province in the country. The entire western border of the province forms part of the international border with Indonesia, while the Australian border lies within 10 km of the south coast on Boigu and Saibai islands. The north of the province covers the high and rugged mountains and plateaux of the Hindenburg Range and the deep valleys of the upper Strickland, Murray, Wok Feneng and Ok Tedi rivers. Approximately 40 km north of Kiunga and Nomad, the landscape flattens into the floodplains, plains and hills of the lower Fly, Ok Tedi and Strickland rivers. South of Lake Murray, the Strickland River joins the Fly to form the largest river in the country. East of Lake Murray are the plains and hills of the Aramia and Guavi rivers, which extend to the border with Gulf Province. The south of the province covers the Fly River delta and its islands. It also includes the floodplains and plains of the Mai Kussa, Kutubura, Morehead and Bensbach rivers. Average annual rainfall varies from 1500 mm on the south coast, to around 8000 mm in the Ok Tedi Valley. There is a long dry season south of Lake Murray. Rainfall increases and seasonality decreases from south to north. Altitude varies from sea level to over 3000 m on the Hindenburg Range, but most of the province is below 150 metres. The three districts in Western Province are Middle Fly, North Fly and South Fly.

The estimated rural population of Western in the year 2000 was 106 000, which was three per cent of the national rural population. The highest population densities are on the south coast plains between the Oriomo and Pahoturi rivers and the East Awin Refugee Relocation Area (EARRA), east of Kiunga. All other areas in the province have low densities of less than 10 persons/km2. There is significant out-migration from the Hindenburg Range, the areas around Bolovip and Olsobip, the upper Murray Valley, the Nomad area and from the Gama Valley which is on the border with Gulf Province.

Rehabilitated Roads in Western Province included for socio-economic evaluation are Tabubul-Kiunga Highway and Kokonda-Kiunga Road. Sample villages are Matkonai and Seven Kona and control villages Kasnerai and Bige.

3. SELECTION OF THE SURVEY VILLAGES

In the beginning of the study in 2004, the survey villages were selected so that half of the villages are sample villages which are by the roads to be rehabilitated, and the other half control villages which are away from the main road with no motorable roads going to the villages. However, some of the roads which were supposed to be rehabilitated may be rehabilitated partly but not in the places where the sample villages are, and some of the control villages are by the roads which can be used by vehicles and may have PMV service. These facts are taken into consideration in the results whenever feasible. The comparisons between the sample and control villages are given throughout of the paper.

4. SELECTION OF THE SURVEY POPULATION

The last evaluation round 8in year 2009) interviewed the same households which were interviewed also for the previous studies, although in some villages the number of households was now smaller. The people are busy in the villages with their everyday tasks, and selection of the households for the last round was based on the willingness and availability of the household members to participate in the study. Hence the sampling is not statistically random sampling and the households do not represent statistically the whole village. However, according to the responses it is quite possible to follow the main opinions and attitudes and trace the development trends and impacts caused by the rehabilitation of the roads.

In the 2007 study, the numbers of the survey households varied from 21 to 72 households per village, and this evaluation round fixed the number to 20 households per village. The reasons were to get more even survey populations. Additionally, the questionnaire was longer and with more questions than the previous ones, to get more detailed responses for the survey indicators. However, it seemed to be impossible to interview 20 households in all villages, and the number in some villages is less than planned. Despite the smaller numbers, the results seem not to be biased and the results can nevertheless be regarded as valid and relevant.

4.1. Data collection

Data collection in all the survey rounds was carried out in the same villages and the same households were interviewed as far as possible. The same households questionnaire in the three earlier studies, and although basically the same, was modified into more detailed questions to suit better the evaluation purposes. It uses the same indicators and can be used for comparisons with the previous data.

Figure 1. Data collection in process

The collection of data in the villages was carried out by the Research Assistants which had been trained for field data collection, part for SIS studies and others for similar work for other studies already earlier. They also had refresher training by the Team Leader before the field work for this round. Two Research Assistants, one male and one female, collected data in a village.

Table shows the roads under the SIS study, and how many households were included in the survey in the sample and control villages.

Table 1. Number of the survey households by roads and by the sample and control villages

Provinces	**Study roads**	**Sample village**	**HH**	**Control village**	**HH**
Manus Province	Somare (East –West) Highway	Lundret	20	Karun	19
		Sapon	12	Bulihan	20
East New Britain	Vunadirdir-Kerevat-Vudal Road	Napapar3	20	Liaga	20
	Vunadirdir Road	Turagunan	18	Gunanur	20
West New Britain	Hoskins Road	Karapi	14	Gule	19
	New Britain Highway	Gigipuna	15	Baia	14
Oro Province	Kokoda Road			Evasusu	20
Central Province	Magi Highway	Saroa	15	Londari	19
	Hiritano Highway	-	-	Douramoku	8
Morobe Province	Bukawa Road	Tikeleng	18	Musom Tale	20
Western Province	Tabubil -Kiunga Highway	Matkomnai	20	Kasrenai	20
	Kokonda -Kiunga Road	Seven Kona	20	Bige	16
Total households	**387**		**172**		**215**

5. INDICATORS

The table shows the indicators, which have been used in the SIS 2007 Study Phase Report to measure the impacts of the Road Maintenance and Rehabilitation upon the living standards of the project beneficiaries.

Table 2. Indicators used in the SIS

Road Transport Overview	time required to reach the nearest road, frequency of travel to the nearest market, PMV fares, and number of trips made by PMV
Income Pattern	household incomes, average household expenditure, food security (the amount of food a household has in

	reserve and the number of families having food shortage), trade store prices
Access to Social Services	distance and time to nearest school and health facility, causes of visiting health centre by men and women, awareness of HIV/AIDS
Environmental Issues	noise and dust level of the road, roadside water quality, loss of agricultural produce due to bad road conditions, increased gardening/farming activities due to road

In this study indicators are compared province by province and then village by village (to see the differences between sample and control villages). The following indicators have been reported:

- Travel time to the nearest road which can be used by vehicle
- Frequency of road use, why
- PMV fares, and number of trips made by PMV
- Travel to market, how often
- Income for five categories
- Expenditures for five categories
- Trade store prices
- Average market income
- Families below and above of poverty line
- Travel to health centres, how often, how long it will take
- Travel time to nearest school
- Information of accidents on the road
- Farming
- Food situation
- Environmental indicators: road side water quality, noise, dust, loss of animals/vegetation, increase in clearing the bush, impacts on gardening; and
- Benefits of the road improvement.

Some economic returns can be seen quickly, such as income, while improvements in health and educational aspects give economic returns later, due to a healthier and better qualified labor force. The basic infrastructure such as roads are seen as a means to reduce poverty. Hence the indicators used in this study are derived from these expectations and include income and expenditure, reduction of poverty, and improved access to educational and health facilities.

6. THE MAIN FINDINGS

Impacts on road use to towns and market visits

After the rehabilitation of the main roads, visits to towns increased in 5 out of 8 sample villages, but only in 3 out of 10 control villages. Also the market visits increased. The trips to markets are not identical with the town visit, but are overlapping, because people use several market places. On average, the trips

increased 1.7 times in the sample villages by the rehabilitated roads, and 1.4 times in their control villages. The increases were less for the non-rehabilitated roads, where the visits increased 1.2 times in the sample villages and 0.7 times in their control villages. Although people refute that the rehabilitation is the primary reason for their trips, nevertheless the trips increased according to the location of the villages and the road status. People do admit that the rehabilitation makes it easier to travel to the vegetable markets, when they use the main roads, especially because the rehabilitation has increased the road services.

6.1. Impacts on the public transportation fees

The rehabilitation has not had any positive impacts on the PMV fees, which on average have increased 20-25 percent. The increases have been bigger on the non-rehabilitated than on the rehabilitated roads. It is clear from the previous study rounds that people did not expect the fees to go down either, mainly because of the minimum fees set by the authorities. Despite the increases in the PMV services, according to the responses, there are still too few PMVs operating and no competition affecting the fees. Additionally, people face problems to get access to PMVs, and sometimes they have to wait for hours to get in.

6.2. Impacts on income sources

Impacts on the vegetable market income. Independent of the number of visits, the single trip incomes have increased in all villages, except in one. These increases mainly follow the general trend of price increases of all goods and services. However, combined with more market trips, the average monthly income from the vegetable sales has increased 1.6 times in the sample and 1.7 times in the control villages.

Roadside and village store sales. The roadside sales have increased and clearly benefited from the rehabilitated roads, because of more traffic and passengers on the roads. This is seen as a good income generating activity especially for women who can earn money near the home and at the same time can take care of children and other domestic tasks. Roadside sales are also seen to help unemployed to earn money. Additionally there is no need to pay transportation fees. Six villages have no roadside sales due to their location. Store owners in the villages can more easily transport needed commodities from the towns. However, in some villages store keepers have less sales because people prefer to buy store food and goods in the towns where the prices are less.

Cash crop sales. Impacts on cash crop sales are modest because the prices are usually fixed, or fluctuate for other than rehabilitation reasons, but if the road is good, it is easier for the farmers to take their produce to factories and storehouses in the towns. From some villages, the company drivers collect rubber and oil palm produce and this collection system was there already before rehabilitation.

The bad or missing feeder roads to the control villages show how important the good roads are. Presently in the control villages, many households could sell much more

vegetables and/or cash crops in the markets if they could transport them at least to the main roads. Presently many cash crop sites lie idle because of the combined problem of no markets and bad feeder roads.

Impacts on salaries and wages. The rehabilitation has had no impact on the people's salaries, which are fixed and decided by the employers. However, the rehabilitation is making the travel more convenient and faster.

6.3. Impacts on the monthly incomes of the survey household

On average, monthly incomes of the survey households have increased. 73 percent of the respondents say that their household income has increased. The share is bigger in the sample villages by the rehabilitated roads, where the percentage is 82. The road rehabilitation mainly has increased the incomes from the sales of vegetables and other agricultural products.

The share of households with an income of K100 or less has decreased from 17 percent to 1 percent comparing the 2007 and 2009 data. For the share of households with an income of K500 or less, the decrease has been from 62 to 47 percent.

Figure 2. Marketplace

6.4. Impacts on access to health services

The rehabilitation of roads has had very little impact on the travel time to the nearest and most often used health services. Either people have services in their villages or their walk to the other villages, but they do not usually use the main roads, but short cuts and bush tracts. From 18 villages people walk, less than half an hour from 12 villages, from 3 villages about one hour, although from one village walking takes 2 hours without a possibility to use PMVs. From 4 villages, people use PMVs to reach the health services. The rehabilitation has a positive impact on the PMV travel times,

and people use them when they have to travel to the hospitals. On average, only ten percent of all health service visits are to the hospitals. Nobody mentions that they have no access to health services because of the distance or costs.

6.5. Impacts on access to education services

The rehabilitation of the roads has no positive impacts on access to schools, either because the schools exist in the villages or children walk to the schools in the near-by villages, using short cuts, bush tracks and river banks. Only in three villages children partly use the main road. For most, the walking time is from a few minutes to about half an hour, but also over one hour from a few villages. The biggest obstacles to education in some villages are too long walking distances for small children, and in all villages the shortage of money to cover the ever increasing school fees. A surprisingly common reason was also that parents do not see the importance of schools and education. In some villages also children are needed to work on the family gardens and cash crop blocks. Road rehabilitation is benefiting the secondary school students by more convenient and faster PMV rides, but the access to secondary schools is better explained by the parents'/fathers' education level and attitudes and by the households' income level.

6.6. Impacts on poverty

According to most responses, very few households are poor in the villages. This was mainly based on the food security; people have food from their gardens. However, according to their own definition, respondents included the shortage of money stronger than food, to the poverty features/indicators: “Food is no problem, the school fees are.”

Comparing the 2007 and 2009 data, there was a decrease of the share of households below the poverty line, from 57 percent to 40 percent, based on the monthly income of K500 or less. In 2007 the poverty line for a household was K500 according to the international definition, now that poverty line shows severe poverty, and the new definition of the poverty line requires at least K800 as a monthly household income. According to this poverty line, 67 percent of the households were below the poverty line. Only Manus, as a province, had more people above the poverty line (of K800) in 2009 than in 2007 (K500). In other provinces, only five sample villages, all by good rehabilitated roads, and one control village, had less households under the poverty line than in 2007.

The comparison among the sample and control villages shows that the villages by the rehabilitated roads have better incomes and less poor, and have benefited more than the villages by non-rehabilitated roads. The importance of the good roads is becoming especially clear, when the sample and control villages are compared. The bad or missing feeder roads are negatively affecting the people's lives and incomes, by preventing people to visit more often markets and/or sell more their produce, because of no transportation to markets. In some villages cash crops are not sold for the same reason. In these villages the shares of the poor have increased.

Moreover, in can be noted that the people in Papua New Guinea seem are quickly attracked to move, if new opportunities can be seized by moving. The roads attrack people and this should also be kept in mind when planning the availability of services. The limiting factor to moving comes from the clan-based land-ownership system, which restricts the cultivation of cash crops and in general economic development for settlers. Land boundary disputes are common throughout the country and some other land disputes were mentioned as well. These are highly complex issues and difficult to take into consideration in project planning, but worthwhile of the effort. However, roads alone cannot alleviate poverty and improved mobility may benefit some groups or communities more than others. There are also possible negative impacts such as spread of HIV/AIDS due to more mobility and negative environmental consequences of the roads.

It is clear, based also on this study data, that the good roads are necessary preconditions for socioeconomic development.