POST BRIDGE BUILDING ASSESSMENT 2015

Report Prepared for the Trail Bridge Support Unit (TBSU)

Prepared by
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LIST OF ABBREVIATIONS

ADTC	Average Daily Traffic Counts
B/C/T/S	Brahmin Chhetry Thakuri Sanyasi
BMC	Bridge Maintenance Committee
DDC	District Development Committee (Nepal)
DTC	Deprived (non-dalit) Terai Castes
ESC	Education Service Center
FY	Fiscal Year
HC	Household Chores
HSC	Health Service Center
MC	Market Center
NGO	Non-Governmental Organization
PBBA	Post Bridge Building Assessment
RCP	River Crossing Patients
RCS	River Crossing Students
SF	Social Function
TBSSP	Trail Bridge Sub-Sector Project
TBSU	Trail Bridge Support Unit
UC	Users Committee

Executive Summary

This study assesses the utilizations, benefits and effectiveness of trail bridges (span ≤ 120m) by collecting data from a sample of 23 bridge sites. Data were collected from different stakeholders – beneficiaries (households), service providers (teachers and health workers), bridge maintenance committee members and travelers crossing bridges (traffic counts) - from the sites of 23 selected bridges. The main findings of the assessment are summarized below.

Utilizations

1. **Qualitative Assessment**: Irrespective of socio-economic, demographic and physical conditions, people are using bridges for various purposes, such as - going to schools, visiting health service centers, going to market centers, performing household chores, attending social functions, and so on.
2. **Quantitative Assessment**: The average daily human, livestock and two-wheeler traffic counts per bridge corresponding turned out to be 208 persons, 29 livestock, 14 two-wheelers. Sex composition among the human traffic counts is male 53.3% and female 46.7%. Out of these 208 human traffic counts, around 28% were crossing rivers for going to market centers, around 27% for performing household chores, around 14% for going schools, around 11% for visiting health service centers, around 10% each for attending social functions, and for employment. As in the past, this assessment also reveals that the average human daily traffic counts per bridge is higher in the terai region than that in the hill and in the mountain region, so as the average livestock and two-wheeler traffic counts.

Benefits

3. **Qualitative Assessment**: Availability of enhanced access to various service centers is one of the most important benefits of bridges. People are and will be benefited for enhancing their capabilities by having enhanced access to schools/campuses and health service centers. Similarly, people are and will be benefited for reducing poverty and physical hardship by having enhanced access for market centers and performing household chores. Enhanced access to attend social functions joins communities separated by rivers for ages and will increase the family and social cohesiveness.

4. **Quantitative Assessment**: Time saved in reaching service centers is one of the most important benefits of bridges. In terms of average time saved is 34 minutes for going to schools, 34 minutes for going to health service centers, and 44 minutes for going to market centers.

Effectiveness

5. Effectiveness of trail bridges is measured by comparing the number of river crossing students for attending selected public schools before and after having bridges. The number of river crossing students in 11 schools has increased from 1,302 in the baseline survey to 1,589 in the current PBBA survey, which in terms of absolute increase is 287 students and in terms of percentage change is 22.0 percent. Gender composition among the river crossing students in the current PBBA survey is 44.3% girls and 55.7% boys.
6. Effectiveness of trail bridges is also measured by comparing the number of river crossing health service seekers for visiting public health service centers before and after having bridges. The number in 18 health service centers has increased from 8,876 in the baseline survey to 11,741 in the current PBBA survey, which in terms of absolute increase is 2,865 patents and in terms of percentage change is 32.3 percent. Gender composition among the river crossing health service seekers in the current PBBA survey is 57% females and 43% males.
7. New development works initiated at the vicinity of bridge sites after having bridges is also considered as effectiveness of bridges in this study. At least one new shop was opened in 9 sites (or 39% of total number of bridge sites), at least one new house was constructed in 111 sites (or 48% of total number of bridge sites), at least one new trail joining the bridges was constructed in 15 sites (or 65% of total number of bridge sites) and land prices were gone up in 14 sites (or 61% of total number of bridge sites).

Conclusions

In summary, this study based on empirical evidences concludes that the outcomes of trail bridges are encouraging toward the enhancement of human capability, reduction of poverty and physical hardships, and bringing family and social cohesiveness among the isolated communities for ages. The social and economic effectiveness will likely to continue in future. People's overdue desire for enhanced access has been fulfilled by the trail bridges.

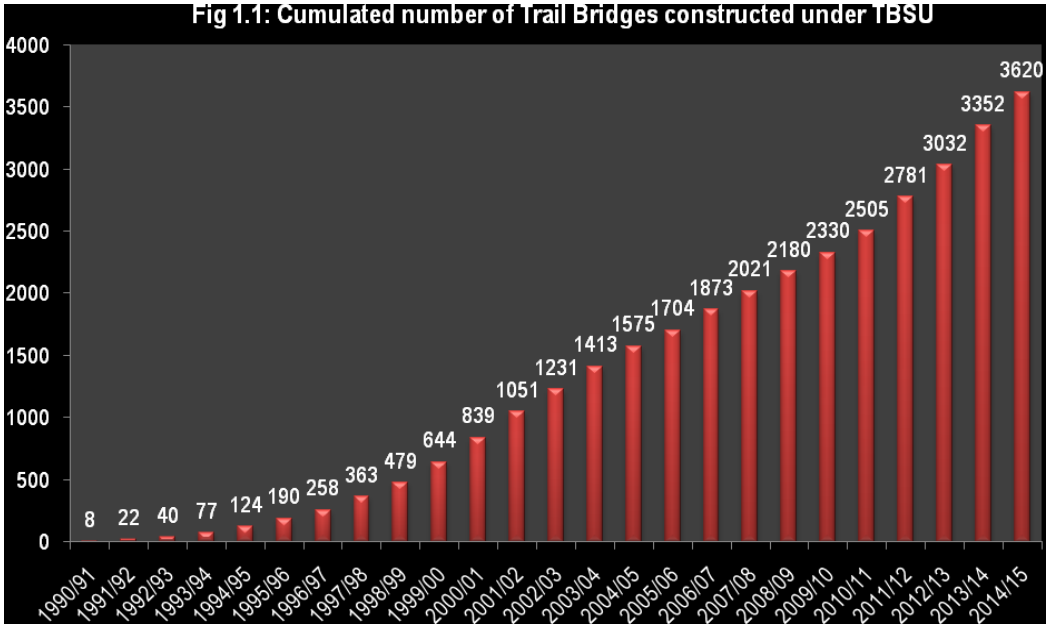
Recommendations

1. TBSU should make an arrangement to protect the Ristikhola bridge of Tanahu district which is in danger due landslide.
2. TBSU should conduct the survey work of PBBA before the rainy season; otherwise traffic counts would be low partly due to the closed down of schools and partly due to less movement of the people.

Chapter-I
Objective and Motivation

1.1 Introduction

The numerous trail bridges constructed so far have been providing safe and reliable access throughout the year to several millions of people living in rural Nepal. The past PBBA has consistently shows that irrespective of age, gender, physical conditions and socio-economic status - millions of peoples are taking advantages from these bridges for going to education and health service centers, market centers, attending social functions, and performing household chores. The enhanced access to service centers has several implications on the life of rural people. First, it enables the local people to enhance their human capability by safely and all time reaching education and health service centers. Second, it facilitates to reduce poverty by reaching easily and safely market and communication centers. Third, it helps to reduce physical hardship of the local people, particularly of women, by easily and safely accomplishing household chores. Fourth, it saves time which can be used by local people for other income generating activities. Fifth, it helps to join the numerous communities separated by rivers for ages, resulting the family and social cohesiveness which will have long term impact on building peace and social harmony at the local level. The coordinated effort of TBSU, the then TBSSP, has been playing dominant role in the construction of trail bridges over the last two and half decades (Fig 1.1).



1.2 Objectives

TBSU, the then TBSSP, initiated the post bridge building assessment (PBBA) in 2003. Since then PBBA has been carried out in almost every year. Over the time, the assessment methodology and strategy has been refined. This report is a continual process of PBBA carried out by an independent researcher. The objectives of this report are as follows.

- To assess the effectiveness of 23 short span trail bridges by comparing the results of baseline and endline survey. Comparable baseline-endline results are available from the household survey and the interview with teachers and health workers (see Chapter II for methodology).
- To assess the current utilization of bridges based on two-day traffic counts conducted in each bridge site during the endline survey.
- To assess the development of infrastructure - new construction works - near the bridge site based on interview with key informants during the endline survey.
- Provide brief assessment of BMC

1.3 Limitations

The field work of this study started in the third week of June and lasted till the end of July. The period, June-July, is monsoon season during which farmers remain busy working on their own farmland as well as many schools remain closed due to summer vacation which may have direct impact the peoples' movement. This may likely underestimate the traffic counts.

Due to the devastating earthquake and aftershocks, primary sample (bridges) selection of central region was not included thus the primary sample of the present PBBA is not as representative like in the previous PBBAs; as a consequence many results of the present PBBA should be compared with great caution to those of the previous PBBAs.

1.4 Organization of the Report

This report is organized into 5 chapters. The second chapter deals with methodology adopted in this assessment. The third chapter deals with benefits and utilization of the selected 30 bridges. The fourth chapter deals with the immediate effectiveness of 30 trail bridges. The last chapter deals with the assessment of BMC.

1.5 Motivations

For the purpose of motivation, few photos snapped by field workers during PBBA are presented below. These photos implicitly display the activities carried out by local people through enhanced access.

Figure 1: Bajura - Baldebafaune Bridge (crossing river with load)

Figure 2: Siraha (Two-wheelers crossing river)

Figure 3: Banke – Duduwanala Bridge (newly opened shop)

Figure 4: Banke – Duduwanala Bridge (students crossing river)

Figure 5: Banke – Duduwanala Bridge (livestock crossing river)

Figure 6: Banke – Duduwanala Bridge (person going to farmland)

Figure 7: Rautahat – Shreenagar Nagar Khorghat (going to market)

Figure 8: Rolpa –Bhutkhola Bridge (livestock)

Figure 9: Rolpa –Bhutkhola Bridge

Figure 10: Rolpa - Rumti Gunam Bridge

Figure 11: Rolpa - Rumti Gunam Bridge

Figure 12: Rolpa - Rumti Gunam Bridge

Figure 13: Rolpa - Simaltara Bridge

Figure 14: Rolpa - Simaltara Bridge

Figure 15: Rolpa - Simaltara Bridge

Figure 16: Syanja - Gaurighat Bridge (new shop and house)

Figure 17: Syanja - Gaurighat Bridge (performing household chore)

Figure 18: Tanahu - Risti Khola Bridge

Figure 19: Tanahu - Risti Khola Bridge

Chapter-II

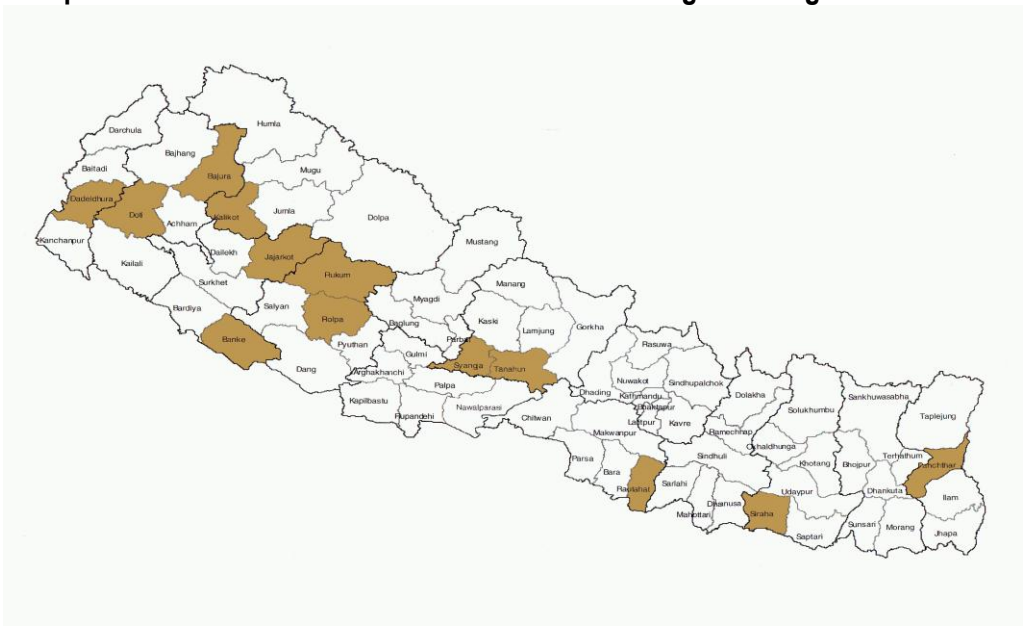
Methodology and Household Characteristics

This chapter has two-fold objectives. The first objective is to briefly describe the methodology adopted to carry out this PBBA. The second objective is to present socio-demographic and economic characteristics of the selected households.

2.1 Primary Sample Selection

A total of 23 bridges were selected as a primary sample from the list of those bridges (a) where baseline surveys were carried out in 2010 to 2012, and (b) where construction works had been completed on or before the end of the mid July 2014 so that the selected bridges would be at least one year old prior to this PBBA. A number of bridges satisfying these two criteria had not been able to include in the present PBBA because they are in the earthquake stricken districts. As a result, bridges have to select mostly from the mid and far-western development region (see the shaded districts in in Map 2.1 which include the selected bridges). Out of 13 such districts, 8 districts (62 percent) belong to the mid and far-western development region. *Due to this unavoidable problem of primary sample selection procedure, the primary sample of the present PBBA is not as representative as the primary samples of the previous PBBAs; as a consequence many results of the present PBBA should be compared with great caution to those of the previous PBBAs*.

Map 2.1: Shaded Districts in which the selected bridges belong in PBBA 2015



The 13 districts as depicted in Map 2.1 are cross-tabulated across the 15 eco-development regions and the result is presented in Table 2.1.

Table 2.1: Cross-tabulation scheme of districts over 15 eco-development regions

	Eastern	**Central**	**Western**	**Mid-western**	**Far-western**
Terai	Siraha (2)	Rautahat (1)		Banke (1)	
Hill	Panchthar (2)		Syangja (1) Tanahu (2)	Rolpa (3) Rukum (2) Jajarkot (2)	Doti (1) Dadeldhura (2)
Mountain				Kalikot (2)	Bajura (2)

Note: Numbers within parenthesis are the number of bridges selected. Out of 23 bridges, 15 bridges (or 65 percent) were selected from the mid and far-western region where the several indicators of development are lower than those of the other regions – eastern, central and western development regions. As for example, see the values of Human Development Index (HDI) published by UNDP in 2014.

Eastern	Central	Western	Mid-western	Far-western
0.542	0.558	0.533	0.503	0.493

2.2 Secondary Sample Selection

Secondary sample constitutes mainly the following stakeholders: households, teachers of education service centers, health workers of health service centers, and BMC members. Secondary sample selection scheme is described below.

- **Household Selection**: Field workers were instructed to select 20 households from those living within the direct influenced area of each bridge site by adopting a random mechanism.

- **Selection of school teachers**: Each field worker was provided the name of 23 education service centers where the baseline surveys were carried out. Then s/he was instructed to form a group of teachers in each of the suggested education service center for interview.

- **Selection of health personnel**: Each field worker was provided the name of 23 education service centers where the baseline surveys were carried out. Then s/he was instructed to form a group of teachers in each of the suggested education service center for interview.

- **Selection of BMC members**: Enumerators were instructed to select at least one member of BMC, and if no such member is available then it was instructed to select one executive member of the past UC. Then s/he was instructed to interview the selected member (s).

2.3 Data Collection

In order to collect data for this PBBA, the local level NGOs who closely worked at local level with the user committees were mobilized. These NGOs deputed their staffs as field workers for data collection. The deputed staff members of NGOs (hereafter referred to as field workers) were trained through one day orientation/training program organized by TBSU in Kathmandu. The main objective of the orientation/training program was to create common understandings with regard to the selection of secondary samples and implementation of data collecting tools among the field workers. It is anticipated that this kind of common understanding will ultimately improve the reliability and validity of the PBBA results.

The orientation program started with the deliberation of the objectives of PBBA. Then the program moved forward with extensive discussions on household questionnaire and other checklists. At this stage the feedbacks of field workers helped to improve the tools. Field workers were instructed how to execute this PBBA by providing the following instructions.

- Formation of sampling frame of households, stratification of households by caste/ethnic groups, proportion allocation of households across strata and selection of households from each stratum, and also from each side of the river were instructed.
- It is also instructed to collect data from each selected household by face-to-face interview using structured questionnaires provided by TBSU.
- Field workers were instructed to collect data from each group of teachers as mentioned in Section 2.2 as per check list provided by TBSU.
- Field workers were instructed to collect data from each group of health workers as mentioned in Section 2.2 as per check list provided by TBSU.
- Field workers were instructed to collect data from the selected BMC member or executive member of the past UC group as per check list provided by TBSU
- Field workers were instructed to collect two-day traffic count data as per checklist provided by TBSU. In this PBBA, in addition to human, attempt has been made to count livestock (male/female cows, buffalos and goats) and two-wheelers (paddling and motor cycle) as traffic.

2.4 Data Entry & Processing

Collected household level data were entered into computer by writing customized program in CSPro version 4.0. The community and institutional level data were entered into Microsoft Excel. Entered household level data were processed/analyzed in SPSS version 18.0. While data collected from the checklists (Health facilities, Educational institutions, UC members, and Traffic counts) were analyzed in Excel and SPSS.

2.5 Anticipated and Actual Samples

Due to various reasons, the field workers were unable to select or interview with stakeholders. The anticipated and actually selected number of secondary samples is presented in Table 2.2.

Table 2.2: Anticipated and Actual Interviewed

	Anticipated	Actually selected	No need	School Closed down
Number of households	460	458		
Number of ESCs	23	11	4	8
Number of HSCs	23	18	5	
Number of traffic counts	23	23		
Number of BMCs	23	23		

2.6 Household and Population Characteristics of Sample

A total of 458 respondents, one from each of the selected 458 households, were interviewed by the field workers. A total of 2,519 individuals were reported as household members in the 458 households during the survey. As a result, the average household size turned out to be 5.5 persons per household. Some socio-demographic characteristics of 2,519 individuals are presented below.

- Sex composition is 47.2% female and 52.8 percent male.
- Age composition is 29.8% are children of age under 15 years, 64.1% are potential labors of age between 15 to 59 years and 6.1% are senior citizens of age 60+ years
- Literacy status of 6+ age group is 86.6% literate and 13.4% illiterate

Some household characteristics are as follows (see Annex-II). Overwhelming majority of respondents reported agriculture as their source of income (90%) followed by wage laboring (49%), remittance (27%), business (20%), service (11%) and pension (2%). Also, overwhelming majority (95%) reported that they possess farmland.

2.6.1 Non-economic Characteristics of Households

The two basic non-economic household characteristics of this study are the *place of residence of households* and the *broad caste/ethnicity of household heads*. The place of residence of households in this study is defined by the three regions – terai, hill and mountain. Throughout this report this variable will be referred to as the *ecological region* or simply *region*. The broad caste/ethnicity of household head in this study is defined by the four social groups – Dalit, Janjati, Brahman/Chhetry/Thakuri/Sanyasi (B/C/T/S) and Deprived (non-dalit) Terai Castes (DTC). Throughout this report this variable will be referred to as the *caste/ethnicity*. The basic results of these variables are presented in Annex-II.

Relationship between Caste/ethnicity and Region: In order to understand the relationship between the two variables – region and caste/ethnicity - the selected households were cross-tabulated across these two variables and the results are summarized in Table 2.3.

Table 2.3: Cross-tabulated results of households across region and caste/ethnicity

Caste/ethnicity	Terai	Hill	Mountain	Total	N
Dalit	20.9	51.6	27.5	100.0	**91**
Janjati	19.2	80.8	0.0	100.0	**104**
B/C/T/S	3.1	71.6	25.3	100.0	**225**
DTC	92.1	7.9	0.0	100.0	**38**

The main findings are as follows.

- No single Janjati household is observed in the mountain region. Around 81 percent of Janjati households are observed in the hill region and 19 percent in the terai region.
- No single DTC household is observed in the mountain region. Around 92 percent of DTC households are located in the terai region and around 8 percent in the hill region.
- Dalit households are distributed in all the three regions, but more than 50 percent in the hill region.
- B/C/T/S households are distributed in all the three regions, but more than 70 percent in the hill region.

2.6.2 Economic Characteristics of Households

The two basic economic characteristics of households in this study are the *annual household food sufficiency level from own farm production* and the *monthly household income level*. The annual household food sufficiency level from own farm production is relevant to those who has farm land. In this study the two levels '< 6 months' and '≥ 6 months' of food sufficiency are considered. The monthly household income level as per questionnaire has two levels '< Rs 9,000' and '≥ Rs 9,000'. The basic results of these variables are in Annex-III.

Relationship between Food Sufficiency Level and Income Level: The relationship between food sufficiency and income level is presented in Annex –III. The main findings are as follows.

- Households with food sufficiency < 6 months are more likely to associate with households having monthly income < Rs 9,000 than household having monthly income ≥ Rs 9,000 (30.4% versus 11.9%).
- Similarly, households with food sufficiency ≥ 6 months are more likely to associate with households having monthly income ≥ Rs 9,000 than household having monthly income < Rs 9,000 (47.8% versus 9.8%)

2.6.3 Relationship between Non-economic and Economic Characteristics

Relationship between Food Sufficiency Level and Region: The relationship between food sufficiency level and region (see Annex –III) is as follows. Among the three regions, the percentage of households with food sufficiency

level ≥ 6 months is highest in hill region (60.7%) followed by the terai region (58.9%) and the mountain region (45.6%).

Relationship between Income Level and Region: The relationship between income level and region (see Annex – III) is as follows. The percentage of households with monthly income level ≥ Rs 9,000 is highest in hill region (64.4%) followed by the mountain region (51.2%) and the terai region (50.6%).

Relationship between food sufficiency & caste/ethnicity: In order to investigate the relationship between food sufficiency and social group, cross tabulation between two variables was carried out and the result is presented in Table 2.4. There is a strong association between food sufficiency and caste/ethnicity, since the percentage of households with food sufficiency < 6 months is highest among Dalits (68.3%), followed by Janjati (57.7%), B/C/T/S (28.8%) and DTC (25.0%).

Table 2.4: Relation between food sufficiency & caste/ethnicity (%)

Food sufficiency	Dalit	Janjati	B/C/T/S	DTC	Total
< 6 months	68.3	57.7	28.8	25.0	42.3
≥ 6 months	31.7	42.3	71.2	75.0	57.7
Total	100.0	100.0	100.0	100.0	100.0
N	82	97	222	36	437

Chi-square = 53.1 and p-value < 0.000

Relationship between income level & caste/ethnicity: In order to investigate the relationship between level of monthly income and caste/ethnicity, cross tabulation between two variables is carried out and the result is presented in Table 2.5. There is a strong association between monthly income and caste/ethnicity, since the households with monthly income < Rs 9,000 is highest among Dalits (68.1%), followed by Janjati (42.3%), DTC (36.8%) and B/C/T/S (28.9%).

Table 2.5: Relation between income level & caste/ethnicity (%)

Income level	Dalit	Janjati	B/C/T/S	DTC	Total
< Rs 9000	68.1	42.3	28.9	36.8	40.4
≥ Rs 9000	31.9	57.7	71.1	63.2	59.6
Total	100.0	100.0	100.0	100.0	100.0
N	91	104	225	38	458

Chi-square = 41.8 and p-value < 0.000

In summary, each group of Dalit, Janjati, B/C/T/S and DTC households is not uniformly distributed across the place of residence (region). As for example, 92% of DTC households are in the terai region and 0% in the mountain region, and 81% of Janjati households are in the hill region and 0% in the mountain region. Households living in the terai, hill and the mountain region are experiencing different level of income and food sufficiency. Similarly, each group of

Dalit, Janjati, B/C/T/S and DTC households is experiencing different level of income and food sufficiency. These varied natures household groups may have several implications in the utilization of bridges.

2.7 Changes in Living Standards

In this survey, as per suggestion of TBSU, five more questions were added in the household questionnaire with the objective of collecting data on living standards[1] of households at two epochs – before the bridge and after the bridges. The processed results are presented in Annex-IV. The main findings in terms of percentage points (after percent – before percent) are summarized below.

- The percentage of households having personal water pipeline up to house has increased by 8.5 percentage points and tube well by 4.0 percentage points. On the other hand, practices of using sources – common tap, river, or *kuwa/inar* – for drinking water has reduced by 12.5 percentage points.
- The percentage of households using permanent toilets has increased by 21.0 percentage points, while the percentage of households using temporary toilets or have no toilet has reduced by 21.0 percentage points.
- The percentage of households using biogas for cooking purpose has increased by 1 percentage point and LP gas by 0.4 percentage point.
- The percentage of households using electricity for the purpose of lighting the house has increased by 14.4 percentage points.
- The percentage of households who had changed roof to *Jastha* has increased by 6.1, concrete by 3.0 percentage points and *tayal* by 1.7 percentage points. On the other hand, percentage of households who had *khar/paral* as roof has decreased by 10.8 percentage points.

The 'time saved' by the trail bridges has been calculated by comparing the time required to access specific service centres before and after the construction of the bridges. This includes the usage of temporary crossings (eg. *Phadkays*, which were being used prior to the construction of the trial bridges. As such, the calculation defers from the 'distance gained' calculated by the internal monitoring system of TBSU as it only takes into account the nearest permanent bridges to calculate the time saved.

[1] such as sources of drinking water, type toilets household members are using, cooking fuels and lighting means households are using, type of roofs households having

Chapter III
Utilization and Benefits of Bridges

The first objective of this chapter is to present utilizations of bridges by households for accomplishing various activities, such as accessing service centers, performing household chores and attending social functions - and also to present the benefits reported by households while accomplishing these activities. This objective is fulfilled by analyzing the household survey data collected from 458 households by field workers for PBBA2015. The second objective is to present the results of average daily traffic counts based on the two-day traffic count data collected by the field workers from each of the 23 bridge sites selected for PBBA2015. Utilizations of bridges are presented by household groups defined by – place of residence (three regions), four broad caste/ethnicity groups, two income levels and two food sufficiency levels.

3.1 Utilization and Benefits in Accessing ESCs

Utilization: Out of 458 households interviewed, a total of 147 households (or around 32%) reported that they had been using bridges to send their children to schools located on the opposite bank of rivers. The utilization of bridges for accessing ESCs by various household groups is presented in Table 3.1.

Table 3.1: Utilization of bridges in accessing ESCs by household groups

Household group	Number of users	% of users
Place of residence (range of variation is 4 percentage points)		
Terai	27	33.3
Hill	96	32.5
Mountain	24	29.3
Caste/ethnic group (range of variation is 11 percentage points)		
Dalit	28	30.8
Janjati	32	30.8
B/C/T/S	78	34.7
DTC	9	23.7
Income group (almost no range of variation)		
< Rs 9000/month	58	31.4
≥ Rs 9000/month	89	32.6
Food Sufficiency Group (range of variation is 7 percentage points)		
< 6 months	52	28.1
≥ 6 months	88	34.9
Overall	**147**	**32.1**

% of users in a group = 100*number of users in the group/number total households in the group
Range of variation = Difference between maximum and minimum of the % of users

The main findings are summarized below.

- Utilization of bridges in accessing education service centers across the region is highest in the terai, followed by the hill and the mountain. In PBBA2014, the percentage of users was highest in the mountain followed by the terai and the hill.
- Utilization of bridges across the households of four caste/ethnic groups is highest among the households of B/C/T/S, followed by each Dalit and Janjati, and DTC.
- With almost no variation, households of two income level groups have used bridges. However, the percentage of users is slightly higher among the households of income level ≥ Rs 9000/month.
- Utilization of bridges is higher for the group with food sufficiency level ≥ 6 month as compared the other group.

Gender Composition of RCS: A total of 348 children were recorded as river crossing students (RCS) in this PBBA. The gender composition of these children in totality is as follows: 52.6% for boys and 47.4% for girls (Table 3.2). The percentage of girls is lower than that of boys in the terai and in the mountain region.

Table 3.2: Gender composition of river crossing students by region

Region	Boys in %	Girls in %	Total Children
Terai	57.8	42.2	64
Hill	49.4	50.6	235
Mountain	61.2	38.8	49
Overall	52.6	47.4	348

Time Saved in Reaching ESCs : An important benefit of bridges is mean time saved in reaching schools; defined by the mean time required to reach school before bridge construction minus the mean time required to reach schools after the bridge construction. The one way mean time saved is summarized in Table 3.3 by region. The overall one way mean time saved is 17 minutes.

Table 3.3: Average mean time saved (one way) in reaching schools

	Mean time before in minutes	Mean time after in minutes	Mean time save in minutes
Terai	66.7	46.9	19.8
Hill	68.6	49.5	19.2
Mountain	43.5	37.9	5.7
Overall	**64.2**	**47.1**	**17.1**

Benefits in Accessing ESCs: During the baseline survey households reported a wide variety of difficulties in accessing education service centers. Some of them are - unsafe to cross river through temporary bridge, parents have to help the children to cross river, takes long time to reach education service center, unable to go to school

when river level is high and so on. In this context, the reported benefits of bridges by those households who are sending children to opposite bank are in Table 3.4.

Table 3.4: Benefits of bridges in accessing school/campus

Benefits	Respondents	%
Safe to go to school/campus	127	86.4
Do not need help from parents	115	78.2
Safe to go to school/campus even river level is high	118	80.3
No need to use other bridge	103	70.1
Time save	106	72.1

3.2 Utilization and Benefits in Accessing HSC

Utilization: Out of 458 respondents, 205 (or 44.8 percent) reported that they had to cross the river to go to S/HP. Similarly, 42.8 percent reported that they had to cross river to go to medical center, and 50.7 percent reported that they had to cross river to go to district hospital. The utilization of bridges for accessing S/HP by various household groups is presented in Table 3.5.

Table 3.5: Utilization of bridge users in accessing S/HP by household groups

Household Groups	Number of users	% of users
Place of residence (range of variation is 20 percentage points)		
Terai	48	59.3
Hill	125	42.4
Mountain	32	39.0
Caste/ethnic group (range of variation is 30 percentage points)		
Dalit	40	44.0
Janjati	37	35.6
B/C/T/S	103	45.8
DTC	25	65.8
Income group (range of variation is 5 percentage points)		
< Rs 9000/month	77	41.6
≥ Rs 9000/month	128	46.9
Food Sufficiency Group (range of variation is 6 percentage points)		
< 6 months	77	41.6
≥ 6 months	120	47.6
Overall	**205**	**44.8**

The main findings are as follows.

- Utilization of bridges in accessing S/HP across the region is highest in the terai, followed by the hill and the mountain. In PPBA2014, the percentage of users was highest in the terai followed by the mountain and the hill.
- Utilization of bridges across the households of four caste/ethnic groups is highest among the households of DTC, followed by the B/C/T/S, Dalit and Janjati.
- Utilization of bridges is higher for the income level group ≥ Rs 9000/month than for income level group < Rs 9000/month.
- Utilization of bridges is higher for the food sufficiency level group ≥ 6 months than for the food sufficiency level group < 6 months.

Time Saved in Reaching S/HP: One way time saved to reach S/HP is 17 minutes (Table 3.6). It is highest in the hill region, followed by the terai and the mountain region.

Table 3.6: Average time save in minutes (one way) in reaching S/HP by region

	Before	After	Time save
Terai	51.5	36.0	15.5
Hill	86.6	66.2	20.4
Mountain	41.2	34.4	6.8
Overall	**71.3**	**54.2**	**17.1**

Benefits in Accessing HSCs: During the baseline survey households reported a wide variety of difficulties in accessing health service centers. Some of them are - difficult to go to health service centers in rainy season, difficult to participate in vaccine program in rainy season, difficult for pregnant women to have regular health checkup, difficult to have delivery cases, difficult for elder people to reach health centers, and difficult to have emergency services. These difficulties are wiped out by having bridges (Table 3.7).

Table 3.7: Benefits of bridges for health service seekers

Benefits	**Respondents**	**% of 205**
Easy to go to S/HP while water level is high	181	88.3
Increase in number of health service seekers	155	75.6
Easy to take children for vaccine	159	77.6
Easy to go for regular check up for pregnant women	156	76.1
Easy to have delivering women to S/HP	151	73.7
Easy to go to S/HP for elder persons	151	73.7
Easy to go to S/HP for emergency services	141	68.8

3.3 Utilization and Benefits in Accessing MC

Utilization: A total of 258 households (56.3% of the total selected 458 households) reported that they had to cross river using bridges in order to go to market centers (identified as bridge users). Utilization of bridges to reach market centers is summarized in Table 3.8 by four household groups.

Table 3.8: Utilization of bridges in accessing MCs by household groups

Household Group	Number of users	% of users
Place of residence (range of variation is 29 percentage points)		
Terai	63	77.8
Hill	143	48.5
Mountain	52	63.4
Caste/ethnic group (range of variation is 32 percentage points)		
Dalit	52	57.1
Janjati	46	44.2
B/C/T/S	131	58.2
DTC	29	76.3
Income group (almost no range of variation)		
< Rs 9000/month	103	55.7
≥ Rs 9000/month	155	56.8
Food Sufficiency Group (almost no range of variation)		
< 6 months	105	56.8
≥ 6 months	143	56.7
Overall	**258**	**56.3**

The main findings are as follows.

- Across the regional level, utilization of bridges in accessing market centers is highest in the terai, followed by the mountain and the hill. In PPBA, the percentage of accessing market centers was highest in the hill, followed by the terai and the mountain.
- Utilization of bridges across the households of four caste/ethnic groups is highest among the households of DTC, followed by the B/C/T/S, Dalit and Janjati.
- With almost no variation, households of two income level groups have used bridges in accessing market centers. However, the percentage of users is slightly higher among the households of income level ≥ Rs 9000/month.
- With no variation, households of two food sufficiency level groups have used bridges in accessing market centers.

Time Saved in Reaching MCs: One way time saved to reach MCs is 22.7 minutes (Table 3.9). It is highest in the hill region, followed by the terai and the mountain region.

Table 3.9: Average time save in minutes (one way) in reaching MCs by region

	Before in minutes (average)	After in minutes (average)	Average time saved
Terai	61.0	44.5	16.4
Hill	77.5	49.3	28.2
Mountain	123.1	108.1	15.0
Overall	**82.6**	**60.0**	**22.7**

Benefits in Accessing MCs: Overwhelming majority of households, who had to use bridges for accessing market, identified the following benefits.

- Around 85 percent identified 'easy to go market for buying household goods'
- Around 82 percent identified 'easy to go to market for selling farm products'
- Around 79 percent identified 'easy to go market for buying agricultural inputs'
- Around 73 percent identified 'easy to go to market for selling livestock product'

3.4 Utilization and Benefits in Performing HC

Utilization: A total of 386 households (or around 80 percent) reported that they had to cross rivers using bridges in order to perform household chores. Utilization of bridges for performing household chores by household groups are presented in Table 3.10. The main findings are summarized below.

- Utilization of bridges in performing household chores across the region is highest in the terai, followed by the hill and the mountain. In PBBA2014, the percentage of users was highest in the mountain region, followed by the hill and the terai region.
- Utilization of bridges across the households of four caste/ethnic groups is highest among the household group of DTC, followed by the household group of Janjati, Dalit and B/C/T/S.
- With almost no variation, households of two income level groups have used bridges for performing household chores. However, the percentage of users is slightly higher among the households of income level < Rs 9000/month.
- With almost no variation, households of two food sufficiency level groups have used bridges for performing household chores. However, the percentage of users is slightly higher among the households of food sufficiency level of < 6 months.

Table 3.10: Utilization of bridges in performing HC by household groups

Household Group	Number of users	% of users
Place of residence (range of variation is 26 percentage points)		
Terai	73	90.1
Hill	239	81.0
Mountain	53	64.6
Caste/ethnic group (range of variation is 32 percentage points)		
Dalit	70	76.9
Janjati	92	88.5
B/C/T/S	165	73.3
DTC	38	100.0
Income group (almost no range of variation)		
< Rs 9000/month	149	80.5
≥ Rs 9000/month	216	79.1
Food Sufficiency Group (range of variation is 3 percentage points)		
< 6 months	151	81.6
≥ 6 months	197	78.2
Overall	**365**	**79.7**

Benefits in Accomplishing HCs: Household chores involve physically hardship jobs, such as – carrying loads of firewood and animal fodder from forest to home, agriculture products from farmland to home, seeds and fertilizer from home to farmland, and so on. Such jobs have to be carried out frequently throughout the year, and crossing rivers with loads when there was no bridge is very difficult. In this context, around 83 percent households reported that the bridges have made their jobs much easier irrespective of the water level in rivers. Other benefits as reported by households are listed below.

- Around 76 percent reported that bridges have made easy to cross river with loads of fodder
- Around 64 percent reported that bridges have made easy to hoard their harvest (*bali thankaune kam)*
- Around 56 percent reported that bridges have made to cross river with loads of firewood
- Around 49 percent reported that bridges have made to cross river with loads of grains for grinding

3.5 Utilization and Benefits for Attending SF

Utilization: A total of 334 households (or 73 percent of total households) reported that some of their family members crossed rivers using bridges for attending social functions during the reference period of one week prior to the survey. Utilization of bridges for attending social functions by household groups is presented in Table 3.11.

Table 3.11: Utilization of bridges in attending SF by household groups

Household Group	Number of users	% of users
Place of residence (range of variation is 20 percentage points)		
Terai	67	82.7
Hill	216	73.2
Mountain	51	62.2
Social group (range of variation is 32 percentage points)		
Dalit	69	75.8
Janjati	78	75.0
B/C/T/S	153	68.0
DTC	34	89.5
Income group (almost no range of variation)		
< Rs 9000/month	126	68.1
≥ Rs 9000/month	208	76.2
Food Sufficiency Group (almost no range of variation)		
< 6 months	129	69.7
≥ 6 months	191	75.8
Overall	**334**	**72.9**

The main findings are summarized below.

- Utilization of bridges in attending social functions the region is highest in the terai, followed by the hill and the mountain. In PBBA2014, the percentage of bridge users was highest in the terai, followed by the mountain and the hill region.
- Utilization of bridges across the households of four caste/ethnic groups is highest among the household group of DTC, followed by the household group of Dalit, Janjati and B/C/T/S.
- Utilization of bridges is higher for the income level group ≥ Rs 9000/month than for income level group < Rs 9000/month.
- Utilization of bridges is higher for the food sufficiency level group ≥ 6 months than for the food sufficiency level group < 6 months.

Benefits in accomplishing Social Functions: Out of 334 households, around 88 percent reported that bridges have provided easy avenues to meet friends and family members living in the opposite bank of rivers, while around 67 percent reported that bridges have provided easy avenues to involve in social and religious program conducted on the opposite bank of rivers.

3.6 Average Daily Traffic Counts

The two-day traffic counts on each of the selected 23 bridge sites were carried out by field workers. As per suggestion of TBSU, for the first time in this PBBA attempt has been made to collect two days traffic count data not only for human traffic but also for livestock[2] and two-wheeler[3] traffic. Also for the first time attempt has been made to collect human traffic data not only for male and female but also for child (age < 15 years) and adult (age ≥ 15 years). The process of disaggregation of human traffics into children and adults is rather crude, since the process is carried out not by asking the age of human traffic but by guessing the age.

The two-day human, livestock and two-wheeler counts were converted into average daily traffic counts (ADTC) for human, livestock and two-wheeler separately and presented in Table 3.12, which shows that on an average per day 208 persons, 29 livestock and 14 two-wheelers crossed the river through each bridge.

Table 3.12: Aggregate level of human, livestock and two-wheeler ADTC

Human ADTC	Livestock ADTC	Two-wheeler ADTC
208	29	14

Regional variation in human, livestock and two-wheeler ADTC is large (Table 3.13). The terai region has the highest human ADTC (569 persons per day per bridge), highest livestock ADTC (90 livestock per day per bridge) and highest two-wheeler ADTC (78 two-wheeler per day per bridge). In fact, the two-wheeler ADTC is virtually none in the hill and in the mountain region. Also, the human ADTC of the terai region is higher than the average ADTC of the hill and the mountain region.

Table 3.13: Regional level of human, animal and two-wheeler ADTC

Region	Human ADTC	Livestock ADTC	Two-wheeler ADTC
Terai	569	90	78
Hill	114	17	0
Mountain	201	13	0

The human ADTC of each bridge is presented in Annex-IV by purpose. The six purposes identified in the present study are - going to ESC, visiting HSC, performing HC, going to MC, attending SF and going for employment. The main findings are summarized below.

- The human ADTC is highest in the Shree Nagar Khorghat bridge of Rauthat district (1538 persons/day) and lowest in the Jhyagad bridge of Kalikot district (31 persons/day).

[2] Includes the followings: he/she cows, water buffalos, goats, and mules
[3] Includes the followings: bicycles (paddling bikes) and motorcycles (motor bikes)

- Out of 208 human ADTC, the highest among those who had crossed the river for the purpose of going to MC (28.1%), followed by performing HC (26.6%), going to ESC (14.2%), visiting HSC (10.5%), attending SF (10.1%), and going for employment (9.6%).

The sex composition of human ADTC is presented in Table 3.14 by purpose. The main findings are as follows.

- Overall the dominance of males over females (53.3% versus 46.7%) is observed.
- Slight dominance of females over males is observed for the following purposes - going to ESC, visiting HSC, and performing HC. For ESC, the traffic counts defer from the figures obtained from the data gathered from the schools (as analyzed in section 3.1) as the ATDCs records student crossings for all ESCs within the vicinity of the trail bridge, including private and public schools, while the latter records for only one ESC.
- Slight dominance of males over females is observed for attending SF.
- Moderately high dominance of males over females is observed for the following purposes – going to MC and going for employment.

Table 3.14: Sex composition of human ADTC by purpose

Purpose	Man	Woman	Total	N
Going to ESC	47.7	52.3	100.0	30
Visiting HSC	46.5	53.5	100.0	22
Performing HC	42.2	57.8	100.0	57
Going to MC	65.4	34.6	100.0	59
Attending SF	54.9	45.1	100.0	21
Going for employment	63.2	36.8	100.0	20
Overall	53.3	46.7	100.0	208

Note: Column total of N may exceed 208 because of rounding error

The age composition of human ADTC is presented in Table 3.15 by purpose. The percentages presented in the table should interpret very cautiously since age is measured very crudely as mentioned in the beginning of this section. In spite of this fact, it can be inferred that a substantial number or percentage of children are crossing river for accomplishing various activities which might reduce the burden of their parents. Children could not had been able accomplish these activities if there would not had been bridges. With these limitations the main findings are as follows.

- Overall the percentage of adults is 56.4% and that of children is 43.6%.

- The percentage of children is higher than that of adults for the purpose of going to school.

Table 3.15: Age distribution of ADTC by purpose

Purpose	Adult (≥ 15 years old)	Children (< 15 years old)	Total	N
Going to ESC	27.7	72.3	100.0	30
Visiting HSC	61.4	38.6	100.0	22
Performing HC	66.5	33.5	100.0	57
Going to MC	52.6	47.4	100.0	59
Attending SF	60.5	39.5	100.0	21
Going for employment	71.5	28.5	100.0	20
Overall	**56.4**	**43.6**	**100.0**	**208**

Chapter-IV
Immediate Impacts

Trail bridges have immediate impacts upon the lives of people. One immediate impact is the increase in the number of river crossing students (RCS) and increase in the number of river crossing patients (RCP) due to safe and easy access to ESCs and HSCs. Another immediate impact is the construction of new shops and houses near the constructed bridge sites. The main objective of this section is to present the results of immediate impact based on the data collected from teachers of public schools, health workers of public health service centers and BMC members.

4.1 Effectiveness of Bridges for Accessing ESC

In order to assess the effectiveness of bridges for accessing ESCs, a list of 23 schools from which relevant information were collected in the baseline survey was provided to the field workers during orientation program, and they were strictly instructed to visit the same schools and collect the relevant information in this survey too. The actual status of these schools in this survey as reported by the field workers is as follows (for detail see Annex-VI):

- 8 schools were closed due to summer vacation
- 4 schools had no river crossing students both in the baseline and in the current PBBA survey

As a result, the current evaluation of the effectiveness of bridges for accessing ESCs is based on the information collected from 11 schools. Out of these 11 schools, the number of RCS in the current PBBA survey has increased in 7 schools and decreased in 4 schools as compared to the baseline survey.

Reasons for Increase/Decrease in the Number of RCS: The teachers were asked for the reasons to increase/decrease in the total number of RCS as well as in the number of river crossing girls. The two most common responses for increase in the total number of RCS are “safe to cross river” and “can cross easily throughout the year”. The common response in the increase of river crossing girls is “growing awareness of girl’s education” among parents. In particular, some bridges have specific reasons for increase as reported by teachers are as follows.

- Increase in the total number of RCS in Jana Bal Kalyan school of Syanja district (Gaurighat bridge site) is due to change in the school level from primary level (1 to 5 grade) to lower secondary level (1 to 8 grade). The bridge had also provided an easy access to contact and coordinate with children’s parents/guardians, and thus building good rapport between school authority and children’s parents/guardians.
- Increase in the total number of RCS in Triveni school of Rukum district (Ratapahar bridge site) is due to time save by avoiding long detour which was common practice in the absence of the current bridge. As a result, small kids are also crossing the river to join this school. In fact, in this school, the number of RCS has

increased from 33 in the baseline survey to 312 in the current PBBA survey (boys from 14 to 171 & girls from 19 to 141).

- Increase in the number of RCS in Pasupati school of Banke district (Duduwanala bridge site) is due to no need to escort children by parents for crossing by boat. Increase in the number of river crossing girls is due to the free distribution of "pad" by school to girls. In this school, the number of RCS has increased from 50 in the baseline survey to 219 in the current PBBA survey (boys from 40 to 117 & girls from 10 to 102).

The total number of RCS has decreased in the current PBBA survey as compared to the baseline in the following four schools - Siddhartha and Bhrikuti school of Tanahu district, Birendra school of Rulum district, Sarswati school of Kalikot district. The main reason for decrease in RCS as reported by teachers is the emergence of newly constructed (constructed after the baseline survey) schools on the demand side.

Percentage/relative Change: The number of RCS in the baseline and the current PBBA survey, absolute change (current PBBA survey number – baseline survey) and percentage change[4] are summarized in Table 4.1 by region.

Table 4.1: Percentage change in RCS by region

Region	Number of RCS in the Baseline Survey	Number of RCS in the current PBBA Survey	Absolute Change	Percentage Change	Cases
Terai	143	363	220	153.8	3
Hill	1009	1103	94	9.3	6
Mountain	150	123	-27	-18.0	2
Total	**1302**	**1589**	**287**	**22.0**	**11**

The main findings are as follows.

- In the terai region, the number of RCS has increased from 143 in the baseline survey to 363 in the current PBBA which has resulted in an absolute increase of 220 RCS or relative increase of 153.8 percent. Among the absolute increase of 220 RCS in the terai region, overwhelming majority 169 RCS were found in a single Pasupati school of Banke district.
- Similarly, relative increase of 9.3 percent is noticed in the hill region and relative decrease of 18.0 percent is noticed in the mountain region.
- In totality the number of RCS has increased from 1,302 in the baseline survey to 1,589 in the current PBBA survey which has resulted in an absolute increase of 287 RCS or relative increase of 22.0 percent.

[4] Percentage change aka relative change is a measure of change that takes place in between the two time points such as before and after intervention. It is measured by 100×(after output – before output)/before output. Positive and negative values correspondingly indicate relative increase and decrease in between the time.

Gender Composition: Gender composition of RCS of the current PBBA is summarized in Table 4.2 by region. The main findings are follows.

- The percentage of girls among RCS is lower than that of boys in each region.
- Overall sex composition is 55.7% boys and 44.3% girls.

This result is dissimilar to those observed in the past PBBAs. The present PBBA survey fails to provide definite reasons for such result. The reasons can be inferred and the inferred reasons are partly due to the sample selection problem and partly due to the technical problem. Both of these problems were unavoidable.

Table 4.2: Gender composition among RCS by region

Domain	% of Boys	% of Girls	Total	N
Terai	51.0	49.0	100.0	363
Hill	57.8	42.2	100.0	1103
Mountain	51.2	48.8	100.0	123
Overall	55.7	44.3	100.0	1589

Sample Selection Problem: The selected bridges (consequently schools) were heavily concentrated in those regions (mid-western and far-western development region) where the poverty incidence is relatively higher and the status of women is lower, particularly in the social development front, as compared to other regions. As a result, it can be inferred that the practices of sending girls to schools among parents is relatively low in the mid-western and far-western development region. This is one of the possible reasons to have lower percentage of girls than boys among the RCS.

Technical Problem: After the baseline survey new schools emerged on the other side of some selected bridges. Emergence of new schools has attracted more girls than boys. Consequently, lesser number of girls crossed the river to go to schools as compared to boys. As for example after the emergence of new school on the other side of Birendra school of Rukum district (Kharkhola bridge site), the number of river crossing boys has decreased from 398 in the baseline survey to 395 in the current PBBA survey, while the number of river crossing girls has decreased from 389 in the baseline survey to 244 in the current PBBA survey. This has obviously unbalanced the sex composition among RCS.

4.2 Effectiveness of Bridges in Accessing HSC

In order to assess the effectiveness of bridges for accessing HSCs, a list of 23 HSCs from which relevant information were collected in the baseline survey was provided to the field workers during training, and they were instructed to

visit the same HSCs and collect relevant information in this survey too. The actual status of these HSCs in this survey as reported by the field workers is as follows (detailed information in Annex-VII): 5 bridges have no river crossing patients.

As a result, the current evaluation of the effectiveness of bridges for accessing HSCs is based on 18 HSCs. Out of these 18 HSCs, the number of RCP in the current PBBA survey has increased in 12 HSCs and decreased in 6 HSCs as compared to the baseline survey.

Reasons for Increase/Decrease of RCHSS: The health service providers were asked for the reasons to increase/decrease in the total number of RCP. The reasons were available only from the HSCs of seven bridge sites. The available reasons are as follows.

- Having enhanced access - safe, easy, and throughout the year
- Elderly, children, disabled and pregnant women can visit HSCs whenever they want
- Growing awareness about health
- Time save by avoiding long detour when there was no bridge (HSC of Bhutkhola bridge site of Rolpa district)

The total number of RCP has decreased in the current PBBA survey as compared to the baseline in the following six locations of HSCs – Gaurighat of Syanja district, Kulang Khola of Tanahu district, Kharkhola of Rukum district, Rumti Gunam of Rolpa district, and Machhindra and Kaina of Jajarkot district. The main reason for decrease in RCP as reported by health workers of two locations of Jajarkot district is the emergence of newly constructed (constructed after the baseline survey) HSCs on the other side. The reasons for decrease in the other four bridge sites were not available.

Percentage Change: The number of RCP in the baseline and the current PBBA survey, absolute change (total number of RCP in the current PBBA survey – total number of RCP in the baseline survey) and percentage change are summarized in Table 4.3 by region.

Table 4.3: Percentage change in RCP by region

Region	Number of RCP in the Baseline Survey	Number of RCP in the Current PBBA Survey	Absolute Change	Percentage Change	Cases
Terai	577	2123	1546	267.9	3
Hill	6192	5282	-910	-14.7	13
Mountain	2107	4336	2229	105.8	2
Total	**8876**	**11741**	**2865**	**32.3**	**18**

The main findings are as follows.

- In the terai region, the number of RCP has increased from 577 in the baseline survey to 2123 in the current PBBA which resulted absolute increase of 1546 RCP or relative increase of 267.9 percent.
- Similarly, relative increase of 105.8 percent is noticed in the mountain region. On the contrary, relative decrease of 14.7 percent is noticed in the hill region. The decrease is partly due to the emergence of newly constructed HSCs on the other side.
- In totality the number of RCP has increased from 8,876 in the baseline survey to 11,741 in the current PBBA survey which resulted in an absolute increase of 2865 RCP or relative increase of 32.3 percent.

Gender Composition among RCP: Gender composition of RCP of the current PBBA is summarized in Table 4.4 by region. The main findings are presented below.

- The percentage of females among RCP is higher than that of males in each region.
- Overall sex composition is 43.4% male and 56.5% female. The percentage of female is high partly due to high frequency of visit of pregnant women after the emergence of bridges

Table 4.4: Gender composition among RCS by region

Region	% of Male	% of Female	Total	N
Terai	45.9	54.1	100.0	2123
Hill	39.9	60.1	100.0	5282
Mountain	46.5	53.5	100.0	4336
Overall	**43.4**	**56.6**	**100.0**	**11741**

4.3 Immediate Impact: New Construction Works

After bridges being constructed, it is anticipated that new shops and houses will be constructed near some bridge sites depending upon economic viability. With this intention, field workers were instructed to collect relevant data about new constructions work from BMC members. New shops have opened near the bridge sites mainly because of the change in temporary to permanent route, increase in traffic flow which motivates small entrepreneurs to small shops, villages or schools are nearby the schools, and so on (see Box-4.1).

Box-4.1: Reasons for opening of new shops by locations

District	Bridge	Reasons
Panchathar	Bardanda	Motorable road is nearby the bridge
Rautahat	Shree Nagar Khorghat	Village is nearby the bridge
Syanja	Gaurighat	Increase in people's movement
Tanahun	Kulang Khola	Bridge joins the two districts - Tanahu & Syanja
Rukum	Kharkhola	Increase in people's movement
Rukum	Ratapahar	Sayuli bazaar
Banke	Duduwanala	School is nearby the bridge
Rolpa	Bhutkhola	Increase in people's movement
Jajarkot	Kaina	Increase in people's movement

The summary results of the 23 bridge sites are presented in Table 4.5 by region. The main findings are as follows.

- At least one shop was opened after the construction of bridges in 39% of the total bridge sites.
- At least one house was constructed after the construction of bridges in 48% of the total bridge sites
- New trails were constructed in 65% of the total bridge sites after the construction of bridges
- Land prices were gone up in 61% of the total bridge sites after the construction of bridges
- Regional variations in new construction works are notable.

Table 4.5: Number (#) and percent (%) of new construction works by region

Domain	Bridge sites	Shops		Houses		Trails		Land price ↑	
		#	%	#	%	#	%	#	%
Terai	4	2	50.0	4	100.0	2	50.0	4	100.0
Hill	15	7	46.7	7	46.7	12	80.0	10	66.7
Mountain	4	0	0.0	0	0.0	1	25.0	0	0.0
Total	**23**	**9**	**39.1**	**11**	**47.8**	**15**	**65.2**	**14**	**60.9**

The ratio of land price in the current PBBA to the baseline survey varies from 1.3 in Kulang Khola bridge site of Tanahu district to 10.0 in Shree Nagar Khorghat bridge site of Rauthat district. In other word, land prices in the current PBBA as compared to baseline has increased as low as 30 percent and as high as 1,000 percent

Chapter-V: Routine Maintenance

Routine maintenance (RM) is the key factor for the sustainability of trail bridges. In order to have regular maintenance, a bridge maintenance committee (BMC) with a bridge warden (local term is *heralu*) is constituted by community in each bridge after its completion. Each BMC is expected to have annual maintenance fund of amount Rs 6000.00 from village development committee (VDC) provided by district development committee (DDC). With a view to assess these institutional arrangements, relevant data were collected in this PBBA from each of the 23 bridge sites. The summary of collected data is presented in Table 5.1 by region.

Table 5.1: Outcomes of Bridge Maintenance by domain

Domain	Expected	# of sites with BMC	# of sites with regular maintenance	# of sites with bridge warden	# of BMC with knowledge about maintenance fund	# of BMC received maintenance fund
Terai	4	3	3	3	4	1
Hill	15	15	14	14	15	11
Mountain	4	4	4	4	3	2
Total	23	22	21	21	22	14

The main findings are as follows.

- BMC has not constituted in one bridge – Shree Nagar Khorghat of Rauthat district. The reason is political.
- No regular maintenance has observed in two bridges – Shree Nagar Khorghat of Rauthat district and Ratapahar of Rukum district. The reason is no *heralu* have yet been appointed.
- No *heralu* has yet been appointed in two bridges: Shree Nagar Khorghat of Rauthat district due to the absence of BMC, and Ratapahar of Rukum district is due to delay in appointment by DDC.
- Unaware about maintenance is reported by one BMC of Jhyagad bridge site of Kalikot district.
- Out of 22 constituted BMCs, 8 reported that they have not yet received maintenance fund. The reasons are presented below by location.

District	Bridge name	Reasons
Siraha	Kalyandehi	VDC has not yet received
Rukum	Ratapahar	Delay in appointment of haleru by DDC/VDC
Kalikot	Khirpi	Late appointment of haleru
Kalikot	Jhyagad	Unware
Banke	Duduwanala	VDC has not yet received
Rolpa	Simaltara	Informed that Will get next year
Rolpa	Bhutkhola	Informed that Will get next year
Rolpa	Rumti Gunam	Informed that Will get next year

Some suggestions as provided by the BMC and ex UC members for making regular maintenance more effective are summarized below.

- Timely delivery of maintenance fund
- Provide training to *heralu*
- Provide necessary tools
- Regular monitoring of bridge conditions from VDC
- Appoint *heralu* by VDC (Ratapahar bridge of Rukum)

Box 5.1: Ristikhola bridge of Tanahu district is in endanger position due to landslide

The Ristikhola bridge of Tanahu district is in endanger position due to landslide on the right hand side of the bridge that lies in Devghat VDC (see Photo below). During interview with BMC member (s), it is reported that they informed about this problem to concern agencies but no one has taken any action against it.

A live example of routine maintenance not carried out at Shree Nagarkhor Ghat, Rautahat. BMC has not been formed yet.

It is anticipated that the health workers will visit villages in order to provide health services to villagers after the bridge construction. With this premise each BMC or ex UC member was asked whether or not health workers has been visiting villages in order to provide the following health services – vaccine for children , treatment for sick persons, emergency services and health related awareness program. Their responses are summarized in Table 5.2. Out of 23 bridge sites, 18 have received vaccine services, 15 have received health treatment for sick persons, 15 have received emergency services and 16 have received health related awareness program. Regional variation in receiving health services is noticeable. It is reasonably poor in the mountain region and quite satisfactory in the hill region.

Table 5.2: Health services by region after the bridge

Region	Expected	Vaccine for children		Treatment for sick person		Emergency service		Awareness program	
		#	%	#	%	#	%	#	%
Terai	4	2	50.0	4	100.0	2	50.0	3	75.0
Hill	15	14	93.3	9	60.0	11	73.3	11	73.3
Mountain	4	2	50.0	2	50.0	2	50.0	2	50.0
Total	**23**	18	78.3	15	65.2	15	65.2	16	69.6

It is also anticipated that the agriculture workers will visit villages in order to provide agriculture services to villagers after the bridge construction. With this premise each BMC or ex UC member was asked whether or not agriculture workers has been visiting villages in order to provide the following services – suggest about problems, sell fertilizer/seeds, communicate new programs and awareness programs - after having the bridge. Their responses are summarized in Table 5.3. Out of 23 BMC/Ex UC members, 19 have reported that agriculture workers visited their village to aware about agriculture problem, 12 have visited to sell fertilizer/seeds, 16 visited to convey new programs and 14 have visited to launch awareness program. Regional variation in receiving agriculture services is noticeable. It is reasonably poor in the mountain region and quite satisfactory in the hill and the terai region.

Table 5.3: Agriculture services by region after the bridge

		Visit to suggest about problems		Visit to sell fertilizer/seeds		Visit to convey new programs		Visit to make aware about agriculture	
Region	**Expected**	#	%	#	%	#	%	#	%
Terai	4	4	100.0	2	50.0	3	75.0	2	50.0
Hill	15	13	86.7	8	53.3	10	66.7	11	73.3
Mountain	4	2	50.0	2	50.0	3	75.0	1	25.0
Total	**23**	19	82.6	12	52.2	16	69.6	14	60.9

Annex-I: List of Selected Bridges of PBBA 2015

Name		Span	Required	Demand for bridges	
Bridge	**District**	**(meter)**	**(Month)**	**LB**	**RB**
Bardanda	Panchathar	83.00	12	School	Market
Sulibung	Panchathar	68.00	6	Health post	Market
Doranadi	Siraha	45.00	8	Market	School
Kalyandehi	Siraha	45.00	8	Market	School
Shree Nagar Khorghat	Rautahat	117.00	9	Market	Household activity
Gairighat	Syanja	54.00	4	Market	School
Kulang Khola	Tanahun	114.00	8	School	School
Risti Khola	Tanahun	89.00	8	School	Household activity
Kharkhola	Rukum	96.70	5	Household activity	School
Ratapahar	Rukum	109.00	6	Market	School
Khirpi	Kalikot	79.00	7	Health post	School
Jhyagad	Kalikot	53.00	5	Market	Market
Duduwanala	Banke	32.00	4	School	Household activity
Simaltara	Rolpa	62.50	0	Health post	School
Bhutkhola	Rolpa	45.00	8	Market	Household activity
Rumti Gunam	Rolpa	24.00	8	Health post	Social function
Machhindra	Jajarkot	65.00	6	Market	School
Kaina	Jajarkot	61.20	6	School	Market
Dhanaghat	Dadeldhura	103.00	8	Market	Household activity
Relaghat Tunga	Dadeldhura	82.00	6	Household activity	School
Rause	Doti	55.00	6	School	Social function
Balde Bafaune	Bajura	73.00	0	Social function	Market
Gopisera	Bajura	40.00	6	Health post	Social function

Annex-II: Characteristics of Selected Households

			Freq	%
Household heads by Caste/ethnicity				
Dalit			91	19.9
Janjati			104	22.7
B/C/T/S			225	49.1
DTC			38	8.3
Total			458	100.0
Households by place of residence (region)				
Terai			81	17.7
Hill			295	54.4
Mountain			82	17.9
Total			458	100.0
Source of income (multiple response: percentages are % of 458)				
Agriculture			411	89.7
Cereal grain	387	84.5		
Cash crop	108	23.8		
Animal husbandry	308	67.2		
Business			91	19.9
Wage labor			225	49.1
Service			49	10.7
Remittance			124	27.1
Pension			9	2.0
Status of having farm land				
Yes			437	95.4
No			21	4.6
Total			458	100

Annex-III: Food Sufficiency and Income Level

	Freq	%
Household by food sufficiency		
< 6 months	185	42.3
≥ 6 months	252	57.7
Total	437	100.0
Household by income level per month		
< Rs 9000	185	40.4
≥ Rs 9000	273	59.6
Total	458	100

Relationship between income level & food sufficiency level

Income level	Food sufficiency level		Total
	< 6 months	≥ 6 months	
< Rs 9,000	30.4	9.8	40.3
≥ Rs 9,000	11.9	47.8	59.7
	42.3	57.7	100.0

Relationship between place of residence (region) by food sufficiency

Food sufficiency level	Terai	Hill	Mountain	Overall
< 6 months	41.1	39.3	54.4	42.3
≥ 6 months	58.9	60.7	45.6	57.7
Total	100.0	100.0	100.0	100.0
N	**73**	**285**	**79**	**437**

Relationship between place of residence (region) by income level

Monthly income level	Terai	Hill	Mountain	Overall
< Rs 9,000	49.4	35.6	48.8	40.4
≥ Rs 9,000	50.6	64.4	51.2	59.6
Total	100.0	100.0	100.0	100.0
N	**81**	**295**	**82**	**458**

Annex-IV: Before & After Comparison in Living Standards

	Before		After	
	Freq	**%**	**Freq**	**%**
Main source of drinking water				
Personal Pipeline (Up to House)	143	31.2	182	39.7
Community Tap	195	42.6	183	40.0
River	13	2.8	3	0.7
Kuwa	42	9.2	9	2.0
Inar	3	0.7	1	0.2
Tube Well	62	13.5	80	17.5
Total	458	100	458	100
Types of toilet				
Temporary	124	27.1	89	19.4
Permanent	219	47.8	315	68.8
Don't have Toilet	115	25.1	54	11.8
Total	458	100	458	100
Main source of fuel for cooking food				
Wood/Guetha	450	98.3	443	96.7
Kerosene	2	0.4	2	0.4
Gas	3	0.7	5	1.1
Bio Gas	3	0.7	8	1.7
Total	458	100	458	100
Main source of lighting house				
Tuki/Batti	105	22.9	44	9.6
Lantern/Petromax	3	0.7	6	1.3
Electricity	138	30.1	204	44.5
Solar/Energy from Sun	212	46.3	204	44.5
Total	458	100	458	100
Types of roof				
Khar/Paral	219	47.8	169	36.9
Tayal	118	25.8	126	27.5
Jasta	110	24.0	138	30.1
Concrete	9	2.0	23	5.0
Other	2	0.4	2	0.4
Total	458	100	458	100

Annex-V: Average Daily Traffic Counts (persons/day)

District	Bridge	Going to ESC	Visiting HSC	Performing HC	Going to MC	Attending SF	Going for employment	ADTC
Panchathar	Bardanda	16	15	60	27	12	0	**130**
Panchathar	Sulibung	0	0	60	0	0	0	**60**
Siraha	Doranadi	50	37	40	36	17	23	**203**
Siraha	Kalyandehi	5	2	9	7	39	3	**65**
Rautahat	Shree Nagar Khorghat	310	45	299	722	85	77	**1538**
Syanja	Gaurighat	0	12	36	13	3	9	**73**
Tanahun	Kulang Khola	4	4	32	9	5	9	**63**
Tanahun	Risti Khola	23	2	16	8	12	16	**77**
Rukum	Kharkhola	64	33	54	33	9	31	**224**
Rukum	Ratapahar	50	29	59	27	8	38	**211**
Kalikot	Khirpi	0	6	15	3	0	9	**33**
Kalikot	Jhyagad	0	2	0	29	0	0	**31**
Banke	Duduwanala	126	59	78	78	62	65	**468**
Rolpa	Simaltara	30	16	16	24	15	5	**106**
Rolpa	Bhot Khola	0	4	21	21	17	2	**65**
Rolpa	Rumti Gunam	0	5	9	20	12	41	**87**
Jajarkot	Machhindra	0	10	57	46	35	13	**161**
Jajarkot	Kaina	0	12	51	48	15	22	**148**
Dadeldhura	Dhanghat	0	42	34	38	22	0	**136**
Dadeldhura	Relaghat Tunga	0	15	45	14	28	6	**108**
Doti	Rause	1	0	53	0	5	0	**59**
Bajura	Balde Bafaune	0	0	116	79	52	39	**286**
Bajura	Gopisera	0	155	154	65	30	51	**455**
Human ADTC by purpose		**30**	**22**	**57**	**59**	**21**	**20**	**208**
% distribution of human ADTC across purpose		**14.2**	**10.5**	**27.4**	**28.1**	**10.1**	**9.6**	**100.0**

Note that % distribution of human ADTC across purpose may not add up to 100 because of rounding error

Annex-VI: River Crossing Students Before and After

District	Bridge name	Number of RCS in the Baseline			Number of RCS in PBBA2015			Remarks
		Boys	Girls	Total	Boys	Girls	Total	
Panchathar	Bardanda	20	15	35	14	27	41	Increase
Panchathar	Sulibung	0	0	0	0	0	0	No Crossing
Siraha	Doranaadi	28	32	60		Holiday		Excluded
Siraha	Kalyandehi	0	0	0	3	1	4	Increase
Rautahat	Shree Nagar Khorghat	56	37	93	65	75	140	Increase
Syanja	Gaurighat	17	21	38	24	21	45	Increase
Tanahun	Kulang Khola	26	34	60	11	7	18	Decrease
Tanahun	Risti Khola	26	30	56	22	26	48	Decrease
Rukum	Kharkhola	398	389	787	395	244	639	Decrease
Rukum	Ratapahar	14	19	33	171	141	312	Increase
Kalikot	Khirpi	70	30	100	31	27	58	Decrease
Kalikot	Jhyagad	27	23	50	32	33	65	Increase
Banke	Duduwanala	40	10	50	117	102	219	Increase
Rolpa	Simaltara	0	0	0	0	0	0	No Crossing
Rolpa	Bhutkhola	0	0	0	0	0	0	No Crossing
Rolpa	Rumti Gunam	11	9	20		Holiday		Excluded
Jajarkot	Macxhhindra	42	36	78		Holiday		Excluded
Jajarkot	Kaina	19	16	35		Holiday		Excluded
Dadeldhura	Dhanaghat	70	65	135		Holiday		Excluded
Dadeldhura	Relaghat Tunga	19	26	45		Holiday		Excluded
Doti	Rause	0	0	0	0	0	0	No Crossing
Bajura	Balde Bafaune	1	2	3		Holiday		Excluded
Bajura	Gopisera	50	60	110		Holyday		Excluded

Note:

1. Increase means (Total RCS in PBBA2015 – Total RCS in Baseline) > 0
2. Decrease means (Total RCS in PBBA2015 – Total RCS in Baseline) < 0
3. Excluded means excluded from the current evaluation

Annex-VII: River Crossing Patients Before and After

District	Bridge	Number of RCP in Baseline			Number of RCP in PBBA2015			Remarks
		Males	Females	Total	Males	Females	Total	
Panchathar	Bardanda	31	30	61	107	174	281	Increase
Panchathar	Sulibung							No need
Siraha	Doranadi	65	72	137	426	522	948	Increase
Siraha	Kalyandehi	45	55	100	152	208	360	Increase
Rautahat	Shree Nagar Khorghat							No need
Syanja	Gaurighat	308	308	616	89	191	280	Decrease
Tanahun	Kulang Khola	28	64	92	23	46	69	Decrease
Tanahun	Risti Khola							No need
Rukum	Kharkhola	487	688	1175	353	455	808	Decrease
Rukum	Ratapahar	184	407	591	288	420	708	Increase
Kalikot	Khirpi	86	251	337	250	288	538	Increase
Kalikot	Jhyagad	0	0	0	36	71	107	Increase
Banke	Duduwanala	184	156	340	396	419	815	Increase
Rolpa	Simaltara	184	457	641	388	408	796	Increase
Rolpa	Bhot Khola	0	0	0	71	126	197	Increase
Rolpa	Rumti Gunam	383	421	804	47	136	183	Decrease
Jajarkot	Machhindra	213	498	711	64	107	171	Decrease
Jajarkot	Kaina	308	404	712	124	385	509	Decrease
Dadeldhura	Dhanghat	161	167	328	210	307	517	Increase
Dadeldhura	Relaghat Tunga	260	201	461	310	346	656	Increase
Doti	Rause							No need
Bajura	Balde Bafaune							No need
Bajura	Gopisera	830	940	1770	1765	2033	3798	Increase