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Impact Assessment Study
of Improved Rural Road Maintenance System under PMGSY

Ministry of Rural Development

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Foreword

In India, Rural Road Connectivity, has been appreciated as a key component of Rural Development, which promotes access to economic and social services and generates increased agricultural incomes as well as strengthens rural livelihoods. In this context, Pradhan Mantri Gram SadakYojana (PMGSY), was launched in December, 2000 as a special intervention of the Government of India with the broad objective of ensuring sustainable poverty reduction. The scheme aims to provide good quality all-weather single connectivity to every eligible habitation. Rural roads are a state subject under the Constitution and as such are the basic responsibility of the states. However under the PMGSY, the construction of good quality and well-engineered roads are fully funded by the Government of India. Maintenance of these roads is the responsibility of the states. The year 2013 saw the launch of PMGSY-II with the objectives of consolidating the existing rural road network and upgrading existing rural roads that provide connectivity to rural growth centres.PMGSY-II envisages sharing of construction costs between the Centre and the states with maintenance costs continuing to be funded fully by the states.

Over the last decade and a half, the PMGSY has carved out a place for itself as a programme characterised by creation of good quality assets, effective management and technical proficiency by the National Rural Road Development Agency (NRRDA), along with capable state road agencies. Under PMGSY more than 4.50 lakh km of all-weather rural roads have been constructed targeting more than 1.67 lakh unconnected habitations of population more than 500 persons in plain areas and 250 persons in hilly areas, deserts and tribal areas. To sustain the benefits arising from this improved connectivity, NRRDA with funding support from respective states, has also introduced a mechanism of integrated 5 year maintenance of the roads constructed or upgraded under PMGSY.

In a parallel initiative NRRDA has associated the International Labour Organisation (ILO), to propagate the essence of maintenance of created road assets to key stakeholders including road users, and to support the rural road agencies in 8 States for capacity building in implementing and executing maintenance activities. These include drafting a maintenance policy framework, producing a guide on rural roads maintenance, alternate contracting options in form of performance based contracts, involvement of community in maintenance activities, developing training materials and conducting training workshops on rural roads maintenance in 8 participating states for field engineers and contractors.

In order to assess the effectiveness of its approach and efforts for maintenance of rural roads under PMGSY, NRRDA had also mandated the ILO to undertake an 'Impact Assessment' study of the improved road maintenance system in the 4States (Bihar, Jharkhand, Rajasthan and Uttar Pradesh). This study report submitted by the ILO, assesses comprehensively the impact of the maintenance (and non-maintenance) of PMGSY rural roads on socio-economic parameters in the influence area of the subject roads in terms of agricultural growth, income and employment generation, access to healthcare, education and on the poverty alleviation.

It must be appreciated that PMGSY is a huge Central Investment in the State Sector as part of a poverty reduction strategy. This investment is likely to be useful only if the main rural road network, particularly the rural Core Network is maintained, for a long time in good condition. In this context, empirical studies, like the present one are important because they provide evidence of such sustained maintenance of rural roads on access to markets, education and health care facilities as well as on–farm and off–farm activities. Such studies also serve as advocacy tools for long term investments in proper maintenance of rural road network.

I would like to acknowledge the support of all those who wereassociated with conducting this study and development of this report, especially the ILO and its technical assistance team under the guidance of its Chief Technical Adviser Mr. Htun Hlaing, the ILO's Rural Roads Maintenance Engineers and counterpart state officials in the four States and M/s CMI Social Research Centre, New Delhi which undertook this study on behalf of the ILO. I would also place on record the valuable suggestions of my colleagues Ms. Manju Rajpal, IAS, (ex Director – RC) and Mr. S. S. Bhatia, Deputy Director, NRRDA during the course of this study.

I sincerely believe, this impact assessment study would assist the rural road agencies in the eight participating states as well in all other states to guide and align their rural roads maintenance initiatives so as to effectively secure adequate and timely maintenance of all rural roads, not merely the PMGSY roads and improve maintenance practices so that benefits of access continue to remain available for our rural population on a sustainable basis.

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Acronyms

ANM	Auxiliary Nurse Midwife
ANW	Anganwadi Worker
APL	Above Poverty Line
ASHA	Accredited Social Health Activist
BPL	Below Poverty Line
CHC	Community Health Centre
DLP	Defect Liability Period
DPR	Detailed Project Report
FGD	Focus Group Discussions
GP	Gram Panchayat
HP	Himachal Pradesh
IAP	Integrated Action Plan
ILO	International Labour Organization
IRC	Indian Roads Congress
KM	Kilometer
MGNREGA	Mahatma Gandhi National Rural Employment Gurantee Act
MHRD	Ministry of Human Resource Development
MoRD	Ministry of Rural Development
NGO	Non-Governmental Organization
NRHM	Nation Rural Health Mission
NRRDA	National Rural Roads Development Agency
NUEPA	National University of Educational Planning and Administration
O&M	Operations & Maintenance
PCI	Pavement Condition Index
PDS	Public Distribution System
PHC	Public Health Centre

PIU	Programme Implementation Unit
PMGSY	Pradhan Mantri Gram Sadak Yojana
PRI	Panchayati Raj Institution
PTR	Pupil-Teacher Ratio
PWD	Public Works Department
RIDF	Rural Infrastructure Development Fund
SBD	Standard Bidding Document
SC	Schedule Caste
SDM	Sub-Divisional Magistrate
SDO	Sub-Divisional Officer
SHG	Self Help Group
SLSC	State Level Standing Committee
SRRDA	State Rural Roads Development Agency
ST	Schedule Tribe
TA	Technical Assistance
ToR	Terms of Reference
UP	Uttar Pradesh
VO	Voluntary Organizations

Executive Summary

The potential of rural roads in transforming rural India has been well established by many impact assessment studies in the past. Road investments have made significant impact on reducing poverty, improving incomes and access to health and education facilities. In India the thrust on rural roads development was intensified by launching of the Pradhan Mantri Gram Sadak Yojana (PMGSY) in December, 2000. This scheme's distinctive quality management system and provision of composite construction contract including maintenance have resulted in better quality roads across the country. State Governments, however have not been very judicious in effectively utilizing their budgets to target road maintenance and have been more inclined in building new roads ignoring the maintenance needs or existing rural roads. It is believed that unless a strategic approach for rural road maintenance starting from adequate funding provisions to building capacities to making the local authorities more accountable is adopted, it will not be far when the benefits of these capital investments will be lost. Better planning and small investments in maintenance can multiply the rural roads' impacts and give much higher returns on the investments made on rural roads.

This study was commissioned by the International Labour Organization (ILO) under the technical assistance project for PMGSY with an objective to assess the impact of rural roads maintenance and to ascertain whether the benefits provided by the construction of the roads developed or not; and if the benefits do develop, whether these are sustained or not. This impact assessment study was carried out in one district each of Bihar, Jharkhand, Rajasthan and Uttar Pradesh States covering two groups of sample units, rural roads which are maintained and in good operational conditions and rural roads which are not maintained and not in good condition. Households were interviewed; group discussions were conducted and based on the findings this report presents the impact of rural roads maintenance.

Key Findings

- The concept of rural road connectivity is based on construction of all-weather roads. The continuity and uninterrupted connectivity has

opened up flow of goods and services to the villages and regular and faster access to facilities outside the villages for the villagers. The real impact of rural roads is only possible when the round the year connectivity is sustained. The study has found that in many habitations where the roads have not been maintained, the road access is disrupted for a substantial period thereby causing huge discomfort to the residence therein who actually got used to the improved access after construction of the roads.

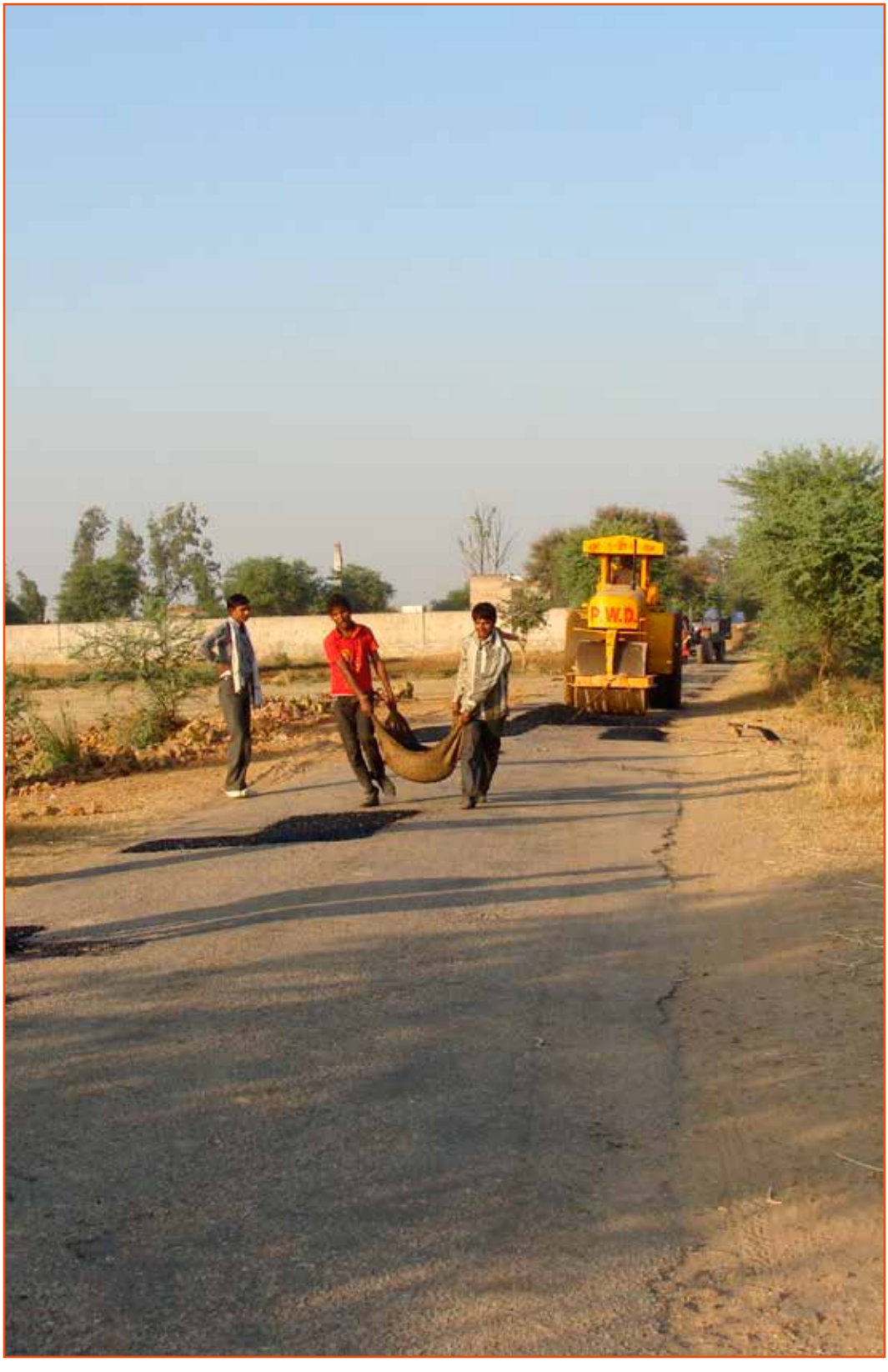
- In many cases it was seen that road construction attracted very complementary investments made by people considering that these roads will be permanent and will remain operational forever. Poor or no maintenance has disrupted the road connectivity threatening the sustainability and returns of such investments causing loss and anxiety to the investors.
- When the roads were built many farmers shifted to crops which were considered feasible and more profitable with the new connectivity. Though no significant loss has been inflicted on them so far but most of them were very apprehensive and concerned about poor maintenance of the roads.
- Most of the roads built in the rural areas resulted in significant savings in travel time and cost to reach the market. In habitations where roads were not maintained, these gains seem to have been lost to a large extent. Whereas habitations covered under the study have identical socio-economic conditions, the comparison of data from sample and control habitations reflects that more farmers are sourcing better agricultural inputs and services where the roads are maintained. The same was noticed in other allied activities like livestock and poultry etc.
- The study also brought out that post construction of rural roads, the employment scenario also improved significantly. More people were traveling outside the habitations for better employment opportunities but in the habitations where the road quality deteriorated the number of people traveling outside the habitations for seeking employment has gone down.
- With the improved roads and better public transport facilities the travel time to the place of work reduced for many workers traveling outside the habitations on a daily basis. The respondents in control habitations where the roads were not maintained reported that these gains are lost now increasing their hardships.

- Many new income opportunities and small enterprises have flourished simply due to the rural roads. The gains were found very impressive in the habitations where roads were maintained but in habitations where the roads were not maintained, the sustainability of these enterprises is threatened now.
- Access to health facilities also improved post construction of the road and very substantial and critically important time is saved. Not only people are travelling outside to access health facilities even more doctors and health workers are visiting these villages more frequently than before. Comparison of data shows that in the habitations connected by roads which are not maintained, the travel outside the habitations for visiting health facility was also much lower. These habitations also show poorer mother and child health indicators than the habitations where roads are maintained and operational.
- One of the most significant differences was seen was related to education parameters in the comparisons. More schools have come up in the sample habitations and more teachers per number of students were noticed in the habitations where roads are better maintained.
- Overall improvements in other social impacts were also found in the habitations having better maintained roads.

Based on these lessons, there is a need to develop a strategic framework to help guide the State Governments in investing in and implementing strategies to take advantage of the potential of rural roads development to accelerate social and economic development of rural areas in a sustained manner. Such a framework shall consist of many critical areas for strategic interventions.

Effort should be made to involve the Gram Panchayats for management and maintenance of rural roads. This will not only develop ownership of the road assets but will also make them more responsible and accountable.

Involvement of local communities and strategic interventions by the States will not only secure the assets but also multiply the positive impacts of rural roads and unleash the potential of rural India to harness their power for developing a strong nation.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1 Introduction

1.1 India and rural roads

Rural infrastructure has a direct link in improving livelihoods, health and productivity and reduced poverty. Investments made on infrastructure facilities which enhance productivity make a much more lasting impact on poverty reduction than unconditional subsidies and other financial assistance provided to the poor. Roads are a lifeline for rural communities, linking them to markets, education, health and other facilities. Better roads provide improved market access which, in term results in favorable input and output prices and improving the economic condition of the rural poor. The Government of India in order to accelerate development and growth made huge investments in power, industry, transport and essential social services like education and health. Efforts were also made to improve the productivity of agriculture sector in the country. However benefits of all these investments were not reaching the majority of its population living in the rural areas. In the early 70s, planners decided to give a major thrust to the development of rural roads through investing in various schemes which had provisions to provide for developing rural roads despite of that the rural roads development still lacked adequate planning & management and the need for National and State highways remained a priority in the successive years. Despite of the massive investments by governments in rural development it was visible that rural areas were not making much progress. Rural population had no option but to migrate to urban areas for job opportunities and lack of access also restricted the desired impact of many efforts of the governments to induce teachers, doctors and other professionals to work in rural areas. Till the late 90s, almost 70% of the villages were not linked with all-weather roads and a focused approach was the need of the hour when Government of India decided to launch the Pradhan Mantri Gram Sadak Yojana (PMGSY) on 25th December, 2000.

In addition to PMGSY, State Governments are also funding rural road construction in their respective States. Many other projects and funds also provide for rural roads network.

1.2 Pradhan Mantri Gram Sadak Yojana (PMGSY)

The Pradhan Mantri Gram Sadak Yojana (PMGSY) is a hundred percent Centrally Sponsored Scheme, which primarily aims to provide all-weather road connectivity to all eligible unconnected habitations in the rural areas with a population of 500 persons and above in plain areas and 250 persons and above in special category States (i.e. Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Himachal Pradesh, Jammu & Kashmir and Uttarakhand), desert areas (identified in the Desert Development Programme), the Tribal areas (Schedule V) and selected tribal and backward districts (identified by Ministry of Home Affairs and Planning Commission). For most intensive Integrated Action Plan (IAP) blocks as identified by Ministry of Home Affairs the unconnected habitations with population 100 and above would be eligible to be covered under PMGSY. The population figures for ascertaining eligibility of habitations on the based on as recorded in Census 2001.

Village Agyara in Ramgarh Block of Alwar district, a sample village covered in this study, was provided connectivity under PMGSY during 2006-07. This 3 KMs long road has brought in prosperity, employment, education, health and happiness for all the inhabitants of our village says Shri. Ramesh Kumar. He said that our village will always remain indebted to Prime Minister Vajpayee for this scheme.

PMGSY also provides for upgradation of existing roads in those districts where all eligible habitations of the designated population size described above have been provided all-weather road connectivity. The priority in upgradation works should be given to Through Routes of the rural Core Network[1], which carry more traffic.

The Ministry of Rural Development (MoRD) has set up the National Rural Roads Development Agency (NRRDA) to provide operational and management support to the programme.

The works are executed by the Executing Agencies identified by the State Governments, these agencies could be the Public Works Department/Rural Engineering Service/Rural Works Department/Zilla Parishad/Panchayati Raj Engineering Department etc. who have been in existence for a large

[1]A Core Network is that minimal Network of roads (routes) that is essential to provide Basic access to essential social and economic services to all eligible unconnected habitations in the selected areas through at least a single all-weather road connectivity.

number of years and have the necessary experience, expertise and manpower. The executing agencies will have a Programme Implementation Unit (PIU) at district level. The State Governments are also expected to nominate a Nodal Department which is officially responsible for management and maintenance of rural roads. The Nodal Department will identify a State Rural Roads Development Agency (SRRDA), an autonomous agency, with a distinct legal status, under its control for receiving the funds from Ministry of Rural Development.

The salient features of the PMGSY are as under:

All roads under PMGSY are prioritized out of the Core Network keeping in view the priorities as per the Guidelines in respect of population size and giving preference to those roads which also incidentally serve other habitations.

The rural roads constructed under PMGSY will be in accordance with the provisions of Ministry of Rural Development's specifications for rural roads must and shall meet the technical specification and geometric design standards given in Rural Roads Manual published by the Indian Roads Congress (IRC: SP20:2002) and also, where required, the Hill Road Manual (IRC: SP:48-1998).

The Ministry of Rural Development has developed a manual for the preparation of District Rural Roads Plan and the Core Network which lays down the various steps in the planning process and the role of various agencies including PRIs. In the identification of the Core Network, the priorities of elected representatives including Members of Parliament and Legislative Assembly are expected to be duly taken into account and given full consideration.

On the basis of the Core Network prepared, it is possible to estimate the length of roads required for new connectivity as well as upgradation for every district. The State's annual allocation is to be distributed among the districts giving at least 80% on the basis of road length required for providing connectivity to unconnected habitations and 20% on the basis of road length requiring upgradation under PMGSY.

The proposals approved by the District Panchayats will be forwarded through the PIU to the SRRDA. The SRRDA shall vet the proposals to ensure that they are in accordance with the guidelines and shall place them before the State Level Standing Committee (SLSC) along with details of proposals forwarded by the Members of Parliament, action taken there on in the prescribed formats. After scrutiny by SLSC, the PIU prepared the detailed project report for each proposed road work in accordance with the Rural Road Manual and instructions issued from time to time.

While commencing with the preparation of Detailed Project Report (DPR), the PIU will hold a consultation with the local community through the Gram Panchayat in order determine the most suitable alignment, sort out issues of land availability (including forest land), moderate any adverse social and environmental impact and elicit necessary participation in the programme.

The proposals finally clubbed into Annual Project Proposals for each State are considered by an Empowered Committee, chaired by Secretary, Department of Rural Development, Government of India. Cleared proposals are accorded technical on each DPR before tendering the works. Tenders are invited by the Executing Agency through competitive bidding based on a Standard Bidding Document (SBD) prescribed by the NRRDA.

1.3 Maintenance of rural roads

The investments on rural roads validate their need both in terms of the social and economic returns to the society. The lack or total absence of road infrastructure to connect the villages concentrated the attention on only new constructions at that time and provisions for maintenance of these roads were not considered immediate priority. Schemes like PMGSY though had considerable commitments towards the maintenance issues. All PMGSY roads are covered by 5 years maintenance contract to be entered into along with the construction contract, with the same contractor, as per the Standard Bidding Document (SBD). Maintenance funds are budgeted by the State Governments and are placed with SRRDAs. At the end of this 5 year post construction maintenance, the PMGSY roads are to be placed under Zonal Maintenance Contracts for another 5 year maintenance including renewal as per cycle. These provisions are based on the identified need of having an improved technical and administrative capacity for planning and managing maintenance issues. However the State Governments on other rural roads have not been able to do so with their limited financial resources and lack of capacities. They have not been judicious in effectively utilizing their budgets to target road maintenance and are more inclined in building new roads than maintaining existing roads.

However the ground level enforcement of the maintenance commitments were not monitored very aggressively as they should have been. Also the federal structure of governance in the country limits the Government of India to have much influence as the same is considered to be responsibility of the State Governments. Issues of corruption in implementations, inadequate technical capabilities and acute climatic conditions however make the need of a more serious approach of maintenance of rural roads, all

the more important in India. The planning for maintenance also lacked preventive and recurring approach and was largely considered as a treatment measure only when a road is significantly damaged.

A very important element of road maintenance is also generating awareness amongst the communities on proper use and maintenance issues. Majority of development programmes which are subsidized or funded by government have provisions of an exit protocol and Operation and Maintenance (O&M) issues where communities are expected to take over the assets and ensure sustainability of benefits. In case of rural roads where huge capital investments are made by governments this has not been thrust upon the community institutions. Funding of maintenance cost may not be expected from community institutions in the rural areas but they can certainly be made more responsible towards creating awareness on proper road use and protecting them from manmade damages. Unless a strategic approach for rural road maintenance starting from adequate funding provisions to building capacities to making the local authorities more accountable is adopted it will not be far when the benefits of these capital investments will be lost. Such very small fractions of costs and professional planning can multiply the rural roads' impacts and give much higher rate of return on the investments made on rural roads.

Four States covered under the study, Bihar, Jharkhand, Rajasthan and Uttar Pradesh have prepared policies on rural road maintenance. Some of them are at draft stage and are yet to be approved.

1.4 International Labour Organization (ILO) technical assistance project for PMGSY

Ministry of Rural Development, Government of India have received a loan of US$ 1.5 billion from the World Bank for the rural roads project to be implemented in 8 States namely Bihar, Himachal Pradesh, Jharkhand, Meghalaya, Punjab, Rajasthan, Uttar Pradesh and Uttarakhand. NRRDA signed an agreement with the ILO for providing Technical Assistance (TA) for establishing sustainable road maintenance systems.

The ILO-TA has following components

1. **Establishment of Technical Support Unit in the NRRDA**: The ILO Delhi team is based in the ILO Country Office New Delhi for while the ILO has senior field engineers are based in all the eight State capitals where the ILO is providing support to respective State Rural Road agencies (SRRDAs) on issues covering Rural Road Maintenance.

2. **Policy and institutional framework**: The ILO to develop a policy framework on maintenance of Rural Roads, to assist the States in framing their own policy. Where no policy exists, the ILO is assisting in drafting state policy and for States with existing policy the ILO is assisting in modification/supplement of this policy.
3. **Financial Tracking Framework**: Developing financial tracking systems to make sure that the available funds including Finance Commission grant funds are appropriately utilized.
4. **Maintenance Management Systems**: Develop standard templates, guidelines for carrying out road condition surveys, road inventories and traffic counts on the rural road network at block and district level. Provide support to the SRRDAs to enable them formulate their annual road maintenance plan in accordance with their maintenance policy and Guidelines for maintenance management.
5. **Execution of maintenance works**: Pilot Performance Based Maintenance Systems (in HP and Uttarakhand) and Community Contracting (in HP, UP and Bihar) for maintenance of rural roads.
6. **Skill Enhancement in Delivery of Maintenance Programmes**: Design and Implementation of Training Programme for the development of field engineers, small Contractors and the community groups.
7. **Impact Assessment Study**: Carryout study of socio-economic parameters within the influence area of the PMGSY and Non-PMGSY rural roads in one identified district in four states (Rajasthan, Bihar, UP and Jharkhand) for impact assessment of the improved road maintenance system these districts.

This report is a part of the aforesaid deliverable of the TA project for the ILO.

1.5 Structure of the report

The next section of this report, Chapter 2 provides detail on the context within which this impact assessment study was taken up, its scope and methodology and the impact indicators.

Chapter 3 deals with socio-economic profile of the habitations and households covered under the study. This section also includes profile of the control unit (control habitations and households therein) covered under the study

In Chapter 4 of the report, we review the type of road access before the road in the sample habitations, changes in all season motorized access to these

habitations and also status of connectivity to important facilities after the construction of road. Changes and improvements in public transport post road construction have been analyzed. Using the findings of indicators on all these issues to compare with the same indicators in control habitations, we also have provided examples where lack of road maintenance has restrained the access to these facilities.

Chapter 5 deals with findings on impact on agriculture in the habitations covered under the study including comparison with the control units. Similarly Chapters 6 to 10 provide impact findings on employment, income and poverty, health, education and other aspects.

2 Impact-Assessment Study~ Scope & Methodology

Many impact assessment studies have been conducted in the past to assess the socio economic impact of PMGSY and all of them have clearly shown that the rural communities have benefited significantly from the improved connectivity provided to them under this scheme. Ministry of Rural Development, Government of India commissioned a quick assessment of the socio economic impact of PMGSY in 2004, thereafter a much larger study was sponsored by the Economic and Monitoring Wing of the Ministry during 2010-11 in order to assess the impact in the lives of rural population and the changes brought about by the PMGSY roads in the lives of the rural poor. The study assessed the impact on agricultural growth, income and employment generation, health care & education, gender empowerment and poverty reduction. This assessment provided a national picture covering 17 States, 50 districts, 748 habitations and 18655 households therein. The study methodology designed to maximize the use of both qualitative and quantitative information clearly brought out significant impact and improvements on all the major indicators of the aspects mentioned above.

Many other studies have been conducted with similar objectives at the State level also and as expected they also clearly validate the underlying assumption that rural roads bring prosperity and improve the living conditions of the population in the connected habitations. Similar studies have also been conducted recently, funded by multilateral organizations aimed at assessing the impact and effects of PMGSY.

The ILO in consultation with the NRRDA and Ministry of Rural Development, Government of India endorsed a proposal to have an Independent Study on the Impact Assessment of the Improved Road Maintenance System to assess the impact of rural roads constructed under PMGSY. It is believed that the benefits from rural road construction which principally relate to the opportunities created from the improved access take some time to develop. The study was designed on the hypothesis that maintenance of rural roads has a major impact on whether the benefits provided by the construction of road develop or not; and if the benefits do

develop, whether these are sustained or not. The sample design was expanded to cover non PMGSY rural roads also which were completely in the similar periods so that a comparison can also be drawn.

CMI Social Research Centre (CMISRC) was contracted to undertake this assignment.

2.1 Objectives of the study

This study to assess the impact of rural roads construction and their maintenance was aligned to the objectives of the previous study and was aimed to find out the impact of rural roads on:

1. Agricultural Growth, particularly, in increasing market access for agricultural products
2. Income and employment generation (both direct and indirect, in short-run and in long-run)
3. Access to healthcare, education and other facilities and the resultant outcomes
4. Poverty reduction

2.2 Scope and methodology

This study was designed to assess the impact of rural roads construction and the maintenance of these roads. The study has been conducted based on data collected from habitations connected by rural roads both PMGSY and other schemes, which were maintained and equal number of such habitations, but not maintained roads.

In order to assess net impact of any developmental intervention, the true assessment is only possible when the current data is compared with the baseline information. In the absence of any available baseline and to determine whether the results are of specifically the roads and their maintenance, a comparison by assessing the impact on the same set of key indicators in the control habitations has been done. In each of the selected districts 10 control habitations have been selected, 5 connected through PMGSY and 5 through other rural roads but have not been maintained and are identical to the sample habitations in various social aspects.

The study methodology was carefully designed to maximize the use of both qualitative and quantitative information available for an impact assessment study like this. Several methodological assumptions that broaden its sphere of inquiry were taken into consideration while deciding on the sample, survey tools and data analysis plans. The multifaceted impacts that

determine how people respond to improved rural roads and shape constraints and opportunities in the life of rural Indians were considered. In addition, the data collected from household surveys, focused group discussions at habitation level and both of these tools were used sequentially, each intending to inform the next phase and cumulatively to validate the data. The use of Control group was also to ensure effective cross-checking and validation through the triangulation of findings.

The use of participatory tools was a decision for each field team depending on the nature of stakeholders and circumstances of each habitation. A core list of study questions were prepared for them. Participatory tools were used where the field teams considered that their use will enhance the quality and accessibility of information. We also have used a system of question checklists to guide semi-structured interviews with all types of stakeholders. In some situations other methods were used to ensure wide participation, shared understanding and quality discussions.

The study design was to maximize the value of information gathered by field teams using participatory techniques, and with households following structured questions. The topics covered were complementary, thus the same or similar questions were asked of groups through participatory settings as were asked of household respondents through a structured questionnaire. Classification of the data enabled analysis to be undertaken according to State, District and socio-economic characteristic of the respondents. This approach enabled aggregation of results within the States and for the study as a whole. The following tools were used in this study.

Desk Review

A comprehensive desk review of the key information sources available was conducted. This included the progress information on investments made on maintenance efforts under the scheme for inclusion in the study and outlining the scoping criteria mentioned above. Documentary sources were reviewed for impact assessment techniques and rural road maintenance issues.

In-Depth Interviews

In depth interviews were conducted on phone and in-person with the key stakeholders identified.

1. State Level ILO representatives
2. District Implementing Agencies

Focused Group Discussions

Focus Group Discussions (FGDs) were conducted with key stakeholders during the survey. FGDs were conducted in the Habitations comprising members of Panchayati Raj Institutions (PRIs), School Teachers, Anganwadi Worker (ANW), Health Workers, and Men & Women Self Help Group (SHG) members, Farmers, Shop Keepers in the habitations, other opinion leaders and residents of the habitations from all sections of the society also participated.

Study Tools

The tools canvassed and the informants are:

S. No.	Study Tools	Nos. Canvassed	Respondent(s)
1.	Sample Habitation Schedule	10 per District	FGDs were conducted in the Habitation comprising members of PRIs, School Teachers, ANW/Health Workers, Men & Women SHG members, farmers, shop keepers in the habitation, other opinion leaders and residents of the habitation from all sections of the society
2.	Control Habitation Schedule	10 per District	FGDs were conducted in the Habitation comprising members of PRIs, School Teachers, ANW/Health Workers, Men & Women SHG members, farmers, shop keepers in the habitation, other opinion leaders and residents of the habitation from all sections of the society
3.	Household Schedule	500 per District	25 households per habitation (Sample & Control) covering landless, small, medium & big farmers, BPL, SC/ST etc

Analysis of data

Data analysis has been done using standard Personal Computer spreadsheet and database software. Data was entered into a database using software developed by us, and tabulated using proprietary database and spreadsheet functions.

2.3 Survey Parameters and Approach

The study aims at capturing the outcomes at on the following parameters in order to achieve its objectives

S. No	Objectives of the Study	Key Parameters to Capture the Outcomes
1.	**Agricultural Growth**	❖ Improved all season access to Regular and Seasonal Markets ❖ Improved availability and use of quality inputs to agriculture ❖ Increase in marketable surplus of agricultural produces ❖ Increase in use of motorized agriculture vehicles and equipments ❖ Improvement in cropping patterns (more cash crops)
2.	**Improved Income & Employment Generation**	❖ Improved all season access to nearby Industries and cities for jobs ❖ Increase in on-farm employment opportunities due to change in cropping patterns ❖ Improved access to banks/post offices and GP/Block offices for seeking funds and jobs ❖ Improved farm yields and better prices for agriculture/ horticulture produces
3.	**Access to Healthcare, Education & other Facilities**	❖ Improved all season access and reduction in time traveled to the nearest PHC/Clinics/Hospitals ❖ Increase in number of deliveries in hospital/health centres/ under medical supervision ❖ Increase in number/frequency of visits by health workers/ ANM ❖ Improved all season access to Schools/Colleges/education and training centres ❖ Increase in number of students registered for higher education ❖ Increase in number of public transport buses connected to the habitation ❖ Increase in number of recreational/pilgrimage/cultural visits ❖ Improved all season access to District/Block/Tehsil Headquarters
4	**Poverty Reduction**	❖ Improvements in living standards ❖ Increase in percentage of non-agricultural workers ❖ Increase in Trade opportunities/Jobs for the poor

2.4 Coverage under the Study

State and districts Selected for the Study are as follows:

S. No.	State	District
1	**Bihar**	**Katihar**
2	**Jharkhand**	**Ranchi**
3	**Rajasthan**	**Alwar**
4	**Uttar Pradesh**	**Sultanpur**

The distribution of sample units under the study is divided into two groups, rural roads which are maintained and in good operational conditions and rural roads which are not maintained and not in good condition. Further within these groups equal proportion of roads selected were PMGSY funded roads and roads funded under other schemes. The sample units are distributed as under:

S. No.	Category	Scheme Type	Status	Nos.	Households covered
1	**Sample Habitation**	**PMGSY**	**Maintained**	**20**	**500**
2	**Sample Habitation**	**Other Scheme**	**Maintained**	**20**	**500**
3	**Control Habitation**	**PMGSY**	**Not Maintained**	**20**	**500**
4	**Control Habitation**	**Other Scheme**	**Not Maintained**	**20**	**500**

Information was collected on the amount of expenditure incurred on maintenance of the sample roads connecting the sample habitations. Details are provided in the table below:

State	Name of Road	Scheme	Year of Construction/ Completion	Expenditure on Maintenance (Rs. in Lakh)	Status of DLP	Name of agency maintaining the road, Post DLP
Bihar	Katihar Paranpur PWD Road to Kanderpali	PMGSY		26.25		
Bihar	Fatehpur to Manikpur	PMGSY		0.00		
Bihar	Hasangunj Sapni Road to Kabeiya	PMGSY		4.26		
Bihar	Jhil jhill to Mohadipur	PMGSY	2008-09	0.00		
Bihar	Balrampur to Laucha via Baidol	PMGSY		0.00		
Bihar	Madhubani Chowk to Mohana Chandpur-I	Other Scheme		91.47		
Bihar	Hasangunj to Nabada	Other Scheme		21.22		
Bihar	Dummer Chowk to Bhangha	Other Scheme		22.51		
Bihar	Madhubani Chowk to Mohana Chandpur-II	Other Scheme		26.21		
Bihar	Dalan Chowk to Padampur	Other Scheme		8.51		
Jharkhand	Bero to Tero via Pakalmeri Road	PMGSY	2001-02	65.99	DLP Over	-
Jharkhand	Silagain to Narkopi via Bazra Bobro Road	PMGSY	2001-02	37.31	DLP Over	-
Jharkhand	Bijuliya More to Tigra via Bijuliya Gram	PMGSY	2001-02	74.79	DLP Over	-
Jharkhand	SH Ranchi Daltonganj to Mander Burmu Road via Malti Hesal	PMGSY	2002-03	55.81	DLP Over	-
Jharkhand	Tuko bazar to pahar kandriya road	PMGSY	2002-03	87.57	DLP Over	-

State	Name of Road	Scheme	Year of Construction/ Completion	Expenditure on Maintenance (Rs. in Lakh)	Status of DLP	Name of agency maintaining the road, Post DLP
Jharkhand	Raghunathpur to Ganeshpur R.E.O. via Nawadih, Jaipur, fuldih and chapadih Road	Other Scheme	2008-09	0.00	DLP Over	-
Jharkhand	Piska NH33 to Ichadag via Banda Tepe Main Road	Other Scheme	2010-11	0.00	DLP Over	-
Jharkhand	Ulatu to Chardih via Selda Road	Other Scheme	2008-09	108.51	DLP Over	-
Jharkhand	Mahadevi Birla Sentorium to Lali via Binhorbera Horhap Road	Other Scheme	2008-09	0.00	DLP Over	-
Jharkhand	NH 75 to Sursa via nagada	Other Scheme		0.00		
Rajasthan	Bhala to Agyara	PMGSY	2007-08	4.98	DLP Over	PWD Rajasthan (CE Roads)
Rajasthan	Delhi Road to Sareta	PMGSY	2007-08	2.48	DLP Over	PWD Rajasthan (CE Roads)
Rajasthan	Masjid to Islam ka ghar	PMGSY	2008-09	0.96	DLP Over	PWD Rajasthan (CE Roads)
Rajasthan	Morud Kala to Khurd	PMGSY	2007-08	3.24	DLP Over	PWD Rajasthan (CE Roads)
Rajasthan	Saimli Dilawar to Bandheri	PMGSY	2008-09	2.64	DLP Over	PWD Rajasthan (CE Roads)
Rajasthan	Lilli to Makreta	Other Scheme	2007-08	0.00	DLP Over	PWD Rajasthan (CE Roads)
Rajasthan	Intarana to Jhopri	Other Scheme	2006-07	0.00	DLP Over	PWD Rajasthan (CE Roads)

State	Name of Road	Scheme	Year of Construction/ Completion	Expenditure on Maintenance (Rs. in Lakh)	Status of DLP	Name of agency maintaining the road, Post DLP
Rajasthan	Bhuleri Jamdoli to Kaleshan	Other Scheme	2007-08	0.00	DLP Over	PWD Rajasthan (CE Roads)
Rajasthan	CC Road on Behror Shahjapur Road	Other Scheme	2007-08	41.69	DLP Over	PWD Rajasthan (CE Roads)
Rajasthan	Nangli to Balaheer upto Haryana Border	Other Scheme	2007-08	25.40	DLP Over	PWD Rajasthan (CE Roads)
Uttar Pradesh	Durgapur to Lambhua Road (1 to 13 Km)	PMGSY	2010	12.66	Under DLP	-
Uttar Pradesh	Kamtagunj to Shambhugunj	PMGSY	2010	2.89	Under DLP	-
Uttar Pradesh	Sultanpur Kurwar to Haliyapur (Km 16.500 to Km 20.500)	PMGSY	2010	7.22	Under DLP	-
Uttar Pradesh	Kurwar Parsipur Saraiya Road to Makdoompur Meerapur Link Road)	PMGSY	2010	3.48	Under DLP	-
Uttar Pradesh	Sultanpur kurwar to Haliyapur (Km 10.500 to Km 16.500)	PMGSY	2010	13.12	Under DLP	-
Uttar Pradesh	UFA to Saraiya Majhuawa Link Road	Other Scheme	2009	0.00	N/A	UP PWD
Uttar Pradesh	Freedpuri Sampark Marg to Saray Subhaga	Other Scheme	2009	0.00	N/A	UP PWD
Uttar Pradesh	Haliyapur Balwai Km 45 to Bhagwanpur Sampark Marg	Other Scheme	2014	0.00	N/A	UP PWD
Uttar Pradesh	Deori Link Road	Other Scheme	2008	0.00	N/A	UP PWD
Uttar Pradesh	Utardhaha Km 2 to Khunhai Link Road	Other Scheme	2008	0.00	N/A	UP PWD

For some of these roads, the figures could not be collected during the time available. The expenditure incurred was also found to be incomparable and not in any proportion to size or life of the road.

2.5 Limitation of the Study

The sample for this study was pre decided in the Terms of Reference (ToR) and its statistical relevance cannot be qualified and the study makes no claims of perfect representation of all section of the society. However efforts were made to do a purposive random selection of households interviewed to allow for a representative picture of the sample units.

Control units under an impact study design are to construct a counter-factual scenario, to determine what has happened in the absence of the intervention which in this case was road maintenance. Since the implementing agencies did not have specific information on condition of the roads, the selection of control units had to be made and replaced after visiting the roads in many cases. This resulted in loss of time and effort. In such cases the control units should be more carefully and meticulously identified well in advance so that impact assessment on the same set of key indicators with the sample units can be undertaken accurately and in a time bound manner.

In the absence of any baseline data, the pre-road status was derived based on recall of respondents and it was found very difficult since many respondents could not reply with a satisfactory level of confidence. This was however attempted to balance out with analysing multiple responses received during group discussions and cross checking with respondent households.

3 Profile and Characteristics of the Sample

The study team covered 40 sample and 40 control habitations spread over Bihar, Jharkhand, Rajasthan and Uttar Pradesh States. Habitation profile information was collected from the key informants on a structured format. PRI representative, School teachers, Anganwadis workers and other opinion leaders in the village were contacted and their responses were obtained. The sample habitations and control habitations were selected in consultation with the State ILO representative, State and district level implementing agencies of PMGSY and other rural roads. Data was also collected on households' characteristics of the entire sample households covered under the study.

3.1 Profile of Sample States

Bihar

One of the largest States in the country, Bihar spread over 38 districts and is largely an agrarian society.

Road Network in Bihar		
S. No.	Class of road	Length (in Km.)
1.	National Highways	4,573
2.	State Highways	4,389
3.	Major District Roads	10,128
4.	Rural Roads	1,22,598

Almost 40% the villages and habitations were without any all-weather road access in the State. The State is covering only habitations above 1,000 population under PMGSY and smaller size habitations are being provided connectivity through different State sponsored schemes like 'Mukhya Mantri Gram Sampark Yojana (MMGSY)'.

Development and maintenance of rural roads is being implemented by Rural Works Department of the Government of Bihar.

The department has developed a maintenance policy for management of rural roads maintenance in the State and roads not covered under DLP are taken up for maintenance under this policy. The State has also developed a road priority index categorizing all the rural roads as class I and II. Roads providing connectivity to important centers and highways are categorized as class I.

Jharkhand

Carved out of the larger Bihar State, with relatively more tribal dominated population and forest cover, the new State of Jharkhand still faces many acute problems in rural roads infrastructure development.

Road Network in Jharkhand		
S. No.	**Class of road**	**Length (in Km.)**
1.	National Highways	2,632
2.	State Highways	1,900
3.	Major District Roads	5,500
4.	Rural Roads	42,133

The Department of Rural Works, Government of Jharkhand is responsible for development and maintenance of all rural roads in the State. A unit in the department headquarters with an Executive Engineer and an Assistant Engineer is set up for planning and overseeing the rural roads maintenance issues.

Jharkhand, so far has not developed a rural road maintenance policy in place. Maintenance of PMGSY roads is taken up based on the Pavement Condition Index (PCI), this system however is not found to be very transparent. For the non PMGSY roads, the decision to select for maintenance is based on recommendations of local public representatives (MLAs).

Rajasthan

The largest State in the Country, Rajasthan is a very sparsely populated desert area. Largely an agricultural economy, the State also has many rural industries and Mining areas. Its long international borders also makes an effective road infrastructure all the more important for the country.

Road Network in Rajasthan		
S. No.	Class of road	Length (in Km.)
1.	National Highways	4,129
2.	State Highways	10,456
3.	Major District Roads	9,176
4.	Rural Roads	1,11,290

The Public Works Department (PWD), Government of Rajasthan is responsible for development and maintenance of rural roads in the State. State has a Road Development Policy developed in 2013. The PWD, with support for the ILO is preparing an addendum to the policy with specific emphasis on rural road maintenance.

Rural roads maintenance is being planned on an annual basis in three seasonal rounds, pre and post monsoon and then another round in the month of February.

Uttar Pradesh

Uttar Pradesh (UP) is the most populous State in India and is also the most densely State. The leading occupation of the State is agriculture and therefore rural roads play a very significant role in rural economy.

Road Network in Uttar Pradesh		
S. No.	Class of road	Length (in Km.)
1.	National Highways	7,863
2.	State Highways	7,370
3.	Major District Roads	7,500
4.	Rural Roads	1,98,115

The Public Works Department, Government of Uttar Pradesh is one of the agency for development and maintenance of rural roads. Other agencies include, Rural Engineering Department, Sugarcane DD, Mandi Parishad and Panchayati Raj Department.

The Public Works Department is the nodal department for maintenance of the rural roads as per the State Rural Roads Maintenance Policy 2013. The policy approved by the State Cabinet however is still not notified.

3.2 Profile of Habitations

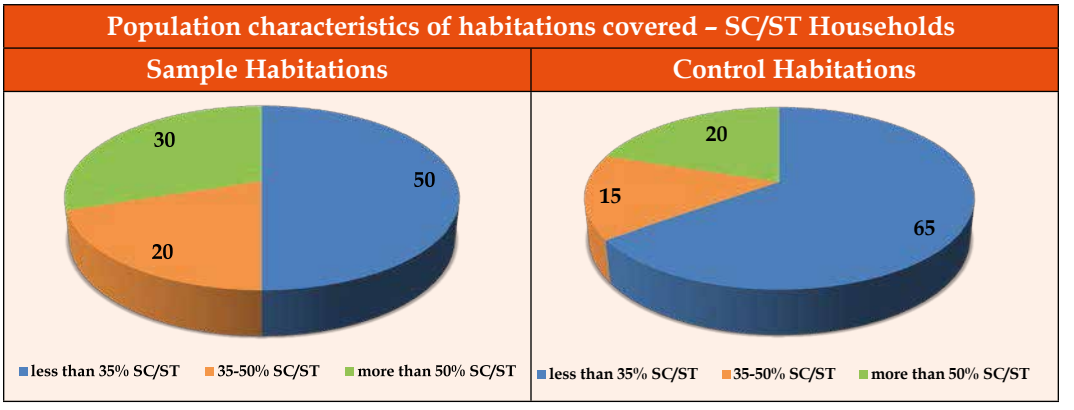
There was a huge variation in the population size of the habitations covered under the study, smallest habitation having only 76 households and the largest habitation having 996 households. The habitations' characteristics in terms of size can be seen in the tables below.

Population size of the Sample Habitations								
State	Population Size				Household Size			
	Mean	Standard Deviation	Minimum	Maximum	Mean	Standard Deviation	Minimum	Maximum
Bihar	2309	1408	754	4860	402	241	135	823
Jharkhand	1964	1209	850	4713	346	219	143	864
Rajasthan	1474	1257	577	4870	258	217	104	840
Uttar Pradesh	2134	1329	512	4722	359	218	80	775
All	**1970**	**1291**	**512**	**4870**	**341**	**222**	**80**	**864**

Population size of the Control Habitations								
State	Population Size				Household Size			
	Mean	Standard Deviation	Minimum	Maximum	Mean	Standard Deviation	Minimum	Maximum
Bihar	2634	1555	617	4853	475	284	105	900
Jharkhand	2122	1599	412	4870	365	288	76	899
Rajasthan	2743	1828	787	5875	466	315	120	996
Uttar Pradesh	1709	1174	732	4775	287	184	135	765
All	**2302**	**1554**	**412**	**5875**	**398**	**273**	**76**	**996**

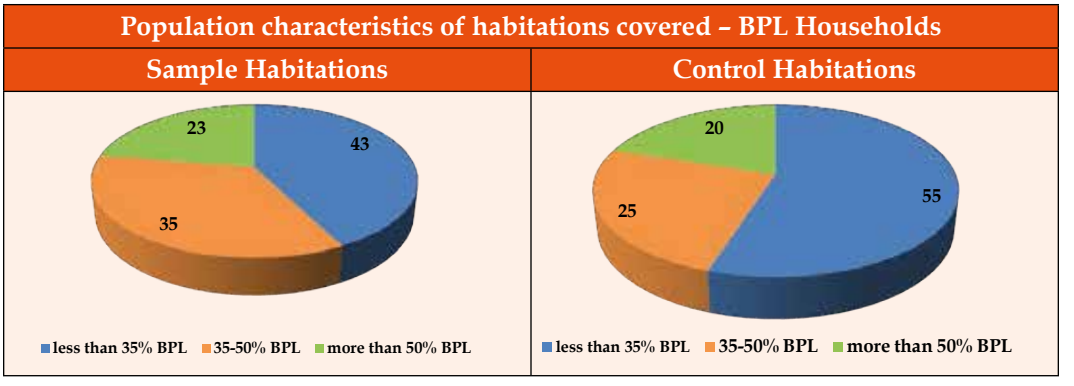
As can be seen above, the sample and control habitations across the States are homogenous in terms of population size.

The demographic profile of these habitations was also studied in terms of their caste compositions.



Majority of the habitations in both the groups have less than 35% of Schedule Caste/Schedule Tribe (SC/ST) households. 30% of the sample habitations and 20% of the control habitations were having more than 50% SC/ST households.

Similarly the figure below represents the comparative picture of sample and control habitations in terms of percentage households living Below Poverty Line (BPL).



43% sample habitations and 55% control habitations had less than 35% households living below poverty line. In Rajasthan, 80% of sample habitations and all the control habitations had less than 35% BPL households.

3.3 Profile of Households

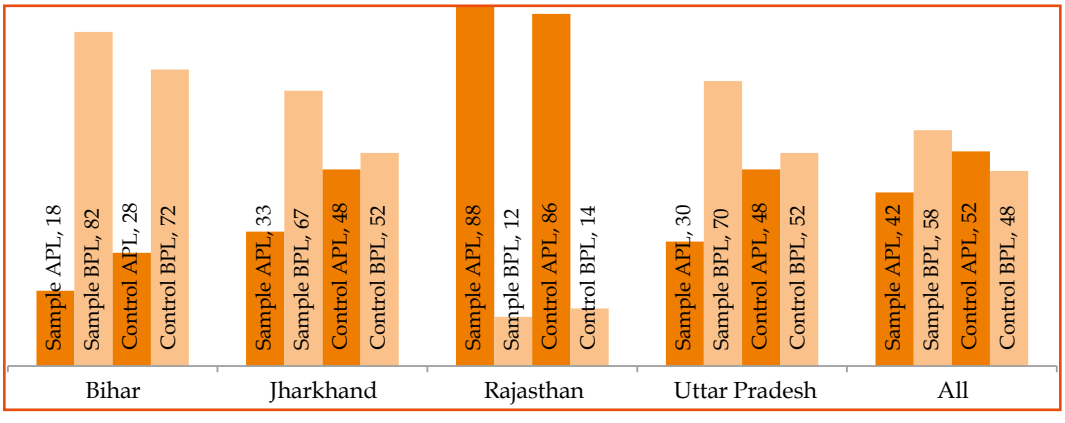
In all, 2000 households have been interviewed under the study in order to assess the impact of rural road maintenance. Basic information on profile of household was collected at the time of household survey. Data on poverty status, caste, ownership of house and size of the households has been analyzed to assess the socio-economic background of the sample households.

The analysis of poverty status of sample and control households confirms to the design of the study with almost equal proportion of above poverty line and below poverty line (APL & BPL) households in the both the sample and control groups.

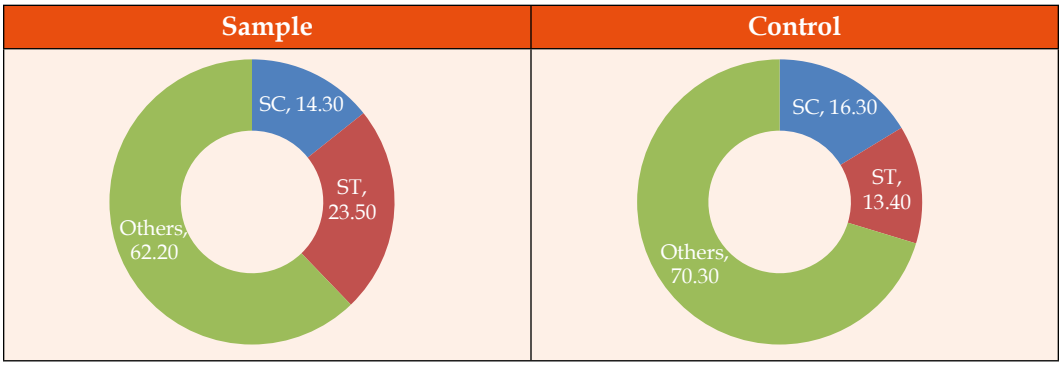
Out of the total 1000 households interviewed in the sample habitations, 42.4% were APL families and 57.6% were BPL. In equal number of households interviewed in the control habitations 52.4% were APL and 47.6% were BPL.

Majority of the respondent households in sample habitations in Bihar (81.6%), Jharkhand (69.6%) and Uttar Pradesh (67.2%) were BPL families.

Poverty status of respondent households in sample and control group, by States



Majority of the respondents in both sample and control groups belonged to the 'other castes' category.



Only 14.3% households in sample habitations and 16.3% households in control habitations interviewed were from Schedule Caste (SC), 23.5% households in sample habitations and 13.4% households in control

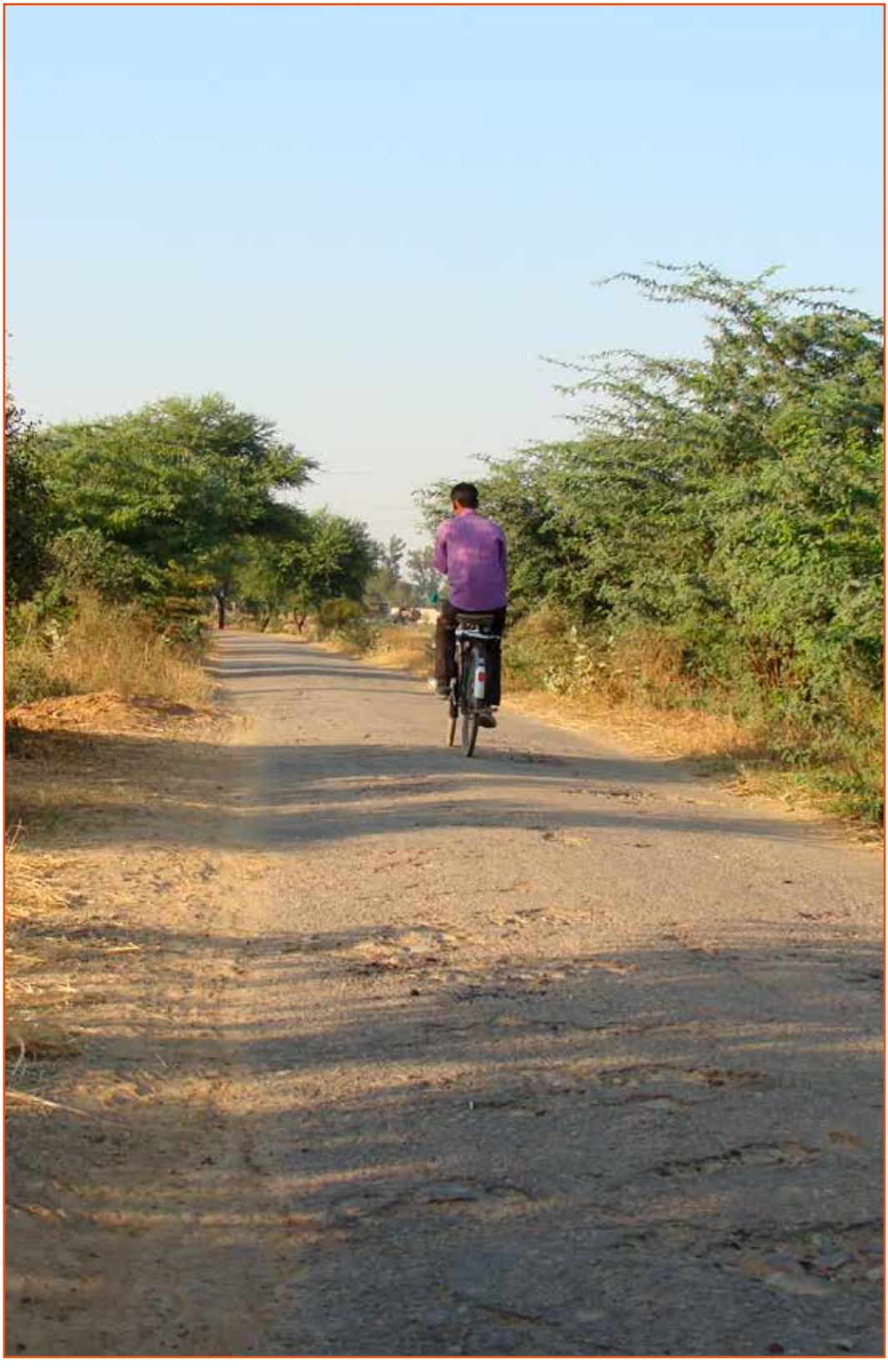
habitations were from Schedule Tribe (ST) category. 62.2% sample households and 70.30% control households were from 'other castes'.

44.9% of the sample households and 39.2% of the control households were living in Temporary (Kutcha) houses. 26.2% of the sample households and 31.9% of the control households were living in Semi-durable (Semi-Pucca) houses. 26.3% of the sample households and 28.8% of the control households were living in durable (Pucca) houses.

State	Sample				Control			
	Temporary	Semi-durable	Durable	Does not own a house	Temporary	Semi-durable	Durable	Does not own a house
Bihar	67.60	24.80	6.80	0.80	44.80	41.60	13.60	0.00
Jharkhand	67.60	24.80	6.40	1.20	67.60	27.20	5.20	0.00
Rajasthan	6.00	25.60	60.80	7.60	6.40	28.40	64.80	0.40
Uttar Pradesh	38.40	29.60	31.20	0.80	38.00	30.40	31.60	0.00
All	44.90	26.20	26.30	2.60	39.20	31.90	28.80	0.10

51.9% sample households and 52.8% control households had family size upto 5 members. 48.1% sample households and 47.2% control households had more than 5 members. Male female ratio was 879 female per 1000 male in sample habitations and 857 female per 1000 male in control habitations.

State	Sample			Control		
	Size of households (no. of members)		(Female per 1000 Male)	Size of households (no. of members)		(Female per 1000 Male)
	≤ 5	6 to 10		≤ 5	6 to 10	
Bihar	48.00	52.00	795	54.80	45.20	822
Jharkhand	48.40	51.60	919	53.20	46.80	903
Rajasthan	68.80	31.20	893	56.40	43.60	849
Uttar Pradesh	42.40	57.60	908	46.80	53.20	855
All	**51.90**	**48.10**	**879**	**52.80**	**47.20**	**857**



4 Connectivity status before and after the road

Poor road connectivity to India's villages deprives them from many opportunities for development. The acute climatic conditions in the country also increase the problems of access to even critical facilities in emergency situations. Hospitals, law and order machinery and relief efforts cannot be reached when they are needed the most. In order to assess the impact of rural roads in terms of the changes brought in by them, it is imperative to study the pre-road access scenario and post-road accessibility status. In this part of the report we analyze the type of road access before these rural roads were constructed, changes in the improved motorized access after the road was built and the status of connectivity to important facilities post-road construction. Last part of this chapter also deals with changes and improvements in public transport after construction of the rural roads. This chapter also deals with variations in all these parameters in the maintained road versus the not maintained roads.

"Our village Morud had many problems due to absence of a motor-able road. So much so, that we would find it very difficult to get marriage proposals for the young men of our village. PMGSY Road has brought not only prosperity but also brides for the youth"

Salamat Khan, Sarpanch of Beleta Gram Panchayat, district Alwar (Rajasthan)

4.1 Type of road access in sample and control habitations before the road

In order to establish the improvements in connectivity after construction of a rural road it is necessary to compare the type of road access available to the habitation before construction of the road. 48% of the sample habitations

and 60% of the control habitations had only earthwork (not motor-able) road access to them. 27% sample habitations and 30% control habitations had only earth-work roads but they were motor-able. 20% of the sample habitations had all-weather road connectivity but the new roads were provided to reduce the distance or better connectivity to markets etc.

% of Sample Habitations				
State	Type of Road access before the rural road			
	Only Earth work (not motor-able) road	Only Earth work (motor-able) road	Gravel/water bound macadam layer road	All-weather road
Bihar	40	50	10	0
Jharkhand	10	40	10	40
Rajasthan	80	10	0	10
Uttar Pradesh	60	10	0	30
All	**48**	**27**	**5**	**20**

% of Control Habitations				
State	Type of Road access before the rural road			
	Only Earth work (not motorable) road	Only Earth work (motorable) road	Gravel/water bound macadam layer road	All-weather road
Bihar	50	40	10	0
Jharkhand	50	50	0	0
Rajasthan	90	0	10	0
Uttar Pradesh	50	30	10	10
All	**60**	**30**	**7**	**2**

It can be safely concluded that the rural roads have improved the type of road access to these habitations in almost all the cases. This improvement reassures better and faster access to and from these habitations. In the following parts of this report we will assess and establish the impact of this improvement and the differences that prevail between the roads that were maintained with those which were not maintained.

4.2 Changes in all season motorized access before and after the road

Very few habitations, only 30% sample and 10% control habitations had all season motorized access before these roads were constructed but after these roads were built almost all of them could travel in and out any time during the year. The problem of connectivity during acute seasonal conditions was

severe in these habitations which remained inaccessible for more than 50 days during a year. This seems to be a significant improvement at least in the sample habitations where all season connectivity is available round the year.

It is also clearly established that rural roads constructed in order to provide better connectivity need regular and systematic maintenance to ensure that the improvements continue to benefit the population for whom these investments were made. The study data reflects that in all the roads which have been maintained regularly, the connectivity is available even during the extreme seasonal conditions however it was not in case of roads which were not properly and regularly maintained. The condition was worse in areas which get heavy rain and often get flooded during the rainy season.

% of Sample Habitations						
State	All Season motorized access before the road			All Season motorized access after the road		
	Available	Not Available	If not available, average no. of days closed	Available	Not Available	If not available, average no. of days closed
Bihar	20	80	56	100	0	0
Jharkhand	60	40	60	100	0	0
Rajasthan	0	100	48	100	0	0
Uttar Pradesh	40	60	58	100	0	0
All	**30**	**70**	**54**	**100**	**0**	**0**

% of Control Habitations						
State	All Season motorized access before the road			All Season motorized access after the road		
	Available	Not Available	If not available, average no. of days closed	Available	Not Available	If not available, average no. of days closed
Bihar	10	90	81	90	10	40
Jharkhand	10	90	62	100	0	0
Rajasthan	0	100	54	60	40	34
Uttar Pradesh	20	80	64	100	0	0
All	**10**	**90**	**56**	**88**	**12**	**37**

Villagers interviewed reported that they have again started facing serious access problems during the rainy season when it is very difficult to navigate through water logged areas and potholes.

12% of the control habitations lose total or partial accessibility during rains and floods and cause huge discomfort to the residents. Condition was found worst in Rajasthan where 40% of the control habitations suffer due to this problem.

4.3 Changes in connectivity Status to important facilities

Many important facilities like education, health, markets, administration and other important establishments become accessible for the rural population if roads are built to their villages. Better roads improve connectivity and convenience to travel, reduces travel time and improve transport facilities. It has been seen that better connectivity changes the patterns and preferences of people to access these facilities resulting in positive impacts. To study how much do these roads contribute to improved connectivity to such facilities, information was collected about the nearest facility, access by these roads and distance to these facilities. It is assumed if these facilities are not within the habitation and its access is through roads, the impact of accessing these facilities can be attributed to these roads. If the distance is longer, the convenience and their impacts are higher.

Analysis of the data reveals that almost all the habitations covered under the study have **Anganwadi centers** within the habitations. Certainly these roads may not be needed by the residents but in almost 5% of the habitations other nearby habitations not having an anganwadi were using these roads to reach the anganwadis in the habitations.

Similarly majority of these habitations also have **local primary schools**, however for further education facilities the population is traveling outside these habitations. It has been observed by various studies in the past that improved access to facilities for further education improves the chances of

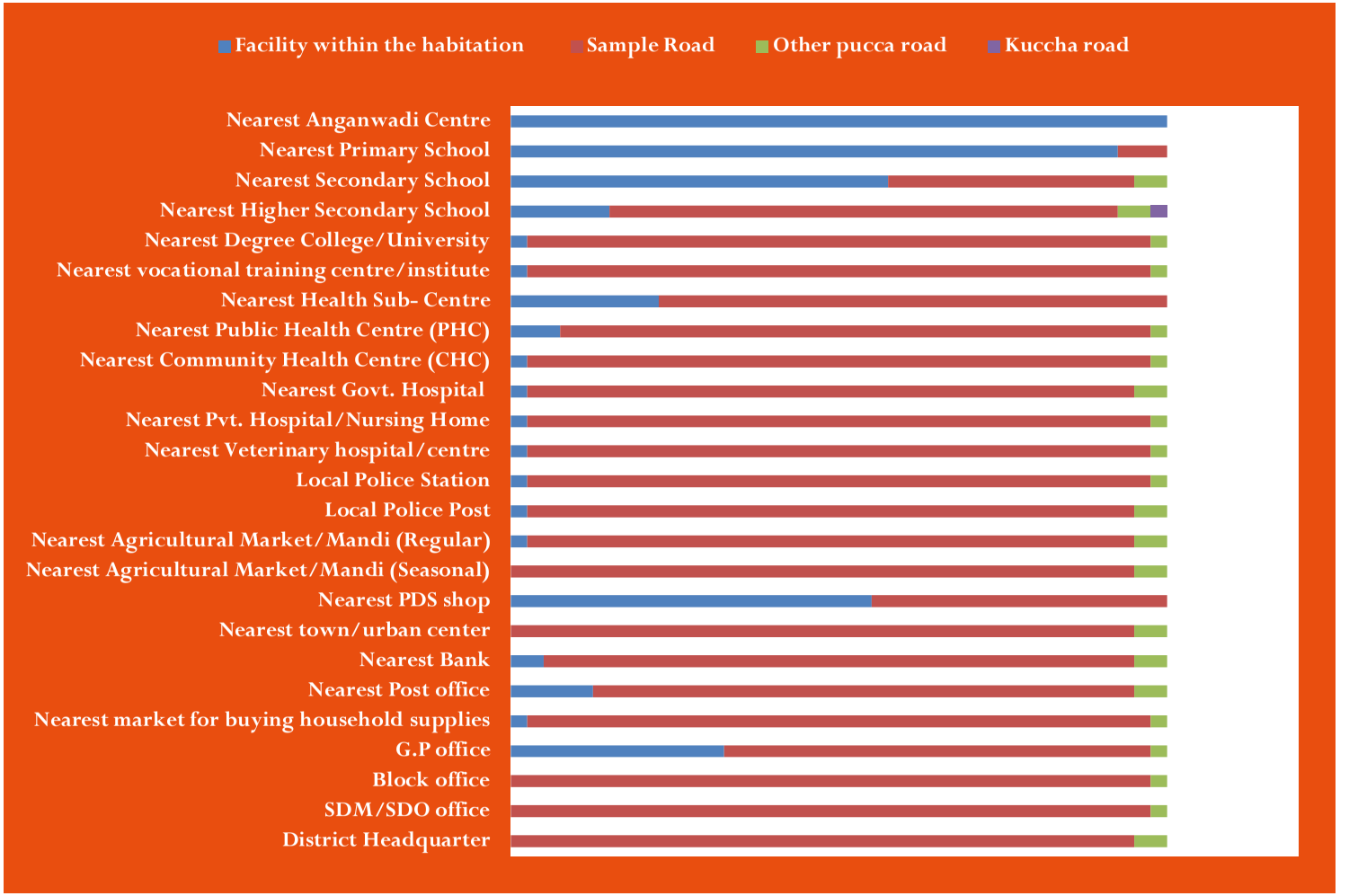
parents enrolling their children for primary education. Obviously an indirect impact of these roads can be found on primary education. The group discussions in many villages also brought out that improved road access made the travel of teachers possible from outside the habitations to reach these primary schools therefore it can be concluded that despite of the fact that these primary schools are within the habitations, rural roads there have contributed significantly to better primary education. 10% Sample habitations in Bihar, Jharkhand and Uttar Pradesh did not have local primary schools and in all these habitations the children were travelling using these roads to reach the nearest primary schools. 20% control habitations in Rajasthan also did not have a local primary school but there access to the nearest primary school was through a Kuccha road (earthwork).

57% of the sample habitations and 65% of the control habitations also have a **secondary school** within the habitations. 50% sample habitations in Jharkhand and Uttar Pradesh and 40% sample habitations in Rajasthan do not have a local secondary school and their children travel on an average 2-3 Kms to reach the nearest secondary schools. The rural roads built for these habitations have helped the residents significantly as 37% of the total sample habitations use the sample road to travel to the secondary schools. 5% habitations also have other all-weather roads connecting them to the nearest secondary schools. In the control habitations 25% depend on the sample roads and 10% use a Kuccha road to reach the nearest secondary school.

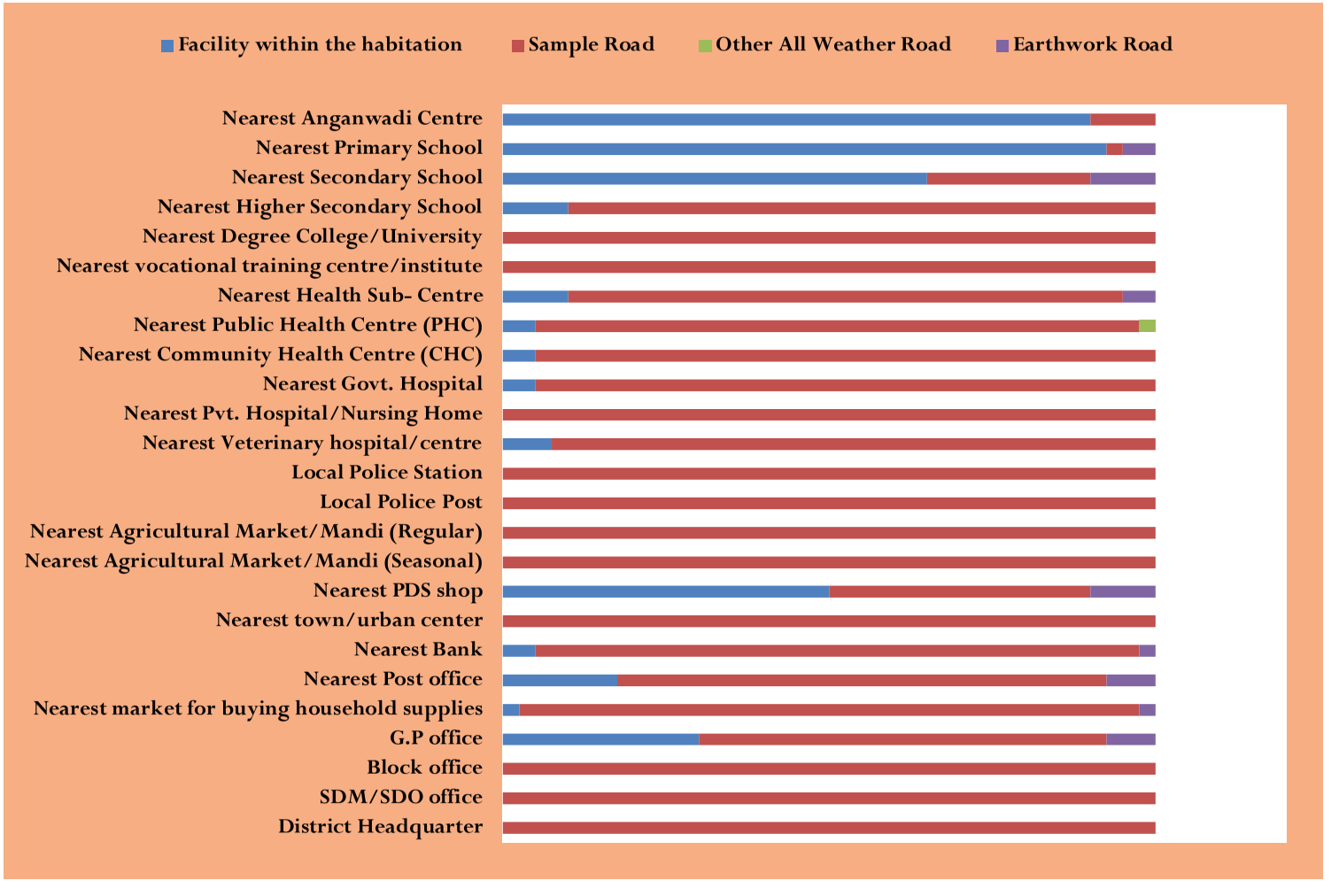
Fewer habitations have a **higher secondary school** within the habitations. 77% sample habitations and 90% control habitations are using the rural roads to reach the nearest higher secondary school. The average distance traveled by them is 4-5 Kms to reach their schools. The villagers during discussions also asserted the road connectivity's role in increase in number of children going to higher secondary schools.

One of the sample habitations has a **degree college and a vocational training institute** whereas all the others have to travel outside using these roads to reach the nearest Degree College/ University or training centers. Average distance travelled by them to reach the colleges is 14-16 Kms. This reiterates the importance of these roads for the residents to access higher education for their children.

Sample Habitations



Control Habitations



Improved connectivity by these roads has a larger and more significant impact on access to health facilities. Only 22% sample habitations and 10% control habitations had a **Health Sub Center**. All the other habitations are using these roads to reach the nearest Health Sub Center traveling on an average of 4-6 Kms. Similarly availability of nearest health facilities for more serious medical needs like **Primary Health Centers, Community Health Centers, Government Hospitals and Private Hospitals/Nursing Homes** within the habitations was very limited and in more than 90% of such habitations, the roads are used to travel an average of 8-15 Kms to reach these facilities. More than 90% sample habitations are traveling distances upto 7-11 Kms to reach the nearest veterinary hospital/center.

Security and law enforcement also have a role in development of an area along with the sense of security they bring to a society. Some of the rural areas have acute insurgent activities like Left Wing Extremism which hamper the process of development. Roads and connectivity to **police stations etc.** have a very important role in these areas. Rural connectivity provided by these roads has been very helpful as almost 95% of these habitations did not have even a police post. All these habitations are now connected through these roads.

Roads improve connections to the markets and influence the agricultural activities in a very significant manner. The information collected during the survey clearly reflects the importance of these roads as almost all of them are being used by the villagers to reach the **agriculture markets/Mandi**. The average distance travelled to reach these markets is 13-26 Kms. The impact of roads on the agricultural economy of these areas is clearly established further in this report.

A qualitative view of the effects of these roads on many other important facilities and services was also attempted to find out during the discussions at the habitation level. In this process the connectivity to these facilities, dependency on these roads and the distance was also collected. Almost half of the habitations had a **Public Distribution System (PDS)** shop within the habitation except for the habitations in Rajasthan where only 30% of them had a PDS shop. As like for other facilities, in all other habitations the residents are accessing the PDS facilities using these roads.

Villagers travel to the **towns and cities** for various needs including employment opportunities. The roads have been very useful in connecting these habitations to the nearest towns and cities. Almost all of them are using these roads to reach the nearest towns and cities.

Banks and Post Offices have being very important for rural population and the recent initiatives of the Government to link everyone with a bank account will increase the role of banks etc. in the lives of our population.

Connectivity to reach these institutions is always critical to avail the facility. The data reveals that more than 90% of the habitations are dependent on these roads to reach the nearest Bank and Post Office facilities.

Empowerment of rural population is very significantly linked to their approachability and involvement with **Gram Panchayats**. The GPs in most of the States comprise many villages and it has been seen that the villages farther from the GP headquarters are often alienated from the decision making processes. Improved connectivity has made traveling easily for the residents in the sample habitations where more than 60% are using these rural roads to reach the GP headquarters. The significance can be asserted with the fact that on an average the distance of GP headquarters from 65% habitations is approximately 4 KMs.

Equally important is the connectivity to **block and district headquarters** where having an all-weather road not only makes it easy for the people to travel to these offices but also improves visits of the officers from these offices to reach such villages. 97% habitations are connected to the block headquarters and 95% habitations are connected to the district headquarters using these roads.

The rural roads have a significant socio-economic impact on the lives of rural population and this has been substantiated by a series of impact assessment studies conducted in the past. This study was aimed to assess the impact of rural roads comparing between roads which were maintained with those which were not maintained. A clear evidence of dependability on these roads is established in this preceding part of this chapter and the net impact of these roads including comparison between the two set of roads is provided in the following chapters.

4.4 Maintained vs not maintained road

A large amount of investment has been made on rural roads in the Country and to keep them in serviceable condition is a huge challenge. This study has brought out very clearly that not merely road construction but their maintenance is very crucial for rural growth and sustainable access to many critical facilities like market, health and education etc. It is also established that lack of maintenance affect the rural poor badly in terms of time loss and travel costs. Many cases and stories presented in this report have brought out the potential danger of losing the very good gains of the improved connectivity if these roads are not properly maintained.

Many academic discussions and suggestions for sustainable maintenance systems of rural roads in the past have given their recommendations; some of them were tested for soliciting the opinion of respondents in this study.

During discussions suggestions were also taken from the opinion leaders, PRI functionaries and officials involved in implementation on several issues for ensuring maintenance of rural roads.

Many respondents during the discussions opined that there should be a firm commitment by Governments to maintain the rural roads to serviceable levels around the year since many people have made private complementary investments, sustainability and usability of them largely depends on the serviceable condition of the new connectivity. The study team in the field was informed about many such cases where people have invested in private schools, private nursing homes, shops and even public transport facilities like Jeeps and mini buses only after the new connectivity was provided to that area. Some of these investors are suffering due to deterioration of road quality, resulting in losses to them.

"5 KM long road to connect Keshroli Road to Bahala ka Bas village was constructed during 2007-08 under the RIDF-XII scheme. Connectivity improved access to education and health facilities and markets. However heavy trucks and other public transport vehicles plying on the highway nearby started using it to bypass a toll tax barrier as a result of which this road got damaged and was never repaired. Trucks transporting material from a brick kiln nearby Now commuting to the mandis nearby has become more time consuming with the potholes and water logging then before this road was constructed."

Hare Singh, Sarpanch of Bahala Gram Panchayat, district Alwar (Rajasthan)

It was very heartening to find that most of the PRI representatives interviewed by the study team were very concerned about the road maintenance issue and were very forthcoming in suggesting solutions for road maintenance issues. Most of them were very receptive of the idea if they were to be involved in maintaining and monitoring road quality.

There were also some examples where mere awareness generation can help in road maintenance. In a village in Alwar district of Rajasthan, the study team observed that some farmers were using the road as a drainage channel

for irrigating their fields. Digging the soil from the shoulders they had made mud bund wall on both sides and water was flowing on the road surface. It was found that this is a regular feature and they were not at all concerned about the damage being caused to the road.

Many respondents interviewed during the study have also suggested building support infrastructure like road side passenger shelters and community toilets etc. for improving the convenience to travel on the rural roads.

PRI representatives in Rajasthan suggested a special beautification and environmental beneficial drive to be undertaken along the rural roads to improve the travel experience. They also suggested owning up such an initiative by managing and harvesting the plantations, income of which they could use for minor repairs and maintenance.

Field observations and community responses have evidently established the need and importance of rural road maintenance systems, a long term solution if established will certainly help in continuation and multiplication of the benefits of rural roads.

4.5 Summary of Key Findings and Conclusions

- Though rural roads have significantly improve the type of road access from only earth work roads to an all-weather road in majority of the habitations, the habitations where the roads have not been maintained this impact has been reversed back to the pre road status. 12% of the habitations where roads have not been maintained lose total or partial accessibility during rains and floods and cause huge discomfort to the residents.
- The selection of the roads constructed was validated as it was found that most of them are providing access to critical facilities related to the educational, health, markets and other needs of the residence. With the poor or no maintenance of some of these roads the amount of discomfort and loss to the people can be very easily understood. This has also be further elaborated and quantified in the following chapters of this report.
- Rural roads also have attracted many complementary investments, mostly private, their sustenance and returns largely depend on the road conditions. These investments have been made by people considering that these roads are permanent and will continue to remain operational forever. Poor maintained roads have threatened the sustainability and profitability of such investments in many cases.
- Involvement of community at planning stage and maintenance of the rural roads needs to be enhanced.

5 Impact of Rural Roads on Agriculture

The most significant justification of the large scale public investments in rural roads is to help the largely agrarian rural economy in exploiting the income opportunities for the farmers. India's most ambitious rural roads programme, PMGSY is also primarily aimed at providing connectivity to the markets. Higher agricultural production, lower inputs and transportation costs, improved cropping patterns and increased output prices are expected once farmers are connected through an improved all-weather road to the markets. These shifts have been clearly reflected and were attributed to the improved connectivity in some of the previous studies also.

This study primarily aimed at assessing the sustainability of these impacts has also brought out that some shifts from traditional cultivations and marketing practices, if not sustained due to road degradation, can cause much larger negative impacts. It was found that changes in cropping patterns and withdrawal of traditional marketing intermediaries due to better connectivity can also cause huge losses if the new facilities by improved connectivity seize to exist, even temporarily.

5.1 Shifts in Cropping Patterns

Roads make access to markets easier for the farmers, improved information and extension services support also impact the cultivation choices and thereby result in positive changes in cropping patterns. The study found that though many farmer households have gained substantially in terms of improved market access and information flow, the effect on changes in cropping patterns were not very significant though could not be denied. The data collected at the habitation level in terms of change in percentage cropped area reflects that reliance on traditional crops like cereals and pulses has reduced and many farmers have shifted to more cash crops like fruits, vegetables etc.

The percentage cropped area under cereals has been reduced by (-) 0.73% and this has happened across the sample States, most significantly in Jharkhand where almost 3% of the cropped area under cereals has shifted to other crops after the roads were built. Farmer households interviewed

reasoned this to the improved access to markets and thereby can be attributed to the road construction.

Similarly a more significant impact of these roads was found in terms of reduction in percentage cropped area under pulses wherein all the habitations, the net shift has been up to (-) 12.53%. A huge area under pulses in some of the habitations in Rajasthan has shifted to crops such as onion and cotton.

A very positive increase (5.26%) in percentage cropped area under fruits and vegetables has also been seen across the sample States. More numbers of farmers are now growing fruits and vegetables.

Data also reflects that improvement in road access has resulted in significant shift from mere subsistence farming to cash crop production in 13% of the interviewed farming households.

All the above may not be clearly attributable to rural roads only but conclusions drawn on the basis of group discussions in these villages and interviews of the farmers clearly reflect towards these roads as major contributing factors in farmers shifting to more cash crops.

The analysis of households' interview data also points that the reliability of these farmers has increased on the better marketing linkages, transport facilities and extension services.

Group discussions in majority of the control habitations have brought out the concern of farmers about the poor maintenance of these roads. Though no noteworthy incident of a major loss to the farmer due to a damaged road was found, the possibility of this cannot be ruled out.

5.2 Increases in Usage of Fertilizers and Improved Seeds

Rural road infrastructure is very important to maintain the supply and distribution of agricultural inputs. Poor connectivity deprives the farmers from accessing or procuring these inputs and that results in suboptimal productivity. It was seen that improved access due to the rural roads have improved transportation, made distribution channels and lowered the transportation costs of agricultural inputs in the study area. Group discussions with the villagers have brought out that a significant leap in production has happened due to use of improved seeds and better fertilizers, pesticides etc.

Almost one fourth of the sample farmer households interviewed under the study reported increased use of fertilizers since the construction of road as compared to the period before that. The highest change was noticed in Uttar Pradesh where 47% of the farmers reported the same.

Similarly a significant shift in use of improved seeds was seen post construction of the road in almost 15% of the farming households. Majority of these farmers attributed this to the easy accessibility to markets, lower transportation costs and all-weather operability of roads.

The trends of shift to increased used of fertilizers and improved seeds have fortunately not changed in the control habitations and it was found that somehow despite of poor road conditions, the farmers still continue to manage the critical inputs needs which they adopted after construction of roads to their villages.

The most significant improvement in use of fertilizers, pesticides and improved seeds was noticed on crops like fruits and vegetables grown by the surveyed households.

5.3 Improved Accessibility to Agriculture Markets

Rural roads are known to impact the marketing related factors; roads can bring markets to the villages and can facilitate farmers accessing the markets easily. Better access to markets results in fetching better prices for their produces. In order to study the changes in access to agricultural markets, information on changes in point of sale of production and changes in distance/time travelled to reach the markets was collected from the respondent households engaged in agriculture activity.

The accessibility to markets for agricultural products has also improved. As mentioned in the previous chapter, all the roads covered under the study are used to reach the nearest agriculture markets/Mandis and have proven very useful for the farmers. The respondents have clearly reflected the benefit of improved access to markets, perishability of their produce is not

a concern anymore and many farmers have shifted to growing fruits and vegetable crops now.

The data in terms of shift in point of sale of production, post construction of the road clearly establishes the above facts, as more farmers are now selling their produce to markets outside their habitation or to traders who reach them from outside markets. Almost 6% of the farmers those who were selling their produce to local traders within the habitation have now started selling to either Mandis outside their habitations or traders from outside the habitation are coming to buy their production. It will also be noteworthy to mention this that majority of these farmers were small or marginal farmers. The change is less significant in case of farmers having bigger land holdings as they were managing to reach the markets or get better market prices even before these roads were built.

Another substantial impact of the improved accessibility to markets has been the reduction in travel time to markets after construction of the roads.

Reduced time not only reduces cost of transport but also saves precious productive time of the farmers.

Savings in travel time to reach the nearest agriculture market/Mandi

State-Sample	Before the road		After the road		Saving in travel time (% reduction)
	Average Distance (KM)	Average Travel Time (HH:MM)	Average Distance (KM)	Average Travel Time (HH:MM)	
Bihar	18.60	02:02	20.40	00:55	54.92
Jharkhand	9.30	01:03	8.40	00:29	53.97
Rajasthan	16.30	02:11	16.90	01:04	51.15
Uttar Pradesh	17.00	02:13	14.25	00:52	60.90
All	**16.10**	**01:58**	**15.42**	**00:52**	**56.27**

State-Control	Before the road		After the road		Saving in travel time (% reduction)
	Average Distance (KM)	Average Travel Time (HH:MM)	Average Distance (KM)	Average Travel Time (HH:MM)	
Bihar	15.42	02:15	17.53	01:12	46.67
Jharkhand	6.83	01:06	6.65	00:46	30.30
Rajasthan	12.20	02:05	13.40	01:31	27.20
Uttar Pradesh	33.00	03:00	31.20	01:45	41.67
All	**14.92**	**02:02**	**16.95**	**01:17**	**36.89**

As reflected in the tables above, there has been a significant reduction in travel time for the farmers to reach the nearest agriculture markets in the habitations after the new connectivity. In sample habitations where the roads were maintained, the impact in terms of savings in travel time has been very significant. Though they had to travel almost same distance to reach the markets which took an average of almost 2 hours, is now reduced to less than an hour. A saving of more than 50% of the travel time as compared to the time they were spending before the construction of the road.

The biggest gain has been for the habitations in Uttar Pradesh where the average distance travelled have reduced by 2.75 KMs and the saving in travel time is almost 61% as compared to the previous period before the road was constructed.

The access to nearest agriculture markets/Mandi has also improved in the control habitations; however savings in the travel time is comparatively less. Poor conditions of road in these habitations has limited the impact to only 37% of the travel time as compared to the time they took to reach the markets before these roads were built.

In the habitations covered in Rajasthan the saving in travel time as compared to the period before is only 27%. The respondents reported that damaged road conditions have made the travel time longer and also the journey very uncomfortable.

5.4 Improved Realized Prices for Agricultural Produces

In order to assess the impact of better connectivity on realized price of agricultural produces into perspective, comparison of average price realized for a commodity before and after the road is an acceptable method. However in the present scenario where food inflation has seen an unprecedented rise during the last few years, it is very difficult to assess how much of increase can be attributed to better connectivity. Since the control units also have a road, though not maintained, any significant variation between the sample and the control can establish that better maintained roads help fetch better prices for the farmers. Also the respondent households were asked whether they felt that the roads helped them get higher prices for their produces. They were further asked if the maintenance of roads has helped in any way to realize higher prices.

The analysis of data reflects that almost all the households in sample and control habitations who were growing cereals before and also after the road have reported increase in the average realized price after construction of the road. Almost 90% of these households in sample habitations felt that roads have helped them access the markets and get better prices however they also felt that they would have managed to get the same prices even if their roads were not maintained. Similarly in the control habitations, majority of the households denied any loss to them in terms of less realized prices due to poor road conditions.

Households growing pulses also do not reflect any significant road maintenance effect. There has been major increase in average realized price as compared to the corresponding period but almost all the respondents reflected no effect of road maintenance on the increased prices.

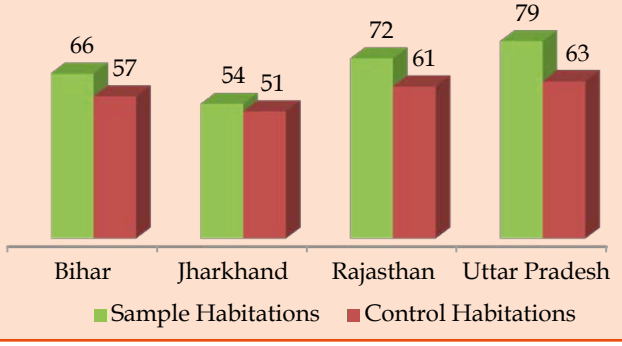
Average price for all the crops, across the States has increased during this period, however no conclusion can be drawn whether increase in the average realized price of agricultural products can be attributed to road construction and maintenance.

State wise distribution of farming households reported increase in realized prices, by crop category (% of farming households)						
State	Households growing Cereals		Households growing Pulses		Households growing Fruits & Vegetables etc.	
	Sample	Control	Sample	Control	Sample	Control
Bihar	86	87	81	82	91	90
Jharkhand	83	81	89	84	93	91
Rajasthan	91	92	93	91	95	95
Uttar Pradesh	93	91	92	92	93	92
All	90	91	91	91	93	91

5.5 Changes in access to facilities/services

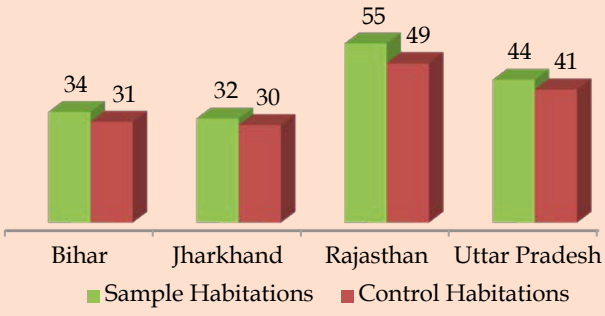
Improved road connectivity helps reduce the deprivation of rural population to access better information, markets and facilities. It was attempted to find out whether better roads have helped the farmers access the critical services and facilities by comparing their status and patterns in sample and control habitations.

% of farming households traveling outside the habitation to source fertilizers and pesticides



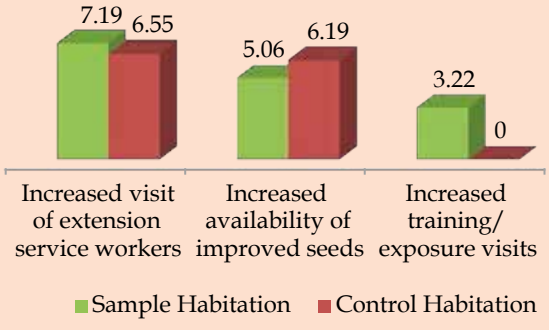
Easier and faster travel is a very important factor in determining the choice to travel out for any purpose. Though the sample and control habitations were homogenous in demographic and socio economic profiles, it clearly showed that higher percentage of farmers in sample habitations where the roads are well maintained, travel outside the habitation to source fertilizers, pesticides etc.

% of farming households traveling outside the habitation to source improved seeds



Respondents in sample habitations also travel outside the habitation to buy improved seeds and as reflected for the previous indicator, the proportion of them in sample habitations is higher than their counterparts in the control habitations.

% of farming households reported improved agricultural extension services

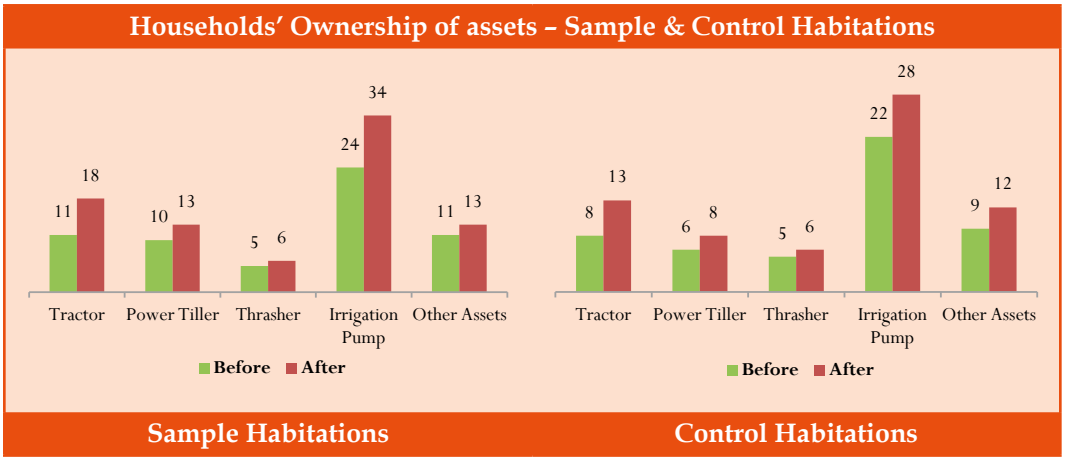


As can be seen in the figure above, there has been an improvement, very marginal, in the improvement in agricultural extension services received by the farmers. The overall impact on the control habitations is lower than of the sample habitations, though in case of receiving improved seeds; control habitations in Rajasthan have shown much higher gain than others.

5.6 Improved ownership of assets related to agriculture

Rural roads also inspire farmers to acquire more assets and equipments for improving their agricultural productivity, the data collected on ownership of assets also brings out that post construction of the road many households have acquired various assets like tractor, power tiller, water lifting pump set and other farm machinery. No major difference was visible in comparing households from sample and control habitations.

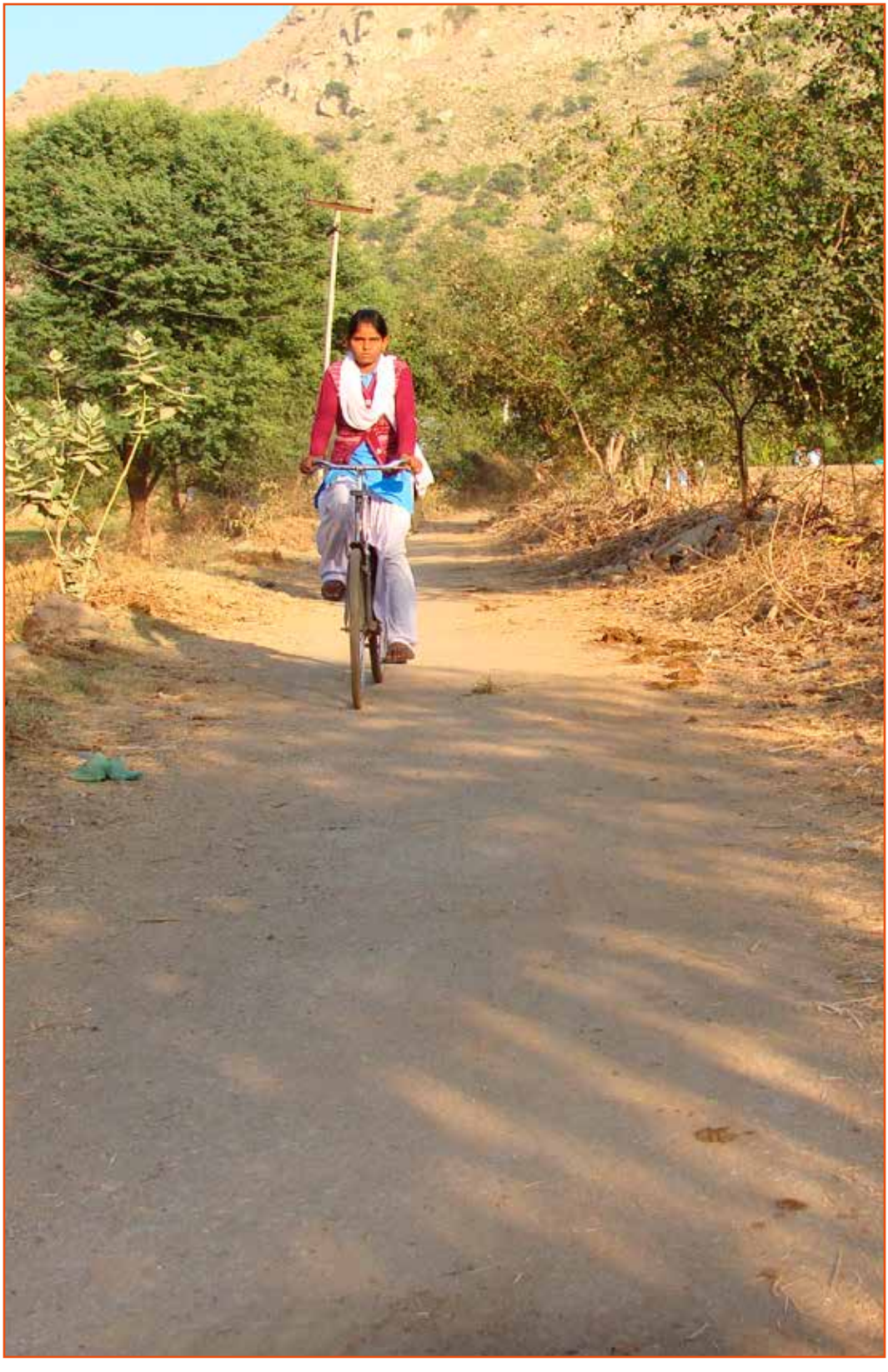
In the sample habitations, where only 11% of the interviewed households owned a tractor even before the road was constructed, more than 18% have a tractor now. Similarly almost 30% more households have acquired a power tiller and 20% more than before have a thrasher now.



The data also reflects how the improved access has helped the households with increased number of livestock. Almost 50% of the households have added more cows/buffaloes, 36% households have added more goats/ sheep/pigs. Also 23% households have increased number of poultry birds after the construction of the road.

5.7 Summary of Key Findings and Conclusions

- Improved road connectivity in the rural areas have the impacted the cultivation choices and improvements in cropping patterns. Though not a very significant change was found as demand, soil and environmental factors play a much larger road in the choice of crops, but improved information and better market access due to better connectivity have resulted in shift in cropping patterns in some pockets. Perishable commodities like fruits and vegetables require faster road access to markets and shift to such crops can caused major loss to the farmers if the roads are damaged. The sample studied has not found any major lose however the farming households have shown their concern on poor maintenance of the roads.
- Similarly, the roads have also found to have resulted in significant savings in travel time and cost to reach the markets in the habitations where roads were not maintained, these gains have been lost to a large extent.
- The data reflects that in the habitations where roads are not maintained, the access to markets for sourcing inputs and services is weaker than the other habitations where roads are maintained.
- Activities such as livestock and use of modern agricultural equipments were better in the habitations where roads are maintained as compared to their counterparts having poor maintained roads.



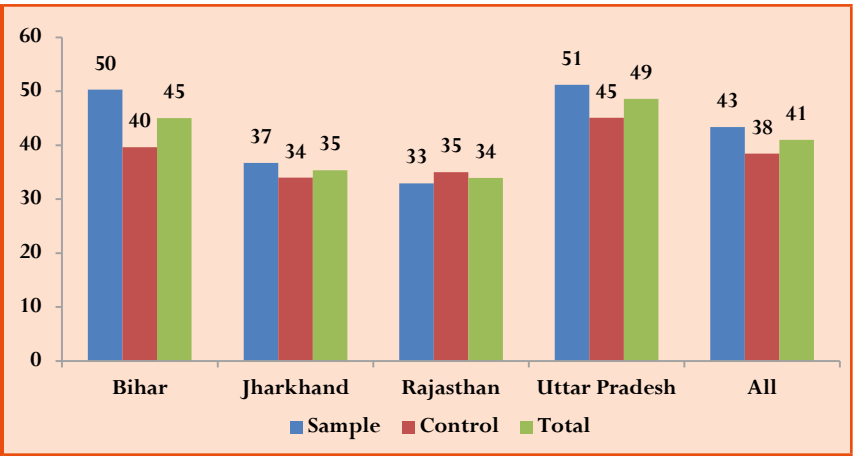
6 Employment Generation and Rural Roads

The Government of India through its wage employment programmes like MGNREGA has attempted to solve or minimize the problem of unemployment by providing unskilled manual work to the needy in the villages. However it has been observed that such schemes cannot be permanent solutions to the employment problem because of the very high cost and less productivity nature of the type of works taken up under such programmes. The ultimate solution for the employment problems in rural areas lies in creating infrastructure, better connectivity and increased employment opportunities by connecting such areas to the markets and to places of employment in abundance. The availability of roads will facilitate more business in the villages thereby increasing the employment opportunities as well as helping people to travel outside for jobs. It has been observed that better connectivity can also result in increase in production capacities of the existing enterprises in the villages as well as creation of new opportunities in the villages, both will result in more people getting jobs in these enterprises.

6.1 Increase in number of days employed

Information was collected on type of occupation and number of days employed of all the earning members of the respondent households in the sample and control habitations before and after the road was in order to assess the impact on the employment opportunities to these households. This information was only collected for the members of the households excluding the ones largely engaged in activities on own farm. Based on the total number of days employed per year before and after the road was operative it was found that 41% households reported increase in number of days of employment in the principal occupation of their earning members post construction of the road.

% of households reported increase in No. of days employed



The improved employment in terms of members of households engaged in other occupations than their own farms and getting more number of days employed after the road were constructed is marginally better in sample habitations (43%) as compare to control habitations (38%). This is expected as some households have stopped going out for employment because of poor road conditions in control habitations. The corresponding distribution by States also reflects a similar picture with the exception of Rajasthan, where in the control habitations the impact was found comparatively higher wherein sample habitations 33% households reported increase in number of days employed as compare to 35% households in control habitations. It was found that in Alwar district of Rajasthan, large scale industrialization and real estate development activities in the nearby area has created many employment opportunities and in some of the control habitations where the roads were not even maintained, people could easily access employment opportunities very close to their villages.

Out of the 41% households who have reported increase in total days employed of all earning members of their family, 3% reported the increase of upto 50 days in a year as compared to the previous period. 36% reported increase of 51-100 days, 1% reported an increase of 101-150 days and 1% reported increase of 151-200 days in a year.

The most significant gain for the households reported increase in number of days of employment was in case of households having their members occupied as 'construction labour', which is followed by households having their members occupied in 'other private jobs'. Households where the primary bread winners were occupied as 'non agricultural unskilled wage earners' also reported significant gain in increased employment after the construction of the road.

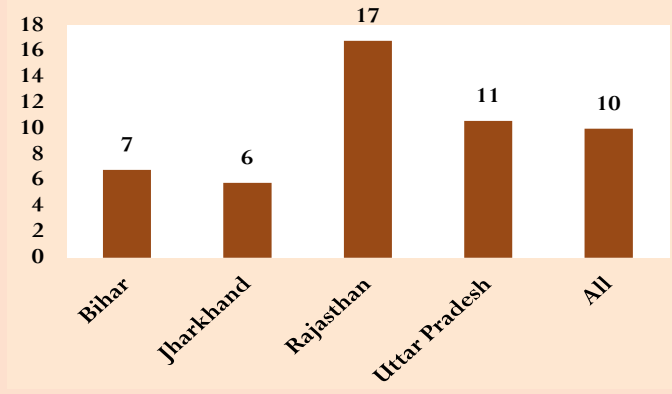
Comparison of impact on households in the sample and control habitations reflect a clear advantage amongst the households of sample habitations and it was clearly visible that the control habitation' households have lost some of the gains due to poor road conditions.

6.2 Traveling outside the village for Employment

Improved all season connectivity in the rural areas is results in reduction in travel time, increased usage of motorized vehicles and travel comfort to the place of employment of the villagers. Better and quicker access to place of employment can help in saving a lot of productive time and travel cost which would increase the chances of more people opting to travel outside the habitation for better jobs. The households interviewed were also asked to provide information on the place of employment (within/outside the habitation) of all their earning members and time, distance and mode of travel to the place of employment before and after the road was operative.

Almost 10% of the households from both sample and control habitations have reported that at least one of their earning members have shifted their place of employment from within the habitation to outside the habitation. It is very obvious to assume that the persons who have opted to going outside the habitation for employment now must have been doing so due to a better opportunity and the construction of road has facilitated their decision. 7% households in Bihar, 6% in Jharkhand, 17% in Rajasthan and 11% households in Uttar Pradesh have reported the same.

% of households where at least 1 of their earning members now travel outside the habitation for employment

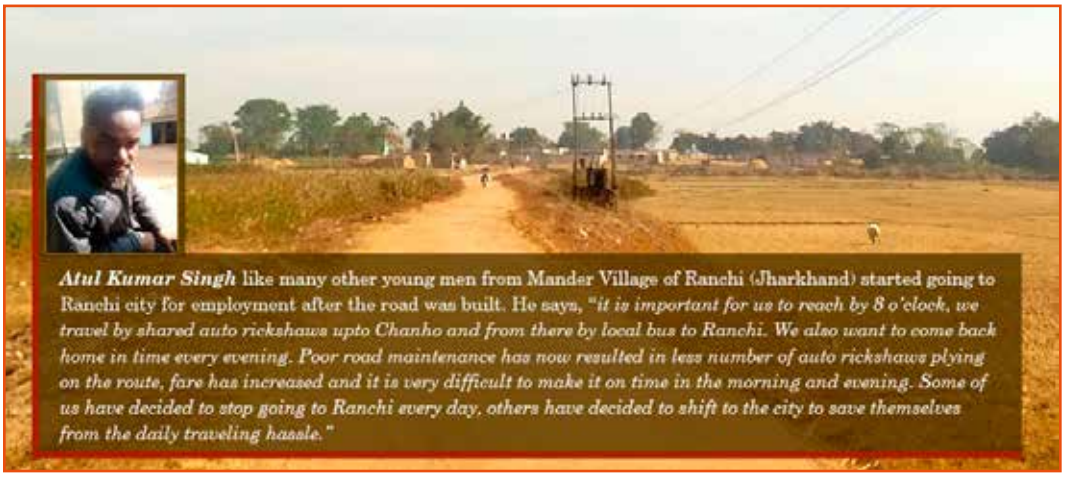


The shift in place of employment was universal across the sample and control habitation and the States. This shift is not clearly attributable to the road construction and can vary based on family needs, local conditions and opportunities etc. To put this in perspective, it was important to relate this with other important elements which can impact the choice of a person to travel outside daily for work. The respondents were also asked whether the construction of road has made any impact on the travel time and distance travel to the place of employment, the data collected was analyzed and it was found that only 3% households in sample habitations reported that there has been reduction in the distance travelled to the place of employment of at least one of their earning members after construction of the road. 2% households in Bihar, Jharkhand and Uttar Pradesh and 6% households in Rajasthan have reported reduction in the distance travelled to the place of employment of at least one of their earning members.

26% households in sample habitations have reported reduction in travel time to the place of employment of at least one of their earning members after the road was constructed for their habitation. As compared to that, only 19% households in control habitations reported reduction in travel time to their place of work outside the habitation.

Nos. (%) of households reported reduction in				
State	Distance Travelled		Travel Time	
	Sample	Control	Sample	Control
Bihar	5 (2%)	7 (2.8%)	60 (24%)	39 (15.6%)
Jharkhand	5 (2%)	7 (2.8%)	57 (22.8%)	37 (14.8%)
Rajasthan	15 (6%)	18 (7.2%)	75 (30%)	66 (26.4%)
Uttar Pradesh	5 (2%)	8 (3.2%)	58 (23.2%)	48 (19.2%)
All	30 (3%)	40 (4%)	260 (26%)	190 (19%)

As visible above, the savings in terms of travel time to the place of employment is higher in case of sample habitations where the roads are maintained as compared to the control habitations.



7% of the respondent households also reported that at least one of their earning members have shifted to motorized transport (bus/jeep/car/auto-rickshaw/scooter/motorcycle) from non-motorized or walking in order to travel to the place of employment after the road was built. A higher percentage of respondents in Rajasthan (11%) and Uttar Pradesh (12%) have reported the same.

6.3 New Employment opportunities

With roads come new opportunities and in an attempt to assess whether the roads constructed have also caused any changes in the occupational pattern of the households in the sample habitations, a comparison of the principal occupation of the household before the road and after the road was conducted. It was found that in only 16% households a change in their principal occupation after the road has happened. The findings state wise also do not show many variations. Study of the households in the control habitations also shows a similar change where only 11% have reported change in their principal occupation during the same period. It there by implies that the construction of the road has not made any substantial impact in terms of change in occupational pattern of the households in the area.

Only 0.6% households had members, who shifted to trading/shop keeping from other occupations, 0.02% households had members, who shifted to Govt. service, 0.5% households had members, who shifted to Pvt. Service and 1.6% households had members, who shifted to Driver/Service in transport sector.

6.4 Summary of Key Findings and Conclusions

- Significant improvements were found in increased employment amongst households engaged in other occupation than their own farms. In the habitations where roads have not been maintained a marginal decrease in the gains achieved due to better connectivity was noticed.
- The savings in travel time to the place of employment was found higher in case of sample habitations where the roads are maintained as compared to control habitations. Better availability of transport facility had an impact and poor maintenance of roads has adversely impacted them.

7 Impact on Income and Poverty-Alleviation

Better road connectivity creates new opportunities for direct and indirect employment adding to the income of the households. The primary aim behind providing all season connectivity in rural areas has been to link these areas to the markets and other facilities so as to counter their deprivation and help them improve their incomes and alleviate themselves from the burden of poverty. In order to assess the extent to which these goals have been transformed into reality, assessment of the information on the incomes collected from the respondents has been analyzed in this chapter.

7.1 Increase in income of households

1163 households (611 in sample and 552 in control) owning agriculture land and engaged in agricultural activities provided details of the value realized of their crop wise production before and after the road. Factoring the inflation, the per unit value realized largely remained same in case of sample and control households and therefore the additional average income increased cannot be clearly attributed to road maintenance. However impact of road construction is established since the average net increase after factoring the inflation across all the sample units reflect that farmers realized better prices as compared to pre-road period.

It was also found that in control habitations the transport costs, travel time and effort have increased due to deteriorated road conditions. The farming households in control habitations also were of the opinion that their profits could have been higher if the roads were maintained.

Roads, if maintained contribute to better profits, all farming households, crop wise and State wise (% of farming households)

State	Households growing Cereals		Households growing Pulses		Households growing Fruits & Vegetables etc.	
	Sample	Control	Sample	Control	Sample	Control
Bihar	75	84	70	71	94	96
Jharkhand	66	70	63	65	92	92
Rajasthan	79	82	73	80	93	100
Uttar Pradesh	64	66	59	62	96	95
All	71	75	66	69	94	96

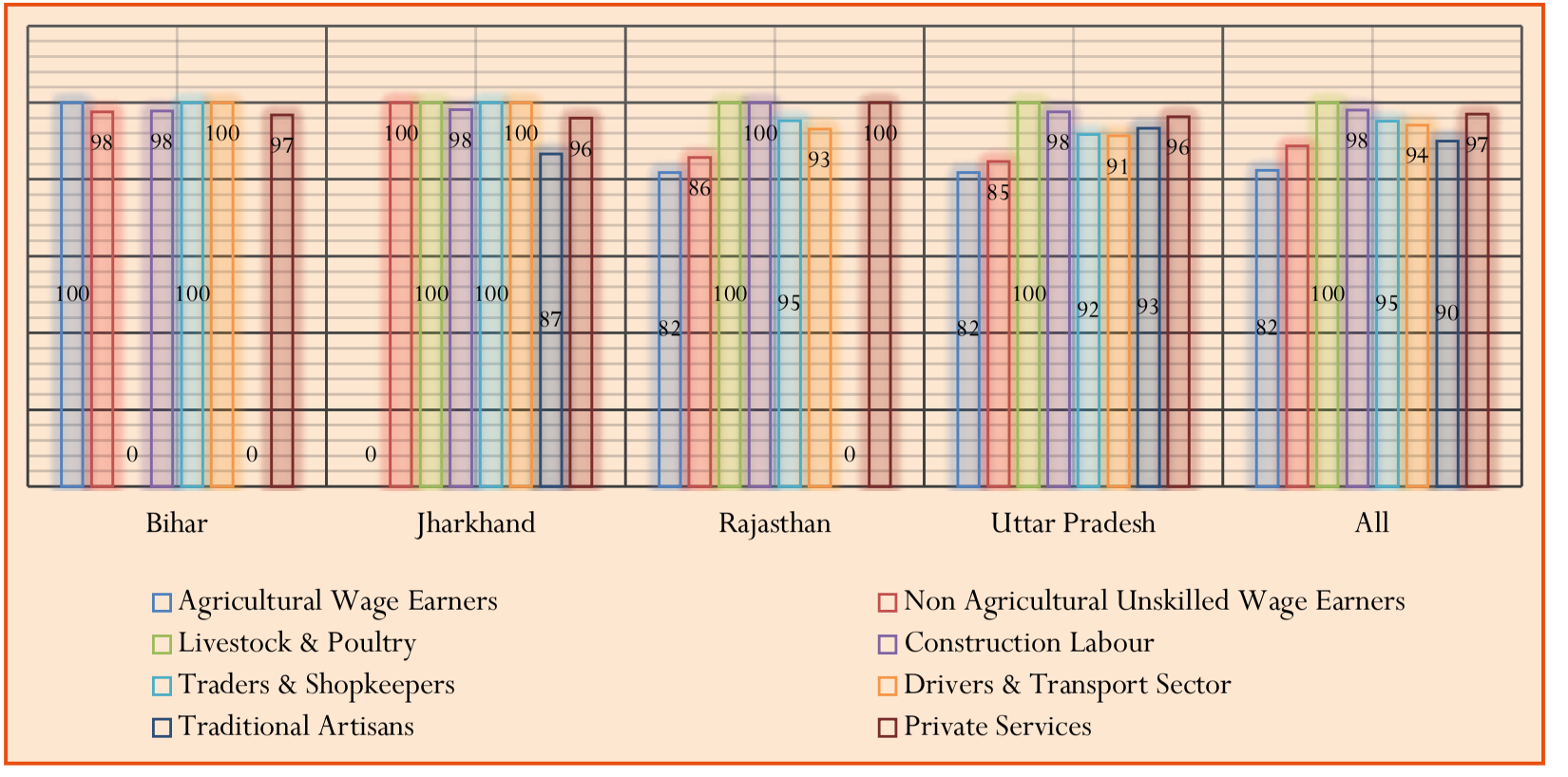
As expected, higher proportion in control habitations responded positively on the importance of road maintenance in better profits for them. Within this group also, farmers cultivating perishable commodities were prominently higher as compared to other farmers.

Comparison of average annual income of the earning members occupied in various other activities was also made. 94% households in the sample habitations and 87% households in the control habitations have reported an increase of more than 20% in their annual average income during the last year as compared to the year before the road was constructed. In the sample habitations, the proportion was highest in Bihar (98%) and lowest in Rajasthan (90%). Similarly in the control habitations, the proportion was highest in Bihar (97%) and lowest in Rajasthan (75%).

% Households reported increase in income post road construction, all occupations by State		
State	Sample	Control
Bihar	98	97
Jharkhand	97	92
Rajasthan	90	75
Uttar Pradesh	92	83
All	94	87

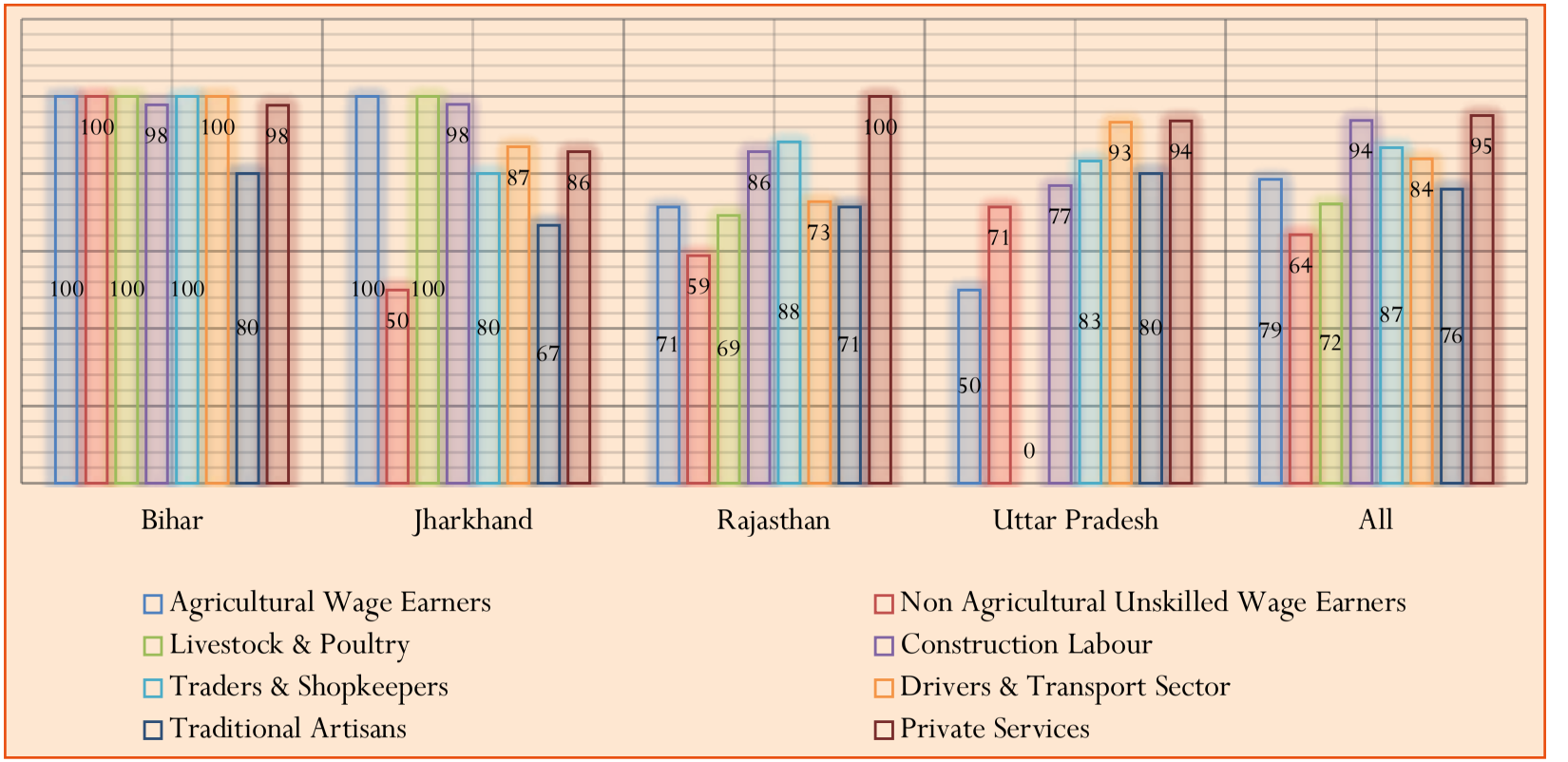
Increase in income of the households by their principal occupation reflects that all the households having livestock & poultry as their principal occupation have reported an increase of more than 15% as compared to the previous period.

% households in sample habitations reported increase in income, by Principal occupation and State



Similarly in the control habitations, 94% households having their principal occupation as construction labour have reported an increase of more than 15% in their average annual income.

% households in control habitations reported increase in income, by Principal occupation and State

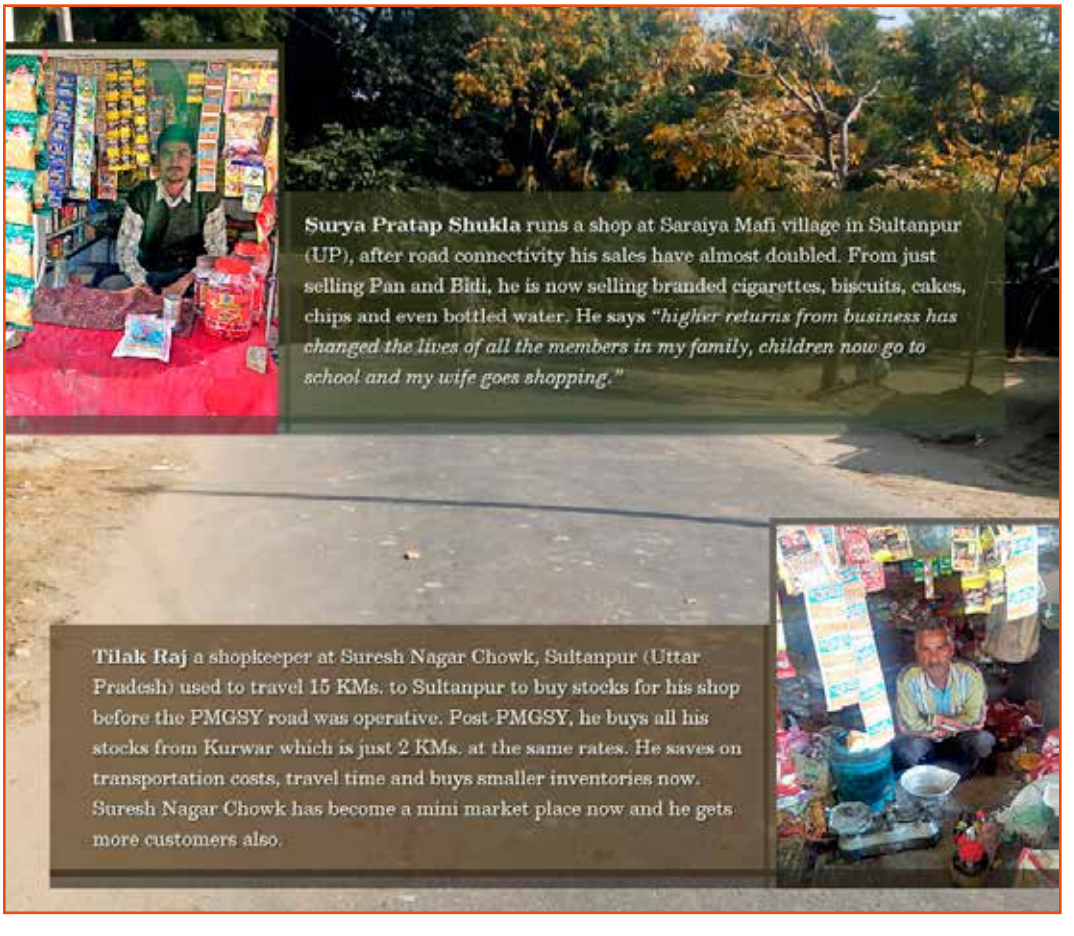


Households having non agricultural unskilled wage earnings as their principal occupation in sample habitation reported a higher impact as 89% of them have reported significant jump in their income as compare to only 64% in the control habitations. Impact on employment, analyzed in the previous chapter also confirms the same. It brings out the fact that road maintenance and better connectivity allows them to avail more income opportunities. Only 50% households in control habitations of Jharkhand and 59% of households in control habitations of Rajasthan have reported the increase in income.

95% households in sample habitations and 87% households in control habitations, engaged in trading and shop keeping activity have reported substantial increase in their annual average income.

Better connectivity has helped significantly for the households engaged in trading and shop keeping, driving and other services in transport sector, especially in Bihar and Jharkhand States.

Though not statistically higher, but many success stories of individual cases were seen in other States also.



7.2 Impact on Improvements in Quality of Life

Many factors make an impact on the quality of life of rural people, identifying them and collating the information to conclude the extent of improvement can be very difficult as there are no established indicators and measures to specify what all is to be assessed and their comparative weight.

An accepted methodology, very commonly used, has been the process of identification of Below Poverty Line households, under which an assessment of their status on 13 socio-economic parameters was used in the BPL Census 2002 by the Ministry of Rural Development. These parameters include size of operational land holding, type of house, availability of clothing, food security, sanitation facilities, ownership of consumer durables, literacy status, status of labour, means of livelihood, status of children working and education, indebtedness, reason for migration and preference of assistance of the families.

The respondents were asked about their status on each parameter before the road was operative and their current status. Ranks were given to households based on weighted scores on all the parameters.

The changes in the weighted score on these parameters before the road as compared to the current status reflect a clear improvement in the quality of lives of the households in the sample habitations. The total weighted scores on the socio-economic parameters before the road was found up to 15 in case of 33% households, whereas now only 10% households fall in this category. 53% households had their total weighted score in the category 16 to 25 before the road was operative, only 50% households have their total weighted score in this category now.

14% households had their total weighted score in the category of 26 to 36 before the road, whereas 35% households had their current total weighted score in this category.

Only 0.33% households had their total weighted score more than 35 before the road, whereas now 5% households have their total weighted score in this category. The shift across the households is a very positive sign, overall out of the 1000 households in sample habitations, the total weighted score on the socio-economic parameters was increased post road construction in case of 89% households. These households in Bihar (97%), Jharkhand (96%) and Rajasthan (98%) have increased their total weighted scores on the socio-economic parameters post road construction. Only 66% households in Uttar Pradesh have increased their scores

Only 1% households in Bihar and Uttar Pradesh, the scores have decreased after the road was constructed.

Change in status of households in sample habitations after construction of road, weighted score, by State											
Sample	No. of HH covered	% Households weighted score on socio-economic parameters								% of HH where score has increased post Road	% of HH where score has decreased post Road
		Before the road				After the road					
		0-15	16-25	26-35	more than 35	0-15	16-25	26-35	more than 35		
Bihar	250	46	36	18	0	8	39	45	7	97	1
Jharkhand	250	21	65	13	1	6	41	49	3	96	0
Rajasthan	250	29	58	12	0	3	56	36	6	98	0
Uttar Pradesh	250	36	51	12	0	23	64	10	2	66	1
ALL	1000	33	53	14	0	10	50	35	5	89	1

Change in status of households in control habitations after construction of road, weighted score, by State											
Control	No. of HH covered	% Households weighted score on socio-economic parameters								% of HH where score has increased post Road	% of HH where score has decreased post Road
		Before the road				After the road					
		0-15	16-25	26-35	more than 35	0-15	16-25	26-35	more than 35		
Bihar	250	52	30	17	0	7	46	39	8	90	1
Jharkhand	250	42	43	13	2	18	46	29	7	77	1
Rajasthan	250	24	26	47	4	6	30	57	7	70	1
Uttar Pradesh	250	27	54	17	2	12	43	44	1	75	1
ALL	1000	36	38	24	2	11	41	42	6	78	1

A comparison of similar data collected on households in the control habitations was also conducted. It was found that only 78% households surveyed in the control habitations have increased their total weighted scores on the socio-economic parameters over the same period. The difference in proportion of such households in sample habitations (89%) clearly brings out the impact of road maintenance in improving the quality of life of the inhabitants in the connected habitations.

The improvement in quality of lives of BPL households also shows a significant improvement. Almost 70% of them across the States in the sample habitations have increased their scores whereas in the control habitations, a slightly less proportion, 64% have improved their scores during this period. The group discussions in majority of these villages also show similar trends, most of the respondents believed that better road generally improve the environment needed for prosperity and development.

The improvements on various socio-economic parameters individually also bring out a substantial impact of the rural roads on quality of life of the households. Almost 25% households have reported owning better dwelling unit as compared to the type of house they owned before the construction of roads. In Rajasthan (65%) and Uttar Pradesh (42%) households own a better house now.

Similarly roads also bring better awareness amongst the rural people on sanitation and hygiene aspects, motivating them to construct a toilet for themselves. It also makes the task of developing agencies much easier to target the beneficiaries of government sponsored sanitation schemes. It was found that 11% of the households have access to better sanitation facilities after the construction of the roads. Better connectivity not only brings out more demand for owning consumer durables but also makes easier access for the people to procure them. 56% households have reported increase in ownership of various consumer durables. Households in Bihar (70%), Jharkhand (71%), Rajasthan (84%) and Uttar Pradesh (79%) have reported the same.

7.3 Summary of Key Findings and Conclusions

- There has been an overall increase in income of the farming households due to many factors however respondents in control habitations have opined that transport cost, travel time and efforts have increased due to deteriorated road conditions.
- Roads have contributed an increase of income for many households engaged in farming, trading, transport and other services. Most of them have reported how the roads constructed and maintained have helped in higher returns for them and at the same time, in control habitations, where roads were not maintained, the respondents expressed their unhappiness and anguish. Livelihoods of some of these people are threatened.
- Data also reflects that socio-economic status and quality of life of people as compared to pre-road period has significantly improved in the habitations whereas in control habitations, a slightly less proportion has reported improvements. Road maintenance thus also helps in poverty alleviation.
- Awareness on not only consumer items from markets but also on toilets and sanitation was found better in habitations having better maintained roads.

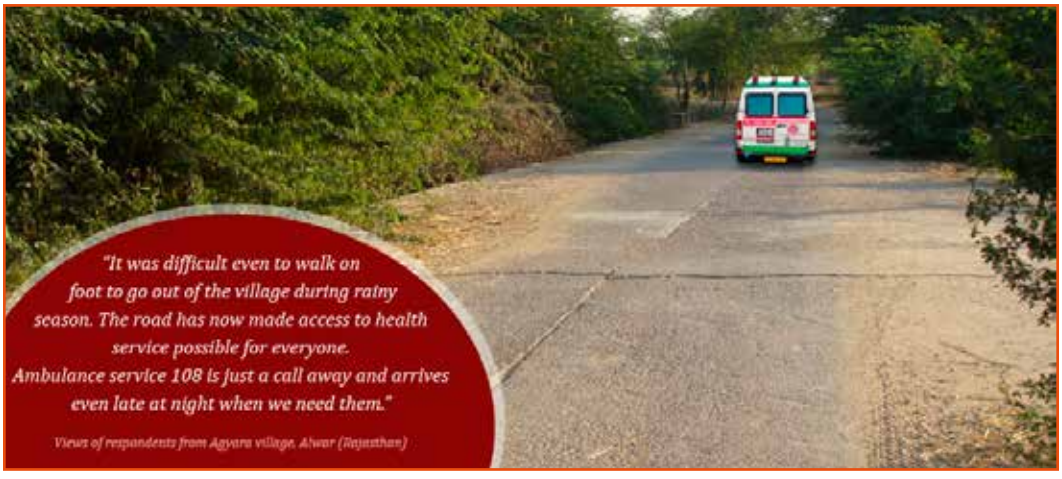
8 Impact on Health Factors

The impacts of better connectivity on improvements in health aspects have been well established in the previous studies also. The benefits may not be equally distributed since a lot depends on availability of health facilities and other socio economic parameters which affects the health indicators of a society. As indicated previously, the habitations covered under the study are homogenous in terms of their demographics; a comparison can be successfully made to assess the changes and improvements brought by the rural roads. In the chapter 4 of this report it is mentioned that almost all the habitations are using the sample roads to access the nearest health facilities. Any significant change in access or pattern of usage of these facilities can be safely attributed to these roads. Differences in comparison with control habitations also established how a better maintained road helps more in accessing these facilities.

8.1 Improved access to health facilities

Out of 40 sample habitations covered, all the habitations were provided all-weather connectivity to the nearest health centers, Government hospitals and private nursing homes by the sample roads only. All these habitations did not have a pucca road to reach these facilities before the road was constructed. Similarly almost all the control habitations were also dependent on these roads to reach the nearest health facility.

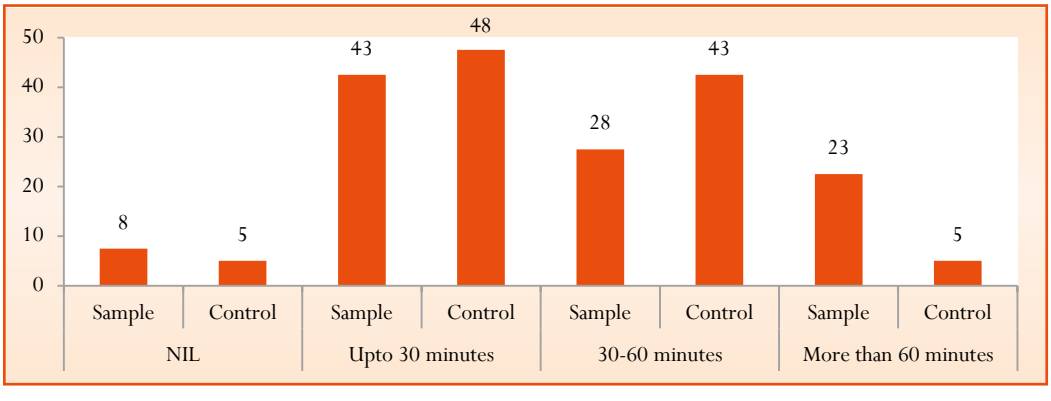
The road improvements help saving a lot of time travel to a destination and time savings in reaching to health facilities do not just save time and cost but can also be life saving. Since both the categories sample and control have a road access, it was attempted to find out how much of time is saved by the users to reach health facilities as compared to the situation before these roads were built. The needs of people to reach different medical facilities have been categorized into three categories, in case of maternity emergencies, serious physical injuries or accidents and other medical emergencies. The group discussions in the habitations concluded that roads have made very substantial and critical time savings.



It was reported that in case of 92% sample habitations there has been a reduction in the travel time to reach the nearest health facility for maternity emergencies. 43% have reported the reduction in travel time upto 30 minutes, 28% habitations reported reduction in travel time by 30-60 minutes and 23% habitations reported reduction in travel time by more than 60 minutes to reach the nearest health facility in case of maternity emergencies.

In case of 95% control habitations there has been a reduction in the travel time to reach the nearest health facility for maternity emergencies. 48% have reported the reduction in travel time upto 30 minutes, 43% habitations reported reduction in travel time by 30-60 minutes and 5% habitations reported reduction in travel time by more than 60 minutes to reach the nearest health facility in case of maternity emergencies.

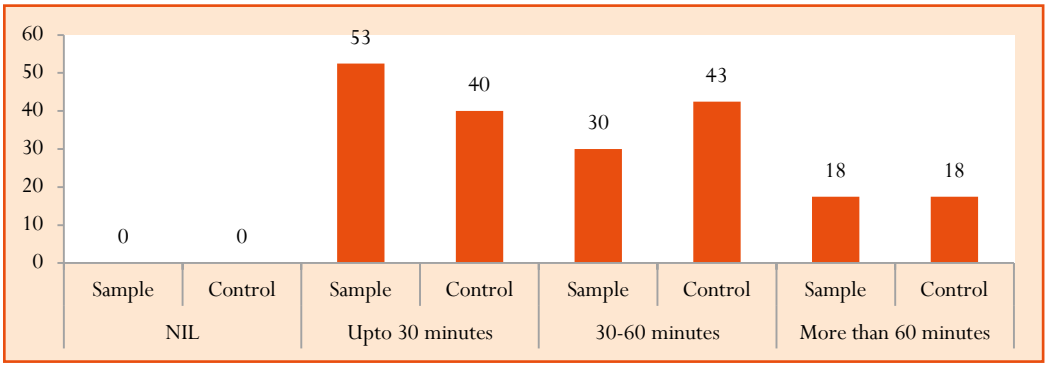
Reduction in travel time to reach the nearest health facility in case of maternity emergencies



All the sample habitations are saving their travel time to reach the nearest health facility in case of serious physical injuries/accidents. 53% have reported the reduction in travel time upto 30 minutes, 30% habitations reported reduction in travel time by 30-60 minutes and 18% habitations reported reduction in travel time by more than 60 minutes to reach the nearest health facility in case of serious physical injuries/accidents.

Similarly all the control habitations are saving their travel time to reach the nearest health facility in case of serious physical injuries/accidents. 40% have reported the reduction in travel time upto 30 minutes, 43% habitations reported reduction in travel time by 30-60 minutes and 18% habitations reported reduction in travel time by more than 60 minutes to reach the nearest health facility in case of serious physical injuries/accidents.

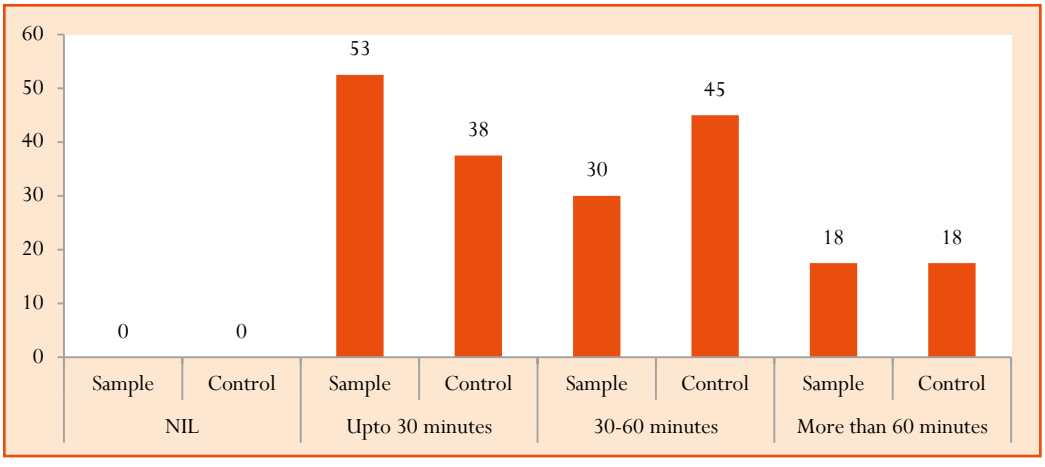
Reduction in travel time to reach the nearest health facility in case of serious physical injuries



All the sample habitations are saving their travel time to reach the nearest health facility in case of other medical emergencies. 53% have reported the reduction in travel time upto 30 minutes, 30% habitations reported reduction in travel time by 30-60 minutes and 18% habitations reported reduction in travel time by more than 60 minutes to reach the nearest health facility in case of other medical emergencies.

All control habitations are also saving their travel time to reach the nearest health facility in case of other medical emergencies. 38% have reported the reduction in travel time upto 30 minutes, 45% habitations reported reduction in travel time by 30-60 minutes and 18% habitations reported reduction in travel time by more than 60 minutes to reach the nearest health facility in case of other medical emergencies.

Reduction in travel time to reach the nearest health facility in case of other medical emergencies



8.2 Improvements in health facilities

To assess how roads have facilitated creation and availability of health facilities within the habitations, information was collected through interactions at habitation level with the opinion leaders and health workers. All-weather connectivity has the potential to improve investments for public welfare and health but the effectiveness of these investments and their sustainability depends on continuation of the connectivity. Roads if not maintained have the potential of disrupting and limiting the impact of such investments. In this part we have tried to assess what are the changes in investments and infrastructure that were facilitated by road construction and whether they have sustained or not in the sample and control habitations.

India, in the last few years has developed enormous amount of rural health infrastructure and it is visible across the country. The study findings also bring out that the development of rural health infrastructure in both sample and control habitations has been more or less same however their effectiveness and impact varies significantly in the areas where roads are maintained and not maintained.

Habitations	Creation of infrastructure after road construction		Availability of health services-current status					
	Health Sub-Centre	Public Health Centre (PHC)	Govt. doctors	ANMs	ASHA	Constitution of village health committee	Preparation of village health plan	Private medical practitioner
Sample	12.50	10.00	35.00	35.00	35.00	40.00	25.00	25.00
Control	15.00	15.00	22.50	34.00	29.00	30.00	22.50	22.50

Providing a Public Health Center (PHC) is decided on the basis of population in the village and around it. These habitations of almost same population size show that there has been an equal distribution of infrastructure creation. Where 12.5% and 10% of sample habitations have been provided with a Health Sub Centre and Public Health Centre respectively, after the road was constructed, in case of control habitations also 15% of them have been provided a Health Sub Centre and equal proportion of them has a Public Health Centre now.

The Focus Group Discussions (FGD) participants in 35% sample habitations reported that Government doctors regularly visit the habitations whereas in 22.5% control habitations, the participants reported so.

Auxiliary Nurse Midwifes (ANMs) are available in 35% sample habitations and in 34% control habitations only. Similarly Accredited Social Health Activist (ASHA) workers regularly visit 35% of the sample habitations but only in 29% control habitations, this was found.

Village health committees are constituted only in 40% sample habitations and 30% control habitations. Village health plans are prepared in 25% sample habitations and 22.5% control habitations.

At least one private medical practitioner is available in only 25% sample habitations and 22.5% control habitations.

The statistical figures notwithstanding, the status of public health services is not very impressive in these habitations and certainly worse in the control habitations. The participants in group discussions also cited how in some of the control habitations, availability of these services improved after the construction of road but now due to poor maintenance the quality and frequency of service has again gone down.

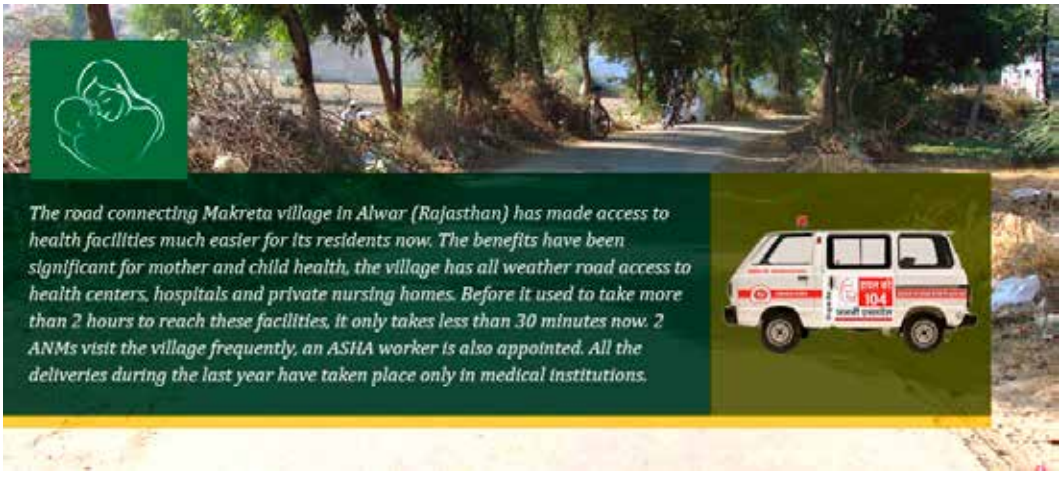
The health workers were also interviewed to take their views on various aspects of public health in their habitations. The responses in the table below clearly bring out the difference in sample and control habitations.

% of Habitations		
As compared to the situation before the road was built, whether at present there has been any change in the following.	**Sample**	**Control**
Increase in the number of deliveries made in hospitals/ health centers	100	100
Improvement in the availability of drug and medical supplies	78	75
Improvement in the general awareness on health and hygiene related issues	88	85
Change in the overall health factors of the people living in the habitations	90	90
Improvement in immunization rate of children	95	95

% of Habitations		
As compared to the situation before the road was built, whether at present there has been any change in the following.	**Sample**	**Control**
Reduction in morbidity rates	90	85
Reduction in infant mortality rate	85	83
Reduction in anemia cases amongst women and girls	80	80
Reduction in child malnutrition	93	90
Reduction in occurrence of communicable diseases	75	78

8.3 Improved pre and post natal care

In order to assess the extent to which rural connectivity provided has impacted in improvements in this aspect, information was collected on women in the respondent households, aged 18-45 years, ever expecting a child/pregnant/gave birth to a child 3 years before and during the last 3 years after the road was constructed in their habitations.



It was reported that 55% of the women ever expecting a child/pregnant/gave birth to a child in the households surveyed in sample habitations, received pre-natal care during the period before the road was constructed. This improved to a larger proportion, where 71% of such women received pre-natal care during the period after the road was constructed. The improvement in control habitations is also significant as 52% of women expecting a child before the road received pre-natal care has improve to 70% of such women post road construction.

During the last year the status of women who received pre-natal care and the service provider is given in the table below

	Sample	Control
No. of respondent households where at least 1 woman was expecting a child/pregnant/gave birth to a child during the last year	**116**	**170**
% of them received pre-natal care	**83**	**79**
Out of them % of women received pre-natal care from		
• ANM/Govt. Doctor in the village	65	62
• Private Doctor/Nurse in the village	5	3
• ANM/Govt. Doctor outside the village	12	25
• Private Doctor/Nurse outside the village	18	8
• Others in the village	0	2

It was seen that majority of the pregnant women during the last one year in the sample and control habitations have received pre-natal care from ANM/ Government Doctors in the village. Respondents in control habitations reported that due to poor connectivity some of them had to travel outside the village as the Government health workers/doctors were not available in their villages. Three cases, two in Bihar and one in Jharkhand also reported that they just relied on local midwives ('traditional Dai') for pre-natal advice before during pregnancy.

Maternal health situation has improved overall in the country during the last few years. Though improved access to health care facilities can be very important determinants of maternal health care seeking behavior, other aspects such as cultural issues, infrastructure and socio-economic status of the families also play a major role in this. A comparison with the data reported on antenatal care of registered pregnant women under the Nation Rural Health Mission (NRHM) reflects that the connected habitations have improved indicators of women receiving antenatal care. As per NRHM data reported for the 4 sample districts, only 61% women received antenatal care during 2013-14 whereas during 2014-15 this marginally improved to 64%. As compared to this the habitations having rural roads, covered under the study have reported a better coverage of women receiving antenatal care. Habitations connected with well maintained road have reported 83% pregnant women receiving antenatal care and in habitations where roads are not maintained the same was 79%.

Similarly, these respondents were also asked about post-natal care during the last one year, the findings are summarized in the table below.

	Sample	Control
No. of respondent households where at least 1 woman was expecting a child/pregnant/gave birth to a child during the last year	**116**	**170**
% of them gave birth and received post-natal care	**42**	**33**
Out of them % of women received post-natal care from		
• ANM/Govt. Doctor in the village	70	61
• Private Doctor/Nurse in the village	7	4
• ANM/Govt. Doctor outside the village	8	14
• Private Doctor/Nurse outside the village	15	21
• Others in the village	0	0

Comparatively a lesser proportion of women go for post-natal care in control habitations and a large number of them depended on medical facilities outside the habitations. Awareness also place a critical role in the probability of a woman going for post-natal care, however the difference here is also found due to accessibility to the facilities and travel convenience to reach them.

The post natal care visits reported by NRHM also reflects a similar picture, only 42% women received post natal care during 2013-14 and 47% during 2014-15[2].

8.4 Increase in number of institutional deliveries

The provision of facilities for institutional delivery on a mass scale in rural areas is viewed as a long-term goal requiring massive health infrastructure investments. Institutional delivery is nevertheless desirable, in as much as it reduces the risk of both maternal and infant mortality. The likelihood of delivering in a medical institution is influenced not only by use of antenatal-care services but also by such potentially confounding factors as mother's age, education, exposure to mass media, household's standard of living, and most importantly access to health services. It is believed that, access to health services, as measured by availability of a hospital/health centre near the village and by availability of an all-weather road connecting the village to the facility has a significant effect on institutional delivery in most cases.

In the sample habitations, almost 70% women of the respondent households delivered a child at home before the road was constructed. After the improved connectivity the proportion of women having child birth at home

[2]Key HMIS indicators reported at http://www.nrhm-hmis.nic.in

was reduced to only 20% in these habitations. Delivery in PHC / CHC in the village increased from 6% to 11% in these habitations. Where only 11% women delivered child in Govt. Hospital/Health Center outside the village before the road was constructed, the proportion of women going for delivery to Govt. Hospital / Health Center increased to 49%. Only 5% women before the road was constructed went to a Pvt. Hospital / Health Center and this increased to 8% after the road was constructed. The above findings bring significant change in the trend after the improved connectivity.

The data collected on women in the control habitations finds that during the same period the percentage of women having delivery at home has reduced from 79% to only 21%.

The overall indicators reported under NRHM also reflect that almost 84% women have reported institutional deliveries during the last year.[3]

8.5 Improved child immunization and health care

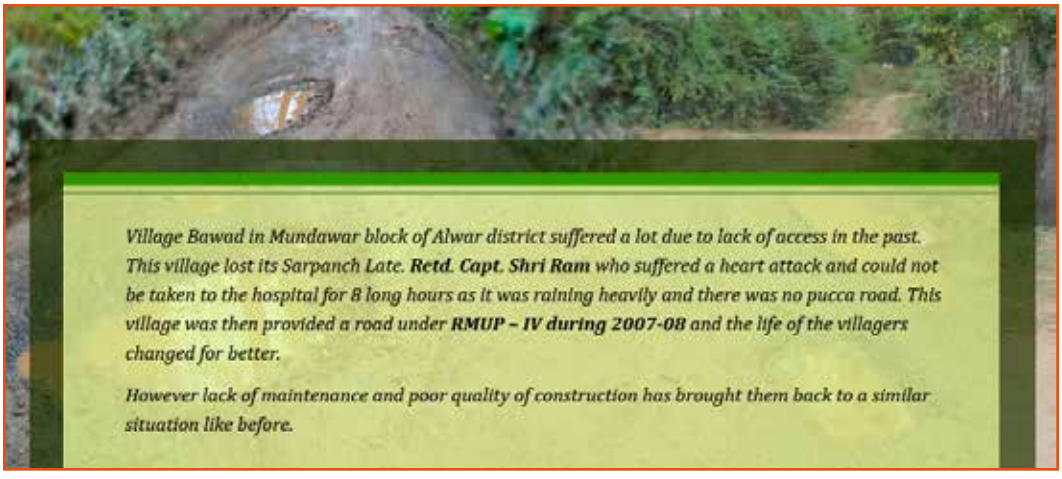
Rural health care and child health efforts have ensured a significantly improved coverage of child immunization during the last few years. Better road connectivity also is an important factor. It was found that there has been an increase of 11% children (aged 5 years or younger) in the habitations immunized as compared to the period before the road was constructed. Similarly there has been an increase of 13% in the percentage of children immunized during the same period in the control habitations also.

Though increase in the control habitations has been slightly better than sample habitations, the respondent households in control habitations have reported that it is very inconvenient for the mother and child to travel outside the habitation for immunization purposes.

8.6 Improved medical care during sickness and accidents etc.

Access to health facilities is also very critical during sickness and accidents where immediate medical attention is required for a person. Road improvements bring many improvements in the overall health related aspects of the inhabitants by providing a safe, faster and comfortable access to the health care facilities. The members of the households interviewed were also asked to report on incidents of sickness/injuries, causes and the place of treatment before and after the road was constructed.

[3]Key HMIS indicators reported at http://www.nrhm-hmis.nic.in



It was found that where only 50% persons in the sample habitations suffering serious injuries were being treated by doctors / health worker before the road was constructed, a higher proportion of almost 80% get treated in a medical institution now. Similarly almost 90% of people suffering from mental illness, TB, diarrhea and other diseases are getting treated by doctor / health worker. It was also found that more number of people suffering from serious infections and other ailments such as organ failure etc. now travel outside to get treatment from doctor outside the habitation.

The control habitations also have almost same proportion of persons who are able to reach the medical facilities when needed, however as described before the effort in terms of time and travel cost varies drastically.

8.7 Summary of Key Findings and Conclusions

- There has been a significant improvement in access to health facilities after construction of the rural roads to the habitations. Comparison of travel time to reach the nearest health facility for various medical emergencies as compared to the time before these roads were built reflects significant improvements and the time saved is very critical and important in saving lives. Habitations where roads are not maintained reported that connectivity gets affected during rainy season and some of these habitations become completely unconnected.
- Visit of doctors and health workers was found more frequent and regular in habitations where roads are better maintained.
- Some critical indicators on mother and child health were also found poor in the habitations where roads are not maintained.

9 Impact on Education

Education is an important element of development and if people are educated, many important issues which are taken up in the previous chapters like poverty, employment and health do get solved very easily. However education sector in rural areas has its own peculiar issues and require different solutions. Like many other rural development issues, for education also, poor connectivity and rampant poverty are the main hindrances in achieving the goal of quality and affordable education for all. Government of India through which various programmes has been attempting to meet this goal and rural road construction has been a complementary tool towards meeting the same. Improved road connectivity has resulted in significant improvements in the status education facilities in the villages and also access to higher education facilities available in the nearby urban cities. The studies in the past have shown how these roads have contributed to the rural education standards in the Country. Education, unlike other aspects covered in this study is the first and most vulnerable to be dropped if the road access deteriorates. Poor maintained roads result in longer travel times and higher travel costs, since many in the villages cannot afford, the probability of children dropping out or stop going to schools is very high.

9.1 Improved status of education facilities

The all-weather roads in the villages facilitate creation of infrastructure, institutions, increase in manpower and other improvements in the educational aspects. In order to assess the changes, details on status of education facilities before and after the road construction was collected. The information was derived from interactions held with community leaders, teachers and others at habitation level.

Road construction has also helped in setting up of new Anganwadi centres in the rural areas. All the sample habitations have at least one Anganwadi centre within the habitation and 50% of them have been added after construction of the road. In control habitations, only 90% of them have an Anganwadi centre and 40% of them have been added after construction of the road. Most of the new Anganwadis have come up in the habitations of Uttar Pradesh and Jharkhand during this period.

Similarly there has been an increase in the number of schools in these habitations, not directly attributable to construction of roads but certainly better road connectivity to a habitation can influence a decision to set up a new school. 27% of the sample habitations have reported increase in number of schools after the construction of the roads. The change in number of schools in control habitations was not as significant as only 15% habitations reported the same.

State	% habitations reported increase in number of Schools	
	Sample	Control
Bihar	20	10
Jharkhand	40	20
Rajasthan	30	20
Uttar Pradesh	20	10
All	27	15

Beyond the development of necessary infrastructure for education, roads in particular impact the availability of teaching staff as better roads encourage and facilitate teachers to travel comfortably. The Pupil-Teacher Ratio (PTR) at primary and upper primary schools has been significantly low in the rural areas. It was found that there was a significant difference in the availability of sufficient number of teaching staff in the schools in the habitations where the roads were maintained and not maintained. Though it was found that the sample habitations also have shortage of teaching staff in the schools therein but in the control habitations the situation was found much worse. Almost all control habitations have much less than required number of teachers and in most of the group discussions it was reported that poor connectivity is one of the major factors for the same. 54% of the primary schools in sample habitations have a PTR of more than 30 whereas almost 80% of the schools in control habitations have a PTR of more than 30.

Similarly 25% upper primary schools in sample habitations were having PTR above 35 whereas in the control habitations, the PTR was above 35 in almost 50% of the upper primary schools. As per a publication by National University of Educational Planning and Administration (NUEPA) and Ministry of Human Resource Development (MHRD), the overall PTR during 2013-14, at all India level was 25 students per teacher at primary level while at the upper primary level it was 17.[4]

Better maintained roads have also helped the mid day meal supply to the schools, all the sample habitations have reported that there has been a

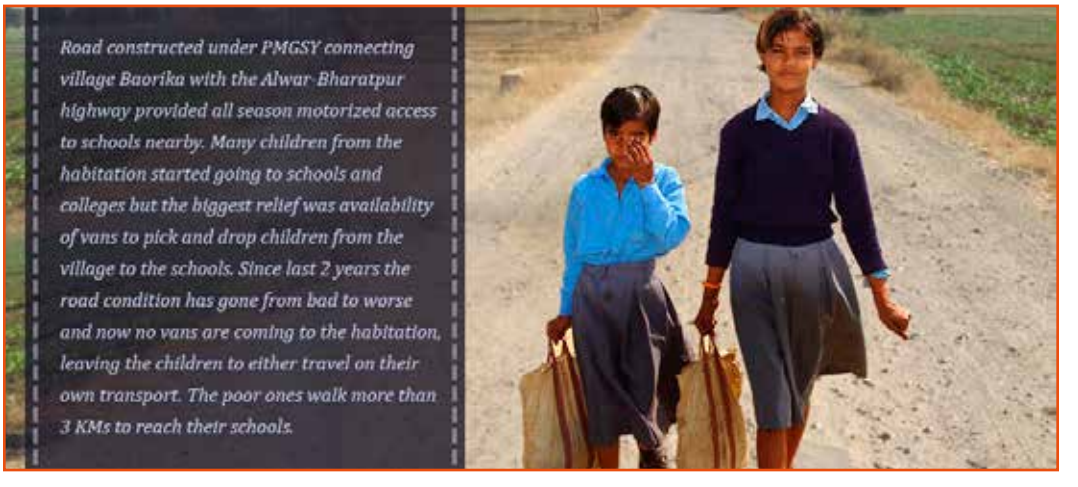
[4]'Elementary Education in India' brought out by NUEPA and MHRD,Govt. of India

regular provision for mid-day meals for the students in their habitations. In three control habitations (in Uttar Pradesh) it was reported that regular provision of mid-day meals for the students is not been maintained and in all of them the meal is provided from the nearby village. Poor maintenance of roads has affected the regular supply of meal for the children in the schools of these habitations.

9.2 Improved all seasons connectivity of education facilities

All the sample habitations have an Anganwadi within the habitation now and in 10% of the control habitations, the children have to travel to the nearby village to reach an Anganwadi. All of them use the roads covered under the study and poor maintenance of these roads has made the travel more difficult for them. So far the road conditions in these habitations were not that bad and no such case was observed where children have stopped going to Anganwadi.

In one sample habitation each in Bihar, Jharkhand and Uttar Pradesh, the nearest Primary School is connected by an all-weather road, rest of the habitations have at least one Primary School within the habitation. Only in one control habitations of Rajasthan, children have to travel outside the habitation to reach a Primary School and the road condition was so bad that children have to travel on foot as there are no Vans/Buses plying on the road.



58% sample habitations and 65% of the control habitations have a Secondary School within the habitations and rests of the habitations are connected to the nearest Secondary School by an all-weather road now.

In majority of the habitations, for higher secondary education and colleges, the students have to travel outside the habitation and except one habitation

in Jharkhand they have an all-weather road connectivity to reach these institutions.

9.3 Savings in travel time to education facilities

One of the major impacts of rural roads has been reduction in travel time and savings in terms of travel cost. The rural roads built in the sample and control habitations have resulted in both for the students going to higher secondary schools and colleges from their habitations. Information was collected from respondent households about the approximate distance and travel time to these institutions before the road was built and currently. The data clearly reflects the savings in time.

Savings in travel time to reach the nearest higher secondary school

State–Sample	Before the road		After the road		Saving in travel time (%reduction)
	Average Distance (KM)	Average Travel Time (HH:MM)	Average Distance (KM)	Average Travel Time (HH:MM)	
Bihar	6.50	0:50	6.78	00:20	60.00
Jharkhand	4.00	0:45	3.75	00:15	66.67
Rajasthan	5.50	0:60	5.38	00:18	70.00
Uttar Pradesh	3.50	0:45	3.44	00:15	66.67
All	**4.88**	**0:50**	**4.83**	**00:17**	66.00

State - Control	Before the road		After the road		Saving in travel time (%reduction)
	Average Distance (KM)	Average Travel Time (HH:MM)	Average Distance (KM)	Average Travel Time (HH:MM)	
Bihar	4.47	0:52	4.45	0:20	61.54
Jharkhand	6.00	0:50	5.56	0:40	20.00
Rajasthan	2.10	0:22	2.00	0:16	27.27
Uttar Pradesh	4.00	0:50	3.85	0:35	30.00
All	**4.12**	**0:44**	**3.97**	**0:28**	36.36

Almost 60-70% travel time is reduced in all the States for the students traveling outside the habitation to reach the nearest higher secondary school. Improved roads also have made public transport facilities available in some cases. A travel cost analysis could not be done as many students were traveling by own bicycle and other mediums. The net savings in travel time in case of control habitations has gone down since the road quality has deteriorated over the period and now they spend just 36% less time than before the road was built.

There has also been a significant improvement in terms of time savings for the road beneficiaries to reach the nearest college. Though the net savings are comparatively less as compared to schools but it is because beyond a certain point the travel is on the main road leading towards town and cities where most of the colleges were located.

Savings in travel time to reach the nearest degree college

State–Sample	Before the road		After the road		Saving in travel time (% reduction)
	Average Distance (KM)	Average Travel Time (HH:MM)	Average Distance (KM)	Average Travel Time (HH:MM)	
Bihar	16.00	01:48	16.00	01:05	33.67
Jharkhand	26.00	02:10	25.00	01:20	38.46
Rajasthan	12.50	01:28	11.89	00:45	48.86
Uttar Pradesh	9.19	01:07	9.10	00:47	29.85
All	**15.77**	**01:36**	**15.50**	**00:59**	38.54

State–Control	Before the road		After the road		Saving in travel time (% reduction)
	Average Distance (KM)	Average Travel Time (HH:MM)	Average Distance (KM)	Average Travel Time (HH:MM)	
Bihar	18.00	02:10	17.90	01:35	26.92
Jharkhand	24.10	02:40	23.30	02:05	21.88
Rajasthan	8.90	01:20	8.70	00:48	40.00
Uttar Pradesh	7.00	01:15	6.65	00:40	46.67
All	**14.50**	**01:51**	**14.14**	**01:17**	30.79

The time savings in sample habitations has been to the extent of approximately 40% to 50% reduction as compared to the period before the road was built whereas in control habitations the time savings varies from 20% to 40%.

Above findings clearly reflect that children going to schools from the habitations where roads are better maintained are saving more time than their comparisons in such habitations where the roads are not maintained.

9.4 Improvements in enrollment of children for education

Assessment of changes in enrollment of children for education at various levels was done based on details of all the children of the eligible age in the

surveyed households. Since almost all habitations were having at least one primary school within the habitation, improved road connectivity and better maintenance of the roads could not be having any substantial impact on enrollment of children at primary level. Similarly in very few habitations, the children had to travel outside the habitation for upper primary education. However the road connectivity and better maintained roads has impacted the enrollment levels of children going outside the habitation to higher secondary schools and above levels.

In the sample habitations where roads were better maintained, the current enrollment levels have shown significant improvements post road construction. It was found that 62.5% of the households having male children of eligible age had them enrolled in a higher secondary school outside the habitation before the road which increased to 84.5% after the road was constructed. 46.75% households having female children, had enrolled them in a higher secondary school before the road, which has increased to 65.25% after the road was constructed.

Enrollment of children going to higher secondary school

State - Sample	Before the road				After the road			
	No. of families having a male of eligible age	% of them enrolled to higher secondary school outside the habitation	No. of families having a female of eligible age	% of them enrolled to higher secondary school outside the habitation	No. of families having a male of eligible age	% of them enrolled to higher secondary school outside the habitation	No. of families having a female of eligible age	% of them enrolled to higher secondary school outside the habitation
Bihar	72	53.00	56	45.00	64	82.00	44	77.00
Jharkhand	68	62.00	58	48.00	74	79.00	66	68.00
Rajasthan	78	68.00	64	51.00	76	90.00	78	59.00
Uttar Pradesh	73	67.00	69	43.00	66	87.00	73	57.00
All	**291**	**62.50**	**247**	**46.75**	**280**	**84.50**	**261**	**65.25**

The change in control habitations is almost similar, though comparatively a lesser proportion of both male and female children go to a secondary school outside the habitation.

Significant changes were also noted amongst families sending their children to colleges in both sample and control habitations. The difference in sample and control is less significant in this case. Only around 21% of eligible age male was going to college before the road has now improved to 36% in the sample habitations and almost 35% in control habitations. Only 15% of

eligible age female was going to college before the road and has now improve to around 28% in sample and control habitations.

Enrollment of children going to college

State - Sample	Before the road				After the road			
	No. of families having a male of eligible age	% of them enrolled to college out side the habitation	No. of families having a female of eligible age	% of them enrolled to college out side the habitation	No. of families having a male of eligible age	% of them enrolled to college out side the habitation	No. of families having a female of eligible age	% of them enrolled to college out side the habitation
Bihar	81	22.00	65	16.00	72	37.00	69	28.00
Jharkhand	77	13.00	76	9.00	81	29.00	82	21.00
Rajasthan	101	29.00	90	19.00	80	41.00	76	29.00
Uttar Pradesh	107	23.00	93	16.00	88	36.00	90	35.00
All	**366**	**21.75**	**324**	**15.00**	**321**	**35.75**	**317**	**28.25**

State - Control	Before the road				After the road			
	No. of families having a male of eligible age	% of them enrolled to college out side the habitation	No. of families having a female of eligible age	% of them enrolled to college out side the habitation	No. of families having a male of eligible age	% of them enrolled to college out side the habitation	No. of families having a female of eligible age	% of them enrolled to college out side the habitation
Bihar	72	18.00	68	14.00	77	34.00	72	26.00
Jharkhand	78	9.00	65	11.00	91	28.00	88	21.00
Rajasthan	94	25.00	83	21.00	65	43.00	69	31.00
Uttar Pradesh	95	24.00	79	11.00	92	32.00	87	33.00
All	**339**	**19.00**	**295**	**14.25**	**325**	**34.25**	**316**	**27.75**

No significant difference was found in the enrollment for colleges. It was felt that these families were very inspired and motivated to get higher education for their children, most of them come from upper economic strata of the society and road quality, inconvenience and related costs do not matter much for them.

A higher proportion of households in sample habitations (37%) as compared to control habitations (29%) were also sending their children for various vocational training and courses outside the habitation and the respondents in sample habitations overwhelmingly attributed this to better connectivity provided by the rural roads.

9.5 Summary of Key Findings and Conclusions

- Improved road connectivity has resulted in very significant improvements in the status of education facilities in the villages and also access to higher education facilities available in the nearby cities.
- Increase in number of schools after the construction of roads is better in habitations where roads are maintained.
- The Pupil Teacher Ratio (PTR) was found significantly better in the schools in those habitations where roads are better maintained.
- Reduction in travel time to schools after the roads were constructed was also found much better in sample habitations.

10 Impact on Other Aspects

10.1 Improved living conditions and Security

It was reported that better road connectivity has resulted in improved and easier availability of construction material and other resources for the purpose of building pucca houses. It was found that in 60% sample habitations, more number of the inhabitant families constructed pucca houses after construction of the road. It was reported that on an average 4 pucca houses were constructed in the sample habitations during the last 12 months. In Uttar Pradesh 7 pucca houses per habitation were constructed during the period, in Jharkhand the same was 2 pucca houses. Whereas only 40% control habitations have reported that families have constructed more number of pucca houses during the same period. On an average only 3 pucca houses per habitation have been constructed in these habitations.

In case of 22.5% sample habitations, more families were reported to be inclined to construct sanitary latrines after the construction of the road. 16 sanitary latrines have been constructed per habitation in the last 12 months in these habitations. The same was reported for only 10% control habitations.

In 85% habitations, it was reported that there has been an increase in the number of families/persons travelling outside the habitations for recreational, pilgrimage and cultural visits after the construction of road. In case of control habitations, only 70% habitations have reported increase in the number of families travelling outside for such purposes during the same period.

65% habitations have reported increase in number of Non-Governmental Organization/Voluntary Organizations (NGOs/VOs) visiting the habitations for various purposes after the construction of the road. In Jharkhand (70%) and Rajasthan (70%) have reported the same. Only 10% control habitations have reported increase in the NGOs visiting the habitations during the same period.

85% habitations have reported increase in the visit of representatives of various companies/organizations to sell their products and services after the construction of the road. The same was reported in case of 75% control habitations.

All the above indicate at the impact of the new connectivity provided to these habitations in improving the living conditions of the people. Comparison with control habitations of similar profile in the same area substantiates clearly the impact of the improved and maintained roads.

Better connectivity has also improved the security situation in these habitations, 62.5% habitations have reported that there has been a significant increase in the frequency of police patrolling/visits after the construction of the road.

10.2 Improved connectivity to various administrative centers

The people living in rural areas are dependent on many administrative offices for their needs of various services provided by the government for their welfare. In order to assess the extent to which the access to these offices has improved by the road construction, respondents in the habitation were asked to provide their views on the same. 77.5% habitations have better connectivity to the Gram Panchayat office now and 45% of them have reported reduction in travel time to reach the Gram Panchayat.

87.5% habitations have better connectivity to the Block office and 97% of them have reported reduction in travel time to reach the Block office. 87.5% habitations have better connectivity to the District headquarters and 97.5% of them have reported reduction in travel time to reach the District headquarters.

85% habitations also have better connectivity to the local police station and 90% of them have reported reduction in travel time to reach the local police station.

10.3 Improvements in Public Distribution System (PDS)

The public distribution system is an important aspect of the lives of rural people and the accessibility by citizens to the PDS shops and connectivity of PDS shops to the supply chain gets severely affected due to lack of all season connectivity. The roads have resulted in many improvements in the PDS in the connected habitations. In case of 12.5% habitations there has been an increase in the number of PDS shops those have come up after the construction of the road. Though there has been increase in number of PDS shops in the control habitations but in case of only 10% control habitations.

2.5% habitations have reported that more number of residents now also access the PDS shops outside the habitations after the road was constructed.

In 50% habitations there has been an increase in number of households holding ration cards, the same was found only in 40% control habitations.

It was observed that there has been improvements in the quantities distributed under PDS to the cards holders of the habitations after the road was construction as compared to the year before the road was constructed. In case of 25% habitations there has been an increase in quantity of wheat/rice distributed to the card holders of the sample habitations after the construction of road. During the same period, this was observed only for 20% control habitations. 12.5% habitations have also reported increase in quantity of sugar distributed through PDS to the card holders as compared to the year before the road was constructed. The same was found in case of 10% control habitations.

10.4 Summary of Key Findings and Conclusions

- Habitations connected with better maintained roads have more number of NGOs/VOs visiting them and also better security environment with increased frequency of police patrolling/visits.
- Travel time and convenience to reach administrative centres was better in sample habitations as compared to control habitations where roads were not maintained.

ANNEX 1: HABITATION SCHEDULE

HABITATION SCHEDULE

I IDENTIFICATION

1.	District		2.	Block	
3.	Gram Panchayat		4.	Village	
5.	Habitation Name & Code		6.	Name of Road	
7.	Road Category *(1- PMGSY, 2- Other Scheme)*		8.	Completion date	M M Y Y Y Y
9.	Type of Connectivity *(New Construction, Up gradation)*		10.	Date since road operative	M M Y Y Y Y

II RESPONDENT PARTICULARS

(Please ensure that at least 4-5 persons from among Sarpanch (1), Member of PRI (2), School Teacher (3), Anganwadi Worker (4), ANM/ Health Worker (5), Doctor/Nurse (6), Village Secretary (7), Patwari (land records worker) (8), Local Shopkeeper(9), Artisan/entrepreneur (10), PWD/DRDA officials (11), resident of habitation (12) are present at the time of canvassing of this schedule)

Sl. No.	Name of the Respondent	Designation *(use code)*	Sl. No.	Name of the Respondent	Designation *(use code)*
1.			6.		
2.			7.		
3.			8.		
4.			9.		
5.			10.		

III HABITATION PROFILE

1.	Total Population of the Habitation	
2.	Total Number of Households in the Habitation	
3.	SC/ST Households in the Habitation	
4.	BPL Households in the Habitation	

IV STATUS OF CONNECTIVITY TO IMPORTANT FACILITIES (present status)

	Status of connectivity to important facilities (present status)	**Within the habitation** *(1 –Yes, 2-No)*	**Distance** *(in km) If within the habitation write '0'*	**If outside the habitation - access by** [☑ *Tick the appropriate response*]		
				Sample road	**Other pucca road**	**Kuccha road**
a	Nearest Anganwadi Centre					
b	Nearest Primary School					
c	Nearest Secondary School					
d	Nearest Higher Secondary School					
e	Nearest Degree College/University					
f	Nearest vocational training centre/institute					
g	Nearest Health Sub- Centre					
h	Nearest Public Health Centre (PHC)					
i	Nearest Community Health Centre (CHC)					
j	Nearest Govt. Hospital					
k	Nearest Pvt. Hospital/Nursing Home					
l	Nearest Veterinary hospital/centre					
m	Local Police Station					
n	Local Police Post					
o	Nearest Agricultural Market/Mandi (Regular)					
p	Nearest Agricultural Market/Mandi (Seasonal)					
q	Nearest PDS shop					
r	Nearest town/urban center					

		Within the habitation *(1 –Yes, 2-No)*	Distance *(in km) If within the habitation write '0'*	If outside the habitation - access by [☑ *Tick the appropriate response*]		
				Sample road	**Other pucca road**	**Kuccha road**
s	Nearest Bank					
t	Nearest Post office					
u	Nearest market for buying household supplies					
v	G.P office					
w	Block office					
x	SDM/SDO office					
y	District Headquarter					

V CONNECTIVITY PROVIDED BY THE SAMPLE ROAD

1.	**What was the type of road access available to the habitation prior to the construction of this road?**	

(Use Code: 1-Only Earth Work road (not motorable), 2- Only Earth Work road (motorable), 3 – Gravel/water bound macadam layer road, 4- All weather road)

			Before this road was operative	**After** this road was operative
2.	**Availability of motorized access to the habitation during all seasons?**	*(Use Code: 1- Yes, 2-No)*		
	If 'No' for what period was/is the motorized access closed to the habitation every year.	*(Average no. of days)*		
3.	**Availability of a public transport commuting service**	*(Use Code: 1- Yes, 2-No)*		
	If Yes, no. of vehicles plying in & out of the habitation weekly	*(appx. Nos.)*		
	Buses			
	Auto Rickshaws			
	Jeep/Car			

	Other vehicles		
4.	**Availability of a public transport load carriage service** *(Use Code: 1- Yes, 2-No)*		
	If Yes, no. of vehicles plying in & out of the habitation weekly *(appx. Nos.)*		
	Light Truck		
	Medium Truck		
	Heavy Truck		
	Pick-up truck/van		
	Tractor - Trolley		
	Other vehicles		

VI IMPACT OF ROAD ON AGRICULTURE

1. Provide the details of cropping pattern of the agricultural land owned by farmers in the habitation, before and after the construction of the road. Take averages and approximate estimates of 2 years prior and after the construction of the road.

	Crop Name	Area under cultivation before road was constructed *(in Ha.)*		Area under cultivation after road was constructed *(in Ha.)*		Reasons for change in cropping pattern, if any. *(Use Code)*	
		Irrigated	Non-irrigated	Irrigated	Non-irrigated	Irrigated	Non-irrigated
a) Kharif *(July to October)*							

	Crop Name	Area under cultivation before road was constructed *(in Ha.)*		Area under cultivation after road was constructed *(in Ha.)*		Reasons for change in cropping pattern, if any. *(Use Code)*	
		Irrigated	Non-irrigated	Irrigated	Non-irrigated	Irrigated	Non-irrigated
b) Rabi *(October to March)*							
c) Zaid *(March to June)*							
Total							

Reasons for change in cropping pattern *(Use Code):*
Irrigated Area (Increased due to: *1- New irrigation scheme, 2- Climatic changes, 3- Better access to markets, 4- Better prices, 5- improved availability of farm inputs, 6- improved availability of machinery/ tools, 7- other reasons)*
Irrigated Area (Decreased due to: *8- Failure of irrigation scheme, 9- Climatic changes, 10- Lower demand/ prices, 11- Commercialization of land, 12- other reasons)*
Non-irrigated Area (Increased due to: *1- Climatic changes, 2- Better access to markets, 3- Better prices, 4- improved availability of farm inputs, 5- improved availability of machinery/ tools, 6- other reasons)*
Non-irrigated Area (Decreased due to: *7- New irrigation scheme, 8- Climatic changes, 9- Lower demand/ prices, 10- Commercialization of land, 11- other reasons)*

2. **Were most of the farmers going to the same agricultural market/mandi before and after the construction of the road?** ☐

(Use Code: 1- Yes, 2-No)

3. **Provide the following details of the agricultural market/mandi accessed by most of the farmers of this habitation.**

		Before the road was operative	**After** the road was operative
(a)	Connectivity through an all weather/pucca road from the habitation *(Use Code: 1- Yes, 2-No)*		
(b)	Distance to the market/mandi *(in Kms.)*		
(c)	Travel time to reach the market/mandi *(minutes)*		
(d)	Type of Market *(Use Code:1-Private markets, 2- Govt. marketing corporation, 3- Farmers cooperative society)*		
(e)	No. of traders/commission agents		
(f)	Availability of godown/warehousing facilities *(Use Code: 1- Yes, 2-No)*		
(g)	Availability of fertilizers/pesticides /improved seeds etc. *(Use Code: 1- Yes, 2-No)*		
(h)	Product Profile *(Use Code: 1- Only grains, 2- Only vegetables, 3- Both, 4-Other)*		

4. **Has there been any perceptible change in the agriculture production of the farmers in the village after the road was constructed?** ☐

(Use Code: 1- Yes, 2-No)

If 'Yes', whether it has [☑ *Tick the appropriate response*] *(multiple response possible)*

(a)	Increased due to improved availability of improved seeds etc.	
(b)	Increased due to improved availability of fertilizers, pesticides etc.	
(c)	Increased due to increased use of tractor/farm machinery etc.	
(d)	Increased due to change in cropping pattern	
(e)	Increased due to better access to irrigation facilities	

(f)	Increased due to better awareness and access to market information for the farmers	
(g)	Decreased due to commercialization of the agriculture land for other purposes	
(h)	Decreased due to out migration of agriculture labour for jobs outside	

5. Has the better connectivity due to the road resulted in farmers fetching better prices for their crops? *(Use Code: 1- Yes, 2-No)*

If 'Yes', has it been because [☑ *Tick the appropriate response*] *(multiple response possible)*

(a) More farmers now take their produce directly to the market/Mandi & not sell to the middlemen

(b) Availability of transport has increased to take the produce to the market/mandi

(c) Farmers now have better awareness and access to market information/prices

6. Has there been an increase in the agricultural day wages due to increased employment opportunities as a result of the road now? *(Use Code: 1- Yes, 2-No)*

7. Has there been a reduction in the unit price of farm inputs due to improved road access to the markets now? *(Use Code: 1- Yes, 2-No)*

8. Has there been an improvement in population and productivity of livestock owned by the inhabitant families of the habitation due to improved road access to markets now? *(Use Code: 1- Yes, 2-No)*

9. Has there been an improvement in access to agro-based industries due to the construction of the road? *(Use Code: 1- Yes, 2-No)*

10. Has there been an improvement in access to farmers' cooperatives/banks after the construction of the road? *(Use Code: 1- Yes, 2-No)*

VII IMPACT ON INCOME AND EMPLOYMENT GENERATION

1. Has there been an improvement in the overall employment generation for the inhabitants after the construction of the road? *(Use Code: 1- Yes, 2-No)*

If 'Yes', whether it has been due to [☑ *Tick the appropriate response*] *(multiple response possible)*

(a) Improved all season access to nearby industries & cities for jobs

(b) Increase in number of persons selling fruits, vegetables, fuel wood & NTFP etc

(c) Increase in on-farm employment opportunities due to change in cropping patterns

(d) Increase in number of persons engaged in livestock/poultry business

(e) Improved access to G.P/Block offices for seeking employment under govt. programmes

(f) Increase in number of non-farm activities – small industries, shops etc in the habitations

(g) Increase in employment opportunities in transport sector

2. Has there been an overall increase in the income levels of people in the habitation as a result of the road? *(Use Code: 1- Yes, 2-No)*

If 'Yes', whether it has been in case of [☑ *Tick the appropriate response*] *(multiple response possible)*

(a) The farmers due to increase in crop yield and fetching better prices

(b) The wage labourers due to increase in labour rates

(c) The persons engaged in livestock/poultry business etc. due to better access to markets

(d) The persons engaged in business/trading/ running shops due to better connectivity

3. Has there been any new enterprise/industry setup in the village, feasibility of which was possible only after the connectivity provided under this road? *(Use Code: 1- Yes, 2-No)*

If 'Yes', no. of such enterprises setup [ ] & no. of persons engaged/employed in these enterprises/industries

4. Has there been an increase in the no. of women traveling outside the habitation for work /employment after the connectivity provided under this road? *(Use Code: 1- Yes, 2-No)*

5. Has there been an improvement in market access to women SHGs to market their products after the connectivity provided under this road? *(Use Code: 1- Yes, 2-No)*

6. Has this road resulted in any changes in the migration of labour/workers in the habitation?

(Use Code: 1- More out-migration of labour for seeking employment , 2-More in-migration of labour coming to the habitation for work, 3- Both, 4-No changes)

VIII IMPACT OF THIS ROAD ON ACCESS TO HEALTH FACILITIES

1.	**Status of Health facilities within the habitation**		Before the road was operative	After the road was operative
(a)	Health Sub -Centre	*(Use Code: 1- Yes, 2-No)*		
(b)	Public Health Centre (PHC)	*(Use Code: 1- Yes, 2-No)*		
(c)	Availability of Govt. doctors	*(Use Code: 1- Yes, 2-No)*		
(d)	Number of ANMs	*(Nos.)*		
(e)	Appointment of ASHA	*(Use Code: 1- Yes, 2-No)*		
(f)	Constitution of village health committee	*(Use Code: 1- Yes, 2-No)*		
(g)	Preparation of village health plan	*(Use Code: 1- Yes, 2-No)*		
(h)	Availability of Private medical practitioner	*(Use Code: 1- Yes, 2-No)*		

2.	**Connectivity to health facilities from the habitation**		Before the road was operative	After the road was operative
(a)	Availability of all weather pucca road connectivity to the nearest public health center	*(Use Code: 1- Yes, 2-No)*		
(b)	Availability of all weather pucca road connectivity to the nearest Govt. hospital	*(Use Code: 1- Yes, 2-No)*		
(c)	Availability of all weather pucca road connectivity to the nearest Pvt. Hospital/nursing home	*(Use Code: 1- Yes, 2-No)*		
(d)	Travel time to reach the nearest health facility in case of maternity emergencies	*(minutes)*		
(e)	Travel time to reach the nearest health facility in case of serious physical injuries/accidents	*(minutes)*		
(f)	Travel time to reach the nearest health facility in case of other medical emergencies	*(minutes)*		

3. Has there been an increase in the number of deliveries made in hospitals/health centers (institutional deliveries) after the construction of this road? *(Use Code: 1- Yes, 2-No)* ☐

4. Has there been an increase in the frequencies of the visits of health workers/ ANMs in the village after the construction of this road? *(Use Code: 1- Yes, 2-No)* ☐

5. Has there been an improvement in the availability of drug & medical supplies after the construction of this road? *(Use Code: 1- Yes, 2-No)* ☐

6. Has there been an overall improvement in the general awareness on health and hygiene related issues after the construction of this road? *(Use Code: 1- Yes, 2-No)* ☐

7. **Has there been change in the overall health care factors of the people living in the habitations due to the better connectivity available under this road now?** *(Use Code: 1- Yes, 2-No)* ☐

If 'Yes', whether there has been any change in terms of [☑ *Tick the appropriate response, take responses from health workers/ staff of PHC/hospital etc.*] *(multiple response possible)*

(a) Improvement in immunization rate of children from the habitation ☐

(b) Reduction in morbidity rates ☐

(c) Increase in number of pregnant women receiving pre-natal care ☐

(d) Reduction in infant mortality rate ☐

(e) Reduction in anemia cases amongst women & girls ☐

(f) Reduction in child malnutrition ☐

(g) Reduction in occurrence of communicable diseases in the habitation ☐

IX IMPACT OF THIS ROAD ON ACCESS TO EDUCATION

1.	**Status of education facilities within the habitation**		Before the road was operative	After the road was operative
(a)	Number of Anganwadi Centres	*(Nos.)*		
(b)	Number of Schools	*(Nos.)*		
(c)	Sufficient number of teaching staff in the schools	*(Use Code: 1- Yes, 2-No, 3- N/A if no school)*		
(d)	Regular provision of mid-day meals for the students	*(Use Code: 1- Yes, 2-No, 3- N/A if no school)*		

2.	**Connectivity status to education centers from the habitation before and after the construction of the road**		Before the road was operative	After the road was operative
(a)	Availability of all weather pucca road connectivity to the nearest Anganwadi Centre	*(Use Code: 1- Yes, 2-No)*		
(b)	Availability of all weather pucca road connectivity to the nearest Primary School	*(Use Code: 1- Yes, 2-No)*		
(c)	Availability of all weather pucca road connectivity to the nearest Secondary School	*(Use Code: 1- Yes, 2-No)*		
(d)	Availability of all weather pucca road connectivity to the nearest Higher Secondary School	*(Use Code: 1- Yes, 2-No)*		
(e)	Availability of all weather pucca road connectivity to the nearest Degree College/University	*(Use Code: 1- Yes, 2-No)*		
(f)	Availability of all weather pucca road connectivity to the nearest Vocational training institute	*(Use Code: 1- Yes, 2-No)*		
(g)	Travel time to reach the nearest Anganwadi Centre	*(minutes)*		
(h)	Travel time to reach the nearest Primary School	*(minutes)*		
(i)	Travel time to reach the nearest Secondary School	*(minutes)*		
(j)	Travel time to reach the nearest Higher Secondary School	*(minutes)*		

(k)	Travel time to reach the nearest Degree College/University	*(minutes)*		
(l)	Travel time to reach the nearest Vocational training institute	*(minutes)*		

3. Estimated no. of students enrolled from the habitation during the current year.

		Boys	Girls
(a)	Nearest Anganwadi Centre		
(b)	Nearest Primary School		
(c)	Nearest Secondary School		
(d)	Nearest Higher Secondary School		
(e)	Nearest Degree College/University		
(f)	Nearest Vocational training institute		

4. Has there been an increase in the number of children going to schools from the habitation due to better road connectivity provided by this road? *(Use Code: 1- Yes, 2-No)* ☐

5. Has there been an increase in the number of girls going to schools from the habitation due to better road connectivity provided by this road ? *(Use Code: 1- Yes, 2-No)* ☐

6. Has there been an increase in the number of children going outside the village for higher education due to better connectivity provided by this road? *(Use Code: 1- Yes, 2-No)* ☐

7. Is the overall literacy levels enhanced due to better access and improved communications because of this road? *(Use Code: 1- Yes, 2-No)* ☐

8. Has there been an improvement in the attendance of students from the habitation in the near by schools during all seasons due to improved all weather connectivity provided by this road? *(Use Code: 1- Yes, 2-No)* ☐

9. Has there been a reduction in the number of student dropouts from this habitation in the nearby schools due to the improved connectivity provided by this road? *(Use Code: 1- Yes, 2-No)* ☐

10. Are the families in the habitation willing to send more of their girls for higher schools due to improved connectivity provided by the road? *(Use Code: 1- Yes, 2-No)* ☐

X IMPACT OF THIS ROAD ON OTHER ASPECTS

1. Has the new connectivity provided under this road also resulted in more families inclined to construct pucca houses? *(Use Code: 1- Yes, 2-No)* ☐

If 'Yes', no of pucca houses constructed in the habitation during the last 12 months. ☐

2. Has the new connectivity provided under this road also resulted in more families inclined to construct sanitary latrines? *(Use Code: 1- Yes, 2-No)* ☐

If 'Yes', no of sanitary latrines constructed in the habitation during the last 12 months. ☐

3. Has there been an increase in the no. of families/persons travelling outside the habitation for recreational, pilgrimage & cultural visit after the construction of this road? *(Use Code: 1- Yes, 2-No)* ☐

4. Has the construction of this road resulted in increase in number of NGOs/VOs visiting the habitation for various purposes? *(Use Code: 1- Yes, 2-No)* ☐

5. Is the habitation now visited more frequently by the representatives of various companies/organizations to sell their products & services after the construction of this road? *(Use Code: 1- Yes, 2-No)* ☐

6. Has there been an increase in the frequency of visit of police patrol to the habitation after construction of this road? *(Use Code: 1- Yes, 2-No)* ☐

7. Has the construction of this road resulted in an exponential increase in the prices of land in and around the habitation? *(Use Code: 1- Yes, 2-No)* ☐

8.	**Connectivity status to various administrative centers from the habitation before and after the construction of this road**	Before the road was operative	After the road was operative
(a)	Availability of all weather pucca road connectivity to the G.P *(Use Code: 1- Yes, 2-No)*		
(b)	Availability of all weather pucca road connectivity to the Block *(Use Code: 1- Yes, 2-No)*		
(c)	Availability of all weather pucca road connectivity to the District H.Qs *(Use Code: 1- Yes, 2-No)*		
(d)	Availability of all weather pucca road connectivity to the Local Police Station *(Use Code: 1- Yes, 2-No)*		
(e)	Travel time to reach the G.P office *(minutes)*		

(f)	Travel time to reach the Block office *(minutes)*		
(g)	Travel time to reach the District H.Qs *(minutes)*		
(h)	Travel time to reach the Local Police station *(minutes)*		

9.	**Status of Public Distribution System (PDS) in the habitation**	Before the road was operative	After the road was operative
(a)	No. of PDS shops within this habitation *(Nos.)*		
(b)	No. of PDS shops outside this habitation, accessed by the residents of this habitation *(Nos.)*		
(c)	No. of households holding ration cards from this habitation *(Nos.)*		
(d)	Estimated qty of Wheat/Rice distributed during the last year from all the PDS shops to card holders of this habitation *(Qntls)*		
(e)	Estimated qty of Sugar distributed during the last year from all the PDS shops to card holders of this habitation *(Qntls)*		
(f)	Estimated qty of Kerosene oil distributed during the last year from all the PDS shops to card holders of this habitation *(Ltr)*		

10.	**Status and progress of Rural Electrification Programme in the habitation**	Before the road was operative	After the road was operative
(a)	No. of households having electricity connections in the habitation *(Nos.)*		
(b)	No. of electricity connections for agriculture in the habitation *(Nos.)*		
(c)	No. of industrial/commercial electricity connections in the habitation *(Nos.)*		
(d)	No. of Street light posts in the habitation *(Nos.)*		

Name of the Field Researcher: _____

Signature : _____

Date : _____

ANNEX 2: HOUSEHOLD LEVEL SCHEDULE

HOUSEHOLD LEVEL SCHEDULE

Household No. | | |

I IDENTIFICATION

(a)	State	
(b)	District	
(c)	Block/Taluk / Mandal	
(d)	Gram Panchayat	
(e)	Village	
(f)	Habitation	Code

II RESPONDENT HOUSEHOLD' PROFILE

Identification Card Type | **No.**

1. **Household Roster** *(Provide the following details of all the members of the household)*

(Use Codes)

ID Code	Name	Age	Gender	Education	Marital Status	Principal Occupation
i						
ii						
iii						
iv						
v						
vi						
vii						
viii						
ix						
x						

Gender *(Code: 1- Female, 2- Male)*

Education *(Code: 1 – Illiterate, 2 – Literate, 3 - Primary, 4 – Middle school, 5 – Matriculate, 6 – Plus 2, 7 – Technically qualified, 8 – Graduate and above)*

Marital Status *(Code: 1 – Married, 2 – Widow, 3 – Separated/Divorced, 4 – Un married)*

Current Principal Occupation *(Code: 1 – Agricultural Wage Earners, 2 – Non-agricultural Unskilled Wage Earners, 3 – Farmer, 4 – Live stock, Poultry etc., 5 – Mining and quarrying, 6 – Construction labour, 7 – Trading/shop keeping, 8 – Driver/service in transport sector, 9 – Traditional artisans, 10 – Govt. Service,11 – Pvt. Service, 12- Housewife, 13 – Students, 14- None, 15 - Others(Specify_____)*

2. **Caste Category:** *(Code: 1 - SC, 2 – ST, 3 - Others)* |
3. **BPL Status:** *(Code: 1 - Yes, 2 - No)* |
4. **Ownership of House** *(Code: 1 - Kutcha, 2 – Semi-Pucca, 3 – Pucca, 4 – Does not own house)* |

III STATUS OF AGRICULTURE ACTIVITY

1. **Does the household own/possess agricultural land?** *(Code: 1 - Yes, 2 - No)* ☐

   If 'No' skip to Q. – IV

   If "Yes"

2. **Total Operational land holding** **Unit** ☐ ☐☐☐.☐☐

   Total Irrigated area **Unit** ☐ ☐☐☐.☐☐

3. **Has this road helped in improved agriculture productivity than before?** ☐

   (Code: 1 - Yes, 2 - No)

If 'Yes', whether it has also resulted in

i	Increase in total area sown *(Code: 1 - Yes, 2 - No)*	
ii	Increase in number of crops *(Code: 1 - Yes, 2 - No)*	
	If 'Yes' are they growing more cash crops now *(Code: 1 - Yes, 2 - No)*	
iii	Has the yield improved of the same crops *(Code: 1 - Yes, 2 - No)*	
iv	Overall reduction in travel time to mandi/markets *(Code: 1 - Yes, 2 - No)*	
	If 'Yes' time saved per trip *(in minutes)*	

4.	**Household's ownership of assets?** *(Nos. write '0' if NIL)*	**Previous Status**	**Current Status**
i	Tractor		
ii	Power Tiller		
iii	Thrasher		
iv	Water lifting pump set		
v	Other farm machinery		
vi	Cows/Buffaloes		
vii	Goats/Sheep/Pigs		
viii	Horse/Mule/Camel		
ix	Poultry birds		

5	**Access to facilities/services**	**Previous Status**	**Current Status**
i	Sourcing of fertilizers/pesticides *(Code: 1 – Local shop within the habitation, 2 - Supplied at doorstep, 3- Near by market outside the habitation 4 – Distant market outside the habitation, 5- Not used at all)*		
	If outside the habitation , distance to the market *(Km)*		
ii	Sourcing of improved seeds *(Code: 1 – Local shop within the habitation, 2 - Supplied at doorstep, 3- Near by market outside the habitation 4 – Distant market outside the habitation, 5-Not used at all)*		

	If outside the habitation , distance to the market *(Km)*		
iii	Membership of farmers' cooperative society *(Code: 1 - Yes, 2 - No)*		
iv	Household /member holding a bank account *(Code: 1 - Yes, 2 - No)*		
v	Household availed agricultural loan *(Code: 1 - Yes, 2 - No)*		
	If 'yes' amount of last loan availed *(Rs.)*		
vi	Access to agricultural extension services *(Code: 1 - Yes, 2 - No)*		
	If yes, No. of visits by the agricultural extension workers *(annual average)*		
	Whether improved seeds received *(Code: 1 - Yes, 2 - No)*		
	Training received/ exposure visits *(Code: 1 - Yes, 2 - No)*		

6 Has this road helped the household in a better access to the market/mandi than before? *(Code: 1 - Yes, 2 - No)* ☐

If 'Yes', whether it has also resulted in [☑ *Tick the appropriate response*] (*multiple response possible)*

i	Better market information and crop prices to the household	
ii	Better prices for livestock/poultry products	
iii	Reduction in cost of agricultural inputs	
iv	Reduction in cost of transportation of produce to the market	
v	Better access to market infrastructure facilities (warehouses, cold storages etc)	

IV STATUS OF INCOME AND EMPLOYMENT

1. **Please provide the following details of all the earning members of the household (excluding the members largely engaged in activities on own farm)**

S. No	ID Code *(from household roster)*	Previous Status							Current Status						
		Principal Occupation	Avg. no. of days employment	Average annual income *(in Rs.)*	Place of employment	Distance *(in Kms)*	Travel time *(mins)*	Main Mode of travel	Principal Occupation	Avg. no. of days employment	Average annual income *(in Rs.)*	Place of employment	Distance *(in Kms)*	Travel time *(mins)*	Main Mode of travel

Principal Occupation *(Code: 1 – Agricultural Wage Earners, 2 – Non-agricultural Unskilled Wage Earners, 3 – Live stock, Poultry etc., 4 – Mining and quarrying, 5 – Construction labour, 6 – Trading/shop keeping, 7 – Driver/service in transport sector, 8 – Traditional artisans, 9 – Govt. Service, 10 – Pvt. Service, 11- Not occupied, 12 – Others (Specify_____)*

Place of employment *(Code: 1- Within the habitation, 2 – Outside the habitation, 3 - Both)*
Distance: *(in Kms), (Write '0' if only within the habitation)*
Main Mode of travel *(Code: 1-Public transport bus, 2-Jeep/Car, 3- Auto rickshaw/three wheeler, 4- Scooter/Motorcycle, 5-Bicycle, 6- Animal cart, 7-On foot, 8-Other specify_____)*

2. Please provide the following details of the other income generating activities for the earning members of the household (excluding the activities on own farm)

S. No	ID Code *(from household roster)*	Previous Status							Current Status						
		Other Occupation	Avg. no. of days employment	Average annual income *(in Rs.)*	Place of employment	Distance *(in Kms)*	Travel time *(mins)*	Main Mode of travel	Other Occupation	Avg. no. of days employment	Average annual income *(in Rs.)*	Place of employment	Distance *(in Kms)*	Travel time *(mins)*	Main Mode of travel

Other Occupation *(Code: 1 – Agricultural Wage Earners, 2 – Non-agricultural Unskilled Wage Earners, 3 – Live stock, Poultry etc., 4 – Mining and quarrying, 5 – Construction labour, 6 – Trading/shop keeping, 7 – Driver/service in transport sector, 8 – Traditional artisans, 9 – Govt. Service, 10 – Pvt. Service, 11- Not occupied, 12 – Others (Specify_____)*

Place of employment *(Code: 1- Within the habitation, 2 – Outside the habitation, 3 - Both)*
Distance: *(in Kms), (Write '0' if only within the habitation)*
Main Mode of travel *(Code: 1-Public transport bus, 2-Jeep/Car, 3- Auto rickshaw/three wheeler, 4- Scooter/Motorcycle, 5-Bicycle, 6- Animal cart, 7-On foot, 8-Other specify_____)*

V ACCESS TO EDUCATION

1. Has this road helped in improved access to education facilities than before? ☐

(Code: 1 - Yes, 2 – No, 3-N/A)

If 'Yes', whether it has also resulted in

i	Improved enrolment of children going to **Primary School**	
ii	Improved access to Primary School during all seasons	
iii	Reduction in travel time to the Primary School	
iv	Improved enrolment of children going to **Secondary School**	
v	Improved access to Secondary School during all seasons	
vi	Reduction in travel time to the Secondary School	
vii	Improved enrolment of children going to **Senior Secondary School**	
viii	Improved access to Senior Secondary School during all seasons	
ix	Reduction in travel time to the Senior Secondary School	
x	Improved enrolment of children going to **College**	
xi	Improved access to College during all seasons	
xii	Reduction in travel time to the College	
xiii	Improved enrolment of children going to **Vocational Training Center**	
xiv	Improved access to Vocational Training Center during all seasons	
xv	Reduction in travel time to the Vocational Training Center	

VI ACCESS TO HEALTH

	1. Provide following details of the last health incident with a family member	**Before the Road**	**After the Road**
(i)	**(a) Was a member ever sick in bed for more than a week or seriously injured?** *(Code: 1 - Yes, 2 – No)* ***(If 'No', skip to 2)***		
	(b) If Yes, What was the Major cause of illness? *(Code: 1- Injury, 2-Mental illness, 3-TB, 4-Infection, 5-Organ Failure, 6-Diarrhoea, 7-Disability, 8-Other)*		
(ii)	**(a) Where was he/she treated/consulted for this illness/injury?** *(Code: 1- Doctor/Health Worker/Nurse in the Village, 2-Doctor/Nurse outside the Village, 3-Faith Healer/Religious Practitioner in the village, 4-Quack/Chemist in the village, 5-Others in the village, 6 -Nowhere) (If 'Nowhere', skip to (iv) below)*		
	(b) If treated outside the village, what was the distance? ***(In Kms.)***		
(iii)	**(a) Was the access to the hospital/health center available during all Seasons?** *(Code: 1 - Yes, 2 – No)*		
	(b) What was the appx. travel time to reach the hospital/health center? ***(minutes)***		

(iv)	**What was the major reason for not treating/consulting a Doctor?** *(Use Codes: 1 – Was not considered necessary, 2 –Hospital/Health Center was very far, 3 – Family could not afford the cost, 4 –Other reasons)*		

2. Provide following details related to health of the youngest child in the family		**Before the Road**	**After the Road**
(i)	**(a) Was this Child's age 5 years or younger at that time?** *(Code: 1 - Yes, 2 – No)* ***(If 'No', skip to 3)***		
	(b) If Yes, was he/she ever immunized? *(Code: 1 - Yes, 2 – No)* ***(If 'No', skip to (iv) below)***		
(ii)	**(a) Where was he/she provided this immunization?** *(Code: 1- Govt. Doctor/Health Worker/Nurse in the Village, 2-Govt. Doctor/Nurse outside the Village, 3- School/Anganwadi in the village, 4-Quack/Chemist in the village, 5-Others in the village. (If 'provided in the village', skip to 3)*		
	(b) If provided outside the village, what was the distance to the hospital/health center *(In Kms.)*		
(iii)	**(a) Was the access to the hospital/health center available during all Seasons?** *(Code: 1 - Yes, 2 – No)*		
	(b) What was the appx. travel time to reach the hospital/health center? *(minutes)*		
(iv)	**What was the major reason for not providing immunization to the Child?** *(Use Codes: 1 –Family was not aware, 2- Was not considered necessary, 3 –Hospital/Health Center was very far, 4 – Family could not afford the cost, 5 –Other reasons)*		

3. Provide following details related to last child in the family		**Before the Road**	**After the Road**
(i)	**(a) Was a mother ever expecting a Child/Pregnant/gave birth to a child during this time?** *(Code: 1 - Yes, 2 – No)* ***(If 'No', skip to next section)***		
	(b) If Yes, did she ever receive pre-natal care? *(If 'No', skip to (iv) below)*		
(ii)	**(a) Where was she provided the pre natal care?** *(Code: 1- ANM/Govt. Doctor in the Village, 2-Pvt. Doctor/Nurse in the Village, 3- ANM/Govt. Doctor outside the Village, 4- Pvt. Doctor/Nurse outside the Village, 5-Others in the village. (If 'provided in the village', skip to (iv) below)*		
	(b) If provided outside the village, what was the distance to hospital/health center *(In Kms.)*		
(iii)	**(a) Was the access to the hospital/health center available during all Seasons?**		
	(b) What was the appx. travel time to reach the hospital/health center? *(minutes)*		
(iv)	**(a) Where was the child delivered?** *(Code: 1- At home, 2-PHC/CHC in the village, 3- Govt. hospital/health center outside the village, 4-Pvt. Hospital/health center outside the village, 5- N/A, pregnancy terminated) (if At home', in the village or N/A , skip to (v) below)*		
	(b) If delivered outside the village, what was the distance to hospital/health center *(In Kms.)*		

(v)	**(a) Did she go for a post –natal checkup?** *(Code: 1 - Yes, 2 – No)*		
	(b) If yes, where did she go for the post- natal checkup? *(Code: 1- ANM/Govt. Doctor in the Village, 2-Pvt. Doctor/Nurse in the Village, 3- ANM/Govt. Doctor outside the Village, 4- Pvt. Doctor/Nurse outside the Village, 5-Others in the village.*		

VII CHANGE IN QUALITY OF LIFE

1. Rank the household based on the weighted scores on each parameter		Before the Road	After the Road
(i)	**Size group of operational holding of land** *(Score: 0 - Nil holdings, 1 - Less than 1 ha of un-irrigated land or less than 0.5 ha of irrigated land, 2 – 1 ha.- 2 ha. of un-irrigated land or 0.5 - 1 ha of irrigated land, 3- 2 ha.- 5 ha. of un-irrigated land or 1.0-.2.5 ha. of irrigated land, 4- More than 5 ha. of un-irrigated land or 2.5 ha of irrigated land)*		
(ii)	**Type of House** *(Score: 0 – Houseless, 1 - Kutcha, 2 - Semi Pucca, 3- Pucca, 4- Urban type)*		
(iii)	**Average availability of normal wear clothing (per person in pieces)** *(Score: 0 - Less than two, 1 – two or more , but less than four, 2 – four or more, but less than six, 3- six or more but less than ten, 4- ten or more)*		
(iv)	**Food Security** *(Score: 0 - Less than one square meal per day for major part of the year, 1 – Normally, one square meal per day, but less than one square meal occasionally, 2 – One square meal per day throughout the year, 3- Two square meals per day, with occasional shortage,4- Enough food throughout the year)*		
(v)	**Sanitation** *(Score: 0 - Open defecation, 1 - Group latrines with irregular water supply, 2 - Group latrines with regular water supply, 3- Clean group latrine with regular water supply and regular sweeper, 4- Private latrine)*		
(vi)	**Ownership of consumer durables viz. TV, Electric Fan, Kitchen appliances like pressure cooker, Radio etc.** *(Score: 0 - Nil, 1 - Any one item, 2 - Two items only, 3- Any three or all items , 4- All items and/ or ownership of any one out of : computer, telephone, refrigerator, colour TV, electric kitchen appliances, expensive furniture, light motor vehicle, light commercial vehicle, tractor, power tiller, combined thresher/ harvester)*		
(vii)	**Literacy status of highest literate adult** *(Score: 0 – Illiterate, 1 - Upto primary (class V),2 - Completed secondary(/passed 10th), 3- Graduate/Professional diploma, 4- Post Graduate/Professional graduate)*		
(viii)	**Status of Household Labour force** *(Score: 0 - Bonded labour, 1 - Women & Child labour, 2 - Only adult female and no child labour, 3- Adult males only, 4- Others)*		

(ix)	**Means of livelihood** *(Score: 0 - Casual labour, 1 - Subsistence cultivation, 2 - Artisan, 3- Salary, 4- Others)*		
(x)	**Status of Children (5-14 years) any child** *(Score: 0 - Not going to school and working/not working, 1 - Going to school and working, 4- Going to school and not working)*		
(xi)	**Type of Indebtedness** *(Score: 0 – for daily consumption purposes from informal sources, 1 - For production purposes from informal sources, 2 - For other purposes from informal sources, 3- Borrowing only from institutional agencies, 4- No indebtedness and possess assets)*		
(xii)	**Reason for migration** *(Score: 0 - Casual work, 1 - Seasonal employment, 2 - Other forms of livelihood, 3- Non-migrant, 4- Other purposes)*		
(xiii)	**Preference for Assistance** *(Score: 0 - Wage employment/ targeted public distribution system, 1 - Self-employment, 2 - Training and skill up gradation, 3- Housing, 4- Loan/Subsidy more than Rs. One lakh or No assistance required)*		

VIII IMPACT ON OTHER ASPECTS

		Before the Road	After the Road
1.	**Ownership of personal vehicles in the household** ***(Nos.)***		
	Cycle		
	Motorcycle/Scooter		
	Car/Jeep/Van		
2.	**Frequency of visit by the male members of the household to the nearest market/city for household purchases per month.**		
3.	**Frequency of visit by the female members of the household to the nearest market/city for household purchases per month.**		
4.	**Frequency of visit by the male members of the household outside the village for visiting relatives/families per year.**		
5.	**Frequency of visit by the female members of the household outside the village for visiting relatives/families per year.**		
6.	**Frequency of visit by the male members of the household outside the village for recreational/pilgrimage purposes per year.**		
7.	**Frequency of visit by the female members of the household outside the village for recreational/pilgrimage purposes per year.**		

Name of the Investigator: _____

Date _____

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