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ABBREVIATIONS

CPCU	Central Project Coordination Unit
DoLI	Department of Local Infrastructure
DRCN	District Road Core Network
DTMP	District Transport Master Plan
ESMF	Environment Safeguard Management Framework
FGD	Focus Group Discussion
GESI	Gender Equality and Social Inclusion
GON	Government of Nepal
HH	Household
IDO	Infrastructure Development Office
MoFAGA	Ministry of Federal Affairs and General Administration
MoPID	Ministry of Physical Infrastructure Development
NGOs	Non-Government Organizations
NVC	National Vigilance Centre
PAC	Project Advisory Committee
PCR	Project Completion Report
PDO	Project Development Objective
PM	Periodic Maintenance
PMU	Project Monitoring Unit
RAIDP	Rural Agriculture Infrastructure Development Project
RMGs	Road Maintenance Groups
SNRTP	Strengthening the National Rural Transport Program
TID	Transport Infrastructure Directorate
ToR	Terms of Reference
UG	Upgrading

EXECUTIVE SUMMARY

1. Background

The Project for Strengthening the National Rural Transport Program (SNRTP) basically the continuation follow-on of the RAIDP is the third IDA operation to support Nepal's rural transport sector for the past 15 years. It is being implemented by the Government of Nepal in support of the World Bank with aims to provide all-weather road access to all local levels (Rural Municipality and Municipality) by gradually upgrading the District Road Core Network (DRCN) and providing proper maintenance with the aim of promoting economic growth, providing access to services and creating sustainable decent jobs in rural areas. The SNRTP project covered the 37 districts with a total population of more than 14.6 million.

2. Objective of the Impact Evaluation

The main objective of the impact evaluation study was to establish baseline with required information/data, compilation through literature review and field surveys adopting retrospective approach as required for the Impact Evaluation purposes on defined indicators specific to access, income, employment, demography and other socio-economic characteristics as applicable to SNRTP activities. The specific objectives were to design detailed Impact Evaluation modality/methodology and implement it; to explore qualitative and quantitative data and information against the prescribed indicators for the analysis of induced impacts of the SNRTP after its interventions with pre- and post- project intervention situations in program districts.

The impact evaluation study design was prepared to measure impacts of SNRTP brought by the road interventions under component B and Window 1 (maintained roads and crossings) and Window 2 (upgraded and rehabilitated roads). The study design covered both treatment roads as treated in the last 3 years and control roads untreated in the last three years (from 2016/17 to present 2018/19).

3. Approach and Methodology

In absence of baseline report, required data/information for comparison was reconstructed through literature review and field surveys (adopting retrospective / recall approach) conducted together with impact evaluation survey on defined indicators. Respondents were requested to recall and provide information at a particular point in time (before project launch/ intervention) to record “before-after” scenario and to measure the changes brought by the project intervention.

Study methodology included desk study, field study and consultation meetings. Field study in sample project districts were conducted during August-September 2019. Standard modality and study tools were designed and implemented accordingly. The field study included household survey, community survey, business survey, vehicle owners, operators and users survey, focus group discussion, key informant interview, traffic count, road observations, etc.

4. Study Area and Sample Covered

Study area for impact evaluation was 37 project districts of SNRTP interventions spreading in all seven provinces. Altogether 1620 households were covered by the survey from 90 settlements

along 45 roads (30 treatment and 15 control) including paved, gravel and earthen in 21 SNRTP districts. In addition to HHs, 1,278 samples were covered by other surveys (traffic count, community, market, business, industry operators, hotel operators, financial institutions, transport associations, vehicle owners, vehicle drivers, transport users, FGD, KII and observation) using 15 sets of survey tools / instruments. The tablet based Computer Assisted Personal Interviewing (CAPI) app was utilized for household survey.

5. Limitation of the Study

In absence of baseline data / information, retrospective approach / recall method was used. Recall always involves a risk of bias due to memory or distortion. In such case, taking baseline of control roads using recall method is not rationale. Moreover, there would not have spontaneous change in those roads over the time (within three year). So, the data / information collected from control roads could be compared with treatment roads, however they could be utilized as baseline status / condition for future reference only.

Provision of one person for Data Manager and GIS Specialist as per ToR was not practical. The provision of technical input for assessment of quality, safety, bio-engineering and safeguards aspects of the roads was not envisaged, so the study could not dealt with such important aspects.

6. Major Findings of the Study

Demography:

The sample households in the zone of influence (ZoI) of the sample treatment roads surveyed are 1080 households with 6,083 population of which 53.1% is male and 46.9% is female. The sex ratio is 113.2, which is interestingly higher than the district level ratio of 94.5 and national level ratio of 94.2. The average household size of the study area is 5.6, which is higher than national average i.e. 4.9. No information was available on demography of before the project to measure the change.

A total 1,080 households were surveyed in 30 treatment roads. Among them, only 11.4% are female-headed households and 88.6% are male-headed households. The percentage of female headed household in the survey area is much lower (11.4%) compared to national level statistics (25.7%).

About 61.7% populations are economically active population (age group of 15-60 years), 7.4% below 5 years age group, 18.6% population of 5-15 years of age group. The aged population above 60 years is 12.3 percent.

The project area, as reflected by composition of the sample is composed of multi-ethnic communities. About, 27.9% is Janajati, 22.9% Madhesi, 18.1% Dalit, 13.1% Chhetri, 13% Brahmin and 5.1% Muslim households.

The cause of migration to urban area is for the better economic opportunities and social services. About 12.2% households were in-migrated in the project influence zone. In-migration of households along the paved roads is 7.6% and along gravel roads is 16.9%. This is due to the

better socio-economic opportunities available along the road. The major purpose for in-migration in the area is for employment (40.8%), education services (30.3%), trade and business (26.5%) and others (2.5%).

Socio-economic status:

Overall literacy rate is 82.7%, which is higher than the national average of 65.9%. The male literacy rate of study area is 90.3% while the female literacy rate is 74.1 percent. The population with a graduate and above education level is 2.8% only in which the population of male is 3.4% and female is 2.1%. Overall school dropout rate is 5.3. The school dropout rate of girls is higher (7%) than the boys (4.2%).

Agriculture is the major occupation of 50.1% population followed by household chores (17.4%), foreign employment (13.1%), wage labor (12.2%) trade and business (7%) and governmental and non-governmental service (6.5%).

The average land holding size of the study area is 0.60 hectare including all types of land which is lower than the national average of 0.96 ha. The annual average household income of the project area is NRs. 370,000 where it was NRs. 287,056 before project. The average annual household expenditure of the project area is NRs. 135,805, which was NRs. 95,801 before project.

Most of the households have cement, stone/brick foundation and cement, stone/brick wall with galvanized iron/slate/tile roofed houses (50.9%), mud, stone/brick foundation and mud, stone/brick, wall with straw roofed houses (34.3%) and cement, stone/brick foundation and cement, brick wall with RCC roofed houses (14.8%).

Among the total households, 49.9% visit hospitals for treatment, 29.9% visiting health post, 13% visiting PHC, 6.7% visiting private clinic, 0.2% nursing home and 0.3% visiting faith healer for treatment. Before project, households visiting hospitals for treatment was 47.6%, health post 30.4%, PHC 15.9%, private clinic 5.3%, nursing home 0.5% and faith healer 0.3%.

About 58.1% households use ground water for drinking, 34.4% use piped tap and 7.4% use well/spring water as a source of drinking water. Before project, households using ground water was 57.8%, piped water 34.1% and 8.1% well/spring water. About 95.5% households of project area have toilet facility in the project area where it was 94.4% before project.

About 71% households use fire wood for cooking, 18.9% use of LPG and 8.4% use of dung cake for cooking purpose in the project area. Before project, 80.2% households used firewood for cooking, LPG 10.1% and dung cake 8.1%. About 97% households of the project area are using electricity and 1.9% using solar for lighting purpose. Before project, households using electricity for lighting purpose was 96% and solar 2.2%.

In overall 97.9% of households possess cell phone, 61.3% television 58.4% fan, 52.8% households own cycles, and 21.2% households have motorcycles. Before project, households possessing cell phone was 95.8%, television 48.8%, fan 53.1%, cycles 50.8% and motorcycle 12%.

Status of women:

Status of women in the project area has been improved. The literacy rate of female is 74.1%. Also, the gap between female and male literacy rate in the project area (16.2%) was found little narrower in comparison to national literacy gap (17.7%).

The overall involvement of female in social organizations has been increased by 15.4% after project. The overall participation of males and females in community activities including social work, religious work, community meeting, political meeting and community infrastructure development is 55% and 45% respectively after project.

After road improvement, the mobility of women beyond the household activities has increased by 5.4%, and women of the area have got exposure on different activities like social work, religious work, community meetings, political meetings, public infrastructure development. The intensity of road use frequently by female has been increased by 23.7%.

The gender disparity is in decreasing trend. The magnitude of decision making role of women has increased from 48.9% (before project) to 54.6% after the project intervention. This is the positive indication in decision making process between male and female.

Out of 3,734 participants benefitted from the livelihood skill development and gender awareness trainings in the study area, and 66% of them were female. Encouraging number of female participation in the skill development training programs indicates the likely involvement of them in income generating activities, which support to uplift the status of women in the project area.

The average population within the ZOI of paved and gravel roads are 200,258 and 125,203 respectively. The average population within the ZOI of paved and gravel roads are found to be 34.10% and 28.00% of the average population of the districts where the roads are existed. District and rural roads in Nepal generally pass through major settlements of the districts where most of the population resides. Thus the per cents of district population seems reasonable.

Access to all-weather road:

The average distance for the people in the ZOI of paved roads to reach all weather road is reduced by 59.69% and for those of gravel roads is reduced by 43.61% after the project. Similarly, average travel time for people of ZOI of paved roads and gravel roads to reach the all-weather road are reduced by 60.71% and 41.59% respectively.

Increase in number of vehicles:

Average vehicle ownerships of households in the ZOI of treatment roads are increased from 157 to 268 which is an increment by 71%. Ownerships of motorcycle, tractors, auto-rickshaw, micro buses and jeeps are increased after the project.

Reduction in vehicle operation cost:

The overall reduction of vehicle operation cost (VOC) after the project in the paved roads is 27.8%, whereas in the gravel roads the VOC is decreased by only 17.36%. The VOC of trucks and buses are reduced significantly compared to smaller vehicles.

Reduction in travel time, distance, fare and freight:

The average travel time after the project for the passenger vehicles from the ZOI of paved roads are reduced by 42.5% and that of gravel road by 29.7%. Similarly, average fare to travel by the vehicles from ZOI of paved roads and gravel roads are reduced by 4.3% and 35.5% respectively.

The average distance after the project for the goods transport vehicles from the ZOI of paved roads is reduced by 19.7% and that of gravel road by 20.1% after the project. Similarly, average freight to transport of goods by the vehicles from ZOI of paved roads and gravel roads are reduced by 9.8% and 27.1% respectively.

Access to service facilities and activities:

The average travel time after the project to reach socio-economic services from ZOI of paved and gravel roads are reduced by 23.5% and 14.6% respectively. Accesses to hospitals and major markets are highly improved. The average travel time from ZOIs of paved roads and gravel roads for socio-economic activities are reduced by 20.2% and by 11.9%respectively.

The travel time to seek health services during pregnancy of women is decreased by 18.34%. There are significant reductions in travel time while visiting maternity and child care center for the pregnant women in the ZOI of gravel road. Average travel time to seek immunization services for children are decreased by 21%.

There are overall increases in the use of agriculture inputs by 24.0% in the ZOI of paved road and by 29.8% in the ZOI of gravel roads. Whereas there is overall reductions in prices of the inputs by 18.4% in both the ZOIs of paved and gravel roads.

Increase in economic activities:

The number of shops, lodge and restaurants in the ZOI of paved roads are increased by 63.1%, 625% and 46.9% respectively. Similarly, they are increased by 57.4%, 63.3% and 69.0% respectively in the ZOI of gravel roads. The average total value of trade per month in the ZOI of paved roads is increased by 24.8% and whereas the value is increased by 59.49% in the ZOI of gravel roads.

Decrease in prices:

The average prices of homestead land, khet (wet land) and pakho (dry land) adjacent to the paved roads are increased by 143.4%, 163.6% and 102.4% respectively. Similarly, the prices are increased by 105.1%, 83.0% and 93.5% respectively in the case of gravel roads. The prices of khet and pakho are increased in the places one hour far from the roads, but in the same places average price of homestead land is decreased by 16.2%. It is observed people tend to build houses adjacent to the roads because such houses have more economic significance such as for

opening shops, renting out etc. thus demands for homestead land away from road are decreased.

Commodity prices in average are decreased by 12.93% and 13.63% in the ZOI of paved roads and gravel roads respectively after the upgrading of the roads. The prices of diesel, petrol, sunflower oil and chemical fertilizers are also found to reduce.

Increase in income:

The annual average household income of the project area is NRs. 370,000. Major income sources include remittance (33.8%), wage labor (16.6%), service (14.1%) and trade (12.8%). The average annual household expenditure of the project area is NRs. 135,805. The major household expenditure items include rituals (10.8%), clothing (10.7%), education (10.4%), oil and spices (8.9%) house construction (8.1%) and health treatment (7.6%).

Access to financial institutions:

Before the upgrading of roads in average 1.4% of households in the ZOI of Paved roads and 3.52% of households in the ZOI of gravel roads had taken loans from different sources. After the upgrading of the roads 2.7% and 4.2% households respectively are found to take the loans from different sources with the increments of 212.1% and 242.1% respectively. After the project number of households taking loans from the banks are reduced by 20% but number of households which took loans from finance companies are increased by 620.37%.

Number of households taking loans for land purchase are increased by 600% in the ZOI of paved roads where as decreased by 25% in the ZOI of gravel roads. In average number of households in the treatment roads taking loans for house constructions are decreased by 89% whereas average number of households taking loans for educating their children are increased by 100%.

Before the upgrading of roads in average 14.19% of households in the ZOI of paved roads and 12.11% in the ZOI of gravel roads had savings /deposits in different financial institutions. After the upgrading of the roads the number of households having savings / deposits in different institutions are increased to 18.04% and 16.4% respectively. The number of households which have savings accounts in the banks are increased by 24.13% where as the number of households have savings accounts in the finance companies are increased by 200%.

Increase in employment:

Number of people employed after upgrading of the roads are increased by 40.4% and 36.0% in the ZOI of paved roads and gravel roads respectively. Number of self-employed people are also increased substantially.

Number of households involved in different activities such as construction works, services, trade, financial institutions etc. are increased by 32.6% and 31.8% in the ZOI of paved roads and gravel roads respectively after the upgrading of the roads. The households engaged in hotels/lodges are also increased by 100%.

7. Conclusions and Recommendations

7.1 Conclusion:

The project has improved condition of the roads remarkably which have increased vehicle speeds and reduced vehicle operating costs (VOC) and reduced passenger travel fares. The reduced travel time and fares have encouraged households to increase their trips to different socio-economic, health, financial facilities etc., and seek their services. The reduced freights for transport of goods have provided households with cheaper consumption goods and other commodities including agricultural inputs. The easier travel and transport of goods all year round have encouraged people to migrate in the area which has increased the price of land.

Improved access has worked as catalysts for overall development of the area and increase prosperity of the people including poor farmers. Households with entrepreneurial skill have set up business of all kinds including tea shops, retail shops, restaurants, lodges etc. Easier access to banks, financial institutions etc. have encouraged households to take more loans for different activities and investments in new businesses. The increased economic activities have led to increased employment opportunities to the local people. With the improved incomes people have more savings in the banks, financial institutions etc.

Improved accesses to cheaper inputs and essential services and easier transport of agricultural products to the markets have enabled farmers to increase farm productivity and production.

Status of women in the project area has been improved after project. The overall involvement of female in social organizations and in community activities including social work, religious work, community meeting, political meeting and community infrastructure development has been increased. The mobility of women beyond the household activities has increased. The gender disparity is in decreasing trend. The magnitude of decision making role of women has increased. Intensity of road use by women after project intervention has increased.

Encouraging number of female participation in the skill development training programs indicates the likely involvement of them in income generating activities, which definitely would help uplift the status of women in the project area. Significant numbers of female involvement in employment activities during the project helped them to generate income source and thus uplift their status in some extent.

Recommendations:

- The survey results show that the impacts of paved roads on access to services are more significant than those of gravel roads. Hence, gravel roads should also be upgraded to paved roads gradually so that people get more social and economic benefits.

- To provide uninterrupted services to the households of the ZOI, the projects roads should be maintained regularly and keep the road condition stable otherwise lack of maintenance do not provide benefits as desired for long time.

- It is very important to encourage local people to exploit the facilities they have with the improved roads for economic development activities which would increase their well beings.

- It is recommended to establish indicators for impact assessments before the project implementation. To measure the indicators it is suggested to carry out socio-economic baseline surveys including traffic counts, safety, vehicle operation cost and access to facilities before the project implementations and prepare baseline data of influence areas of the project roads so that impacts could be measured after the project implementation.

- It is recommended to provision the technical inputs / experts for assessment of quality, safety, bio-engineering and safeguards aspects of the roads improvement during impact evaluation.

1. INTRODUCTION

1.1 BACKGROUND

This Draft report of Impact Evaluation of SNRTP has been prepared in accordance with a ToR documents and contract document signed between the Project for Strengthening the National Rural Transport Program (SNRTP), Jawalakhel, Lalitpur and Full Bright Consultancy (Pvt.) Ltd., (FULL BRIGHT), Sinamangal, Kathmandu on April 18, 2019.

1.2 OBJECTIVE OF THE IMPACT EVALUATION STUDY

The main objective of the impact evaluation study is to establish baseline with required information/data, compilation through literature review and field surveys adopting retrospective approach as required for the Impact Evaluation purposes on defined indicators specific to access, income, employment, demography and other socio-economic characteristics as applicable.

The specific objectives of the impact study include:

- To design detailed Impact Evaluation modality/methodology and implement it. This includes literature review and field surveys on standard indicators like access, income, employment, demography and other socio-economic characteristics as applicable to SNRTP activities.

- To explore qualitative and quantitative data and information against the prescribed indicators for the analysis of induced impacts of the SNRTP after its interventions, and to assess the direct, indirect and distributional impacts of SNRTP interventions in various aspects mentioned above in control and treatment areas and also in pre- and post- project intervention situations in program districts are part of the objectives.

1.3 SCOPE OF WORKS FOR IMPACT EVALUATION

As per the Terms of Reference (ToR), the scope of works or services for this assignment were as follows:

Task 1: Review and update of Impact Design Report
Task 2: Implementation of Impact Design
Task 3: Production and submission of Expected Outputs/Deliverables

- Inception Report
- Report on Pre-Testing of Survey Tools
- Draft Report Submission
- Final Report Submission

The consultant has prepared and delivered following additional documents during the study period:

- Monthly Progress Reports
- Training Manual and Survey Guidelines
- Field Survey Report

1.4 KEY INDICATORS FOR EVALUATION

Key indicators for the impact evaluation study of SNRTP include demography, accessibility, income, employment and socio-economic status. Data for each indicator have been collected, analyzed and reported ensuring disaggregation by gender, ethnicity, poverty and other social inclusion parameters. The key indicators are in line with project development objective and the evaluation study have assessed the changes against the baseline data established using recall method.

1.5 APPROACH & METHODOLOGY OF THE STUDY

The impact evaluation study adopted participatory approach by involving relevant stakeholders in different levels. The impact evaluation team worked in close coordination with the client (CPCU/SNRTP) during entire period of impact evaluation study and shared all draft documents before finalizing each time. Various meetings, consultations and interactions with other relevant stakeholders were also carried out in the process of conducting and concluding the study. The impact evaluation team has completed the study in compliance with applicable universal standards at each stage, including in designing the modality, in developing and implementing the tools/templates, and in preparation of the reports.

1.5.1 Impact Evaluation Study Design

The impact evaluation study design was prepared to measure impacts of SNRTP brought by the road interventions under component B and Window 1 (maintained roads and crossings) and Window2 (upgraded and rehabilitated roads). The study design covered both treatment roads as treated in the last 3 years and control roads untreated in the last three years (from 2016 to present 2018/19). The settlement, traffic and communities under the treatment roads were covered to measure impacts by the project intervention and that of the control roads.

The impact evaluation study was designed to explore qualitative and quantitative data and information against the prescribed indicators for the analysis of induced impacts of the SNRTP after its interventions, and to assess the direct, indirect and distributional impacts of SNRTP interventions in various aspects in treatment areas and also in pre- and post- project intervention situations in program districts.

1.5.2 Baseline Establishment

In absence of baseline report, required data/information for comparison was reconstructed / established through literature review and field surveys (adopting retrospective / recall approach) conducted together with impact evaluation survey on defined indicators specific to traffic volume, vehicle operation cost, use of agri-inputs, trade / business, accessibility in socio-economic and administrative services as applicable to SNRTP activities. Respondents were requested to recall and provide information on above indicators at a particular point in time (before project launch/ intervention) to record “before-after” scenario and to measure the changes brought by the project intervention.

1.5.3 Desk Study

The study team reviewed various relevant documents throughout the study period. Review of project related documents PAD, POM, ESMF and others as required by the set objective were carried out. A comprehensive Impact Evaluation Design Report of SNRTP with objective to carry out baseline and impact study in August 2015 was reviewed and updated. Being a follow on project of RAIDP, the impact results were useful as baseline information for this study. Hence, review of impact study report of RAIDP was carried out. Other relevant documents were consulted for this study (details in **Chapter 2**).

1.5.4 Field Study

Field study in sample project districts were conducted during August-September 2019. Standard modality and study tools were designed and implemented accordingly. The field study included household survey, community survey, business survey, vehicle owners, operators and users survey, focus group discussion, key informant interview, traffic count, road observations, etc. The required quantitative and qualitative primary data were collected from two groups of communities (treatment: set of communities with a road investment/intervention, and control: the other set having no road investment/intervention) over two intervals of time (one observation before the program placement and the other after the implementation). Retrospective/reflective approaches was adopted wherever required especially in establishing the Baseline.

1.6 STUDY AREA & SURVEY SAMPLE

Study area for impact evaluation was 37 project districts of SNRTP interventions spreading in all seven provinces. List of project districts is provided in **Chapter 2**. The proposed sample size was calculated using standard statistical formula. Altogether 1620 households were covered by the survey from 90 settlements (village) along 45 roads (30 treatment and 15 control) including paved, gravel and earthen in 21 SNRTP districts.

Table 1.1: Sample size for household survey

Treatment/ Control Roads	Type of roads	No. of	(Z_0)		(Z_1)		Total HHs
		Roads	No. of settlement	No of HHs	No. of Settlement	No of HHs	
I. Treatment Roads (treated in the last 3 years)	1. Paved roads	15	15	270	15	270	540
	2. Gravel roads	15	15	270	15	270	540
Total Treatment		***30***	***30***	***540***	***30***	***540***	***1080***
II. Control Roads (untreated in the last 3 years)	3. Earthen roads	15	15	270	15	270	540
Total Control		***15***	***15***	***270***	***15***	***270***	***540***
Total Sample		**45**	**45**	**810**	**45**	**810**	**1,620**

The detail information in project districts, roads, and survey settlements/villages are presented in **Annex 2**.

1.6.1 Sampling Procedure

Step by step sampling procedure for household survey, traffic count survey, community survey, market survey, business survey, transport owners' survey, transport users' survey, focus group discussions, key informants' interview and road observation were prepared and oriented to field survey teams during orientation training and practiced in field testing exercise.

1.6.2 Sample Roads selection

The sample frame of different types of roads was allocated to different regions. The total sample 15 required for paved road and 15 for gravel road were allocated among different ecological belts (mountain, hill and tarai) and PMU region (eastern and western) in proportion to their number. Considering the investment amount of different types of roads such as periodic maintenance, routine maintenance and upgrading, the sample size of road was computed in proportion of investment. After the allocation of total 30 sample roads among ecological belt and regions, the districts were selected randomly.

Fifteen (15) control roads (untreated roads for comparison with treatment roads) were selected from DRCN/VRCN list of respective districts ensuring not intervened / invested since last three years or having minimal investment with similar nature and location with the treatment sample roads. The control roads were selected after the finalization of the treatment roads in consultation with SNRTP/CPCU, PMUs and Infrastructure Development Offices (IDOs) in sample districts. The list of 45 sample roads are presented in **Annex 2**.

1.6.3 Selection of Survey Settlements

After selecting the districts, two settlements along the road alignment was selected. One settlement was selected within the zone of influence (Settlement-A: i.e. Z_0 and Settlement-B: i.e.Z_1) applying the following criteria of settlement selection:

- Z_0 : Up to 10 minutes walking distance from road in Terai and up to 30 minutes walking distance from road in Hill
- Z_1 : 10-30 minutes walking distance from road in Terai and 30-60 minutes walking distance from road in Hill

1.6.4 Selection of Survey Households

In each settlement, total number of household head were listed out with name, sex and ethnic group. From the list of households, 18 households were selected in one settlement randomly using the ethnic strata in proportion to their size for survey.

1.7 SURVEY TOOLS / INSTRUMENTS

1.7.1 Questionnaires/Checklists

Altogether 15 sets of survey tools / instruments were prepared for field survey on the basis of key indicators and types of respondents. Adequate questionnaires was prepared for collection of both qualitative and quantitative data / information from beneficiaries of sample roads (both treatment

and control roads). The survey tools prepared were household survey questionnaire, traffic count checklist, and community level surveys for quantitative survey whereas focus discussion guidelines, key informant interview (KII) checklist and observation checklist for qualitative survey. The research matrix was prepared to explain the survey methods to be utilized for the study among with the target respondents/beneficiaries, survey tools to be used, key indicators and key questions to be covered in survey tools for collection of data/information required information for impact study. Following survey tools were prepared, pre-tested and finalized for data / information collection:

1. Household Survey Questionnaires
2. Traffic Survey Checklist
3. Community Survey Questionnaires
4. Market Survey Questionnaires
5. Business Survey Questionnaires
6. Industry Operator Survey Questionnaires
7. Hotel Operator Survey Questionnaires
8. Financial Institution Survey Questionnaires
9. Transport Owner Association Survey Questionnaires
10. Vehicle Owner Survey Questionnaires
11. Vehicle Driver Survey Questionnaires
12. Transport User's Survey
13. Focus Group Discussion Guidelines
14. Key Informant Interview Questions
15. Road Observation Check list

1.7.2 Computer Assisted Personal Interviewing (CAPI)

The tablet based Computer Assisted Personal Interviewing (CAPI) app was utilized for household survey. The CAPI platforms have been useful in customizing the survey, collecting specific data as required, such as photographs, information from a list selected, record GPS coordinates, etc. Using CAPI helped in managing data collection process easier for data management team since data were submitted in real time, allowing survey supervisors to see the pace of data collection, the coverage, and which data collectors were submitting datasets when and from where. It made entering and aggregating data easier. CAPI development was started after finalization of quantitative paper questionnaire. The mobile data server called Survey Solutions was utilized. The devices used for data collection were android tablets, power back-ups, SIM / data cards for household survey. However, paper based questionnaires/checklist were used for KII, FGD, Community Surveys and Traffic Count Survey. Laptops were provided to field supervisors for data validation in the field, and desktop computers were provided to data checkers with access to central server in Kathmandu.

1.7.3 Manual & Guidelines

An orientation training manual and data collection guidelines were prepared to complete the field work systematically. The field survey guidelines clearly described about the detailed process and handling of CAPI in Survey Solutions. A google.doc document was created and shared with all team members to access and update the field survey progress and data entry progress. The manual and guideline were explained to field survey teams during the orientation training and provided hard for field. Detail training manual and survey guidelines were finalized in consultation with the client.

1.8 SELECTION AND ORIENTATION OF FIELD TEAM

For selection of the field teams, the Consultant has given priority to those who have worked in the baseline and impact surveys, and those have demonstrated ability to work as per requirements. The selection was made from the roaster of perspective enumerators and supervisors from similar previous projects. Adequately qualified enumerators and supervisors with good understanding of such survey works and good knowledge of geography, local languages and other socio-cultural environment were deployed for data collection and supervision. Field survey activities were monitored by core team members.

Based on the manual prepared, a five-day orientation training was conducted including pre-test exercise to field survey team. The orientation training and pre-testing were observed by the Client's representatives. The survey tools, questions/checklists/ templates and field survey procedures were revised and finalized after pre-testing exercise conducted in Bhimdhunga-Lamidada-Galchhi Road, Dhading. All field survey teams and senior consultants including team leader took part in the pre-testing process.

1.9 DATA COLLECTION

The sample area was divided in five different clusters, and five field survey teams were mobilized for data / information collection. Each field survey team was comprised of a field supervisor, assistant supervisor and two enumerators. They were fully equipped with survey tools, contact details and necessary logistics.

Senior Consultants including the team leader monitored the field survey teams and data collection process in the field and from the central server on regular basis in coordination with SNRTP/ CPCU, PMUs and IDOs. Moreover, data manager and data checkers from central server monitored data quality and provided technical support on daily basis.

1.10 DATA MANAGEMENT

Survey Solution application was used for online web-based data collection from households. The household survey data was obtained and compiled into a master server and saved accordingly as an original version. Separate DO files were created and put the corrected data on the STATA file. All the facilities available in the software for the consistencies check-up were carefully utilized to make the data entry program design robust. The program was pre-tested before actual entry of field data from the pre-test survey works. Other remaining survey data was compiled and processed using spread sheet.

The quantitative data obtained in hard copy from other than household survey were entered in to computer and analyzed for reporting. Likewise qualitative information were coded and converted into frequency and percentage for analysis. Field notes were summarized in matrix form. All these quantitative and qualitative data / information collected from different sources and respondents were analyzed and triangulated in the findings of the study.

1.11 REPORT PREPARATION AND SUBMISSION

Based on the findings from qualitative and qualitative surveys a draft report was prepared, and the findings was submitted to the Client for comments/suggestions. All the comments and suggestions received from the Client would be incorporated and re-submitted the draft final report for dissemination at the joint consultation meeting. The comments and suggestions received in joint consultation meeting will also be incorporated before sharing in the dissemination workshop with wider stakeholders. The Consultant will present the findings of impact evaluation study report at the dissemination workshop for the purpose of information sharing. A half-day workshop would be conducted with the facilitation of Client /SNRTP where relevant stakeholders would be invited for sharing of the results and documentation of discussion. After incorporation of valid comments/ suggestions/ feedbacks, final impact evaluation study report would be prepared and submitted to the Client.

1.12 LIMITATIONS AND CHALLENGES OF THE STUDY

Few limitation were observed and experienced during the study:

- Respondents were requested to recall and provide information on above indicators at a particular point in time (before project launch/ intervention). Recall always involves a risk of bias due to memory or distortion. The reliability of recall data also depends on the nature of the outcome variable being studied. For example, families will usually be able to recall major events such as a death in the family or enrollment of a child in school, but it may be more difficult to obtain reliable responses on income and expenditure. In such case, taking baseline of control roads using recall method is not rationale. Moreover, there would not have spontaneous change in those roads over the time (within three year).
- Provision of one person for Data Manager and GIS Specialist as per ToR was not practical. The provision of technical input for assessment of quality, safety, bio-engineering and safeguards aspects of the roads was not envisaged, so the study could not dealt with such important aspects.

1.13 ORGANIZATION OF THE REPORT

This impact evaluation report contains seven chapters and annex section. Chapter 1 dealt with background, study objectives, scopes, key indicators, approach and methodology, study area and study sample, survey tools/instruments, field survey administration, data collection, data management and report preparation. Chapter two describes about the background of SNRTP, its components, and review of relevant literatures. Chapter three illustrates the traffic situation. Chapter four illustrates socio-economic conditions. Chapter five presents status of women in the project area. Chapter six describes impact on access to services. Chapter seven deals with the perception of local stakeholders on the project. Chapter eight provides the conclusion of the study and recommendation. Additional and detail information are presented in annex section of the report.

2. LITERATURE REVIEW

2.1 SNRTP PROJECT BACKGROUND

Project for Strengthening the National Rural Transport Program (SNRTP) was implemented by the Government of Nepal in support of the World Bank with aims to provide all-weather road access to all local levels (Rural Municipality and Municipality) by gradually upgrading the District Road Core Network (DRCN) and providing proper maintenance with the aim of promoting economic growth, providing access to services and creating sustainable decent jobs in rural areas. Currently a large majority of roads are only fair-weather and in poor condition, with a large portion of roads not trafficable. Insufficient maintenance is being carried out, further aggravating the situation.

The SNRTP project was designed to strengthen the DRCN with a particular emphasis on the "Maintenance First" approach. This project furthermore covered the upgrading and rehabilitation of rural roads as well as the construction of new river crossing structures to bring the roads to an all-weather maintainable standard. The project has covered the 37 districts with a total population of more than 14.6 million.

Project strategy: The project contributes at improving rural accessibility. It has two key components; (i.) Institutional strengthening and beneficiary monitoring of physical works and (ii.) Maintenance and upgrading of rural transport infrastructure.

Project outputs: There are two outcomes to be achieved from this Project:
Outcome 1: Increased access to all-weather transport connectivity
Outcome 2: Improved reliability of rural transport infrastructure

The Project targeted to create 3.9 million days paid job through maintenance. It has employed local workers, mainly women and in coordination with financial institutions and service providers on skill development training on road maintenance and income generation to improve the economic situation.

2.2 PROJECT AREA

Table 2.1: SNRTP Project districts spread in all 7 in provinces of Nepal

Cluster	Name of Province	No. of Project Districts	Name of Districts
Eastern Cluster PMU Hetauda	Province No. 1	4	Bhojpur, Sankhuwashabha, Tehrathum, Udayapur
	Province No. 2	8	Bara, Dhanusha, Mahottari, Parsa, Rautahat, Saptari, Sarlahi, Siraha
	Province No. 3	5	Makawanpur, Dhading, Nuwakot, Rasuwa, Sindhupalchowk
Western Cluster	Gandaki Province	6	Gorkha, Kaski, Nawalparasi-East,

Cluster	Name of Province	No. of Project Districts	Name of Districts
PMU Butwal			Syangja, Tanahun, Lamjung
	Province No. 5	10	Arghakhnchi, Banke, Bardiya, Dang, Gulmi, Kapilvastu, Nawalparasi-West, Palpa, Pyuthan, Rupandehi
	Karnali Province	2	Surkhet, Salyan
	Sudurpaschim Province	2	Kailali, Kanchanpur
	Total	**37**	

Figure 2.1: SNRTP Project Districts in the Map of Nepal

2.3 PROJECT DEVELOPMENT OBJECTIVE AND OUTCOMES

The Project Development Objective (PDO) for this project is to enhance the availability and reliability of transport connectivity for rural communities in the participating districts.

Project outcomes include (i) increased access to all weather transport connectivity for communities in participating districts; and (ii) improved reliability of rural transport infrastructure in participating districts. The indicators are listed in the table below.

Table 2.2: PDO Indicators of SNRTP

PDO level result	PDO level indicator
Increased access to all weather transport connectivity	PDO 1: Percentage of population within 2 and 4 hours walking distance from an all-weather road in the participating *Terai* and *Hill* districts respectively.
Improved reliability of rural transport infrastructure	PDO 2: Percentage of district core road networks (DRCN) in participating districts rated in "good" or "fair" condition.

2.4 PROJECT COMPONENTS

The PDO would be achieved through the following two components:

Component A: Institutional Strengthening and Technical Assistance
Component A would fund three categories of activities including: (A1) institutional strengthening and technical assistance; (A2) beneficiary monitoring of physical works under Component B of the project; and (A3) an impact study of selected project interventions.

Table 2.3 Component A: Institutional Strengthening and Technical Assistance

A1	**Institutional strengthening and Technical Assistance**
A1.1	Staff training on specific technical, fiduciary, or safeguards related subjects
A1.2	Capacity building of DoLI, CPCU, PMU, MoPID, TID and IDO officials
A1.3	Procurement of vehicles (2 & 4 WD Double-Cab Pick-Ups and Jeeps) for CPCU, PMUs & IDOs
A1.4	Laboratory facilities and equipment
A1.5	Rental costs for CPCU, two PMU offices; salary costs, TSA & DSA of the project-based temporary employees in CPCU, PMUs T ID a n d IDOs (lab technicians, lab assistants, social mobilizer, computer operator, office assistant and 4 WD vehicle drivers); procurement of computers, photocopy machines, fax machines, and other office equipment; logistic support and other expenditures for MoFAGA, DoLI, CPCU, PMUs, MoPID, TID & IDOs (stationeries, fuel, furniture, water supply, electricity, security, telephone, internet facility, etc.); electricity back up (generators) and other ICT accessories and their installment

A1.6	Strengthening technical, environmental and social frameworks
A1.7	Technical audit and verification through NVC
A1.8	Implementation support consultancies (International Expert (ILO), both individuals and firms for engineering, safeguards, NGOs and others)
A1.9	Market infrastructure investment study and preparation activities
A2	**Beneficiary monitoring of physical works under component B of the project**
A3	**Impact study of selected project interventions**

Component B: Maintenance, Upgrading and Rehabilitation

Component B will support districts to implement physical works through two funding windows: (B1) output-based maintenance of rural transport infrastructure; and (B2) upgrading or rehabilitating rural transport infrastructure.

Table 2.4: Component B: Maintenance, Upgrading and Rehabilitation

B1	**Output-based maintenance (Window 1)**
	B1.1 Routine and periodic roads maintenance
	B1.2 Routine and periodic crossing structure maintenance
	Upgrading and rehabilitation (Window 2)
B2	B2.1 Roads upgrading and rehabilitation
	B2.2 New construction of crossing structures and rehabilitation

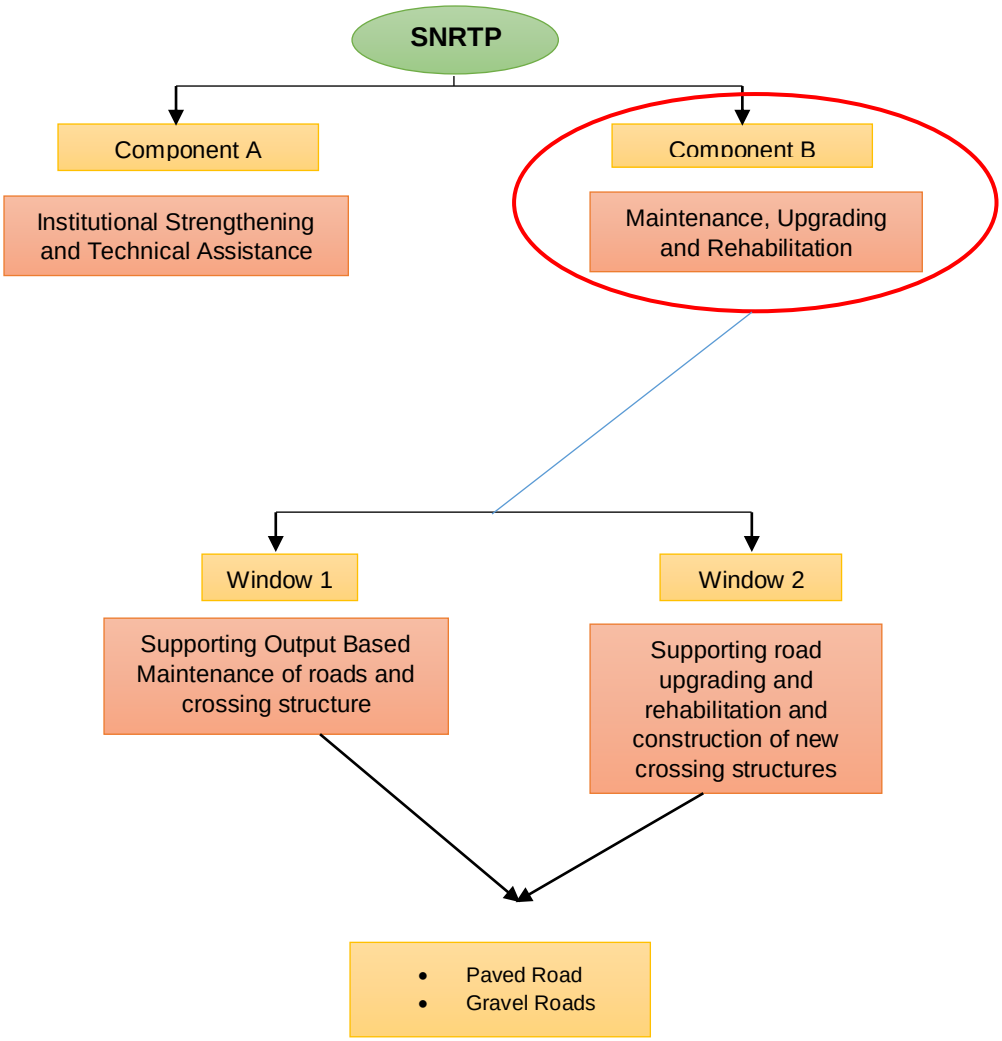
Window 1 supported routine and periodic maintenance of DRCN roads and crossing structures in the DRCN roads using a simplified output-based disbursement approach that ties release of IDA/ donor funds to the completion of works. Under Window 1, SNRTP also supported districts to operationalize Road Maintenance Groups (RMGs) for routine maintenance. Window 1 only supported works within existing rights of way along existing DRCN roads or crossing structures within the DRCN roads. Maintenance that requires new or extended rights of way were considered under Window 2 as rehabilitation works.

Window 2 supported road upgrading and rehabilitation as well as new crossing structure construction as needed to provide all weather connectivity in DRCN roads. Road upgrading and new crossing structure construction under window 2 must be complementary such that access along the integrated road linkage becomes possible year-round. Window 2 not support upgrading or new crossing structure worked alone unless uninterrupted year-round access was possible upon their completion. SNRTP directly managed funding for crossing structures and liaise with DoLI's Local Roads Bridge Program (LRBP).

The proposed assignment (impact evaluation) aimed to carry out Impact study for **component B** (window-1 and window-2). Under Component B of the project, Window 1 has been supporting

output based maintenance of roads and crossing structures whereas Window 2 has been supporting road upgrading and rehabilitation and construction of new crossing structures.

Figure 2.2: Project Background in a Gist



2.5 REVIEW OF RELEVANT REPORTS

The study team reviewed various relevant documents throughout the study period. Review of project related documents PAD, POM, ESMF and others as required by the set objective was carried out. The literature review was carried out especially of works in rural transport sector conducted by multilateral and bilateral agencies like World Bank, Asian Development Bank, DFID, JICA etc. and all the project related documents including monitoring reports. Being a follow on project of RAIDP, the impact result would be useful as baseline information for this study. Hence, impact study report of RAIDP was carried out. Review of relevant survey manuals for Household Survey, Community Survey, Market Survey, Business Survey, Transport Owner Survey, and Transport User Survey as may be available was carried out.

Following relevant reports / documents were reviewed, and on which basis the impact evaluation study modality was designed:

2.5.1 Concept Note on Impact Evaluation Design (draft), August 2015

The comprehensive Impact Evaluation Design Report was prepared by SNRTP with objective to carry impact study, having input from International Consultant (Shahidur R. Khandaker, Ph.D. procured through ILO) for the Baseline and impact Study in August 2015. As it is important to carry out a full-blown impact study, it is imperative to have a baseline survey of communities and households so as to acquire the baseline socioeconomic information in both to-be-treated and not-to-be-treated communities with road intervention. The Report has illustrated the indicators of rural welfare may be rural income, employment, migration, and access to social and economic services such as markets, schools and health services in order to measure the extent and nature of overall benefits of road interventions. The design categorically stated the sources of data its sampling procedure and size and appropriate tools that can be complied during collection of data. The report will be review and update the design in the present scenario and comply accordingly during establishment of baseline and impact study. Findings of relevant impact study of similar roads such as impact study of RAIDP will be reviewed and compared along with the findings of this impact study and reconstruction of baseline whenever applicable.

2.5.2 Socio-economic Impact Study Report of RAIDP, December 2013

The study was intended to examine whether the project has been able to meet the following PDO indicators in compared to baseline values:

- 20 percent increase in motorized and non-motorized trips by beneficiaries by End of Project (EOP).
- 20 percent reduction in travel time by beneficiaries by EOP.
- 30 percent increase in annual average daily traffic (AADT) within the project districts in the categories bus, truck, microbus and jeep.

This socio-economic impact study was covered 22 sample road subprojects (completed section only) identified by RAIDP/DoLIDAR. A baseline study was conducted in 2011 during the implementation of AF project in a total of 40 road sub-projects (20 roads from 20 old districts and 20 roads from 10 newly added districts). The findings of this study could not be considered as baseline information, and could not be compared with impact study findings because the sample roads in both cases are different, not the same.

2.5.3 Other Reports/Documents Consulted

- Terms of Reference (ToR) document attached in **Annex 6** section for Impact Study of SNRTP, November 23, 2018
- Environmental and Social safeguard Management Framework (ESMF-revised) for SNRTP, December 2015
- Implementation Status & Results Report of SNRTP, the World Bank, April 23, 2019
- Project Appraisal Document (PAD) of SNRTP, the World Bank, Nov 13, 2014
- Project Operations Manual (Version-3) Project for Strengthening the National Rural Transport Program (SNRTP), DoLI, 2018
- Report on External Review of Motorable (Local) Road Bridge Programme (MLRBP), 2015

- Report on External Review of District Road Support Programme (DRSP), 2013
- Project Completion Report (PCR) Sub-regional Transport Enhancement Project (STEP), 2018
- Project Completion Report (PCR) of Road Connectivity Sector Project 1 (RCSP 1), 2016
- Socio-Economic Impact Study of Road Sector Development Project (AF) Construction Supervision Phase-II, 2015.

3. TRAFFIC SITUATION

3.1 TRAFFIC DATA COLLECTION

To understand the volume and composition of traffic movements in the project roads Classified Manual Vehicle Counts (CMVCs) were carried out in all the treatment roads during the preparation of the Detailed Project Reports (DPRs) and Annual Average Daily Traffics (AADTs) were estimated for the roads. The average AADTs of paved, gravel and for whole treatment roads are presented in Table 3.1.

To estimate AADTs of the treatment roads after the project CMVCs are carried out for three days starting from 6 am in the morning to 8 pm in the evening each day. The results of the CMVCs of each day are adjusted to 24 hour traffic and averaged for number of days of counts to determine the Average Daily Traffic (ADT). Traffics in the roads of Nepal are subject to a range of influences, some of which are markedly seasonal. The seasonal influences are usually crop harvestings and rainfall. During the harvesting season, traffic levels are increased due to more movements of labour, transport of crops and increase in other associated activities. The impact of rainfall on traffic level is due to disruptions by the damages of roads. The calculated ADTs of roads and tracks in Nepal show that traffic levels are usually below the annual average during the period July to November. Between December and June traffic levels are higher than the annual average. Department of Roads (DoR) has calculated seasonal conversion factors (SCFs) to be used to convert observed ADTs of roads of Nepal in different months to AADTs. Current CMVCs for the study was carried out during the month of August. The DoR's calculated SCF to convert ADT of the month to AADT is 1.93. This SCF is used to obtain AADTs of the treatment roads. Table 3.2 shows the average AADTs in the paved roads, gravel roads and treatment roads as a whole after the project.

Table 3.1: AADTs of Treatment Roads Before the Project

Road Type	Motor Cycle/ Scoter	Car	Utility Vehicle	Bus	Mini-bus	Micro	Heavy Truck	Light Truck	Tractor	Total
Paved	28	10	16	7	6	8	10	11	42	139
Gravel		5	9	3	6	0	9	7	24	63
Treatment	28	9	14	6	6	6	10	10	38	127

Source: DPRs of SNRTP

Table 3.2: AADTs of Treatment Roads After the Project

Road Type	Motor Cycle/ Scooter	Car	Utility Vehicle	4-WD	3-Wheeler	Bus	Mini-bus	Micro-bus	Multi Axel Truck	Heavy Truck	Light Truck	Tractor	Total
Paved	1372	55	58	64	426	21	46	35	1	9	25	97	2209
Gravel	889	7	25	20	149	7	18	8	0	9	10	52	1194
Treatment	1130	31	42	42	287	14	32	22	1	9	18	75	1702

Source: Field Survey

3.2 COMPARISONS OF AADTS IN THE TREATMENT ROADS

It is understood that normal traffics of a road grows whether the road is improved/upgraded or not. Hence, the AADTs of treatment roads before the project (during 2014) are projected to 2019 level using nominal traffic growth rates for meaningful comparisons with the AADTs of treatment roads after the project (during 2019).
Traffic growth is related to the output of the economy that produces it. Traffic is almost invariably positively correlated with GDP and traffic growth with GDP growth. The relationship is as follows:

Q = k (real GDP)^e
where, Q is some measure of demand for transport, k is a constant and exponent 'e' is the elasticity of demand for transport with respect to GDP. Elasticity is the proportional change in demand per unit change in real GDP, so an elasticity of 0.2 implies a 2 percent growth in transport demand in response to a 10 percent in real GDP.

When a road is constructed or upgraded in rural areas of Nepal passenger traffic such as cars are not observed to increase much except buses and motorcycles. In most cases buses are found to increase remarkably. It is may be due to lower income levels of people in the influence area which are mostly based on agriculture economy. Most of the people cannot afford car. Motorcycles are cheap and public passenger transport fares are quite low which can be afforded by even poor people. Hence, motorcycles and buses are found to increase considerably after the construction or upgrading of roads. Similarly, transport cost by truck is very cheap compared to those costs by porters or animal and truck and truck traffic tend to increase considerably after the construction or upgrading of roads. Since the project area is rural, elasticity for demand for motorcycles, buses and trucks transport is assumed to be higher as in other parts of Nepal. The estimated elasticities for all types of transport are shown in Table 3.3.

Table 3.3: Elasticity of Demand for Transport

Vehicle Type	Price Elasticity	
	2015 - 2018	2019 - 2045
Car/Taxi/Van	0.8	0.7
Motorcycle	1.8	1.7
Trucks/Tippers/Tractors	1.35	1.25
Bus/Rickshaw/Jeep	1.7	1.6
Pickup	1.35	1.25

Source: Consultants' estimates, 2019

The gross domestic product (GDP) of Nepal grew at an average annual rate of 4.6% between FY2008 and FY2018 and is forecast to grow at 7.2% in the future. GDP growth rates and above elasticities are used to obtain traffic growth. The traffic growth rates are used to project future traffic. Annual traffic growth rates by vehicle types forecasted for the analysis are summarized in **Error! Reference source not found.**3.4.

Table 3.4: Estimated Annual Traffic Growth Rate

Period	Growth Rate (%)					
	Car	Motorcycle	Bus/Rickshaw/Jeep	Truck	Pickup	Tractors
2015-18	3.8	8.6	8.2	6.5	6.5	6.5
2019-2045	5.0	12.2	11.5	9.0	9.0	9.0

Source: Consultants' estimates, 2019

Traffic growth rates shown in Table 3.4 are used to project the before the project traffic to 2019 level. Table 3.5 shows the comparisons of AADTs of roads before and after the project. The AADTs in the roads before project in 2019 are the traffics which would have been grown without the project. The difference between the before and after project AADTs are generated traffic due to the implementation of the project. The table clearly shows average AADTs increased by 845% over all after the project. AADTs are higher in the paved roads compared to the gravel roads. Three wheelers and 4WD vehicles are added in the AADTs.

Table 3.5: AADTs of Treatment Roads before and after the Project

Road Type	Status	Motor Cycle/ Scotoor	Car/ Taxi	Utility Vehicle	4-WD	3-Wheeler	Bus	Mini-bus	Micro	Multi Axel Truck	Heavy Truck	Light Truck	Tractor	Total
Paved	Before Project	43	12	24			10	9	12		13	15	58	197
	AfterProject	1372	55	58	64	426	21	46	35	1	9	25	97	2209
Gravel	Before Project	0	7	13			4	9	1		13	9	33	88
	AfterProject	889	7	25	20	149	7	18	8	0	9	10	52	1194
Treatment	Before Project	43	11	21			8	9	9		13	13	52	180
	AfterProject	1130	31	42	42	287	14	32	22	1	9	18	75	1702
	% Change	2544%	182%	96%			66%	241%	141%		-33%	33%	44%	845%

Source: Traffic surveys and estimates, 2019

4. SOCIO-ECONOMIC CONDITION

4.1 GENERAL

Nepal is a land linked country. Geographically it lies between 80^0 4' and 88^0 12' East Longitude and 26^0 22' and 30^0 27' North Latitude. The total area of the country is 147,181 sq. km. The east, south and west part of country is bordered by India and north part by China. Politically, Nepal is divided into seven provinces including 77 districts. Ecologically, it is divided into three regions - Mountain, Hill and Terai. The Mountain region covers 15 percent area where Hill and Terai regions cover 68 and 17 percent area respectively. According to the Population Census 2011, total population of Nepal is 26,494,504. The percentage of male and female population is 48.50 and 51.50 respectively. The sex ratio is 94.2. As per the population projection 2019, total population of the country is 29,609,623 with sex ratio of 94.1. As a land linked country, Nepal relies on road transport as the principal means of transportation.

4.2 SOCIAL CHARACTERISTICS

The project area is located in 37 districts representing all seven provinces including mountain, hill and terai ecological regions. Altogether 30 treatment roads including 15 paved and 15 gravel spread in 36 palikas in 21 districts have been covered on sampling basis by this study. The list of sample project districts and palikas are presented in Table 4.1.

Table 4.1: Sample Project Districts and Study Palikas

S.N.	Project Districts	No of Roads	Study Palikas
1.	Sankhuwasabha	2	Chainpur and Khandbari Municipality
2.	Udaypur	2	Belaka, Triyuga Municipality
3.	Saptari	2	Rajbiraj Municipality and Agnisair Krishnasawara, Tirhut Rural Municipality
4.	Siraha	1	Kalyanpur Municipality
5.	Dhanusha	2	Hansapur, Nagarain Municipality and Mukhiyapatti Musaharmiya Rural Municipality
6.	Rautahat	1	Ishanath, Paroha Municipality
7.	Parsa	2	Birgunj Metropolitian City and Bidabasini, Pakaha Mainpur Rural Municipality
8.	Nuwakot	2	Bidur Municipality and Suryagadhi Rural Municipality
9.	Tahanun	2	Bhanu Municipality and Ghiring Rural Municipality
10.	Kaski	1	Pokhara Lekhnath Metropolitan City
11.	Syangja	1	Putalibazar Municipality and Arjun Chaupari Rural Municipality
12.	Nawalpur	1	Devchuli Municipality
13.	Rupandehi	1	Gaidahawa Rural Munucipality
14.	Kapilvastu	2	Mayadevi, Suddhodhan Rural Municipality
15.	Arghakhanchi	2	Bhumikasthan, Sandhikharka Municipality
16.	Dang	1	Rajpur Rural Munucipality

S.N.	Project Districts	No of Roads	Study Palikas
17.	Surkhet	1	Lekbesi Municipality
18.	Banke	1	Duduwa Rural Munucipality
19.	Bardiya	1	Madhuwan Munucipality
20.	Kailali	1	Dhangadi Sub-Metropolitan City and Godhawari Municipality
21.	Kanchanpur	1	Punarbas Municipality
	Total	**30**	

Source: Field Study, 2019

4.2.1 Demography of Project Districts

The total population of 21 sample project districts was 10,187,008 as per the Population and Housing Census of Nepal 2011. The population of male was 48.6 percent where the population of female was 51.4 percent. The average household size of the project district was 5.2 whereas the sex ratio was 94.5. As per the population projection 2019, total population of these districts is 11,525,211 where the population of male and female is 5,586,364 and 5,938,847 respectively. The sex ratio of projected population is 94.1. The population composition of project districts is given in Table 4.2.

Table 4.2: Population of Project Districts

No. of HH	Male	Female	Total	HH Size	Sex Ratio
1,973,637	4,950,385	5,236,623	10,187,008	5.2	94.5

Source: Population and Housing Census of Nepal 2011, CBS, 2012

4.2.2 Demography of Project Palika

Project impact zone falls under 36 Palikas (Municipalities and Rural Municipalities) including two metropolitan cities, one sub-metropolitan city, 20 municipalities and 13 rural municipalities. According to Population Census 2011, total population of the study area was 2,091,199 where the population of male and female was 48.5 percent and 51.5 percent respectively. The average household size was 4.9. As per the population projection 2019, total population of project Palika is 2,367,956 with sex ratio of 94.0. The projected population of male and female is 1,149,862 and 1,218,094 respectively. Table 4.3 presents the population composition of project Palika.

Table 4.3: Population of Study Palikas

No. of HH	Male	Female	Total	HH Size	Sex Ratio
430,398	1,013,511	1,077,688	2,091,199	4.9	94.0

Source: Population and Housing Census of Nepal 2011, CBS, 2012

4.2.3 Demography of Surveyed Households

During impact study a total of 1,080 households from 60 settlements in project impact zone (540 HHs in Z_0 settlements and 540 in Z_1 settlements) were surveyed. The total population of surveyed households is 6,083 of which 53.1 percent is male and 46.9 percent is female. In contrast, female population is higher than male in district level and national level statistics mentioned above. The sex ratio of project area is 113.2 which is interestingly higher than the

district level ratio of 94.5 and national level ratio of 94.2. The average household size of the study area is 5.6, which is higher than national average i.e. 4.9. Population composition of the surveyed household is presented in Table 4.4.

Table 4.4: Population Composition of Surveyed Households

Road Type	Male		Female		Total Population	Total Household	Average HH Size
	No.	%	No.	%			
Paved Roads	1,691	53.2	1,485	46.8	3,176	540	5.9
Gravel Roads	1,538	52.9	1,369	47.1	2,907	540	5.4
Total	**3,229**	**53.1**	**2,854**	**46.9**	**6,083**	**1,080**	**5.6**

Source: Field Study, 2019

4.2.4 Sex of Household Head

A total 1,080 households were surveyed in 30 treatment roads. Among them, only 11.4 percent are female-headed households and 88.6 percent are male-headed households. The percentage of female headed household in the survey area is much lower (11.4%) compared to national level statistics (25.73%). The sex wise information of household heads is presented in Table 4.5.

Table 4.5: Sex of Household Heads of Study Area

Road Type	Male		Female		Total Household
	No.	%	No.	%	
Paved Roads	493	91.3	47	8.7	540
Gravel Roads	464	85.9	76	14.1	540
Total	**957**	**88.6**	**123**	**11.4**	**1,080**

Source: Field Study, 2019

4.2.5 Age Composition of Surveyed Population

The age group of the surveyed population is classified as below 5 years, 5-15 years, 15-60 years, and above 60 years. Among the total population, 61.7 percent is within the age group of 15-60 years i.e. economically active population which is higher than the national average of 57 percent. The proportion of below 5 years age group is 7.4 percent. Likewise, the population of 5 to15 years of age group is 18.6 percent. The aged population above 60 years is 12.3 percent. Age-wise distribution of surveyed population is presented in Table 4.6.

Table 4.6: Age-wise Distribution of Surveyed Population

Road Type	< 5 Years		5-15 Years		15-60 Years		>60 Years		Total Population
	No.	%	No.	%	No.	%	No.	%	
Paved Roads	253	8.0	627	19.7	1,938	61.0	358	11.3	3,176
Gravel Roads	195	6.7	506	17.4	1,815	62.4	391	13.5	2,907
Total	**448**	**7.4**	**1,133**	**18.6**	**3,753**	**61.7**	**749**	**12.3**	**6,083**

Source: Field Study, 2019

4.2.6 Ethnic Composition

The project area is composed of multi-ethnic communities. Brahmin, Chhetri, Janajati, Madhesi, Dalit and Muslim are major caste/ethnic groups living in the project area. Among the total surveyed households, 27.9 percent is Janajati, 22.9 percent is Madhesi, 18.1 percent Dalit, 13.1 percent Chhetri, 13 percent Brahmin and 5.1 percent Muslim households. The ethnic composition of the surveyed households is presented in Table 4.7.

Table 4.7: Ethnic Composition of Surveyed Households

Road Type	Brahmin		Chhetri		Janajati		Dalit		Madhesi		Muslim		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Paved Roads	68	12.6	61	11.3	102	18.9	99	18.3	164	30.4	46	8.5	540
Gravel Roads	72	13.3	81	15.0	199	36.9	96	17.8	83	15.4	9	1.7	540
Total	**140**	**13.0**	**142**	**13.1**	**301**	**27.9**	**195**	**18.1**	**247**	**22.9**	**55**	**5.1**	**1,080**

Source: Field Study, 2019

4.2.7 Educational Status

Among the surveyed population, the overall literacy rate is 82.7 percent, which is higher than the national average of 65.9 percent. The male literacy rate of study area is 90.3 percent while the female literacy rate is 74.1 percent. The population with a graduate and above education level is 2.8 percent only in which the population of male is 3.4 percent and female is 2.1 percent. The educational status of surveyed population is given in Table 4.8.

Table 4.8: Educational Status of Surveyed Population (5 Years and Above)

Road Type	Illiterate		Informal		Basic		Secondary		SEE-Plus 2		Graduate & Above		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Paved Roads	572	19.9	330	11.5	1,147	39.9	280	9.7	451	15.7	92	3.2	2,872
Gravel Roads	385	14.4	313	11.7	986	36.9	370	13.9	552	20.7	63	2.4	2,669
Total	**957**	**17.3**	**643**	**11.6**	**2,133**	**38.5**	**650**	**11.7**	**1,003**	**18.1**	**155**	**2.8**	**5,541**

Source: Field Study, 2019

4.2.8 School Dropout Status

School dropout status was calculated among 1,158 children of age group 6-18 years. The study shows that the overall school dropout rate is 5.3. The school dropout rate of girls is higher (7.0) than the boys (4.2). The school dropout rate of school aged children is given in Table 4.9.

Table 4.9: School Dropout Status of Study Area by Sex

Road Type	Male/Boy				Female/Girl				Total			
	Yes		No		Yes		No		Yes		No	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Paved Roads	19	5.7	312	94.3	32	10.5	272	89.5	51	8.0	584	92.0
Gravel Roads	7	2.4	282	97.6	3	1.3	231	98.7	10	1.9	513	98.1
Total	**26**	**4.2**	**594**	**95.8**	**35**	**7.0**	**503**	**93.5**	**61**	**5.3**	**1,097**	**94.7**

Source: Field Study, 2019

4.2.9 In-Migration of Household

Migration from hill to Terai and rural area to urban area is a common phenomenon in the country. The cause of migration to urban area is for the better economic opportunities and social services. Out of 1080 households, 12.2 percent households were in-migrated in the project influence zone. In-migration of households along the paved roads is 7.6 percent and along gravel roads is 16.9 percent. This is due to the better socio-economic opportunities available along the road. Table 4.10 shows the in-migration status of the study area.

Table 4.10: In-Migration Status of Project Area

Road Type	Yes		No		Total Household
	No.	%	No.	%	
Paved Roads	41	7.6	499	92.4	540
Gravel Roads	91	16.9	449	83.1	540
Total	**132**	**12.2**	**948**	**87.8**	**1,080**

Source: Field Study, 2019

4.2.10 Purpose of In-Migration

The major purpose for in-migration in the area is for employment, which is 40.8 percent while 30.3 percent in-migration is for education service. Similarly, 26.5 percent in-migration is for trade and business. Other purpose for in-migration in the area is 2.5 percent. Table 4.11 shows the purposes of in-migration in the study area.

Table 4.11: Purpose of In-Migration of Households of Study Area

Road Type	Employment		Trade		Education		Others		Total Responses
	No.	%	No.	%	No.	%	No.	%	
Paved Roads	28	37.8	22	29.7	22	29.7	2	2.7	74
Gravel Roads	69	42.1	41	25.0	50	30.5	4	2.4	164
Total	**97**	**40.8**	**63**	**26.5**	**72**	**30.3**	**6**	**2.5**	**238**

Source: Field Study, 2019

4.3 ECONOMIC CHARACTERISTICS

4.3.1 Occupational Status

Agriculture, service (governmental and non-governmental), trade and business, wage labor, foreign employment and household chores are the occupation of the population in the project area. Agriculture is the major occupation of 50.1 percent population. This is followed by household chores which accounts for 17.4 percent of the population. Foreign employment is an attractive occupation and is a major source of remittance earning. About of 13.1 percent of the surveyed population are engaged in foreign employment. The population engaged in wage labor is 12.2 percent while the population engaged in trade is 7 percent. The population engaged in service is 6.5 percent. The occupational status of people in the study area is given in Table 4.12.

Table 4.12: Occupational Status of Study Area

Road Type	Agriculture		Service		Trade		Foreign Job		Wage Labor		Household Chores		Others		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Paved Roads	919	47.3	107	5.5	98	5.0	208	10.7	254	13.1	323	16.6	34	1.7	1,943
Gravel Roads	789	53.8	116	7.9	141	9.6	238	16.2	161	11.0	270	18.4	22	1.5	1,467
Total	**1,708**	**50.1**	**223**	**6.5**	**239**	**7.0**	**446**	**13.1**	**415**	**12.2**	**593**	**17.4**	**56**	**1.6**	**3,410**

Source: Field Study, 2019

4.3.2 Land Holding Size

The major land holding found in the project area is irrigated wetland followed by un-irrigated wetland, cultivated dry land, fallow land and forest land. The average land holding size of the study area is 0.60 hectare including all types of land which is lower than the national average of 0.96 ha. The average irrigated wetland holding is 0.32 hectare. Table 4.13 presents the land holding pattern and size in the project area.

Table 4.13: Land Type and Land Holding Size of Study Area (in Hectare)

Road Type	Irrigated Wetland		Unirrigated Wetland		Cultivated Dry Land		Fallow Land		Forest		Total	
	Total	Average	Total	Average	Total	Average	Total	Average	Total	Average	Total	Average
Paved Roads	177.13	0.33	50.41	0.09	31.84	0.06	35.54	0.07	6.81	0.01	301.72	0.56
Gravel Roads	169.31	0.31	67.63	0.13	58.57	0.11	40.76	0.08	11.89	0.02	348.16	0.64
Total	**346.44**	**0.32**	**118.04**	**0.11**	**90.41**	**0.08**	**76.29**	**0.07**	**18.70**	**0.02**	**649.88**	**0.60**

Source: Field Study, 2019

4.3.3 Household Income

The annual average household income of the project area is NRs. 370,000, which was NRs. 287,056 before project. The average per capita income of the project area is NRs. 65,768. The household income of the project area has increased by 29 percent. The income of surveyed households including average and per capita has been given in Table 4.14.

Table 4.14: Annual Household and Per Capita Income (NRs.)

Road Type	Total Income		Average HH Income		Per Capita Income		Change %
	Before	After	Before	After	Before	After	
Paved Roads	142,868,489	196,419,254	264,571	363,739	44,984	61,845	37.5
Gravel Roads	167,151,982	203,647,699	309,541	377,125	57,500	70,054	21.8
Total	**310,020,471**	**400,066,953**	**287,056**	**370,432**	**50,965**	**65,768**	**29.0**

Source: Field Study, 2019

4.3.4 Source of Household Income

Remittance, wage labor, service and trade are major sources of cash income in the study area. Among these sources, remittance contributes the highest amount which is 33.8 percent followed by wage labor of 16.6 percent. The contribution of service and trade in household income is 14.1 percent and 12.8 percent respectively. The income source of households is given in Table 4.15.

Table 4.15: Source of Household Income (NRs.)

Source	Before		After		Change %
	Amount	Percent	Amount	Percent	
Cereal Crops Sale	15,244,960	4.9	19,106,880	4.8	25.3
Vegetable Sale	1,141,680	0.4	2,010,366	0.5	76.1
Cash Crops Sale	728,000	0.2	1,018,380	0.3	39.9
Fruit sale	4,617,260	1.5	3,048,270	0.8	-34.0
Livestock Sale	23,543,630	7.6	26,462,950	6.6	12.4
Livestock Product	5,663,275	1.8	10,503,660	2.6	85.5
Service	42,806,800	13.8	56,575,550	14.1	32.2
Trade and Business	35,492,762	11.4	51,044,202	12.8	43.8
Remittance	107,455,552	34.7	135,106,978	33.8	25.7
Pension	15,235,112	4.9	18,273,130	4.6	19.9
Rent and Interest	1,334,640	0.4	1,984,787	0.5	48.7
Wage Labor	50,227,800	16.2	66,567,000	16.6	32.5
Others	6,529,000	2.1	8,364,800	2.1	28.1
Total	**310,020,471**	**100.0**	**400,066,953**	**100.0**	**29.0**

Source: Field Study, 2019

4.3.5 Household Expenditure

The average annual household expenditure of the project area is NRs. 135,805, which was NRs. 95,801 before project. Likewise, the per capita expenditure is NRs. 24,111. The study findings revealed that surveyed households have more income than expenditure. This means better socio-economic status in the project influence zone. The household expenditure of the project area has increased by 41.8 percent. The expenditure of the project area household including average annual and per capita is presented in Table 4.16.

Table 4.16: Annual Household Expenditure (NRs.)

Road Type	Total Expenditure		Average HH Expenditure		Per Capita Expenditure		Change %
	Before	After	Before	After	Before	After	
Paved Roads	46,840,838	67,982,847	86,742	125,894	14,748	21,405	45.1
Gravel Roads	56,624,273	78,686,783	104,860	145,716	19,479	27,068	39.0
Total	**103,465,111**	**146,669,630**	**95,801**	**135,805**	**17,009**	**24,111**	**41.8**

Source: Field Study, 2019

4.3.6 Items of Household Expenditure

The major household expenditure items in the study area are rituals, clothing, education, oil and spices, house construction and health treatment. The household expenditure in rituals is 10.8 percent whereas the expenditure in clothing is 10.7 percent. Likewise, the expenditure in education is 10.4 percent. The expenditure in oil and spices is 8.9 percent. Similarly, the expenditure in house construction is 8.1 percent. The expenditure in health treatment is 7.6 percent. The items of household expenditure of the project area is presented in Table 4.17.

Table 4.17: Items of Household Expenditure (NRs.)

Items	Before		After		Change %
	Amount	%	Amount	%	
Food Grains (rice, wheat, pulses etc.)	7,540,233	7.3	8,933,081	6.1	18.5
Cooking Oil, Spices, Salt, Sugar, Tea	10,877,343	10.5	13,015,704	8.9	19.7
Meat/Egg/Milk/Fish	8,646,254	8.4	10,696,112	7.3	23.7
Fruit and Vegetables	5,883,849	5.7	7,463,243	5.1	26.8
Clothing	12,465,085	12.0	15,706,825	10.7	26.0
Education	10,857,436	10.5	15,295,760	10.4	40.9
Health/Treatment	6,915,238	6.7	11,196,469	7.6	61.9
Rituals/Festivals	12,815,756	12.4	15,771,751	10.8	23.1
Agriculture Tools/Inputs	5,196,898	5.0	6,900,795	4.7	32.8
Transportation and Communication	5,547,510	5.4	7,231,573	4.9	30.4
Firewood, Gas, Petroleum	3,712,118	3.6	5,489,404	3.7	47.9
Electricity and Water	2,511,363	2.4	3,289,152	2.2	31.0
Tobacco and Alcohol	2,327,959	2.2	2,983,861	2.0	28.2
Entertainment/Recreation	1,953,931	1.9	3,112,914	2.1	59.3
Tax/Interest	1,991,519	1.9	3,544,093	2.4	78.0
Insurance	1,266,019	1.2	2,163,883	1.5	70.9
House Construction	2,732,000	2.6	11,834,300	8.1	333.2
Toilet Construction	15,000	0.0	660,000	0.4	4300.0
Others	209,600	0.2	1,380,710	0.9	558.7
Total	**103,465,111**	**100.0**	**146,669,630**	**100.0**	**41.8**

Source: Field Study, 2019

4.4 BASIC UTILITIES AND SERVICES

4.4.1 Types of Houses

The houses have been categorized into three types as *Kachhi* (mud, stone/brick foundation and mud, stone/brick, wall with straw roof), *Pakki* (cement, stone/brick foundation and cement, stone/brick wall with galvanized iron/slate/tile roof) and Modern (cement, stone/brick foundation and cement, brick wall with RCC roof). Most of the households have *Pakki* types of houses which is 50.9 percent, where it was 52.8 percent before project. Similarly, 34.3 percent households have *Kachhi* houses, which was 35.8 percent before project. Households with modern houses account for 14.8 percent, which was 11.4 percent before project. Table 4.18 presents the type of houses of the surveyed household in the study area.

Table 4.18: Type of Houses in the Study Area

Road Type	Kachhi				Pakki				Modern				Total HH
	Before		After		Before		After		Before		After		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Paved Road	150	27.8	144	26.7	333	61.7	316	58.5	57	10.6	80	14.8	540
Gravel Road	237	43.9	226	41.9	237	43.9	234	43.3	66	12.2	80	14.8	540
Total	**387**	**35.8**	**370**	**34.3**	**570**	**52.8**	**550**	**50.9**	**123**	**11.4**	**160**	**14.8**	**1,080**

Source: Field Study, 2019

4.4.2 Domestic Amenities

Cell phone, television, fan, cycle are the most widely owned household amenities in the project area. In overall 97.9 percent of households possess cell phone, which was 95.8 percent before project. The percentage of households possessing television is 61.3 percent, where it was 48.8 percent before project. Households possessing fan is 58.4 percent. Before project, households possessing fan was 53.6 percent. Likewise, 52.8 percent of households own cycles, and 21.2 percent households have motorcycles. Before project, the households owning cycles and motorcycles was 50.8 percent and 12 percent respectively. Household possessing different domestic amenities is presented in Table 4.19.

Table 4.19: Households Having Domestic Amenities

Amenities	Paved Roads				Gravel Roads				Overall				Change %
	Before		After		Before		After		Before		After		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Television	267	49.4	357	66.1	260	48.1	305	56.5	527	48.8	662	61.3	25.6
VCD/DVD	-	-	9	1.7	11	2.0	15	2.8	11	1.0	24	2.2	18.2
Computer	8	1.5	16	3.0	14	2.6	25	4.6	22	2.0	41	3.8	86.4
Telephone	-	-	2	0.4	1	0.2	2	0.4	1	0.1	4	0.4	300.0
Cell Phone	517	95.7	526	97.4	518	95.9	531	98.3	1,035	95.8	1,057	97.9	2.1
Internet	5	0.9	5	0.9	4	0.7	1	0.2	9	0.8	6	0.6	-33.3
Car	2	0.4	2	0.4	-	-	-	-	2	0.2	2	0.2	-
Jeep	1	0.2	1	0.2	1	0.2	1	0.2	2	0.2	2	0.2	-
Motorcycle	62	11.5	118	21.9	68	12.6	111	20.6	130	12.0	229	21.2	76.2

Amenities	Paved Roads				Gravel Roads				Overall				Change %
	Before		After		Before		After		Before		After		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Cycle	316	58.5	334	61.9	233	43.1	236	43.7	549	50.8	570	52.8	3.8
Fan	341	63.1	367	68.0	238	44.1	264	48.9	579	53.6	631	58.4	9.0
Iron	40	7.4	95	17.6	36	6.7	72	13.3	76	7.0	167	15.5	119.7
Rice-cooker	36	6.7	58	10.7	75	13.9	116	21.5	111	10.3	174	16.1	56.8
Refrigerator	13	2.4	58	10.7	21	3.9	49	9.1	34	3.1	107	9.9	214.7
Heater	6	1.1	2	0.4	-	-	4	0.7	6	0.6	6	0.6	-

Source: Field Study, 2019

4.4.3 Health Services

Major health service providing institutions in the project area are hospitals, health posts and primary health centers. Among the total households, 49.4 percent visit hospitals for treatment, which was 47.6 percent before project. Households visiting health post for treatment is 29.9 percent, which was 30.4 percent before project. Similarly, households responding place of treatment at private clinic is 6.7 percent, which was 5.3 percent before project. Information on households responding place of treatment is presented in Table 4.20.

Table 4.20: Households Health Seeking Behavior

Health Institution	Paved Road				Gravel Road				Overall			
	Before		After		Before		After		Before		After	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Hospital	196	43.5	205	46.5	108	57.4	114	57.6	304	47.6	319	49.9
PHC	56	12.4	45	10.2	46	24.5	38	19.2	102	16.0	83	13.0
HP/SHP	181	40.1	174	39.5	13	6.9	17	8.6	194	30.4	191	29.9
Nursing Home	2	0.4	0	0.0	1	0.5	1	0.5	3	0.5	1	0.2
Private Clinic	16	3.5	17	3.9	18	9.6	26	13.1	34	5.3	43	6.7
Faith Healer	0	-	0	0.0	2	1.1	2	1.0	2	0.3	2	0.3

Source: Field Study, 2019

4.4.4 Drinking Water Service

Piped tap, well/spring and ground water are different sources of drinking water in the project area. Ground water is the main source of drinking water followed by piped tap and well/spring. In the project area, 58.1 percent households have used ground water for drinking water source. Before project, households using ground water for source of drinking water was 57.8 percent. Likewise, 34.4 percent households have used piped tap for drinking water source, where it was 34.1 percent before project. Similarly, 7.4 percent of households use well/spring water as a source of drinking water, which was 8.1 percent before project. Table 4.21 shows the drinking water sources of the project area.

Table 4.21: Sources of Drinking Water

Road Type	Piped Water				Well/Spring				Ground			
	Before		After		Before		After		Before		After	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Paved Road	144	26.7	143	26.5	14	2.6	15	2.8	382	70.7	382	70.7
Gravel Road	224	41.5	229	42.4	74	13.7	65	12.0	242	44.8	246	45.6
Total	**368**	**34.1**	**372**	**34.4**	**88**	**8.1**	**80**	**7.4**	**624**	**57.8**	**628**	**58.1**

Source: Field Study, 2019

4.4.5 Toilet Facility

The status of sanitation in the region is reflected in terms of the availability of toilets. It is found that about 95.5 percent households of project area have toilet facility in the project area. Among the total households, 87.3 percent have pan toilet, where it was 81.6 percent before project. Likewise, 7.9 percent households have pit type toilet facility, which was 12.7 percent before project. Toilet facility of the surveyed households is presented in Table 4.22.

Table 4.22: Households Using Toilet Facility

Source	Paved Road				Gravel Road				Overall			
	Before		After		Before		After		Before		After	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Pit	105	19.4	62	11.5	32	5.9	23	4.3	137	12.7	85	7.9
Pan	398	73.7	450	83.3	483	89.4	493	91.3	881	81.6	943	87.3
Commode	2	0.4	2	0.4	-	0.0	1	0.2	2	0.2	3	0.3
No toilet	35	6.5	26	4.8	25	4.6	23	4.3	60	5.6	49	4.5

Source: Field Study, 2019

4.4.6 Use of Cooking Energy

Fire wood and liquefied petroleum gas (LPG) are major sources of cooking energy in the project area. In the project area 71 percent households use fire wood for cooking, which was 80.2 percent before project. Likewise, the use of LPG for cooking purpose is 18.9 percent, where it was 10.1 percent before project. The use of fire wood for cooking energy decreased by 11.4 percent and the use of LPG increased by 87.2 percent. Table 4.23 presents the cooking energy sources in the project area.

Table 4.23: Sources of Cooking Energy

Source	Paved Road				Gravel Road				Overall			
	Before		After		Before		After		Before		After	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Firewood	439	81.3	387	71.7	427	79.1	380	70.4	866	80.2	767	71.0
Dung Cake	50	9.3	54	10.0	38	7.0	37	6.9	88	8.1	91	8.4
LP Gas	46	8.5	94	17.4	63	11.7	110	20.4	109	10.1	204	18.9
Bio-Gas Plant	5	0.9	5	0.9	12	2.2	12	2.2	17	1.6	17	1.6
Kerosene	-	-	-	-	-	-	1	0.2	-	-	1	0.1

Source: Field Study, 2019

4.4.7 Use of Lighting Energy

Electricity is the main source of lighting energy in the project area. Presently, 97 percent households of the project area are using electricity for lighting purpose, where it was 96 percent before project. The households using solar for the lighting purpose is 1.9 percent. Table 4.24 presents the sources of lighting energy in the project area.

Table 4.24: Sources of Lighting Energy

Road Type	Electricity				Solar				Kerosene			
	Before		After		Before		After		Before		After	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Paved Road	522	96.7	529	98.0	3	0.6	2	0.4	15	2.8	9	1.7
Gravel Road	515	95.4	519	96.1	21	3.9	19	3.5	4	0.7	2	0.4
Total	**1,037**	**96.0**	**1,048**	**97.0**	**24**	**2.2**	**21**	**1.9**	**19**	**1.8**	**11**	**1.0**

Source: Field Study, 2019

4.4.8 Access to Communication Facility

Access to means of information and communications has increased in the project area. Overall 97.9 percent of households have access to cell phone services, where it was 95.8 percent before project. In the project area 61.3 percent households have access to television, which was 48.5 percent before project. Likewise, 32 percent households have access to FM radio in the project area. Status of communication services in the project area is given in Table 4.25.

Table 4.25: Access to Communication Facilities

Services	Paved Road				Gravel Road				Overall			
	Before		After		Before		After		Before		After	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Newspaper	2	0.4	-	0.0	4	0.7	14	2.6	6	0.6	14	1.3
Cell phone	517	95.7	526	97.4	518	95.9	531	98.3	1,035	95.8	1,057	97.9
Television	265	49.1	357	66.1	259	48.0	305	56.5	524	48.5	662	61.3
Internet	2	0.4	4	0.7	3	0.6	7	1.3	5	0.5	11	1.0
FM radio	159	29.4	149	27.6	217	40.2	197	36.5	376	34.8	346	32.0

Source: Field Study, 2019

5. STATUS OF WOMEN

The status of women in Nepal is poor and varied from one ethnic group to another throughout history. In the early 1990s, like in some other Asian countries, women in Nepal were generally subordinate to men in almost every aspect of life. Men were considered to be the leader of the family and superior than women while the social norms and values at that time were also biased in favor of men. This strong bias in favor of sons in society meant that daughters were discriminated against from birth and didn't have equal opportunities to achieve all aspects of development.

Gender discrimination is a major problem to the development and progress of Nepali society, which has historically been patriarchal in nature. It is less problematic among educated communities in urban areas. Gender discrimination is intensely rooted in many rural and traditional communities in Nepal. In our society, women concentrate more on their ascribed reproductive and household roles while men focus on income-earning roles. The society has also imposed restrictions on the mobility of women and their participation in the public domain. Moreover, women are deprived of the privileges including rights, education, healthcare, property rights and social status.

5.1 MALE AND FEMALE LITERACY RATE

Literacy status also shows the status of women in the society. The literacy rate of female and male of the project area is 74.1 percent and 90.3 percent respectively. The literacy rate of the project area is higher (82.7%) in comparison to national literacy rate (65.9%). Also, the gap between female and male literacy rate in the project area (16.2%) was found little narrower in comparison to national literacy gap (17.7%). Table 5.1 shows the literacy status of male and female in the project area.

Table 5.1: Male and Female Literacy Rates

Sex	Project Road	National
Female	74.1	57.4
Male	90.3	75.1
Total	**82.7**	**65.9**

Source: Field Study, 2019; Population and Housing Census of Nepal 2011, CBS, 2012

5.2 INVOLVEMENT OF MALE AND FEMALE IN SOCIAL ORGANIZATION

In the project area, it was found that there are still some restrictions for women to involve in public sphere. The overall involvement of male and female in social organization is 58.7 percent and 41.3 percent respectively in the study area. Before project the involvement of male and female in social organization was 61.6 percent and 38.4 percent respectively. The overall involvement of female in social organizations has been increased by 15.4 percent after project. This indicates the improving status of women in the society. Table 5.2 shows the status of involvement of male and female in social organization.

Table 5.2: Involvement of Male and Female in Social Organizations

Organization	Male				Female				Change	
	Before		After		Before		After		Male	Female
	No.	%	No.	%	No.	%	No.	%	%	%
Community Forest Users' Group	190	85.6	190	84.8	32	14.4	34	15.2	0	6.3
Drinking Water Users' Group	34	82.9	40	76.9	7	17.1	12	23.1	17.6	71.4
Irrigation Users' Group	5	100	6	85.7	0	0	1	14.3	20	0
Income Generating Group	10	20.8	12	21.4	38	79.2	44	78.6	20	15.8
Political Organization	73	96.1	73	93.6	3	3.9	5	6.4	0	66.7
Cultural Organization	9	56.3	8	42.1	7	43.8	11	57.9	-11.1	57.1
Religious Organization	57	49.1	56	48.3	59	50.9	60	51.7	-1.8	1.7
Cooperative	60	27.4	67	26.7	159	72.6	184	73.3	11.7	15.7
Street (Tole) Development Committee	68	73.9	70	72.9	24	26.1	26	27.1	2.9	8.3
School Management Committee	37	80.4	32	71.1	9	19.6	13	28.9	-13.5	44.4
Total	**543**	**61.6**	**554**	**58.7**	**338**	**38.4**	**390**	**41.3**	**2**	**15.4**

Source: Field Study, 2019

5.3 PARTICIPATION OF MALE AND FEMALE IN COMMUNITY ACTIVITIES

In general women are discriminated against by their own family members. The overall participation of males and females in community activities including social work, religious work, community meeting, political meeting and community infrastructure development is 55 percent and 45 percent respectively after project. The participation between males and females in community activities before project was 55.8 percent and 44.2 percent respectively. This shows a narrowing of the gap between males and females in community participation. After road improvement, the mobility of women beyond the household activities has increased by 5.4 percent, and women of the area have got exposure on different social issues. Participation of males and females in different community activities is given in Table 5.3.

Table 5.3: Participation of Male and Female in Community Activities

Activities	Male				Female				Change	
	Before Project		After Project		Before Project		After Project		Male	Female
	No.	%	No.	%	No.	%	No.	%	%	%
Social Work	679	57.1	684	55.7	510	42.9	544	44.3	0.7	6.7
Religious Work	476	49.4	485	49.8	488	50.6	488	50.2	1.9	0
Community Meetings	332	55.7	347	54.6	264	44.3	288	45.4	4.5	9.1
Political Meetings	141	71.2	141	68.4	57	28.8	65	31.6	0	14
Public Infrastructure Development	39	90.7	47	83.9	4	9.3	9	16.1	20.5	125
Total	**1,667**	**55.8**	**1,704**	**55.0**	**1,323**	**44.2**	**1,394**	**45.0**	**2.2**	**5.4**

Source: Field Study, 2019

5.4 PARTICIPATION OF MALE AND FEMALE IN DECISION MAKING ROLE

In the context of decision-making, the role of women is lower than men in all activities. However, the gender disparity is in decreasing trend. In overall activities, in the case of equal magnitude of

decision making, the role of women has increased from 48.9 percent (before project) to 54.6 percent after the project intervention. This is the positive indication in decision making process between male and female. Table 5.4 shows the involvement of male and female in decision-making in different activities.

Table 5.4: Participation of Male and Female in Decision Making (%)

Activities	High				Low				Equal			
	Male		Female		Male		Female		Male		Female	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
Household work decision	44.1	38.1	34.9	34.0	34.9	34.0	44.1	38.1	21.0	27.9	21.0	27.9
Agricultural activities	44.3	38.4	22.7	22.3	22.7	22.3	44.3	38.4	33.1	39.3	33.1	39.3
Financial decision	64.3	60.6	7.41	7.1	7.41	7.1	64.3	60.6	28.3	32.2	28.3	32.2
Social activities	63.5	58.6	6.48	7.3	6.48	7.3	63.5	58.6	30.0	34.1	30.0	34.1
Property ownership	42.0	36.9	12.7	12.7	12.7	12.7	42	36.9	45.3	50.5	45.3	50.5
Family planning decision	17.3	10.7	7.22	6.8	7.22	6.8	17.3	10.7	75.5	82.5	75.5	82.5
Women's marriage decision	29.5	22.7	4.81	4.4	4.81	4.4	29.5	22.7	65.6	72.9	65.6	72.9
Women health decision	15.3	10.6	12.1	11.6	12.1	11.6	15.3	10.6	72.6	77.9	72.6	77.9
Reproductive behavior decision	15.2	8.89	14.8	14.9	14.8	14.9	15.2	8.9	70.0	76.2	70.0	76.2
Child education	29.4	20.6	8.7	9.0	8.7	9.0	29.4	20.6	61.9	70.4	61.9	70.4
Foreign employment	62.9	60.6	2.31	2.0	2.31	2.0	62.9	60.6	34.8	37.3	34.8	37.3
Overall	**38.9**	**33.4**	**12.2**	**12.0**	**12.2**	**12.0**	**38.9**	**33.4**	**48.9**	**54.6**	**48.9**	**54.6**

Source: Field Study, 2019

5.5 ROAD USE STATUS OF MALE AND FEMALE

Frequent use of road by women after project intervention has increased by 5 percent. The present status of frequent use of road service by male and female is 53.7 percent and 46.3 percent respectively. Before project, it was 58.7 percent and 41.3 percent respectively. The intensity of road use frequently by female has been increased by 23.7 percent. This shows the increased mobility of women and access to outside exposure. Table 5.5 shows the intensity of road use of male and female in the project area.

Table 5.5: Intensity of Road Use of Male and Female

Intensity	Male				Female				Change	
	Before Project		After Project		Before Project		After Project		Male	Female
	No.	%	No.	%	No.	%	No.	%	%	%
Never	8	29.6	6	46.2	19	70.4	7	53.8	-25	-63.2
Occasionally	215	31.9	210	39.1	458	68.1	327	60.9	-2.3	-28.6
Frequently	857	58.7	864	53.7	603	41.3	746	46.3	0.8	23.7

Source: Field Study, 2019

5.6 PARTICIPATION OF MALE AND FEMALE IN TRAINING PROGRAMS

As the provision of vulnerable community development plan (VCDP) and gender action plan (GAP), skill development and awareness training programs were implemented by the project based on the demand of the project beneficiary. SNRTP has conducted 148 VCDP and 129 GAP training events across the project districts. A total of 3,734 participants were benefitted from the livelihood skill development and gender awareness trainings in the study area. Among them 65.8 percent participants were female, 17.5 percent participants were from Dalit community and 27.8 percent participants were from Indigenous community. Encouraging number of female participation in the skill development training programs indicates the likely involvement of them in income generating activities, which support to uplift the status of women in the project area. Participation of Male and female in training is presented in Table 5.6.

Table 5.6: Participation of Male and Female in Livelihood and Gender Awareness Training

Types	Total Event	Male	Female	Dalit	Janajati	Others	Total
VCDP							
Number	148	1,131	724	309	521	1,025	1,855
Percent	NA	61.0	39.0	16.7	28.1	55.3	100.0
GAP							
Number	129	148	1,731	343	517	1019	1,879
Percent	NA	7.9	92.1	18.3	27.5	54.2	100.0
Total (VCDP/GAP)							
Number	**277**	**1,279**	**2,455**	**652**	**1,038**	**2,044**	**3,734**
Percent	**NA**	**34.3**	**65.8**	**17.5**	**27.8**	**54.7**	**100.0**

Source: SNRTP PMU Office, 2019

5.7 EMPLOYMENT STATUS OF MALE AND FEMALE IN ROAD PROJECT

Employment generation is one of the significant positive impacts. During road construction period, significant numbers of people were involved in road construction activities. In overall, 6,630,000 person-days got employment opportunity in road upgrading, rehabilitation, period maintenance, construction of crossing structures and routine maintenance activities. Among them 37.6 percent were female workers and 63.4 percent were male workers. In routine maintenance work, 100 percent workers were local where 65 percent were female, 37 percent were from ethnic group and 36 percent were from Dalit community. In road upgrading and period maintenance work, 15 percent workers were female and 40 percent workers were local. Significant numbers of female involvement in employment activities helped them to generate income source and thus uplift their status in some extent. Employment generation during project period is presented in Table 5.7.

Table 5.7: Employment Generation in Road Construction and Maintenance Works (Person/Days)

Intervention	Female	Male	Total
Upgrading/Rehabilitation of Road/Bridge	492,000	2,788,000	3,280,000
Periodic Maintenance and Crossing Structures	52,500	297,500	350,000
Routine Maintenance	1,950,000	1,050,000	3,000,000
Total	**2,494,500**	**4,135,500**	**6,630,000**

Source: SNRTP PMU Office, 2019

6. IMPACT ON ACCESS TO SERVICES

6.1 ACCESS TO ALL SEASON ROAD

In Nepal zone of influence (ZOI) of a road in the Hills is considered to be the area within 4 hours walking distance on either side from the center of the road. Whereas, the ZOI in the case of a road in the terai is considered within 2 hours walking distance on either side from the center of the road. People in the hills can travel 3Km per hour and in the terai they can travel 5Km per hour which means ZOI of a road in the hills covers 12Km on either side of the road and 10Km in the terai road. Table 1 shows the average populations within the ZOIs of gravel and paved roads of hill and terai roads. The average population within the ZOI of paved and gravel roads are 200,258 and 125,203 respectively. The average population within the ZOI of paved and gravel roads are 34.10 percent and 28.00 percent respectively of the average population of districts where the roads exist. Generally district and rural roads passes through major settlements of a district where majority of people reside. Thus these per cents are seems reasonable.

Table 6.1: Population within ZOI of Project Roads

S.N.	ZOI	Average Population	% of Project Districts Population
1	Paved Roads	200,258	34.10
2	Gravel Roads	125,203	28.90
3	Average	162,730	31.50

Source: Field Study, 2019

Access to roads that are reliably passable year round is critical for many rural development processes. Increased access to an all-weather road is one of the impacts of road upgrading. Table 6.2 shows decreases in distance and travel time to reach all weather road from the zone of influence (ZOI) of project roads after the project. The average distance for the people in the ZOI of paved roads to reach all weather road are reduced by 59.69 percent and for those of gravel roads are reduced by 43.61 percent after the project. Similarly, average travel time to reach the all-weather road from ZOI of paved roads and gravel roads are reduced by 60.71 percent and 41.59 percent respectively. The reductions show that the project was successful in achieving one of its objectives.

Table 6.2: Distance and Travel Time to All Season Road of Study Area

Heading	Paved Roads		Gravel Roads		Overall		%change		
	Before Project	After Project	Before Project	After Project	Before Project	After Project	Paved Roads	Gravel Roads	Overall
Average distance (Km)	2.8	1.1	1.9	1.1	2.4	1.1	-59.69	-43.61	-54.49
Average travel time (minute)	31.1	11.9	18.7	11.3	24.9	11.6	-61.74	-39.57	-53.41
Average							**-60.71**	**-41.59**	**-53.95**

Source: Field Study, 2019

6.1.1 Vehicle Ownership

It is normal practice to own or add new vehicles by household in the ZOI of roads once they are upgraded to all season roads. Table 6.3 shows vehicles owned by households before and after road upgrading. The table shows that there have been additions of large number of motorcycle and tractors after the project. Similarly, there have been new ownerships of micro and jeeps after the upgrading of the roads.

Table 6.3: Total Number of Vehicles Owned by Local Households

Roads	Bike		Car		Tractor		Jeep	Micro
	Before Project	After Project	Before Project	After Project	Before Project	After Project	After Project	After Project
Total of Paved Roads	69	133	2	2	2	5	1	0
Total of Gravel Roads	74	117	0	0	8	10	1	1
Aggregate of Treatment Roads	143	250	2	2	10	15	2	1

Source: Field Study, 2019

6.1.2 Vehicle Operation Cost (VOC)

Decrease in Vehicle Operation Cost (VOC) is the major impact or indicator of any road improvement or upgrading. Generally VOC savings are taken as the benefits of road projects for feasibility studies.

Vehicle wise VOCs are calculated using Road Economic Decision Model (RED) [HDM-4[1] module calibrated to Nepali condition]. The model requires various input data for predicting VOCs. The input data comprises characteristics of route and prices of vehicles, tires, fuel and oil, costs of crew members and maintenance labour. The data on characteristics are collected through observation. The prices are obtained from dealers of vehicles, dealers of tires and Nepal Oil Corporation (NOC) in Kathmandu prevailed during October 2019. All the duties, taxes and subsidies are excluded from the financial prices to estimate economic prices. The costs of crew members such as drivers, helpers and maintenance labour are obtained from drivers and workshops also prevailed in during October 2019. The model has calculated VOCs for all vehicle types during before and after project implementation based on the input data. Table 6.4 shows VOC of all vehicle types before and after the road upgrading. The VOC of all vehicle types are decreased after road upgrading. There are more reductions in paved roads than in gravel roads. The overall reduction in the paved roads is 27.8 percent, whereas in the gravel roads the VOC is decreased by only 17.36 percent. The VOC of trucks and buses are reduced significantly compared to smaller vehicles. The reductions in the VOC of vehicles after the project implementation reflect the feasibility of the road upgrading projects.

Table 6.4: Vehicle Operation Cost (VOC) in the Project Roads (NRs./Km)

Road	Project	Motorcycle	Car	Jeep	Pickup	Mini-Truck	Truck	Mini-bus	Bus	3 Wheeler	Tractor	% Change
Paved	Before	6.53	26.09	37.73	50.17	57.01	100.06	54.72	82.19	22.05	45.42	
	After	5.09	20.84	28.68	43.84	35.50	50.75	34.96	51.77	17.42	37.14	
Gravel	Before	6.95	27.41	39.97	51.49	59.52	103.99	56.90	85.58	23.15	47.83	

[1] Highway Design and Maintenance Standards Model, the World Bank

Road	Project	Motorcycle	Car	Jeep	Pickup	Mini-Truck	Truck	Mini-bus	Bus	3 Wheeler	Tractor	% Change
	After	5.24	22.05	31.03	45.93	49.54	89.42	48.06	71.70	19.35	39.56	
%Change	**Paved**	-22.03	-20.12	-23.98	-12.61	-37.73	-49.28	-36.11	-37.01	-21.01	-18.23	-27.81
	Gravel	-24.57	-19.56	-22.37	-10.81	-16.76	-14.01	-15.55	-16.22	-16.42	-17.29	-17.36
	Overall	-23.3	-19.84	-23.17	-11.71	-27.25	-31.64	-25.83	-26.61	-18.72	-17.76	-22.58

Source: Field Study, 2019

6.1.3 Travel Time and Fare

Table 6.5 shows decreases in travel time and fare of different public transport to the usual destinations from the zone of influence (ZOI) of project roads after the project. The average travel time for the vehicles from the ZOI of paved roads are reduced by 42.5 percent and that of gravel road by 29.7 percent after the project. Similarly, average fare to travel by the vehicles from ZOI of paved roads and gravel roads are reduced by 4.3 percent and 35.5 percent respectively. The higher percent of reductions in the fares for gravel roads are due to the improvement of seasonal earthen road to all weather road after the project. The fares before the project are inflated to 2019 prices using CPI. There have been significant reductions in travel time of car/taxi and auto after the upgrading of roads but the fare of car/taxi is increased (due to increases in the operation costs as result of increases in prices of the vehicle). The reductions show that the project has successful in improving the road conditions leading to reduced travel time.

Table 6.5: Travel Time and Fare to Usual Travel Destinations

Means	Travel Time (min.)		Travel Fare/Trip/ Person (NRs.)		%change	
	Before Project	After Project	Before Project	After Project	Travel Time (min.)	Travel Fare/Trip/ Person (NRs.)
Paved Road						
Bus	44.4	38.1	52.3	49.4	-14.2	-5.5
Micro	46	27.7	41.6	48.5	-39.8	16.7
Jeep	54.4	27.2	71.3	50	-50	-29.9
Car/Taxi	105	25.5	458.8	462.4	-75.7	0.8
Auto	33.6	22.6	58.1	56.1	-32.7	-3.4
Average					-42.5	-4.3
Gravel Road						
Bus	93.8	66.6	105.3	81.2	-29	-22.9
Micro	102.5	105	90.2	76.7	2.4	-15
Jeep	90.9	62.8	148.4	112.1	-30.9	-24.5
Car/Taxi	45	21	524.3	166.7	-53.3	-68.2
Auto	45	28.1	163.8	86.8	-37.6	-47
Average					-29.7	-35.5

Source: Field Study, 2019

Table 6.5a shows the average travel time for the vehicles from the ZOI of hill and mountain treatment roads are reduced by 51.57 percent and that of terai road by 0.3 percent after the project. Similarly, average fare to travel by the vehicles from ZOI of hills and mountain and terai roads are reduced by 1.55 percent and 0.09 percent respectively. The fares before the project

are inflated to 2019 prices using CPI. There have been significant reductions in travel time and fare of micro after the project.

Table 6.5a: Distance to Usual Travel Destinations of Study Area

Means	Travel Time (min.)			Travel Fare/Trip/ Person (NRs.)		
	Before	After	%change	Before	After	%change
A. Hill/Mountain Road						
Bus	91.9	60.5	-34.1%	97.3	86.2	-11.3%
Micro	120.0	32.8	-72.6%	89.3	62.2	-30.4%
Jeep	82.6	54.5	-34.0%	114.3	97.6	-14.7%
Car/Taxi	85.0	29.3	-65.5%	436.7	656.1	50.2%
Average	94.9	44.3	-51.57%	184.4	225.5	-1.55%
B. Tarai Road						
Bus	46.4	43.1	-7.1%	46.99	45.8	-2.4%
Micro	71.3	32.1	-55.0%	58.56	42.5	-27.4%
Jeep	26.9	21.9	-18.6%	47.06	41.2	-12.5%
Car/Taxi		18.0		0.00	83.9	
Auto	34.2	26.3	-23.2%	57.72	60.8	5.3%
Average	44.7	28.3	-0.3	42.1	54.8	-0.09

Source: Field Study, 2019

6.1.4 Distance and Freight of Goods Transportation

Table 6.6 shows average distance and freight of different goods' transport from markets to the zone of influence (ZOI) of project roads before and after the project. The average transport distance for the vehicles from the ZOI of paved roads is increased by 17.4 percent and that of gravel road is decreased by 4.8 percent after the project. Similarly, average freight to transport of goods by the vehicles from ZOI of paved roads and gravel roads are reduced by 35.5 percent and 23.0 percent respectively. There have been increases in average transport distance of trucks and pickups whereas average transport distance of tractors is decreased. The increase in transport distances of trucks and pickups are due to the vehicles directly coming to the ZOIs from larger markets. There have been decreases in transport freights of all transport vehicles. The freights before the project are inflated to 2019 prices using CPI. The reductions show that the project has been successful in improving the road conditions leading to the increased transport speed and reductions in the VOC (which led to reductions in the freights).

Table 6.6: Distance of Goods Transportation and Freight

Means	Distance (km.)		Freight Cost (NRs/Qtl)		%Change	
	Before Project	After Project	Before Project	After Project	Distance (km.)	Freight Cost (NRs/Qtl)
Paved Road						
Truck	6.8	10.4	129	110.8	52.9	-13.7
Pickup	9.7	10.6	155	95	9.3	-38.7
Tractor	8.9	8	129	78.5	-10.1	-39.1
Average					17.4	-30.5
Gravel Road						
Truck	17.7	16.7	173	131.5	-5.6	-23.9
Pickup	14.6	13.2	214	162.7	-9.6	-24.1
Tractor	11.4	11.5	179	141.6	0.9	-21
Average					-4.8	-23

Source: Field Study, 2019

Table 6.6a shows the average transport distance for the vehicles from the ZOI of hill and mountain treatment roads are reduced by 2.68 percent and that from ZOI of terai road by 24.77 percent after the project. Similarly, average freight to transport of goods by the vehicles from ZOI of hill and mountain treatment roads and terai roads are reduced by 15.17 percent and 21.07 percent respectively. There have been decreases in transport distance of all vehicles in the ZOI of hill and mountain treatment roads whereas there are increases of all vehicles in ZOI of terai roads. Generally, the improved road condition encourage people to access bigger markets. There have been decreases in transport freights of all transport vehicles in both the hill and mountain and terai treatment roads. The freights before the project are inflated to 2019 prices using CPI. The reductions show that the project has been successful in improving the road conditions leading to the reductions in the VOC (which reduce freight of goods vehicles).

Table 6.6a: Distance of Goods Transportation Place of Study Area (Distance in Km.)

Means	Distance (km.)			Freight Cost (NRs./Qtl.)		
	Before	After	%Change	Before	After	%Change
Hill/Mountain Road						
Truck	15.1	14.5	-4.02%	149.1	129.2	-13.36%
Pickup	13.2	13.0	-1.49%	180.2	150.1	-16.71%
Tractor	12.0	11.7	-2.28%	181.7	154.2	-15.13%
Average	13.4	13.1	-2.68%	170.3	144.5	-15.17%
Tarai Road						
Truck	4.4	9.0	104.90%	47.6	39.3	-17.54%
Pickup	7.6	8.0	5.38%	113.7	86.2	-24.21%
Tractor	8.8	8.9	1.56%	104.9	84.7	-19.27%
Average	6.9	8.6	24.77%	88.8	70.1	-21.07%

Source: Field Study, 2019

6.2 ACCESS TO SOCIO-ECONOMIC SERVICES

Increased accesses to socio-economic services are some of major impacts of road upgrading. Table 6.7 shows decreases in travel time to the socio-economic services from the ZOI of paved and gravel roads after project. The average travel time to all the services from ZOI of paved and gravel roads are reduced by 32.2 percent and 8.4 percent respectively. Accesses to campuses and financial institutions are highly improved. These show that road upgrading improves access to socio-economic-services.

Table 6.7: Travel Time to Socio-Economic Services

S.N.	Service/Facilities	Average travel time to socio-economic services in minutes in the ZOI					
		Paved			Gravel		
		Before	After	%change	Before	After	%change
1	Basic school	12.4	12.1	-2.9%	13.7	13.6	-1.1%
2	Secondary school	17.2	16.9	-1.3%	22.8	22.1	-2.9%
3	Higher secondary school	19.2	18.0	-6.3%	28.4	27.8	-2.4%
4	Campus	46.0	40.1	-12.8%	50.4	39.5	-21.7%
5	Health post	16.6	14.0	-15.2%	26.3	24.3	-7.7%
6	Hospital	80.0	30.0	-62.5%	59.5	51.8	-12.9%
7	Bank/financial institution	20.0	15.3	-23.7%	47.8	29.3	-38.8%
8	Agri./livestock service center	23.2	11.9	-48.6%	51.3	49.9	-2.8%
9	Agricultural inputs market	22.4	14.2	-36.5%	50.3	49.1	-2.5%
10	Local market	12.2	10.7	-12.2%	16.6	15.9	-4.3%
11	Major market	45.7	20.3	-55.7%	54.5	49.7	-8.9%
12	Palika office	20.7	20.0	-3.5%	44.5	46.5	4.6%
13	Ward office	23.7	20.1	-15.2%	40.2	39.9	-0.8%
14	District Headquarter	66.7	45.0	-32.5%	54.8	54.7	-0.3%
Average		30.4	20.6	-32.2%	40.1	36.7	-8.4%

Source: Field Study, 2019

Table 6.7a shows decreases in travel time to the socio-economic services from the ZOI of hill/mountain and terai treatment roads after the project. The average travel time to all the service from ZOI of hill/mountain and terai treatment roads are reduced by 10.5 percent and 23.5 percent respectively. Accesses to financial institutions and hospitals are highly improved in hill/mountain treatment roads. Whereas accesses to major market and district headquarter are highly improved in terai treatment roads. These show that road upgrading improves access to socio-economic-services.

Table 6.7a: Travel Time to Socio-Economic Services

S.N.	Service/Facilities	Average travel time to socio-economic services in minutes in the ZOI					
		Hill/Mountain			Tarai		
		Before	After	%change	Before	After	%change
1	Basic school	13.7	13.6	-0.9%	12.6	12.3	-2.7%
2	Secondary school	23.6	23.4	-0.9%	16.9	16.1	-5.1%
3	Higher secondary school	29.5	29.4	-0.5%	17.5	15.4	-12.4%
4	Campus	50.6	40.8	-19.4%	45.7	25.3	-44.6%
5	Health post	28.2	25.7	-9.0%	14.8	12.3	-16.9%
6	Hospital	53.4	50.8	-4.9%	107.0	35.0	-67.3%
7	Bank/financial institution	63.9	32.1	-49.8%	20.7	14.8	-28.3%
8	Agri./livestock service center	50.4	46.5	-7.8%	18.0	13.2	-26.5%
9	Agricultural inputs market	55.4	53.9	-2.7%	22.5	13.8	-38.7%
10	Local market	16.7	16.4	-1.8%	12.7	10.9	-14.6%
11	Major market	55.3	52.0	-6.0%	45.6	19.4	-57.4%
12	Palika office	45.4	45.8	1.0%	20.4	17.6	-13.7%
13	Ward office	46.5	45.1	-2.8%	16.5	14.0	-15.2%
14	District Headquarter	54.9	50.7	-7.8%	70.0	117.5	67.9%
Average		42.0	37.6	-10.5%	31.5	24.1	-23.5%

Source: Field Study, 2019

Table 6.8 shows decreases in travel time of the people in the ZOI of paved roads and gravel roads for socio-economic activities. The table clearly shows decreases in travel time of people for performing their socio-economic activities after project implementation. The average travel times from ZOI of paved road for socio-economic activities are reduced by 20.2 percent and reduced by 11.9 percent from ZOI of gravel roads. There have been significant reductions on travel times for sales of agricultural products such as cash crops, grains and milk.

Table 6.8: Travel time for different socio-economic activities

Heading	Travel time for different socio-economic activities in minutes								
	Paved Roads		Gravel Roads		Overall		%change		
	Before Project	After Project	Before Project	After Project	Before Project	After Project	Paved Roads	Gravel Roads	Overall
Employment	55	50	33	31	44	40.5	-9.1	-6.1	-7.6
Trade/business	48	45	26	21	37	33	-6.3	-19.2	-12.7
Food grains	51	46	32	32	41.5	39	-9.8	0	-4.9
Educational materials	63	60	31	27	47	43.5	-4.8	-12.9	-8.8
Constructions materials	77	63	27	24	52	43.5	-18.2	-11.1	-14.6
Clothing	63	56	32	30	47.5	43	-11.1	-6.3	-8.7
Sales of vegetables	45	37	27	21	36	29	-17.8	-22.2	-20
Sales of milk	37	17	15	14	26	15.5	-54.1	-6.7	-30.4
Sales of grains	55	31	31	23	43	27	-43.6	-25.8	-34.7

Heading	Travel time for different socio-economic activities in minutes								
	Paved Roads		Gravel Roads		Overall		%change		
	Before Project	After Project	Before Project	After Project	Before Project	After Project	Paved Roads	Gravel Roads	Overall
Sales of fruits	57	55	28	26	42.5	40.5	-3.5	-7.1	-5.3
Sales of cash crops	92	51	53	46	72.5	48.5	-44.6	-13.2	-28.9
Overall Change							-20.2	-11.9	-16.1

Source: Field Study, 2019

Table 6.8a shows the average travel times from ZOI of hill/mountain treatment road for socio-economic activities are reduced by 27.8 percent and by 43.2 percent from ZOI of gravel roads. There have been significant reductions on travel times for sales of milk and food grains in the hill/mountain treatment roads whereas for sales of fruits and milk in terai treatment roads.

Table 6.8a: Travel time for different socio-economic activities

Heading	Travel time for different socio-economic activities in minutes					
	Hill/Mountain			Tarai		
	Before Project	After Project	%change	Before Project	After Project	%change
Employment	77	49	-35.9%	46	30	-35.0%
Trade/business	66	41	-38.4%	45	28	-38.1%
Food grains	90	57	-36.2%	43	31	-28.8%
Educational materials	81	56	-30.4%	54	30	-44.7%
Constructions materials	101	68	-33.1%	60	28	-52.7%
Clothing	91	61	-32.5%	56	31	-43.8%
Sales of vegetables	52	41	-20.0%	45	26	-42.3%
Sales of milk	22	13	-39.7%	34	15	-54.7%
Sales of grains	64	60	-6.5%	42	25	-41.8%
Sales of fruits	65	50	-22.6%	61	25	-59.5%
Sales of cash crops	56	50	-10.1%	63	42	-33.5%
Overall Change	69	50	-27.8%	50	28	-43.2%

Source: Field Study, 2019

6.3 ACCESS TO HEALTH SERVICES

Improved access to health services impacts a person's overall physical, social, and mental health status and quality of life. Hence, improvements in the access to services of people in the ZOI of roads are one of the main objectives of road improvements or upgrading. Table 6.9 shows travel time of pregnant women to seek health services before and after project implementation. The table shows overall decrease in the travel time by 18.34 percent to seek health services during pregnancy of women. There are significant reductions in travel time while visiting maternity and child care center for the pregnant women in the ZOI of gravel road. All these reductions show the upgrading of the roads have achieved improved access to health institution.

Table 6.9: Travel Time to Health Services for Women during Pregnancies

SN	Institutions	Average time taken per visit in minutes in the ZOI						
		Paved Roads		Gravel Roads		%change		
		Before Project	After Project	Before Project	After Project	Paved Roads	Gravel Roads	Overall
1	Hospital	56	33	64	60	-42.1	-5.8	-23.95
2	Primary health center	19	16	21	20	-15.8	-3.8	-9.8
3	Health/sub health post	13	11	26	18	-21.3	-30.6	-25.95
4	Maternity and child care center	7	7	21	12	0.9	-45.3	-22.2
	Average					**-19.58**	**-17.1**	**-18.34**

Source: Field Study, 2019

Table 6.9a shows decrease in the travel time by 28.8 percent for seeking health services during pregnancy of women in the hill/mountain treatment roads whereas by 20.0 percent in the terai treatment roads. There are significant reductions in travel time while visiting health/sub health posts in the hill/mountain treatment roads whereas there is significant reduction while visiting hospitals in terai roads. All these reductions show the upgrading of the roads have achieved improved access to health institution.

Table 6.9a: Travel Time to Health services for Women during Pregnancies

SN	Institutions	Average time taken per visit in minutes in the ZOI of					
		Hill/Mountain			Tarai		
		Before Project	After Project	%change	Before Project	After Project	%change
1	Hospital	73	55	-25.0%	54	37	-32.0%
2	Primary health center	22	16	-28.6%	20	16	-21.1%
3	Health/sub health post	31	21	-32.8%	14	12	-14.9%
4	Maternity and child care center				12	10	-12.0%
	Average	**42**	**30**	**-28.8%**	**25**	**19**	-20.0%

Source: Field Study, 2019

Table 6.10 shows travel time to seek immunization services for children before and after project implementation. The table shows overall decrease in the travel time by 21 percent to seek the services. There are significant reductions in travel time while visiting immunization center in the case of ZOI of paved roads. But there have been reduction in travel time while visiting hospital in the case of ZOI of gravel roads. All these reductions show the upgrading of the roads have achieved expected improved access to children's immunization.

Table 6.10: Travel Time to Visit Health Institution to Immunize Children

S.N.	Institutions	Average time taken per visit in minutes in the ZOI of								
		Paved Roads		Gravel Roads		Overall		%change		
		Before Project	After Project	Before Project	After Project	Before Project	After Project	Paved Roads	Gravel Roads	Overall
1	Hospital	55	36	57	43	57	39	-35	-25	-30
2	Primary health center	18	16	24	19	22	18	-11	-21	-16
3	Health/sub health post	14	12	20	18	16	14	-14	-10	-12
4	Private medical	5	5	45	30	45	18	0	-33	-17
5	Immunization center	21	10	17	15	18	15	-52	-12	-32
Average								**-22**	**-20**	**-21**

Source: Field Study, 2019

6.4 ACCESS TO AGRICULTURAL INPUTS

It is observed that uses of agricultural inputs are increased within the ZOI of roads when the roads are upgraded which leads to increased access to agricultural input centers. Table 6.11 shows households have used more quantities of urea and potash after the upgrading of roads. Similarly, households are also found to use increased volume of pesticides after the upgrading of roads. On the other hand prices of the inputs are found to be decreased. The table shows overall increase in the use of agriculture inputs by 24.0 percent in the ZOI of paved road and by 29.8 percent in the ZOI of gravel roads. There table also shows overall reductions in prices of the inputs by 18.4 percent in both the ZOIs of paved and gravel roads. The increase in use of inputs and reductions of the price of inputs reflect that the expectations of upgrading of roads are fulfilled.

Table 6.11: Average quantity/volume and cost of agricultural inputs used by households

Item	Use of agricultural inputs per household											
	Paved Roads				Gravel Roads				%change			
	Quantity/Volume		Value (NRs./Unit)		Quantity/ Volume		Value (NRs./Unit)		Paved Roads		Gravel Roads	
	Before Project	After Project	Before Project	After Project	Before Project	After Project	Before Project	After Project	Quantity/ Volume	Value (NRs./Unit)	Quantity/ Volume	Value (NRs./Unit)
Urea (Kg)	63	64	24	20	91	94	26	21	1.6	-18.4	3.6	-18.3
Potash (Kg)	24	32	53	43	28	29	50	40	33.3	-19.7	3.8	-19
DAP (Kg)	46	48	58	47	78	80	59	48	4.3	-18.4	2.7	-18.3
Pesticides (Litre)	1	2	1457	1206	1	2	2076	1705	56.7	-17.2	109.1	-17.8
Total									24	-18.4	29.8	-18.4

Source: Field Study, 2019

6.5 ACCESS TO TRADE

It is expected that trade (involving in the buying and selling of goods and services, with compensation paid by a buyer to a seller, or the exchange of goods or services between parties) activities and values are increased after upgrading of roads. Hence, they are considered some of the major impacts obtained from the road upgrading. Table 6.12 shows number of shops, lodge

and restaurants in the ZOI of paved roads are increased by 63.1 percent, 625 percent and 46.9 percent respectively.

Table 6.12: Increase in number of enterprises in the settlement

Road Type	Shop		Lodge		Restaurants		%Change		
	Before Project	After Project	Before Project	After Project	Before Project	After Project	Shop	Lodge	Restaurants
Paved	388	633	4	29	49	72	63.1	625	46.9
Gravel	1307	2057	11	18	87	147	57.4	63.6	69
Total	**1695**	**2859**	**15**	**61**	**136**	**228**	**68.7**	**306.7**	**67.6**

Source: Field Study, 2019

Table 6.13 shows average value of trade per month in the ZOI of paved roads is increased by 24.8 percent and increased by 59.49 percent in the ZOI of gravel roads. The increments in the number of enterprises and increase in the value of trade clearly reflect that they are the results of upgrading of the roads.

Table 6.13: Total value of trade by month (NRs.)

Paved		Gravel		% Change		
Before Project	After Project	Before Project	After Project	Paved	Gravel	Overall
6,270,638.00	7,830,095.00	3,061,157.00	4,759,891.00	24.87	55.49	34.91

Source: Field Study, 2019

6.6 INCREASE IN LAND PRICE

Generally people tend to migrate in areas which are accessible by all season roads. Hence, the increased demands of land always raise price of the same. Table 6.14 shows the average prices of homestead land, khet (wet land) and pakho (dry land) adjacent to the paved roads are increased by 143.4 percent, 163.6 percent and 102.4 percent respectively. Similarly, the prices are increased by 105.1 percent, 83.0 percent and 93.5 percent respectively in the case of gravel roads. The prices of khet and pakho are increased in the places one hour far from the roads but in the same places average price of homestead land is decreased by 16.2 percent. It is observed people tend to build houses adjacent to the roads because such houses have more economic significance such as for opening shops, renting out etc. thus demands for homestead land away from road are decreased. The changes in the prices of lands clearly reflect that they are the results of upgrading of the roads.

Table 6.14: Increase in land prices NRs/Unit

Type of Land	Adjacent to Road				One hour far from road				%Change			
	Paved		Gravel		Paved		Gravel		Adjacent to Road		One hour far from road	
	Before Project	After Project	Before Project	After Project	Before Project	After Project	Before Project	After Project	Paved	Gravel	Paved	Gravel
Homestead Land	874,400	2,128,000	1,262,000	2,588,000	947,200	794,000	484,160	972,000	143.4	105.1	-16.2	100.8
Low land (Khet)	448,842	1,183,158	890,800	1,630,000	187,789	391,579	256,800	474,000	163.6	83	108.5	84.6
Upland (Pakho)	368,000	745,000	829,500	1,604,800	150,500	385,000	204,900	387,360	102.4	93.5	155.8	89

Source: Field Study, 2019

6.7 ACCESS TO FINANCIAL INSTITUTIONS

It always true that increased access to financial institutions are reflected by households' saving and credit status. Table 6.15 shows households who have taken loans from different sources. Before the upgrading of roads in average 1.4 percent of households in the ZOI of Paved roads and 3.52 percent of households in the ZOI of gravel roads had taken loans from different sources. After the upgrading 2.7 percent and 4.2 percent households respectively are found to take the loans from different sources. The table also shows that households taking loans from bank are reduced by 20 percent after the project whereas households taking loans from finance companies increased by 620.37 percent. The increments in the households taking loans from different sources reflect that there had been increase in access to financial institutions.

Table 6.15: Households taking loans from different sources

Headings	% of Household taken loan from different sources						
	Paved Roads		Gravel Roads		%change		
	Before Project	After Project	Before Project	After Project	Paved Roads	Gravel Roads	Overall
Bank	0.93	0.74	1.85	3.52	-20	90	35
Finance	0.10	0.74	0.19	1.30	640.74	600	620.37
Co-operatives	2.22	5.00	3.70	8.33	125	125	125
Saving groups	1.30	2.41	0.56	3.33	85.71	500	292.86
Money lender	3.15	4.44	1.30	1.85	41.18	42.86	42.02
Relatives/friends	0.56	2.78	3.52	6.85	400	94.74	247.37
Average	1.40	2.70	1.90	4.20	212.1	242.1	227.1

Source: Field Study, 2019

Table 6.16 shows percent of households who have taken loans for different purposes. The table shows that number of households in the ZOI of paved roads taking loans for land purchase are increased by 600 percent whereas number of households in the ZOI of gravel roads are decreased by 25 percent. Households who have taken loan for house constructions are decreased by 89 percent after the project. But the households who took loan for educating their children have increased by 100 percent showing a good sign of improved awareness.

Table 6.16: Households who have taken loans for different purposes

Headings	%Household who have taken loan for different purpose						
	Paved Roads		Gravel Roads		%change		
	Before Project	After Project	Before Project	After Project	Paved Roads	Gravel Roads	Overall
Land Purchase	0.1	0.7	0.8	0.6	600	-25	287.5
House Construction	0.6	0.2	0.9	0.1	-66.7	-89	-77.8
Trade and Business	0.6	0.5	2	0.3	-16.7	-85	-50.8
Household Expenses	0.2	0.1	0.7	0.7	-50	0	-25
Agriculture	0.7	0.8	2	0.5	14.3	-75	-30.4
Marriage	0.9	0.1	0.4	0.9	-88.9	125	18.1
Treatment	0.6	0.8	0.3	0.4	33.3	33	33.3
Education	0.1	0.2	0.2	0.4	100	100	100
Going Abroad	0.5	0.2	0.1	0.7	-60	600	270

Source: Field Study, 2019

Table 6.17 shows households who have savings accounts in different financial institutions. Before the project in average 14.19 percent of households in the ZOI of Paved roads and 12.11 percent of households in the ZOI of gravel roads had savings accounts in different institutions. After the project 18.04 percent and 16.4 percent households respectively have saving accounts. The table also shows that households with savings accounts in the banks are increased only by 24.13 percent whereas households with savings accounts in finance companies are increased by 200.0 percent. It seems finance companies have become very active after the project implementation. The increments in the households' savings in the financial institutions reflect that there had been increase in access to financial institutions.

Table 6.17: Households who have savings in different institutions

Headings	%Household having savings in different institutions						
	Paved Roads		Gravel Roads		%change		
	Before Project	After Project	Before Project	After Project	Paved Roads	Gravel Roads	Overall
Bank	33.7	41.85	25.37	31.48	24.18	24.09	24.13
Finance	0.19	0.74	1.11	2.22	300	100	200
Co-operatives	12.78	17.96	17.04	21.85	40.58	28.26	34.42
Saving groups	23.15	27.78	14.63	20.74	20	41.77	30.89
Individual lending	1.11	1.85	2.41	4.44	66.67	84.62	75.64
Average	14.19	18.04	12.11	16.15	60.48	106.78	83.63

Source: Field Study, 2019

6.8 ACCESS TO MARKETS

Table 6.18 shows commodity prices before and after the project implementation. After the upgrading of the roads commodity prices in average are decreased by 12.93 percent and 13.63 percent in the ZOI of paved roads and gravel roads respectively. The table shows that prices of diesel, petrol, sunflower oil and chemical fertilizers substantially after the upgrading of roads which are very good examples of impacts of road upgrading.

Table 6.18: Commodity prices in before and after project

Commodities	Unit	Paved Road		Gravel Road		% Change		
		Before Project	After Project	Before Project	After Project	Paved	Gravel	Overall
Cauliflower	KG	198.924	164	47.6297	43	-17.60	-2.80	-10.20
Chemical fertilizer	KG	54.6341	45	47.6297	37	-17.60	-23.60	-20.60
Chicken	KG	395.047	329	402.051	336	-16.70	-20.10	-18.40
Diesel	Litre	134.484	106	131.682	105	-21.20	-25.20	-23.20
Egg	No.	29.4184	26	36.4227	30	-11.60	-24.70	-18.20
Fine paddy	KG	348.818	296	43.4271	36	-15.10	-2.50	-8.80
Fine rice	KG	403.452	338	79.8498	70	-16.20	-2.90	-9.60
Kerosene	Litre	131.682	114	126.079	108	-13.40	-15.90	-14.60
Maize	KG	33.621	30	40.6254	38	-10.80	-8.80	-9.80
Milk	KG	74.2463	66	84.0524	72	-11.10	-18.30	-14.70
Noodle	Packet	21.0131	19	23.8149	20	-9.60	-20.10	-14.80
Petrol	Liter	145.691	115	144.29	116	-21.10	-24.60	-22.80
Potato	Kg	219.937	203	32.2201	28	-7.70	-2.10	-4.90

Commodities	Unit	Paved Road		Gravel Road		% Change		
		Before Project	After Project	Before Project	After Project	Paved	Gravel	Overall
Salt	KG	28.0175	24	28.0175	24	-14.30	-16.70	-15.50
Soybean oil	Litre	179.312	148	187.717	153	-17.50	-23.50	-20.50
Sugar	KG	96.6603	82	98.0612	82	-15.20	-19.60	-17.40
Sunflower oil	Litre	196.122	161	201.726	162	-17.90	-24.70	-21.30
Wheat	KG	287.179	239	46.2288	36	-16.80	-4.30	-10.50
					Overall Average	-12.93	-13.63	-13.28

Source: Field Study, 2019

6.9 ACCESS TO EMPLOYMENT OPPORTUNITIES

Table 6.19 shows employment situation in the ZOIs of paved and gravel roads before and after the project implementation. The roads number of people employed are increased by 40.4 percent and 36.0 percent in the ZOIs of paved roads and gravel roads respectively. The table also shows that number of self-employed people are increased substantially after the upgrading of roads which are very good examples of impacts of road upgrading.

Table 6.19: Number of employed people before and after project

Employment Type	Paved		Gravel		%Change	
	Before	After	Before	After	Paved	Gravel
Accountant	1	1	1	1	0	0
Business	2	2	4	4	0	0
Driver	2	3			50	
Helper	1	2		2	100	
Manager	2	2	3	3	0	0
Operation Manager	17	18	16	32	5.9	100
Retail shop	1	1	2	3	0	50
Sales Person	1	1	7	13	0	86
Self	27	55	36	48	103.7	33.3
Workers	3	5	8	8	66.7	0
Grand Total	57	90	77	114	40.4	36

Source: Field Study, 2019

Table 6.20 shows households engaged in different employment generation sectors in the ZOI of paved and gravel roads before and after the project implementation. After the upgrading of the roads households involved in different activities are increased by 32.6 percent and 31.8 percent in the ZOI of paved roads and gravel roads respectively. The table also shows that households engaged in hotels/lodges are increased substantially by 100 percent after the project. Households engaged in other sectors are also notable (35.4%). These are very good examples of impacts of road upgrading.

Table 6.20: Employment generating sectors

Activities	% households who are involved in different employment generation activities								
	Paved Roads		Gravel Roads		Overall		%change		
	Before Project	After Project	Before Project	After Project	Before Project	After Project	Paved Roads	Gravel Roads	Overall
Non-Governmental Organization	9.4	10.4	7.8	8.9	8.6	9.6	9.8	14.3	12
Construction Work	3.7	4.6	4.3	6.1	4	5.4	25	43.5	34.2
Industry	26.7	29.8	18	20.2	22.3	25	11.8	12.4	12.1
Shops	8.9	9.3	2.4	3	5.6	6.1	4.2	23.1	13.6
Government Service	0.9	1.1	0.9	1.1	0.9	1.1	20	20	20
Educational Institution	2	2	1.9	2.6	1.9	2.3	0	40	20
Financial Institution	0.1	0.2	0.6	0.6	0.3	0.4	85.2	0	42.6
Hotel/Lodge	0.4	0.7	0.4	0.7	0.4	0.7	100	100	100
Other	1.5	2	0.6	0.7	1	1.4	37.5	33.3	35.4
Average	**6**	**6.7**	**4.1**	**4.9**	**5**	**5.8**	**32.6**	**31.8**	**32.2**

Source: Field Study, 2019

7. PERCEPTION OF LOCAL PEOPLE ON THE PROJECT

People in the ZOI of the project roads have different perceptions regarding quality of road improvements, positive impacts of the improvements and the negative impacts of the improvements.

7.1 PERCEPTION ON QUALITY OF ROADS

7.1.1 Overall Quality of Roads

Majority (60%) of road users have perceived the overall quality of paved roads a “good” quality whereas only 40 percent road users have perceived the gravel roads as “good” quality. Similarly, majority (53.3%) of road users have perceived the gravel roads as “fair” quality and only 26.7 percent road users have perceived paved roads as “fair” quality. Only few (13.3%) road users have perceived the paved roads as “poor” quality and very few (6.7%) road users perceived gravel roads as “poor” quality (Table 7.1).

Table 7.1: Perception of road users regarding overall quality of all-weather road

Overall Quality of Road	Paved Roads	Gravel Roads
Good	60.0	40.0
Fair	26.7	53.3
Poor	13.3	6.7
Total	**100**	**100**

Source: Field Survey, 2019

7.1.2 Surface of the Roads

The surface of paved roads are considered as “smooth” or good riding quality by 53.3 percent road users, as “moderate” riding quality by 26.7 percent road users and as “poor” by 20 percent road users. Similarly, equal percent (46.7%) of road users perceived gravel roads as “smooth” and “moderate” whereas only 6.6 percent road users perceived gravel roads as “poor” having pot holes and rough surface (Table 7.2).

Table 7.2: Perception of road users regarding surface of all-weather road after project intervention

Surface of Road	Paved Roads	Gravel Roads
Smooth riding quality	53.3	46.7
Moderate	26.7	46.7
Poor / pot holes/rough surface	20.0	6.6
Total	**100**	**100**

Source: Field Survey, 2019

7.1.3 Passing space of the Roads

Higher percent (73.3%) of road users opined that paved roads have insufficient passing spaces, 20 percent said no change/ same as before and only 6.7 percent said sufficient space for parking. Likewise, about 40 percent, 33.3 percent and 26.7 percent of road users said gravel roads have insufficient, sufficient and same as before / no change in parking space of gravel roads respectively (Table 7.3).

Table 7.3: Perception of road users regarding passing space of all-weather road after intervention

Passing space of Road	Paved Roads	Gravel Roads
Sufficient	6.7	33.3
No change (same)	20.0	26.7
Insufficient	73.3	40.0
Total	**100**	**100**

Source: Field Survey, 2019

7.1.4 Accident Rate of the Roads

As reported by the road users, accident rate in paved roads have been same as before (40%, higher than before (33.3%) and lower than before (26.7%). Similarly, in gravel roads accident rate have been lowered now as reported by 53.4 percent road users, no change / same rate as said by 33.3 percent and higher now as said by 13.3 percent road users (Table 7.4).

Table 7.4: Perception of road users regarding accident rate of all-weather road

Accident Rate of Road	Paved Roads	Gravel Roads
Lower	26.7	53.4
No change (same)	40.0	33.3
Higher	33.3	13.3
Total	**100**	**100**

Source: Field Survey, 2019

7.2 PERCEPTION ON POSITIVE IMPACTS OF ROADS IMPROVEMENTS

Table 7.5 shows that 43.3 percent beneficiaries people of ZOI of paved road and 40.0 percent of gravel roads perceive that the road improvements provided improved access to services such as health, education, administration etc. Similarly, 53.3 percent beneficiaries of ZOI of paved road and 33.3 percent of gravel roads perceive that the road improvements had saved their travel time a lot. 26.7 percent and 20.0 percent people in ZOI of paved and gravel roads respectively think there had been improvements in women empowerment.

Table 7.5: Perception of local people regarding positive impacts of road improvement

Perception	Paved	Gravel
	%	%
Decreased travel fare	10.0	10.0
Easy to travel	40	33.3
Access to services (health, education, admin)	43.3	40.0
Save time	53.3	33.3
Easy to sale local produce	36.7	50.0
Women empowerment	26.7	20.0
Access to market	23.3	10
Employment increased	10	6.7
Increased land price	3.3	3.3
Increased business	6.7	6.7
Decreased women violence	23.3	26.7

Source: Field Survey, 2019

7.3 PERCEPTION ON NEGATIVE IMPACTS OF ROADS IMPROVEMENTS

Table 7.6 shows that 33.3 percent of ZOI of paved road and 23.3 percent of gravel roads perceive that there had been increase in road accidents after the project. Similarly, 6.7 percent people of ZOI of paved road and 3.3 percent of gravel roads perceive that there had been increase in drug addicts after the project.

Table 7.6: Perception of local people regarding negative impacts of road improvement

Perception	Paved	Gravel
	%	%
Increase in land slides	0.0	6.7
Increase in dust pollution	10.0	26.7
Increase in road accidents	33.3	23.3
Increase in drug addicts	6.7	3.3

Source: Field Survey, 2019

8. CONCLUSIONS AND RECOMMENDATIONS

8.1 CONCLUSION

The project has improved condition of the roads remarkably which have increased vehicle speeds and reduced vehicle operating costs (VOC) in the roads together with all season roads to the households in the ZOI of project roads. The increased vehicle speed have saved travel time to places such as markets, socio-economic service centers, health services, agricultural input centers etc. The reduced VOCs have reduced passenger travel fares to visit different facilities and obtain services.

The reduced travel time and fares have encouraged households to increase their trips to different socio-economic, health, financial facilities etc. and seek their services. The reduced freights for transport of goods have provided households with cheaper consumption goods and other commodities including agricultural inputs. The easier travel and transport of goods all year round have encouraged people to migrate in the area which has increased the price of land.

Improved access has worked as catalysts for overall development of the area and increase prosperity of the people including poor farmers. Households with entrepreneurial skill have set up business of all kinds including tea shops, retail shops, restaurants, lodges etc. Easier access to banks, financial institutions etc. have encouraged households to take more loans for different activities and investments in new businesses. The increased economic activities have led to increased employment opportunities to the local people. With the improved incomes people have more savings in the banks, financial institutions etc.

Improved accesses to cheaper inputs and essential services and easier transport of agricultural products to the markets have enabled farmers to increase farm productivity and production. This ultimately support to increase income level of rural area people.

The involvement of women in social and political activities has been increased after project. The mobility of women beyond the household activities has increased. The gender disparity is in decreasing trend. The magnitude of decision making role of women has increased. The intensity of road use frequently by female has been increased. Significant numbers of female involvement in employment activities and participation in the skill development training during the project helped them to generate income source and which definitely would help uplift the status of women in the project area.

In addition to the positive impacts, the project has some negative impacts as well. Impact on private assets, haphazard settlement, unmanaged migration, landslides etc. are some negative impacts identified after project. The overall assessment of the impact study has shown very limited negative impacts and significant positive impacts.

8.2 RECOMMENDATIONS

The survey results show that the impacts of paved roads on access to services are more significant than those of gravel roads. Hence, gravel roads should also be upgraded to paved roads gradually so that people get more social and economic benefits.

The projects roads should be maintained regularly and keep the road condition stable otherwise lack of maintenance do not provide benefits as desired for long time.

It is very important to encourage local people to exploit the facilities they have with the improved roads for economic development activities which would increase their well beings.

- It is recommended to establish indicators for impact assessments before the project implementation. To measure the indicators it is suggested to carry out socio-economic baseline surveys including traffic counts, safety, vehicle operation cost and access to facilities before the project implementations and prepare baseline data of influence areas of the project roads so that impacts could be measured after the project implementation.

- It is recommended to have provision of technical inputs / experts for assessment of quality, safety, bio-engineering, GIS and environmental safeguards aspects of the roads improvement during impact evaluation.

ANNEXES

Annex-1: Data Tables

Annex-2: List of Surveyed Roads and Settlements

Annex-3: Selected Photographs

Annex-4: Location Maps of Surveyed Road

Annex-5: Persons Consulted During Field Visits

Annex-6: Terms of References