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Government of Nepal
Ministry of Federal Affairs and Local Development
Department of Local Infrastructure Development
and Agricultural Roads
(DoLIDAR)

RAP 3

Nepal Rural Access Programme
Monitoring, Evaluation and Learning Component

BASELINE REPORT

June 2015

Foreword

RAP3 is one of the longest running development projects in Nepal supported by UK Aid. The program was conceived in 1999 as a way to use the construction of transport infrastructure as an entry point for improving the lives of people in remote areas of Nepal.

The current phase of the program, which started in September 2013, focuses on eight districts in the mid and far west Nepal which have the lowest road density in the country and low levels of human development.The Government of Nepal regards RAP3 as an important initiative to improve connectivity and improve wellbeing in the region.The program does this through a combination of activities aimed at achieving employment generation, a more resilient rural transport network, and improved access to economic opportunities

I welcome the fact that RAP3 has a dedicated system for independent monitoring, evaluation and learning. This report presents a key output from this system: the program's baseline which has been constructed through a large scale household survey and complementary qualitative research. The survey is one of the largest conducted in mid and far west Nepal in recent years.

This research provides an important basis for measuring the impact of RAP3 and provides valuable evidence to increase our understanding of the influences of poverty in the region.

I believe that the findings arising from the baseline study will be useful not only for the managers of RAP3, but also to national level agencies that develop programs and policies which target the mid and far west Nepal.

I would like to thank DFID Nepal and DoLIDAR for their support to this initiative. Congratulations are also due to Itad, Development Consultancy Centre (DECC), and the Statistical Services Centre at the University of Reading for their respective roles in the successful completion of the survey and subsequent analysis.

The Ministry of Federal Affairs and Local Development (MoFALD) also takes this opportunity to thank Her Majesty's Government of UK for their continued support for Nepal's social and economic development.

Dr Som Lal Subedi

Secretary

Secretary, Ministry of Federal Affairs and Local Development

Introductory message

It gives me great pleasure to know that an independent baseline study of the third phase of Nepal Rural Access Program has been conducted. The baseline provides a rich dataset on poverty, livelihoods and household economics in the eight core program districts in mid and far west Nepal. The study not only provides data to support the effective implementation of the program, but also gives a comprehensive overview of the social and economic status of these districts.

I would like to invite and encourage media and researchers to actively use the data their different purposes. Similarly, there is a scope for further analysis of the baseline dataset which will be available for public use from the DoLIDAR website.

I also take this opportunity to thank Dr Ben Powis, Social Development Advisor, DFID Nepal for his important contribution in overseeing the research. Dr Andrew John Pinney of the University of Reading, who lead the study, deserves special thanks. Colleagues at Itad and DECC also deserve credit for the successful completion of this work.

Jeevan Kumar Shrestha
Director General

Director General

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Disclaimer

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Abbreviations

CBS	Central Bureau of Statistics
DFID	UK Department for International Development
DoLIDAR	Department of Local Infrastructure Development and Agriculture Roads
DTMP	District Transport Master Plan
FCS	Food Consumption Score
GLLAMM	Generalized Linear Latent and Mixed Models
KEP	Karnali Employment Program
MEL	Monitoring, Evaluation and Learning Component of RAP
MOFALD	Ministry of Federal Affairs and Local Development
NLSS	Nepal Living Standard Survey
NPC	National Planning Commission
NPR	Nepali Rupee
ODK	Open Data Kit
PMT	Proxy Means Test
PPI	Progress out of Poverty Index
PSU	Primary Sample Unit
RAP	Rural Access Program
RBG	Road Building Group
RCA	Reality Check Approach
RMG	Road Maintenance Group
SED	Social and Economic Development
SOLI	Standard of Living Index
VDC	Village Development Committee
WB	World Bank
WFP	World Food Program

Executive summary

1. Introduction

This report presents the findings of a survey of 3,200 households in eight districts in the mid and far west of Nepal that was conducted in mid-2014. The data from this survey presents probably the most comprehensive dataset ever generated about the livelihoods of people living in the region. The survey was designed with four main purposes:

- **Establish a sample** that generates evidence to increase understanding of the multiple factors that influence household poverty and overall wellbeing.
- **Provide a robust analytical base** to test the RAP theory of change both now and in future.
- **Set in place a panel**, which will allow for an objective assessment of change in the midline impact assessment (mid 2016) and an end line impact assessment (at the end of the current RAP3 phase, likely 2018/19).
- **Provide a rich data set** specific to an under-researched area of the country to inform policy and practice debates for government and non-government agencies.

Where relevant, the findings from a qualitative module of the baseline (the Reality Check Approach) are provided in the report to help explain the findings from the household survey.

2. Survey design and methods

Questionnaire: The RAP3 baseline questionnaire was designed with a view to capturing a wide range of hypothesised results of RAP3. The design used the Nepal Living Standards Survey (NLSS III, 2010-11) as a starting point, ensuring a large degree of consistency of definitions with national statistics, whilst stripping out some of the detailed sections of the NLSS that were not of interest in this case. This should ensure comparability of RAP3's indicators with existing and future rounds of the NLSS.

Proxy means test: Due to the difficulties of gathering accurate estimates of income from household surveys, our baseline survey goes beyond income estimates to construct a composite indicator of consumption using a proxy means test (PMT) approach. This uses information from NLSS-III to model household consumption upon a range of explanatory variables, including health, education, demography, housing and assets. Through this, we are able to gather a multidimensional understanding of the drivers of household consumption that goes beyond our income estimates, and thereby achieve a more nuanced perspective on household poverty.

Sampling: The baseline survey was conducted in RAP's four road construction districts (Humla, Mugu, Bajura and Kalikot) and four road maintenance districts (Doti, Achham, Dialekh and Jumla). Three 'direct beneficiary' groups were surveyed – the beneficiaries of the socio-economic development (SED) interventions in both the building and maintenance districts, and the road building groups (RBGs).

It was decided that given the great degree of variation in results that is likely to be observed across the analytical domains within the RAP3 districts, there was no need for additional comparison groups to be selected, as sufficient plausible information could be gleaned about the likely counterfactual (the without-intervention case) through cross-comparison of these groups.

Digital data collection: Smart phones were used by enumerators to record survey data and Open Data Kit (ODK) was used as the digital data collection platform for the household survey. As the midline and endline surveys will attempt to return to the same households, recording individual household geo-references along with photographs to help identify household structures and household members was an important component of ensuring accurate household re-identification. This is one of the features that is easily accomplished with ODK because geo-references and photographs can be incorporated into the data collection form without recourse to other devices.

3. Reality Check Approach

To provide a qualitative complement to the quantitative research conducted through the household survey, a Reality Check Approach (RCA) was undertaken. This comprised a short scoping

study before the household study and full baseline study in parallel with the household study.

The RCA provides findings in the following areas:

- How poverty is experienced and perceived in the different locations, taking a multi-dimensional view of poverty.
- The way that people currently make a living (with a view to understanding how short term waged labour opportunities provided by RAP3 fit into the mix as well as the current level of diversified income opportunities and constraints to further diversification).
- The intended RAP3 outcomes related to better physical access by provision of new and better maintained roads as well as the upgrade to all weather roads to extend the usability of roads.
- How people view change, their aspirations and how this change may come about.

The full RCA report is presented as a separate document.

4. Findings

The findings from the baseline are presented in a structure that broadly follows the key dimensions of poverty in the mid and far west of Nepal.

Demographics

- The caste breakdown is very similar in all areas surveyed, with the Upper Caste Chetteri being the dominant caste, accounting for around half of the population.
- 18% of households in the sample are female-headed. Average household size is around 6. This level is consistent throughout the region.

Income and consumption

- There are significant differences in average predicted consumption levels across the region. Surprisingly, many of the more remote areas have the highest predicted household consumption.
- Predicted consumption levels are significantly higher for upper caste groups. Dalits and ethnic groups record similar predicted consumption levels.
- The overall poverty rate across the sample is 53%. Poverty rates are around 50% in the RAP3 build areas compared to 60% in the maintenance areas.
- Poverty rates range from around 70% for the Dalit caste to around 50% of Brahman and Chhetri and just 36% of Thakuri.
- Better-off households have significantly fewer members and a lower dependency ratio.

Sources of income

- Public works are the most important source of wage income, although overall, they account for a relatively small proportion of average incomes.
- A large proportion of households continue to engage in agriculture, primarily for household consumption rather than sales.
- Around 20-40% of households benefit from remittances, depending on the region.
- No surveyed member of the ethnic groups received any income from enterprise or crop sales and proportionately fewer received income from public works wages, remittances and benefits. Sources of income are broadly similar for Dalits and upper castes, although earnings from enterprise are significantly higher for upper castes.
- Better-off households tend to receive more income from public works programmes, which suggests that targeting of the poorest is not successful.

Assets

- Dalits tend to own fewer assets than other castes. Ethnic groups own the most land; Dalit and Chhetri households own the least.
- The value of loans increases with income, probably because higher income households are better placed to secure loans and take on associated risk.

Access

- Access to a range of services is considerably higher in the inner areas and regions with existing road networks. Variations are particularly significant for access to secondary schools, hospitals and agricultural centres.
- There is a clear positive correlation between access and predicted consumption.

Food consumption and security

- The Ethnic Group category shows the lowest levels of food consumption, followed by Dalits. Consumption is highest for the upper castes.
- Unsurprisingly, food insecurity is highest amongst the poorest households.

Migration and remittances

- The vast majority of migrants are male. Migration levels are highest from Doti and lowest from Jumla. Otherwise, they are broadly uniform across the region surveyed.
- India is the destination for the majority of migrants. Popular occupations for migrants include construction, hotel/restaurant work, and security.
- Better-off households tend to earn more from remittances.
- The ethnic groups tend to migrate less, and receive lower remittances, than other caste categories.

Section A: Introduction

1. Purpose and structure of the report

This report presents the findings of a survey of 3,200 households in eight districts in the mid and far west of Nepal that was conducted in mid-2014. The data from this survey presents probably the most comprehensive dataset ever generated about the livelihoods of people living in the region. It aims to provide evidence to increase understanding of the influences of poverty in the region, and thereby inform policy and practice for actors. It will also provide the baseline for an objective assessment of the impact of the third phase of DFID's Rural Access Programme (RAP3)[1].

Where relevant, the findings from a qualitative module of the baseline (the Reality Check Approach) are provided in the report to help explain the findings from the household survey.

The findings presented represent a partial analysis of what is a very rich dataset. It is anticipated that the data will be amenable to significant further analysis – both by RAP and by other stakeholders. Some preliminary ideas on the scope of further analysis are presented.

The report is structured as follows:

- **Section A:** Provides an introduction to RAP3's Monitoring, Evaluation and Learning component, the baseline purpose and process, and suggested next steps in disseminating the baseline findings and undertaking further analysis of the dataset.
- **Section B:** Presents the RAP3 theory of change, which formed the basis of the design of the baseline.
- **Section C:** Summarises the design of the survey and the methods employed.
- **Section D:** Presents the findings from the baseline. It is structured according to what are considered to be the key dimensions of poverty in the mid and far west of Nepal.
- **Annex 1:** Provides further detail on the RAP3 theory of change.
- **Annex 2:** Describes the methodology employed for the household survey.
- **Annex 3:** Elaborates on the Reality Check Approach (the qualitative module that accompanied the household survey).

2. RAP3's MEL Monitoring, Evaluation and Learning component

Itad has been contracted by DFID to set up and manage an independent Monitoring, Evaluation and Learning (MEL) unit for the third phase of the Rural Access Programme (RAP3).

DFID has been supporting the Nepal Rural Access Programme (RAP) for the last 10 years through the RAP 1 and 2 programmes to construct rural roads and thereby increase access to markets and social services for the rural poor and disadvantaged. RAP3, which began in 2013, aims to support continued rural road building, road maintenance, short-term job creation, and poverty reduction and market led economic development. RAP will also continue to support labour based rural infrastructure works that are climate and disaster resilient. As a part of this project, DFID is also providing support to the Karnali Employment Programme (KEP) and its potential expansion into a national programme and associated social protection policy.

[1] www.rapnepal.com

RAP3's work is focused on eight core districts of the mid and far west of Nepal. Both these regions have been historically underserved by the national development agenda and have a low Human Development Index and high poverty incidence compared to the national average. To exacerbate the situation, access to infrastructure is low, with road densities only a third of the national average; and two of the eight district headquarters are not connected to the national road network by a motorable road. Not only does this constrain economic development, but it also hampers access to government services such as health and education.

The programme is diverse and complex, is spread over multiple sites in the eight districts, with the various localised contexts presenting their own distinctive challenges and opportunities, and containing a variety of initiatives planned by the RAP3 programme.

The MEL component provides an opportunity to focus dedicated resources and expertise on what is a high profile, large scale, and strategically important programme for DFID, the Government of Nepal, and the large numbers of poor people that it seeks to support. The overall aim of the MEL component is to design and implement research and learning processes that go beyond what would be possible through a more standard M&E function within a programme, over time providing in-depth analysis and findings on progress, outcomes and contribution to wider development impact in the regions.

MEL has three core components:

- **Impact assessment.** The baseline for the impact assessment was undertaken in mid-2014. It included a large-scale household survey (findings presented in this report) and a 'Reality Check Approach' (see section B.3). A follow-up midterm impact assessment is planned in May 2016 with an endline indicatively scheduled to be completed after RAP3 ends.
- **Regular monitoring:** which includes monthly process monitoring, and transport and market surveying.
- **Thematic studies:** Eight thematic studies will be undertaken. One of these will be a follow-up to the baseline RCA which will be undertaken in 2016. The coverage of the other thematic studies has not yet been decided. It is expected that some of them will entail follow-up analysis on issues that arise from the baseline – as presented in this report.

3. Baseline purpose and process

The baseline was designed with four main purposes:

- **Establish a sample** that generates evidence to increase understanding of the multiple factors that influence household poverty and overall wellbeing, and enables comparison across different domains.
- **Provide a robust analytical base** to test the RAP theory of change both now and in future. Note that from the outset, the baseline has been viewed as an important tool for not only understanding progress of RAP3, but also placing this within the broader development scenario of this region of Nepal.
- **Set in place a panel**, which will allow for an objective assessment of change in the midline impact assessment (mid 2016) and an end line impact assessment (at the end of the current RAP3 phase, likely 2018/19).
- **Provide a rich data set** specific to an under-researched area of the country to inform policy and practice debates for government and non-government agencies.

Baseline data collection began in early May 2014 and was completed by mid-June 2014.There are some notable aspects of the baseline development worth documenting here:

- **Consistency with government approaches.** A key working principle was that the survey sought to build on, and be consistent with, existing data sets and approaches such as the Nepal Living Standards Survey (NLSS). The survey borrowed heavily from the NLSS, with careful consideration on leaving out sections not relevant to RAP MEL priorities, and augmenting sections where more detailed data was required, such as on migration flows. NLSS datasets and other materials from the Central Bureau of Statistics were obtained with assistance from DFID, as were shape files from the Department of Survey that were a base resource for the development of the sample mapping. The design therefore drew on quite a range of different government and RAP data sources and it was a major task to convert all these into a single dataset from which the sample was designed.

- **Investing in a large scale survey.** Considering that many national surveys have a similar number of sample households (in this case 3,200), the level of rigour applied, and the detail and specificity on the eight districts that the survey can provide will be a knowledge asset that will be very useful for development actors working in this area of the country.

- **Building qualitative enquiry into the baseline.** The 'Reality Check Approach' was adopted as a method for generating in-depth qualitative insight in the districts. An initial scoping study was carried out in Kalikot and Dailekh. Findings from this informed the development of the household quantitative survey in areas such as inclusion and decision making, and unintended / potential negative impacts. The baseline RCA was conducted in communities in Humla, Bajura, Doti and Achham using the same comparator locations as the quantitative survey but different households. Ideally this would have taken place after the household survey so that particular trends, issues or surprises identified in this could have been looked at in more depth but this was not possible due to delays in the household survey start-up. A separate RCA report has been produced and this baseline document draws on insights from this where appropriate.

- **Deciding on the most appropriate methods for comparison and on analytical domains.** The original intention was to carry out the survey over the eight core districts along with two additional comparison districts neighbouring the eight (Jajarkot and Bajhang). It was quickly recognised that any attempt to identify credible 'control' areas in this way was going to be extremely difficult (for instance there is major investment in wage-based infrastructure being carried out by multiple actors in this area of the country) and the costs involved were not justifiable. At the same time, the diverse mix of RAP3 interventions (programmatically and contextually /geographically) presented an unusually rich opportunity to design an impact assessment that would compare between and within the RAP programme interventions. The design therefore focused on these comparisons within the RAP3 districts. The idea of 'corridors' around the roads was developed by RAP and this proved a useful starting point for designing the sample (see section C for a summary of final analytical domains and data sources).

- **Coping with incomplete direct beneficiary datasets.** The Road Building Group (RBG) beneficiary groups were by far the most straightforward groups to factor into the sample design – a large number of participating households were clearly identified and relatively stable, with the intention that these households will continue to carry out this work until road completion. The process of forming the Road Maintenance Groups (RMGs) has taken much longer than anticipated and this meant that RMG direct beneficiary households could not be identified in time for the sample. In addition to this, there were more significant differences between RMG and RBG modus operandi than had initially been understood. RMG groups are smaller and employ lower numbers of people, and will have a more evolutionary approach for maintenance, with certain road stretches prioritised for the first year and others to be

added each subsequent year. Similarly, the Socio-Economic Development (SED) components have adopted a more evolutionary approach, meaning that the reach and nature of interventions will change over the programme period; however SED beneficiary data was available. It was therefore decided to adopt a random cluster sample approach for villages in the RMG areas. A small specific household RMG survey is proposed for in the near future, when these households are known, to add to the datasets from the main baseline. The Department of Survey data proved useful in constructing the maps from which the samples could be based, but these files were produced around four years ago, meaning that with RAP's assistance, road network data had to be checked and updated.

- **Trail bridges.** It was decided to treat the trail bridges separately through a specific thematic review research piece. This was partly a practical consideration to reduce the number of analytical domains and be able to allow a good representative sample of remaining domains within the resources available. It was also recognised that the timescales for observable change, and opportunities for 'before and after' comparisons are very different for trail bridge initiatives compared to the longer time frames of road works and other SED activities.

- **Use of Open Data Kit (ODK).** The survey was contracted out to an experienced Survey Manager. His team of supervisors were trained by an Itad international expert on the questionnaire and the use of ODK on mobile phones. Whilst this approach is gradually becoming more common, it is a particularly innovative aspect of the baseline and presents a considerable opportunity for improving efficiencies and the accuracy of the survey. Applying the approach has contributed to local skills development. The approach could potentially be used in regular monitoring and borrowed by other actors (including RAP who are interested in their field staff using this approach). This approach does bring a different set of risks (technology / equipment failure; the increased skill sets required of enumerators; practical issues such as recharging phones in remote areas; and considerable time needed for testing and fixing bugs) compared to traditional paper-based surveys. However the investment proved worthwhile and this baseline will have a long shelf life, and indeed is an essential platform for the midline and endline evaluations.

4. Next steps

Dissemination

Central government agencies were engaged to help shape the analysis of baseline data that is presented in this report. A half day technical working group meeting was held on 28 August 2014comprising representatives of the NPC, CBS, DoLIDAR, RAP3 and the Central Department of Economics, Tribhuvan University.

Building on suggestions received from the workshop, the following targeted dissemination activities are planned to maximize the use of the survey data in informing policy and practice:

- A series of dissemination workshops targeted at central government agencies, including DoLIDAR, CBS, NPC, RAP3 partners, and selected bilateral and multilateral donors involved in public wage programs.

- The final report will be published under the aiges of DoLIDAR, and will be distributed to interested government agencies, donors, policy makers and academia. Besides the main report, the preparation of a summary of the quantitative and qualitative reports is also planned.

- Publication of the analysis and dataset on the RAP3 and DoLIDAR websites.

- Making the baseline dataset publicly available online for use by other researchers.

Further analysis

This report presents a preliminary analysis of the baseline dataset. There is significant scope for further analysis to be undertaken. The following areas are worthy of particular consideration:

- **Construction of a separate Standard of Living Index (SOLI).** The team decided not to construct the index at this point, due to technical complications in determining the weightings of such an index. Further work to develop a SOLI could be a useful complement to the Proxy Means Test (PMT) indices developed for this report.
- **RMG direct beneficiary study.**The main baseline survey conducted a large random sample of households in the RMG areas because data on direct beneficiary households was not available at the time that the survey was conducted. A small specific household RMG sample is proposed for in the near future, when these households are known, to add to the datasets from the main baseline. A sample size of around 400 households is believed to be appropriate.
- A number of **additional thematic studies** are planned, including the application of the Reality Check Approach (RCA) to assess the impact of trail bridges constructed under RAP.Terms of reference for this thematic study have been drafted.
- Further analysis of the dataset, including:
  - ✓ Weighted analysis, including ensuring that all poverty statistics are weighted by household.
  - ✓ More analysis on transfers and public works.
  - ✓ Analysis of shocks and coping strategies.
  - ✓ Comparison of poverty rates for the region with those from NLSS-III from the same region and from other parts of Nepal.

Section B: RAP3 theory of change

One of the main objectives of the baseline survey was to provide a robust analytical base to test the RAP3theory of change, both now and in future. This section provides a narrative summary of the theory of change. It is extracted from the RAP MEL Framework document, describing how RAP3 envisions the achievement of its goals. This is illustrated in a visual theory of change in Annex 1.

The theory of change is based around three core hypotheses presented below. The baseline survey and its analysis is focused on generating evidence to assess the first two.

1. ***In the context of Mid and Far-West Nepal, the provision of increased access to remote and geographically excluded communities, combined with short-term income sources, is an essential step in lifting people out of poverty***
    - Increasing access to markets, services and employment opportunities has been proven to help lift people out of poverty. The most significant changes for households are in time and cost savings for those benefitting, along with income through wage labour provided through road building and maintenance groups.
    - This will in most cases likely only result in short term (but valuable) gains for these households that translate to improved household food and income security. However, there is an assumption that some of these households will be able to use this income to invest in securing improved longer term income security through purchase of assets, setting up small businesses.
    - It is assumed that people living in the road 'corridor'– whether or not directly engaging in RAP3 interventions – will also benefit from the improved access and local economic stimulation brought about by improved road infrastructure.
2. ***However, roads and other transport infrastructure alone are not enough. Positive change is sought through an integrated approach that addresses other development needs, and together these can multiply the effects beyond single initiatives***
    - RAP3 has evolved and learned that building in initiatives and investment in complementary socio-economic development (SED) activities can multiply the effects of the improved access generated through new or improved transport infrastructure.
    - It is assumed that those households benefitting most from RAP3 will be directly participating in road and SED activities. However, whilst reaching the poorest through construction activities is relatively straightforward, the design of SED activities will need to take account of the real constraints to market access for very poor people, and avoid serving only the better off. The approach also recognises and intends to address the multi-dimensional nature of poverty beyond income.
    - The programme recognises that there must be equal access for women and traditionally excluded groups as these make up the majority of the poorest, and they will be targeted by all interventions. It is assumed that income and opportunity gains will contribute, even if modestly, to individuals gaining greater economic power and autonomy within their households and the community – and that these gains are sustainable.
3. ***The scale and sustainability of change depends on strong linkages between RAP3 and other socio-economic initiatives. It is recognised that the programme is not working in isolation in the mid and far west and many other initiatives are working on rural infrastructure and socio-economic development***

- RAP contributes to the definition of district government priorities (such as the District Transport Master Plans) and ensures its work conforms to, and informs, these. RAP will also channel funding to road maintenance schemes, provide technical oversight and monitoring, and invest in building capacity of government and private sector actors.
- The sustainability of the benefits of RAP's work in such difficult rural terrains will depend on other actors. A key assumption, perhaps particularly in road maintenance work, is that government and other actors will be receptive to a successfully delivered model, and be willing to revise policy and practice in areas such as priority setting for road maintenance, improvement and building. The government will need to ensure the sustainable resourcing of these. Aside from government, it is assumed that a successful and attractive model for private sector involvement in SED and infrastructure is developed from which these actors can adopt improved practices and approaches.

Section C: Survey design and methods[2]

1. Questionnaire design

The RAP3 baseline questionnaire was designed with a view to capturing a wide range of hypothesised results of RAP3, including those noted in the table below, which are derived from the RAP3 theory of change (see Section B). The survey was also designed to ensure adequate coverage of RAP3's logframe indicators. The MEL Framework document provides a much fuller discussion on the RAP3 programme, its objectives and anticipated benefits to households in these areas.

• Reduced transport cost for passengers	• Reduced distress migration
• Increased household income (both short and longer term)	• Increased non-distress migration
• Increased household income diversity	• Reduced cost of credit/ greater diversity of institutions offering credit resulting in lower interest rates
• Increased added value from primary producers income	
• Improved nutritional status/food diversity	• Increased female and excluded group participation in the labour force and household decision-making
• Increased school enrolment and attendance.	• Increased household spending on asset creation activities
• Improved immunisation rates.	• Increased non-farm employment activities
• Increased utilisation of health facilities and other government services	• Increased utilisation of improved agricultural technology and agriculture and livestock service centres

Table 1: Hypothesised effects of RAP3 intervention

The design used the Nepal Living Standards Survey (NLSS III, 2010-11) as a starting point, ensuring a large degree of consistency of definitions with national statistics, whilst stripping out some of the detailed sections of the NLSS that were not of interest in this case. This should ensure comparability of RAP3's indicators with existing and future rounds of the NLSS.

As well as the above considerations, the survey sought to capture any potential negative impacts that road construction and maintenance might bring to a region. The inclusion of this module was motivated by the findings of the pilot **Reality Check Approach (RCA)**(see Section B.3 below), conducted in November 2013, which highlighted perceptions of the socio-economic strain relating to increasing modernisation and migration brought about by improved road networks.

Measuring Poverty

Due to the difficulties of gathering accurate estimates of income from household surveys (due to multiple income sources, inaccuracies in recollection of past income, sensitivities around sharing income information and so forth), our baseline survey goes beyond income estimates to construct a composite indicator of consumption using a **proxy means test (PMT)** approach. This uses information from NLSS-III to model household consumption upon a range of explanatory variables, including health, education, demography, housing and assets. Through the development of a composite indicator under the PMT approach, we are able

[2] Further detail on the household survey methodology is provided in Annex 2.

to gather a multidimensional understanding of the drivers of household consumption that goes beyond our income estimates, and provides a more nuanced perspective on household poverty.

The team considered developing a separate Standard of Living Index (SOLI) in addition to the above, but has decided not to do so at this point, due to technical complications in determining the weightings of such an index. A more complete discussion around the PMT and the SOLI is provided in Annex 2.

2. Sampling

It was decided that a panel survey would be conducted, allowing the same households to be tracked through time. This allows for a more accurate understanding of the effects of the programme on particular households, and removes the need for relisting and selecting households at each survey round.

The baseline survey was conducted in RAP's four road construction districts (Humla, Mugu, Bajura and Kalikot) and four road maintenance districts (Doti, Achham, Dialekh and Jumla). In general, the maintenance districts currently have far less road infrastructure than the build districts, which is a useful basis for comparison at baseline, as well as being of value in assessing change over time as RAP and others invest in road construction in the construction districts.

Three 'direct beneficiary' groups were surveyed – the beneficiaries of the socio-economic development (SED) interventions in both the building and maintenance districts, and the road building groups (RBGs).

Furthermore, in order to give a richer picture of the different impacts of RAP, and help place this within broader change, 'buffer zones' were drawn up around the relevant roads, with sampling of households in 'inner buffers' containing 'indirect beneficiaries' living within 1.5 hours' walking distance of a RAP road. These households are not benefitting directly from road building or SED activities but one may see change over time through increased access and ripple/spin-off benefits such as better access to markets and services and opportunities from these stimulating the local economy. Households living in 'outer buffer zones' – those living up to 5 hours' walk from the road – were also sampled. This was done so that a further comparison group in these more remote areas could be studied to determine if any change was taking place for them as a result of activities in the inner zones.

This gives a total of seven sampling domains – the inner, outer and SED cohorts of both the road building and road maintenance districts (six domains in total), plus the RBGs themselves. Ideally the survey would have included another direct beneficiary group – those involved in waged works on road maintenance groups RMGs – but at the time of the survey the process of identifying those households had not been completed. It is intended that a further survey on RMG households will be carried out as soon as possible.

Calculations of the required sample sizes, as constrained by the available survey resources, led the team to sample just under 3,200 households in total. Full details of the sampling methodology are provided in Annex 2.

3. Digital data collection using Open Data Kit

"*Smartphones are rapidly becoming the platform of choice for deploying data collection and information services in the developing world. They have quickly leap-frogged desktop and laptop computers due to their mobility, increased independence from the power infrastructure, ability to be connected to the internet via cellular networks, and relatively intuitive user interfaces enabling well-targeted applications for a variety of domains*."[3]

[3]Open Data Kit 2.0: Expanding and Refining Information Services for Developing Regions; Waylon Brunette, Mitchell Sundt, Nicola Dell, Rohit Chaudhri, Nathan Breit, Gaetano Borriello; Department of Computer Science and Engineering,

Smart phones were used by enumerators to record survey data and Open Data Kit was used as the digital data collection platform for the household survey. As the midline and endline surveys will attempt to return to the same households, recording individual household geo-references along with photographs to help identify household structures and household members was an important component of ensuring accurate household re-identification. This is one of the features that is easily accomplished with ODK because geo-references and photographs can be incorporated into the data collection form without recourse to other devices.

Other advantages of using ODK to record survey data included:

- Face-to-face training time was no longer than traditional training with paper-based questionnaires. While the ODK form should not substitute for enumerator understanding of the questions and the questionnaire logic, the form automatically implements this logic, requiring less decision-making, and therefore potential for errors, on the part of the enumerator during enumeration.
- Supervisory load is reduced with an ODK form developed with all possible data validation logic built into it. This is because the enumerator has no choice but to follow questionnaire logic and capture responses within appropriate ranges etc.
- The cost of buying an android device (and SD card to facilitate local backup during enumeration) for each enumerator was offset against the cost of data entry for each survey round, reduced supervision costs and expected higher quality of data plus completeness of identification to assist re-identification of panel households, i.e. geo-references and associated photographs with minimal extra data management, without recourse to having to buy GPS devices or cameras.
- Android devices that are capable of taking an SD card were used because having an SD card enables local backups of completed forms to be made. This is particularly useful if the android devices are going to operate off-line for extended periods, which was often the case in the remote mountain areas of western Nepal. In such a situation, the breakage or loss of the cell phone would incur significant data loss. Each day, the enumerator could back up the ODK directory from the internal phone memory to the SD card, remove the SD card and keep it separate to the android device. This provided a significant degree of data security when working off-line for extended periods.
- Using Wi-Fi in offices for up-loading to the ODK aggregate server combined with local daily SD card backup was a substitute for enabling the android devices to have mobile data services, which were often inaccessible in many of the RAP 3 survey areas.

4. Reality Check Approach

To provide a qualitative complement to the quantitative research conducted through the household survey, a Reality Check Approach (RCA) was undertaken. This comprised a short scoping study before the household study and full baseline study in parallel with the household study.

The Reality Check Approach extends the tradition of listening studies and beneficiary assessments by combining elements of these approaches with actually living with people, usually those who are directly experiencing poverty. It could be likened to 'light touch' participant observation. Participant observation involves entering the lives of the subjects of research and both participating and observing in their normal

University of Washington. Paper presented at 14th International Workshop on Mobile Computing Systems and Applications; February 2013 http://www.hotmobile.org/2013/papers/full/2.pdf

everyday activities. It usually entails extensive and detailed research into behaviour, understanding peoples' perceptions and their actions over long periods of time. The Reality Check Approach is similar in that it requires participation in everyday life within people's own environment but differs by being comparatively quick and placing more emphasis on informal, relaxed and insightful conversations than observing behaviour and complexities of relationships.

A scoping RCA study was conducted in December 2013 in Kalikhot and Dailekh, which was used to influence the quantitative survey and to provide insights into how the survey might be better conducted. The main RCA baseline study was undertaken in July 2014. The RCA study was conducted in 25 households in four out of eight RAP3 core districts, using similar critieria as the quantitative sampling; two districts represented 'new' areas where new road construction is planned (Humla and Bajura) while two other districts were old RAP1 and 2 areas where the emphasis is on ensuring improved maintenance with small amount of upgrade work (Accham and Doti). Purposive sampling resulted in study villages being selected along the road corridor and within 1.5 hours walk (the 'inner buffer zone') of the road corridor. Households were selected with a view to being representative of the kinds of households which RAP would directly target for their employment generation programmes but were not necessarily RAP direct beneficiaries. In consultations with villagers, households were selected which were comparatively poorer; and had different generations living in the house, including school-age children.

The RCA provides findings in the following areas:

- How poverty is experienced and perceived in the different locations, taking a multi-dimensional view of poverty.
- The way people that currently make a living (with a view to understanding how short term waged labour opportunities provided by RAP3 fit into the mix as well as the current level of diversified income opportunities and constraints to further diversification).
- The intended RAP3 outcomes related to better physical access by provision of new and better maintained roads as well as the upgrade to all weather roads to extend the usability of roads.
- How people view change, their aspirations and how this change may come about.

The full RCA report is presented as a separate document.

Section D: Findings

This section presents the findings from the baseline, structured according to what are considered to be the key dimensions of poverty in the mid and far west of Nepal. The specification of these dimensions is drawn from the broad categories of variable that were included in the PMT (see Annex 2) as well as the qualitative findings on dimensions of poverty from the Reality Check Approach baseline. Each poverty dimension is analysed in relation to income, caste and location, as well as a number of other factors depending on the dimension.

The section begins with a summary of the demography of the survey sample, followed by an analysis of the baseline findings in relation to income, consumption and poverty. An analysis of each of the following poverty dimensions is subsequently provided: income sources (employment), assets, access, food consumption and security, and migration and remittances.

Finally, some additional findings from the analysis are presented, in relation to social capital, negative impact, and differences in results between RAP3 domains.

Headline findings

Demographics

- The caste breakdown is very similar in all areas surveyed, with the Upper Caste Chetteri being the dominant caste, accounting for around half of the population.
- 18% of households in the sample are female-headed. Average household size is around 6. This level is consistent throughout the region.

Income and consumption

- There are significant differences in average predicted consumption levels across the region. Surprisingly, many of the more remote areas have the highest predicted household consumption.
- Predicted consumption levels are significantly higher for upper caste groups. Dalits and ethnic groups record similar predicted consumption levels.
- The overall poverty rate across the sample is 53%. Poverty rates are around 50% in the RAP3 build areas compared to 60% in the maintenance areas.
- Poverty rates range from around 70% for the Dalit caste to around 50% of Brahman and Chhetri and just 36% of Thakuri.
- Better-off households have significantly fewer members and a lower dependency ratio.

Sources of income

- Public works are the most important source of wage income, although overall, they account for a relatively small proportion of average incomes.
- A large proportion of households continue to engage in agriculture, primarily for household consumption rather than sales.
- Around 20-40% of households benefit from remittances, depending on the region.

- No surveyed member of the ethnic groups received any income from enterprise or crop sales and proportionately fewer received income from public works wages, remittances and benefits. Sources of income are broadly similar for Dalits and upper castes, although earnings from enterprise are significantly higher for upper castes.
- Better-off households tend to receive more income from public works programmes, which suggests that targeting of the poorest is not successful.

Assets

- Dalits tend to own fewer assets than other castes. Ethnic groups own the most land; Dalit and Chhetri households own the least.
- The value of loans increases with income, probably because higher income households are better placed to secure loans and take on associated risk.

Access

- Access to a range of services is considerably higher in the inner areas and regions with existing road networks. Variations are particularly significant for access to secondary schools, hospitals and agricultural centres.
- There is a clear positive correlation between access and predicted consumption.

Food consumption and security

- The Ethnic Group category shows the lowest levels of food consumption, followed by Dalits. Consumption is highest for the upper castes.
- Unsurprisingly, food insecurity is highest amongst the poorest households.

Migration and remittances

- The vast majority of migrants are male. Migration levels are highest from Doti and lowest from Jumla. Otherwise, they are broadly uniform across the region surveyed.
- India is the destination for the majority of migrants. Popular occupations for migrants include construction, hotel/restaurant work, and security.
- Better-off households tend to earn more from remittances.
- The ethnic groups tend to migrate less, and receive lower remittances, than other caste categories.

1. Demography

Household demographics: household head – caste

The **overwhelming majority (78%) of all households in the sample belong to an upper caste**. The caste breakdown is very similar in all areas surveyed, with the Upper Caste Chetteri being the dominant caste, accounting for around half of the population. The Kami Dalit caste makes up around 10% of the population in all of the areas, but other Dalit castes (particularly Sarki and Damain/Dholi) were much more frequent in

the RAP road building districts than in the RAP road maintenance districts. The ethnic groups are most predominant in the RAP road building districts, within 1.5 hours' walk of a road.

Caste Group	Sub-Group	N	% total	Castes included in group
Upper Caste	Brahman	290	9%	
	Chhetri	1,714	54%	
	Thakuri	469	15%	
Dalit	Kami	348	11%	
	Other Dalit	226	7%	Sarki (102), Damain/Dholi (104), Dalit (14), Sunar (4)
Ethnic Group		102	3%	Gurung (5), Magar (91), Tamang (6), Thakaali (1), BK (1)
Other		28	1%	Aalpa sankhe jata (1), Giri (4), Janjati (1), Jogi (3), Lama(2), Nath(1), Parki(1), Sanyasi(14), Tamata (1), Yogi (2)

Table 2: Caste breakdown of surveyed households

Household demographics: household head by sex

Overall, 18% of households in the sample are female-headed. The proportion of female-headed households amongst SED beneficiaries within the RAP3 road maintenance districts is considerably higher than in any of the other sampling domains. This could be due to the recruitment strategy for members of the SED groups in the maintenance zone, the higher migration rates of adult males in maintenance areas (see section D.7), or other factors.

Domain	Female	Male
Build: RBG	90 (19.7%)	366 (80.3%)
Build: Inner	74 (16.0%)	388 (84.0%)
Build: Outer	41 (8.1%)	467 (91.9%)
Build: SED	74 (19.8%)	299 (80.2%)
Maintenance: Inner	105 (19.3%)	438 (80.7%)
Maintenance: Outer	50 (12.6%)	347 (87.4%)
Maintenance: SED	133 (29.6%)	317 (70.4%)
Total	567 (17.8%)	2,622 (82.2%)

Table 3: Breakdown of sample by sex of household head. P-value for differences between strata <0.001

2. Income and consumption

The more remote areas earn more than would have been perhaps expected

As described in Annex 2, the primary method used for assessing poverty or well-being of the households sampled was the proxy means test (PMT) model constructed from the NLSS-III. This showed that there were significant differences in average predicted consumption between RAP3 areas. In particular, as seen clearly in Figure 1, **the average predicted consumption in the maintenance districts was lower than the build districts[4].**

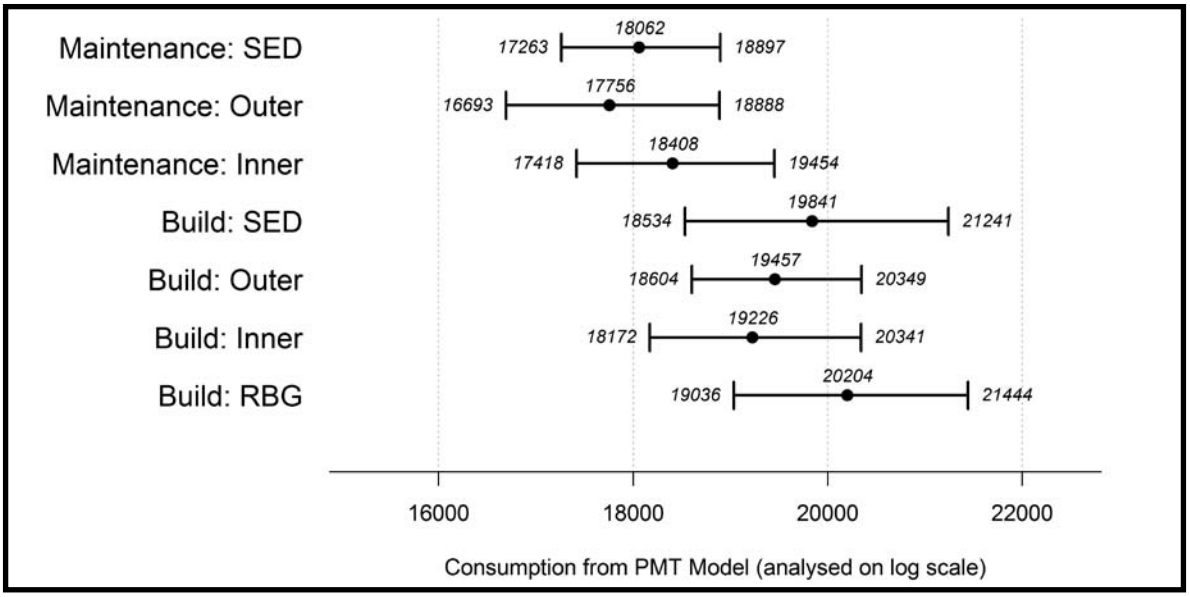


Figure 1: Mean and 95% confidence limits for RAP PMT estimates of annual per capita nominal (NPR). Confidence intervals calculated on log scale, but transformed back onto a real scale for ease of interpretation, hence the asymmetry of the confidence interval widths either side of the mean

This pattern is not consistent with generally-held belief that the outer, more remote zones have less economic opportunity and therefore lower household income potential[5]. The RCA study confirmed this conclusion, finding little evidence of personal income poverty in Humla in particular, with households engaged in a number of diverse cash income earning activities.

It is also perhaps surprising that average incomes are higher in the RAP road building districts, where road infrastructure is generally more sparse, than in the RAP road maintenance districts.

[4] To some extent this can be explained by the PMT model itself. The model applied a positive adjustment upwards for all of the build districts (Mugu, Humla, Kalikot and Bajura); whereas for the maintenance districts the adjustments are either downwards (Dailekh and Doti) or smaller than the positive adjustments in the build areas (Jumla and Aacham). In other words, where the values for all of the other variables in the PMT model are equivalent, the expected consumption for a household in the build areas is higher than for a household in the maintenance area. Figure 1 shows the overall distribution of the scores, and indicates that the spread of scores within each of the domains was very similar.

[5] Section D.10 provides further commentary on direct beneficiary groups (RBGs in build and SED groups in both build and maintenance areas) compared to other domain households.

Figure 2 presents the cumulative distribution of the PMT consumption index and shows that there is not a large divergence in distribution of wellbeing between the road building and road maintenance districts.

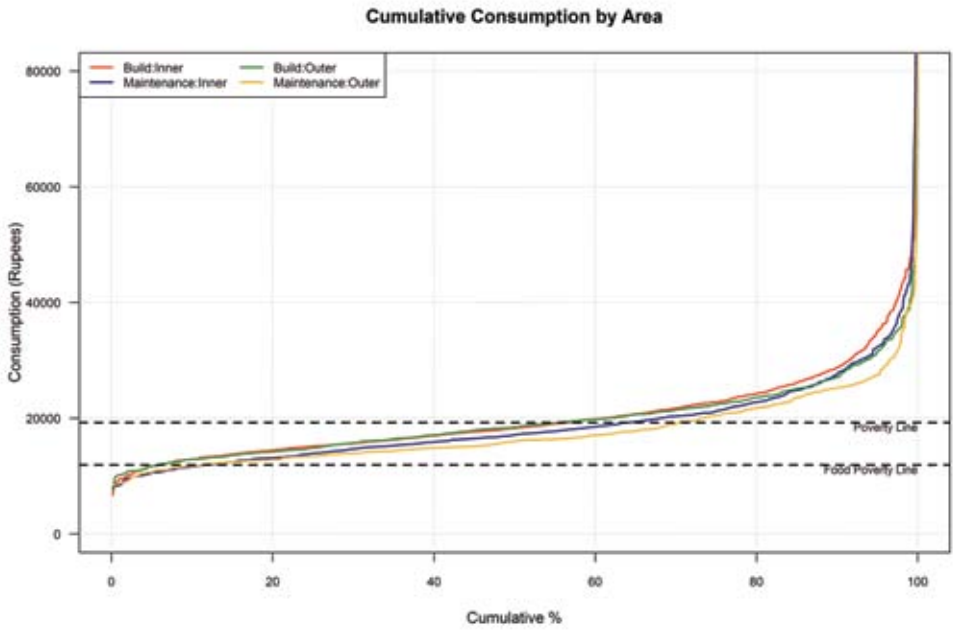


Figure 2: Cumulative distribution of predicted consumption (annual per capita, nominal NPR)

The poverty line is set at NPR 19,261 per annum. **Poverty indices derived from the cumulative distribution suggest that around 50% of those in the build districts are under the poverty line compared to around 60% in the maintenance districts. The average poverty rate across the sample is 53%[6].**

		P0	P1	P2
Build	Inner	0.50	0.10	0.027
	Outer	0.48	0.10	0.027
Maintenance	Inner	0.57	0.13	0.040
	Outer	0.61	0.15	0.047

Table 4: Poverty indices by RAP3 domain[7]

[6] In the NLSS dataset used to calibrate the PMT model, the subset of households in the region showed a poverty rate of 47% (n=658).

[7] p0 = poverty headcount rate, i.e. % households with consumption below the national annual per capita poverty line of NPR 19,261.18.

p1 = the depth of poverty below the poverty line. It can be visualised in Figure 4 as the area above the cumulative curve but below the poverty line as a ratio of the rectangle created between the poverty line and 0 for all households below the poverty line.

p2 = the depth of poverty squared, and allows for further differentiation between cohorts where p1 may be equal or similar, because this statistic gives greater weight to those households that are further from the poverty line.

Average total household income by caste / ethnicity

Clear variances by caste

Predicted consumption was examined by caste (see Figure 3). **This shows a clear divide between castes: the three upper caste groups have significantly higher average predicted consumption than the Ethnic Group category and Dalit castes.** Within the upper caste groups, predicted consumption was significantly higher for the Thakuri caste than the Chhetri caste.

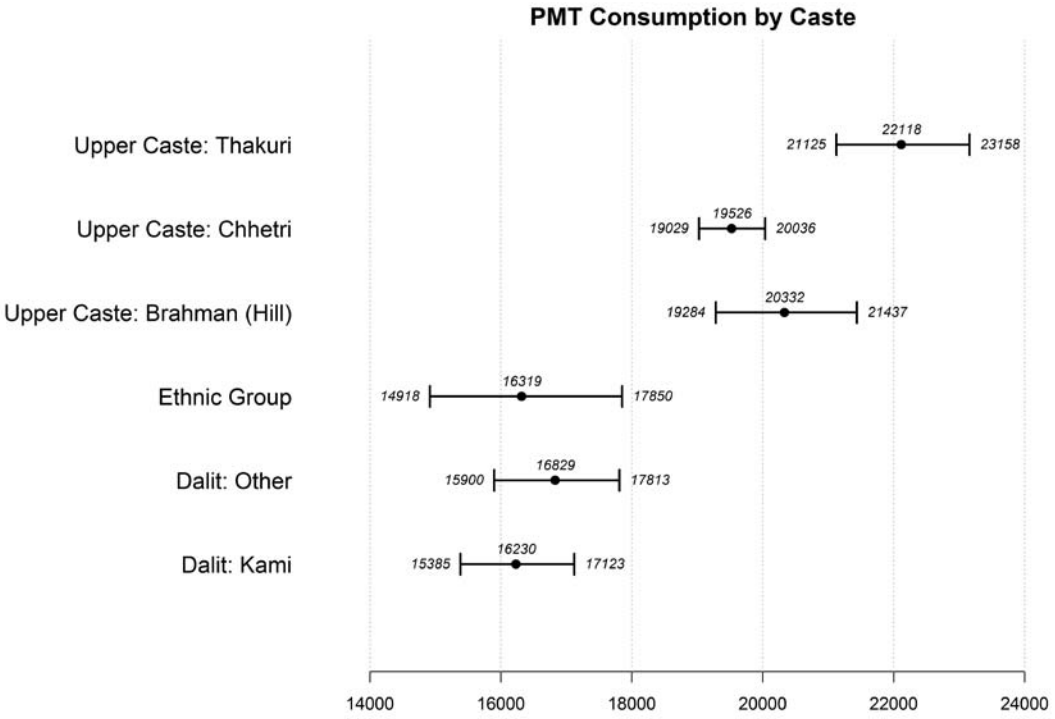


Figure 3: PMT consumption by caste

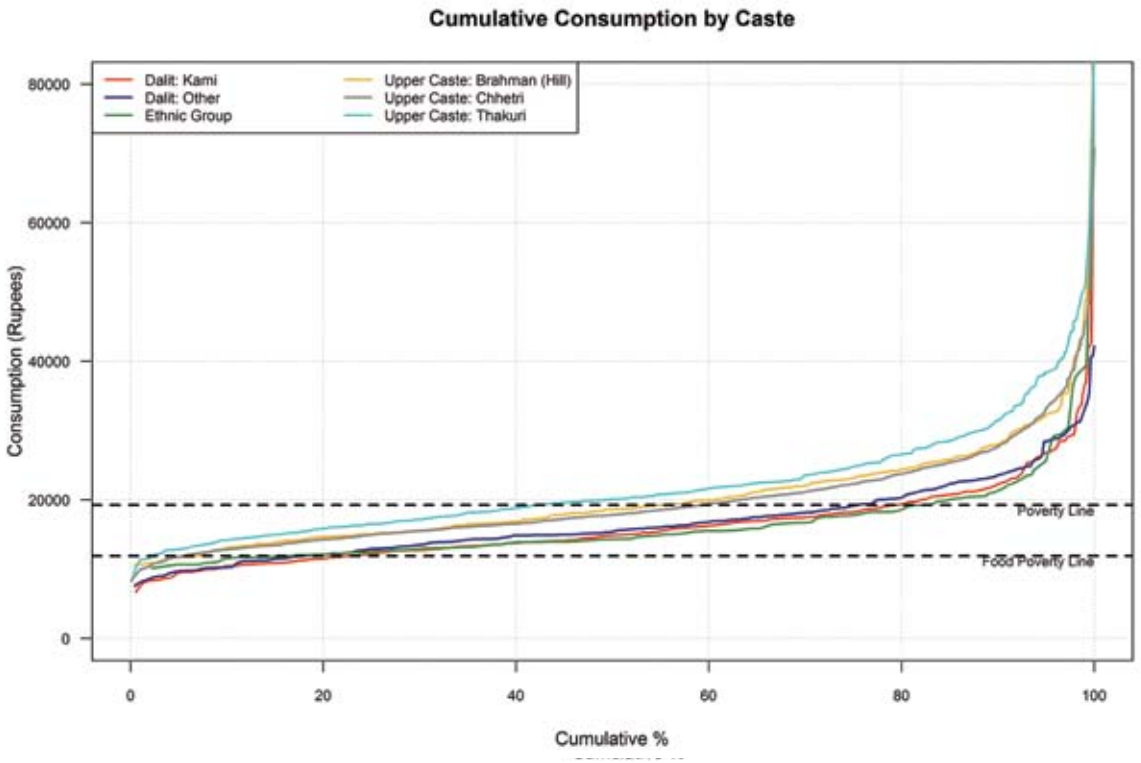


Figure 4: Cumulative consumption by caste

The cumulative plot in Figure 4shows the divide by caste as existing consistently throughout the population, with the caste effect clearly in evidence at both the 5th percentile and the 95th percentile. When calculating the poverty indices (Table 5), this translates to around 70% of the Dalit caste being classified as below the poverty line in comparison to around 50% of Brahman and Chhetri and just 36% of Thakuri. Dalits also have the highest poverty depth (P1) and the highest depth of poverty squared (P2), showing a consistent pattern of higher poverty rates associated with higher depth of poverty and depth of poverty squared.

It should be noted that the data recorded for the ethnic groups came from two villages and was therefore very clustered. The 75% poverty rate for the ethnic groups shown in the table is therefore unlikely to be representative of the region as a whole (the equivalent rate in the NLSS was 41% for the ethnic groups). It has therefore been disregarded in the analysis presented in the paragraph above.

		P0	P1	P2
Upper Caste	Brahman (Hill)	0.48	0.09	0.024
	Chhetri	0.52	0.10	0.029
	Thakuri	0.36	0.06	0.015
Dalit	Kami	0.73	0.20	0.069
	Other	0.68	0.17	0.057
	Ethnic Group	0.75	0.19	0.060

Table 5: Poverty indices by caste. See for Footnote 7a definition of P0, P1, P2.

Spatial variation in predicted consumption

Figure 5 presents the spatial variation of predicted 7-day consumption across all sampling locations, based on the PMT[8]. The colour-coding used in the map can be interpreted as follows:

- Where areas are unshaded, this corresponds to the areas where the predictions are close to the overall average.
- As the shaded areas go through oranges-reds, this indicates a lower than the average result – the more red the shading is, the lower the result is.
- As the shaded areas go through greens, this indicates a higher than average result – the more green the shading is, the higher the result is.

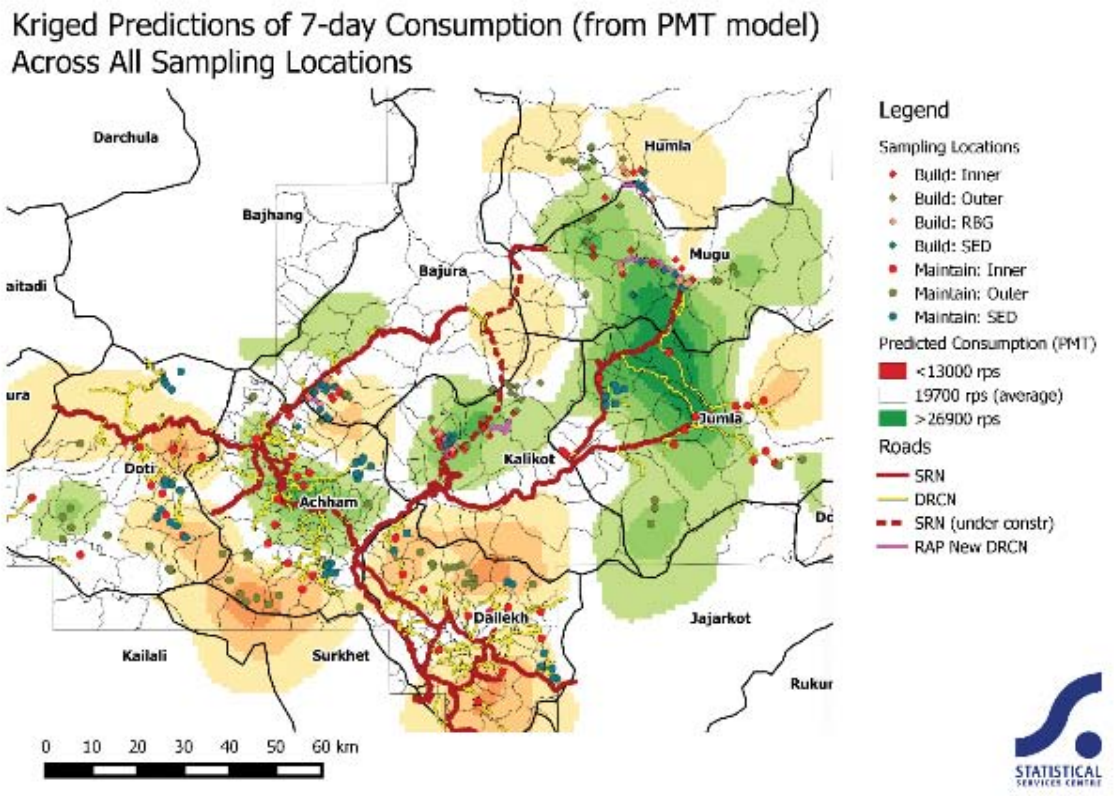


Figure 5: Kriged predictions of 7-day consumption (from PMT model)

[8] The predictions apply to area units of one square kilometre. The statistical process used to create the map is called 'kriging' which takes all of the values from the individual sampling points and uses these to produce predictions for small areas (in this case, a resolution of one square kilometre). The 'range' of the model used was 15km – i.e. sampling points have some effect on predictions up to 15km away. One of the main limitations of this approach is that the process works best when the sampling points are spread evenly across the entire area, which is not the case with this sample. As a result, in areas with very dense sampling points, some useful information may be lost relating to 'small-scale spatial variability' (e.g. if a very 'rich' village is near to a very 'poor' village, they will essentially cancel each other out and the area will be seen to be 'average' and will be indistinguishable from an area which is consistently 'average'). Conversely in areas with very sparse sampling points, results are extrapolated from a small number of households over a large area.

Key findings from the analysis presented in Figure 6 are:

- In **Accham**, predicted consumption is above average in the inner areas, and below average in the more remote areas, with a clear gradient right through the scale.
- The results are similar for **Dailekh**, but with no richer areas –predicted consumption in the inner areas is 'average' rather than 'above average'.
- Predicted consumption in **Humla** is generally slightly lower than average, particularly in more remote areas.
- Predicted consumption in **Mugu** and **Kalikot** is generally higher than average throughout.
- **Jumla** is split into a richer western region and poorer eastern pocket.
- Predicted consumption in **Bajura** is lower than average, with PMT consumption lower in the more remote parts[9].
- **Doti** shows low PMT scores throughout, with the exception of a small pocket of wealth in the south western corner.

Household size

Smaller households tend to be better off

Across the sample, **the average household size is approximately six members** and there is no significant variability across districts. The patterns in Figure 6show the striking variation across the predicted consumption quintiles, with **better-off households having fewer household members** on average.

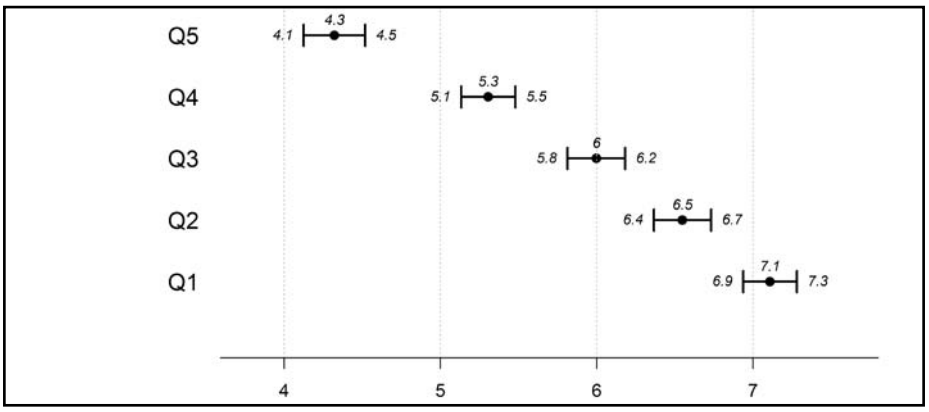


Figure 6: Average household size disaggregated by PMT consumption quintiles. P-value for differences between consumption quintiles <0.001

[9]The coloured patches in the middle of Bajura should be interpreted carefully: these are in areas with very scarce sampling points and are therefore very heavily influenced by a single village on the edge of the area.

Dependency ratio

Better off households tend to have less dependents

Throughout the sample domains, the dependency ratio was slightly larger than 100%, indicating slightly more members of households were classified as dependents than non-dependents.

There were very significant differences between RAP PMT consumption quintiles for dependency ratio. While dependency ratio was not directly incorporated into the RAP PMT model, certain elements of it were; i.e. instance number of children 6 years and under, number of children aged 7-15, as well as household size. **The pattern of dependency ratio by consumption quintiles shows a statistically significant decreasing dependency ratio with increasing predicted consumption quintiles** (see Figure 8**Figure 7**).

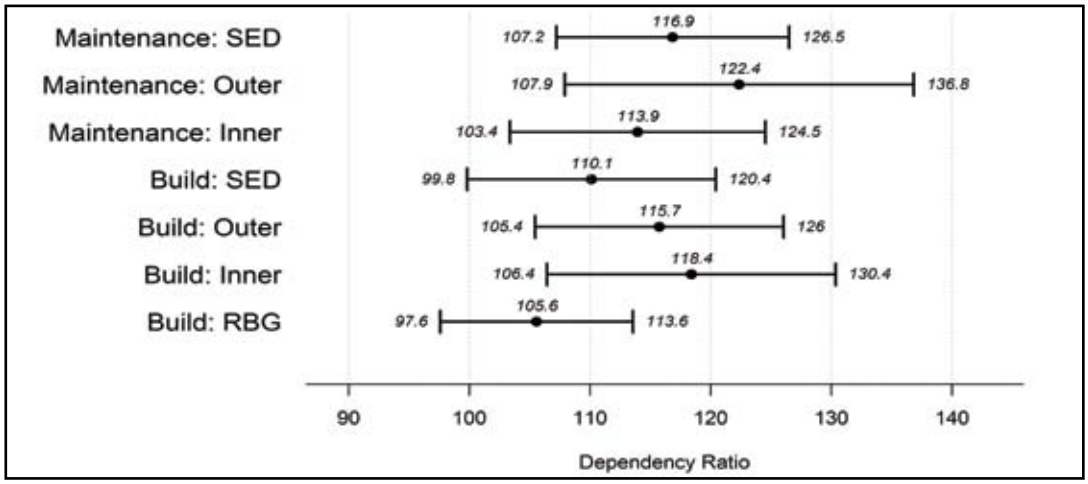


Figure 7: Dependency ratio disaggregated by RAP strata. P-value for differences between strata = 0.331

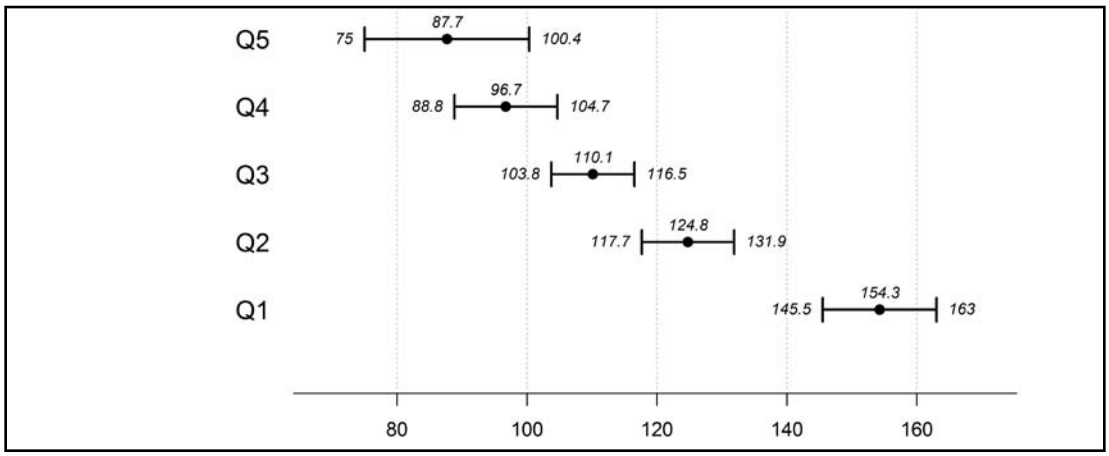


Figure 8: Dependency ratio disaggregated by disaggregated by PMT consumption quintiles. P-value for differences between quintiles <0.001

3. Income sources (employment)

Household income is generated from a wide range of sources

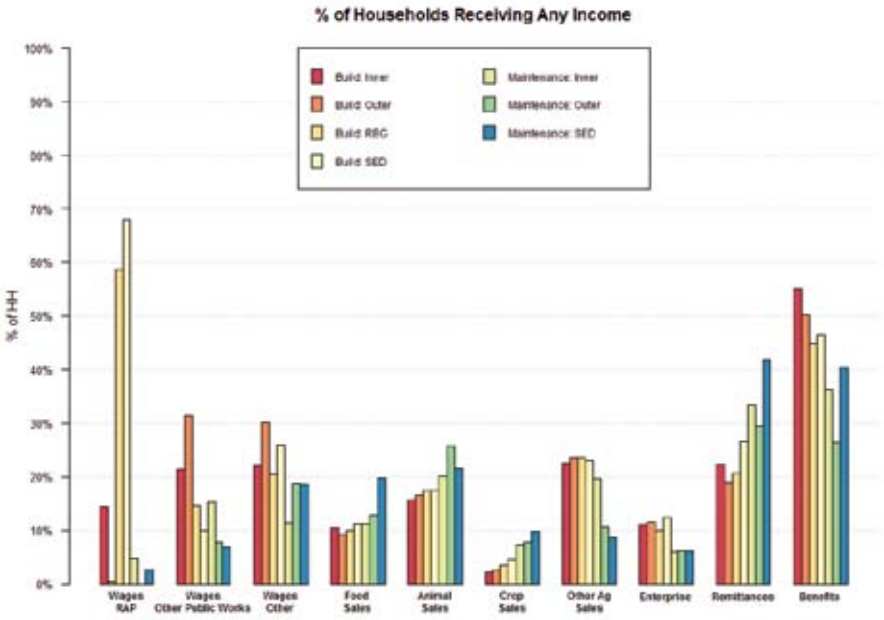


Figure 9: % of households receiving any income by source, by domain

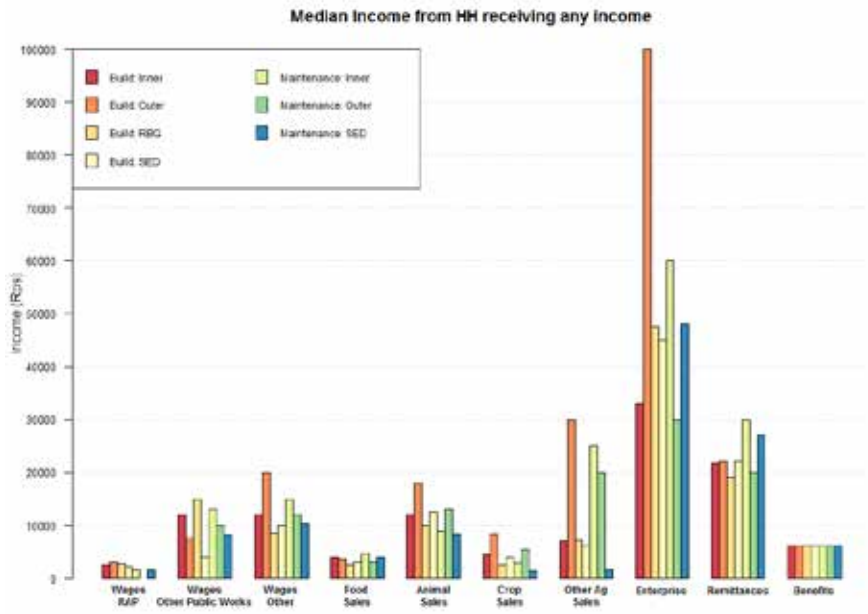


Figure 10: Median income from the various sources by domain

Medians were used in the break-down in Figure 10 because the mean figures are significantly skewed by a small number of very high earners.

- Whilst by no means accounting for the majority of household income, **the most common source of wage income was public works** (including wages and in-kind earnings such as food for work). Public works has highest household involvement in the RAP3 build zones, where RAP is a more common source of public works income than "other" public works. In the maintenance zones, at the time of the survey, RAP was relatively insignificant as a source of household income compared to "other" public works. Overall, actual earnings from public works throughout the sample are modest; and earnings are significantly lower from RAP than from "other" public works[10].
- The survey supports RCA findings that **a large proportion of households remain engaged in agriculture** but that this is mostly for household consumption rather than sales.
- Income from 'other agricultural sales' is generated from a range of sources including equipment hire and services such as grinding mills.
- **High enterprise earnings reported are generated from a small number of very high income earners.** Activities consist of home-run shops or services – mostly grocers, tailors or unspecified, but also quite a high number of hotels and guesthouses. If the enterprises annual earnings above 0.5 million NPRs or more are examined, the households earning these amounts include a person trading in medicinal herbs, a mule train owner, a hotel owner, a grocers shop, two unspecified shops and a sheep farmer. All of these are based in the build districts. Activities consist of home-run shops or services (mostly grocers), tailors, hotels and guesthouses.
- **Remittance contributions benefit around 20-40% of households, depending on region[11]**.
- The vast majority of those who had received any wages from RAP at this point in the study belonged to either the Road Building Groups or SED groups in the RAP3 build districts.
- **'Benefits received' was identical for all domains** (6,000 NPR). This appears to be the flat rate for pensions, the principal contributor to this category of income.

Income sources by caste

Splitting the sources of variation by caste showed some differences, with the notable category being the ethnic groups. **No surveyed members of the ethnic groups received any income from crop sales or enterprise, and much fewer proportionately received income from public works wages (both RAP and other), food sales, remittances and benefits[12]**. There were very few differences between income sources for the Dalit and upper castes; the most notable being higher proportions of upper caste gaining income from food and animal sales.

[10] Note that public works includes Food-for-work; Cash-for-work; Rural Community Infrastructure Works; RAP Maintenance; RAP Construction; KEP; Users Committee/Road Maintenance Users committee. At the time of the survey not all RAP groups had started work / yet earned wages. And those that had started had not been functioning for long, which probably explains why average household income from RAP public works is so much less than "other" public works.

[11] See section D.7 for further analysis on migration and remittances.

[12] It should be noted that the data recorded for the ethnic groups came from two villages and was therefore very clustered. These results are therefore unlikely to be representative of the region as a whole.

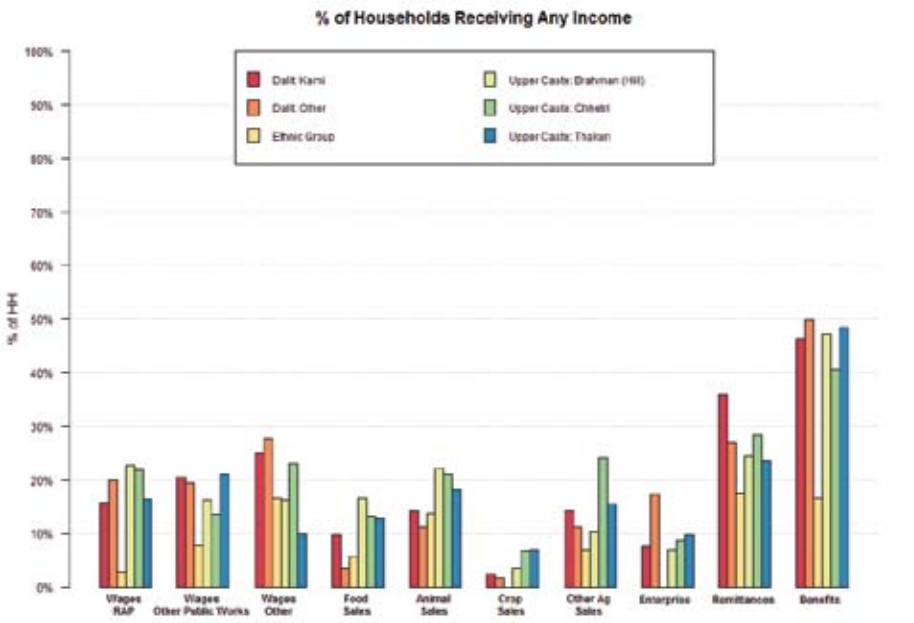


Figure 11: Sources of income by caste

Amongst those earning any income, the median income levels differed between castes most dramatically for enterprise. **Median income from enterprise for all three upper castes was more than double that of the Dalit castes. Conversely income from wages was higher for the Dalit castes than for the upper castes.**

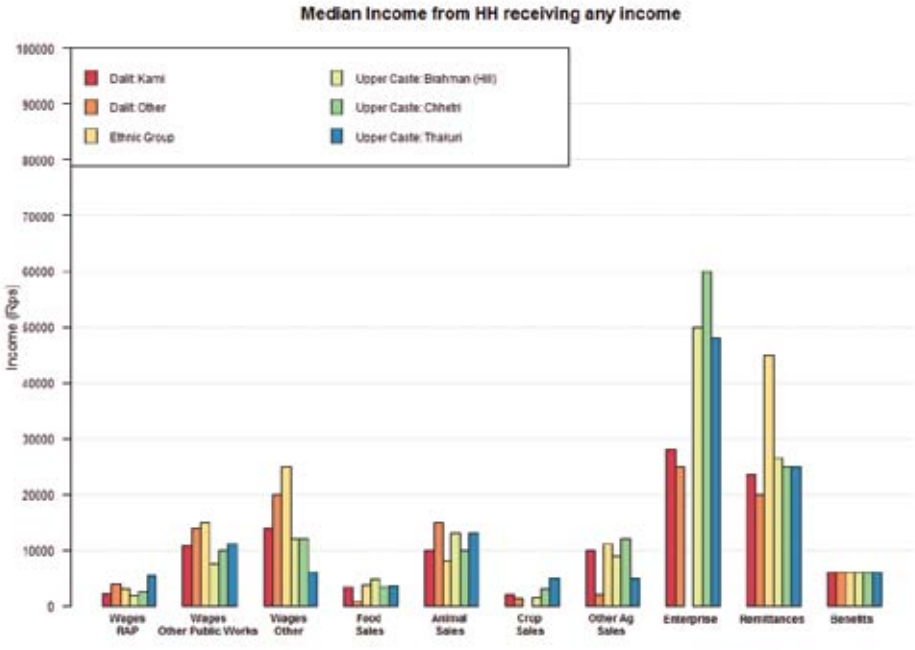


Figure 12: Median income from different sources by caste

The RCA noted some evidence of emergent trends affecting traditional patterns around identity and livelihoods.

Most families seemed to just break even in terms of their family income/expenditure, but several had large debts to service, especially those supporting children in higher education. As traditionally landless, Dalits have always needed employment and have been working in India for generations. Many shared with us that they have accumulated savings and have purchased land and houses, especially from others in the village who have left for the Terrai. This study indicates that often they had assets such as TVs and mobile phones when their Chettri or Brahmin neighbours did not. In one study site, Dalits were in a position to be the main money lenders in the village, especially where large loans were required (e.g. to service broker and transport costs for overseas migration to Japan or Korea). Most of the Dalits with whom the study team stayed or interacted with did not see themselves as poorer than others in the village (except in Humla, where the difference was acute). Some had been able to set up shops and were making good livings but the majority were continuing the tradition of migration for work.

Public works

Build area households are more involved in public works, but maintenance household earnings are higher. The better-off households are benefitting more than others

Respondents indicated whether they had any involvement in public works from RAP or any other programme over the last 12 months. Table 6 highlights the following findings:

- A total of 1,135 households had received income from public works (36% of the sample), of which just over half had received income from RAP.
- 2% had received income from RAP *and* other public works programmes.
- 10% of those receiving income from RAP also received income from other cash-for-work or food-for-work programmes.
- 12% of those receiving income from other cash-for-work or food-for-work programmes also received income from RAP.

	Number	%
Total # Households	3,189	100%
# Households Receiving Income from RAP	628	20%
# Households Receiving Income from Other Public Works	507	16%
# Households Receiving Income from All Public Works	1,135	36%
Receiving Income from RAP & Cash for Work	48	2%
Receiving Income from RAP & Food for Work	15	0%
Receiving Income from RAP & KEP	0	0%
Total Receiving Income from RAP & any other Public Works Programmes	63	2%

Table 6: Households receiving income from public works

Average household wages received from public works ranged from NPR 2,412 to NPR 9,459, with levels highest in the RAP maintenance zones.

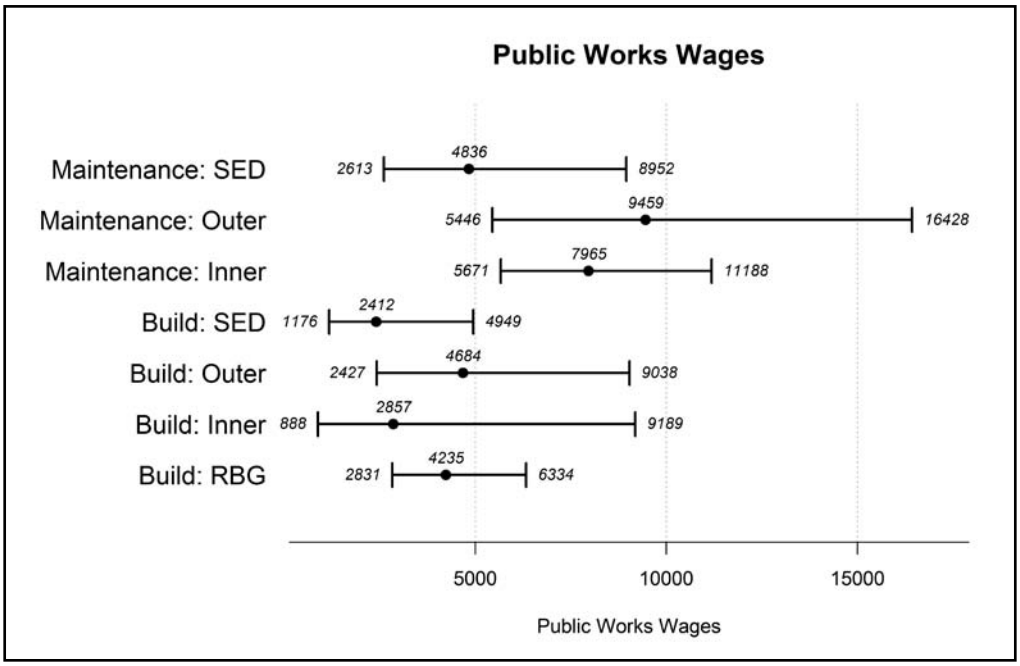


Figure 13: Income from public works programmes disaggregated by RAP strata. P-value for differences between strata <0.001

When the same data was disaggregated by RAP PMT quintiles (Figure 14) **households in the quintiles with the higher predicted consumption were also those households that received on average more income from public works programmes. Clearly if there is a pro-poor targeting aim for public works programmes in this region, it does not seem to be realised**. In fact the distribution of the public works income is regressive. The poorest quintiles are receiving the lowest amount of income per household from this potential safety net.

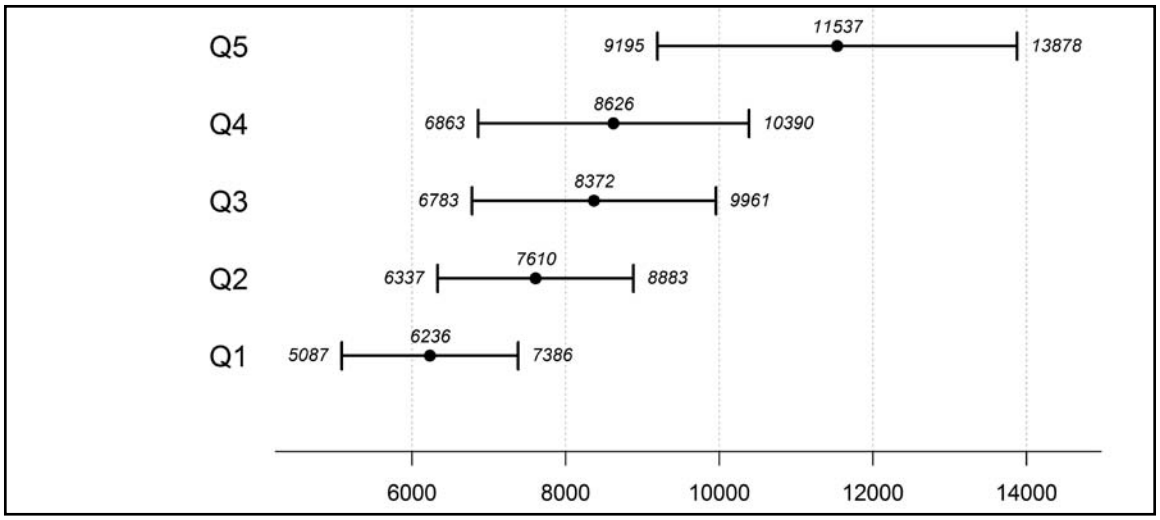


Figure 14: Income from public works programmes disaggregated by RAP PMT quintiles. P-value for differences between strata <0.001

Of those participating in public works, around 75% of those in the RAP3 maintenance zones receiving public works wages source them from cash-for work programmes, compared to a lower percentage in the build zones[13]:

	Build: RBG	Build: Inner	Build: Outer	Build: SED	Maintenance: Inner	Maintenance: Outer	Maintenance: SED
Cash for work	17.1	40.2	54.1	6.7	76.1	81.1	74.1
Food for work	0.8	10.6	37.3	4.2	4.5	18.9	0
KEP	0.5	6.3	7.6	0.6	0	0	1.9
RAP construction	81.6	42.9	1.1	87.9	3.0	0	20.4
RAP maintenance	0	0	0	0.6	16.4	0	3.7

Table 7: Spread of public works jobs by type of programme by domain

'Cash for work' pays a substantial amount more than any of the other public works programmes – on average about three times more. This was classified as house construction and labour, daily rate work that was mostly on a flat rate of 400 NPR/day. It is not possible to tell from the survey data what agency or government scheme was supporting this work.

	Mean wage	Median wage	Geometric mean wage	Min	Max
Cash for work	18,944	12,000	9,880	0	120,000
Food for work	4,533	4,000	941	0	24,000
KEP	6,713	2,000	2,156	1	57,600
RAP Construction	6,835	2,500	868	0	123,456
RAP Maintenance	2,542	1,500	1,132	0	12,000

Table 8: earnings by type of public works over the past 12 months

Earnings from the cash for work programmes came mostly from periods of 30 days' work. Note that some of the above works are highly dependent on seasonal factors.

Medicinal and aromatic herbs sales, and other economic activities are significant in some of the remote build areas

It is difficult to pin down precisely the reasons for higher than expected incomes in some of the more remote areas of the sample and this is an area that could benefit from further study. However, there are clearly contributions to the household purse that are outside normal rural activities. One opportunity that is unique to this part of the country is the collection and sales of medicinal and aromatic herbs for families in the more remote areas. The RCA sheds some light on this and it is useful to set out some extracts below.

[13]Note that the 20% reported on 'RAP construction' in the maintenance SED group appears strange given that there is no RAP construction in this area. However, the figure was only a total of 11 jobs. The daily rate was 200 NPR/day, and an average of 8 days. There is some possible confusion on responses to the survey, and / or respondents stating this as they have been involved in SED infrastructure work such as small scale irrigation schemes.

The researched villages in Humla posed the greatest conundrum in terms of manifestations of poverty. Here, unlike all the other study locations, there was very high public poverty (access to services and markets, connectivity to the outside world) and low personal poverty (as judged by relative family wealth). People in the researched sites in Humla were relatively 'cash rich' but had very poor access to quality public facilities or opportunities to raise their concerns and voice. They felt neglected by the Government and remote and cut off. Personal family cash incomes were relatively good and better than other study villages.

People had cash incomes, mostly from cross border trade with China (there was some reluctance to discuss this), and benefit from Chinese tradespersons coming to them to buy a range of at least six different medicinal herbs, which formerly they had traded at lower prices through Nepalgunj. Paying a very small fee to the Community Forest Committee, entire families gather herbs over a period of 1-2 months and earn an estimated at NPR 70,000 to one lakh. Interestingly, they referred to cash in US dollar exchange rate terms rather than in Nepalese rupees.

They indicated that they did not need to migrate to India to look for work and this practice has largely stopped in recent years. They own relatively large numbers of livestock. They invest in gold as savings (with much evidence of this wealth in the jewellery worn by women and the gold dealers situated in the village). They felt they were more food secure than other areas[14] with many indicating that they did not have to purchase food at all throughout the year. Bottled alcohol consumption was high with families saying they spent an average of NPR 15,000 per month.

Household income is also supplemented by lucrative portering, including the use of pack animals which has really only taken off in the last two years as the village has become connected with Mugu. A single mule can carry a load at a rate of 2,500 NPR[15] from the district town for local hirers and more for outsiders providing a typical monthly income per mule of NPR 10,000-15,000.

The team also observed extensive opium cultivation. It was very difficult to engage in conversation around this as it was clearly sensitive but the cultivation was not hidden and other conversations suggest the trade routes through China which are used for other commodities are being used for this too.

4. Assets

Less than 5% of households own a bicycle, motorbike, or heater (this was the same for pressure lamps, landline phones and sewing machines). Jewelry was the most commonly held of the 12 assets identified in the survey.

Asset ownership by caste

Dalits own fewer assets than other castes

Investigation of asset ownership by caste shows a clear divide between the Dalit castes and the upper caste and ethnic groups. On average, members of the Dalit castes owned 2 of the assets listed in the survey, whereas the other castes owned 3 of the assets on average.

[14] They queried why they were eligible for food aid when they grow sufficient for their consumption needs.
[15] The rates per kg are five times those in other areas e.g. 35NPR/kg compared with 7-8 NPR/kg in Bajura.

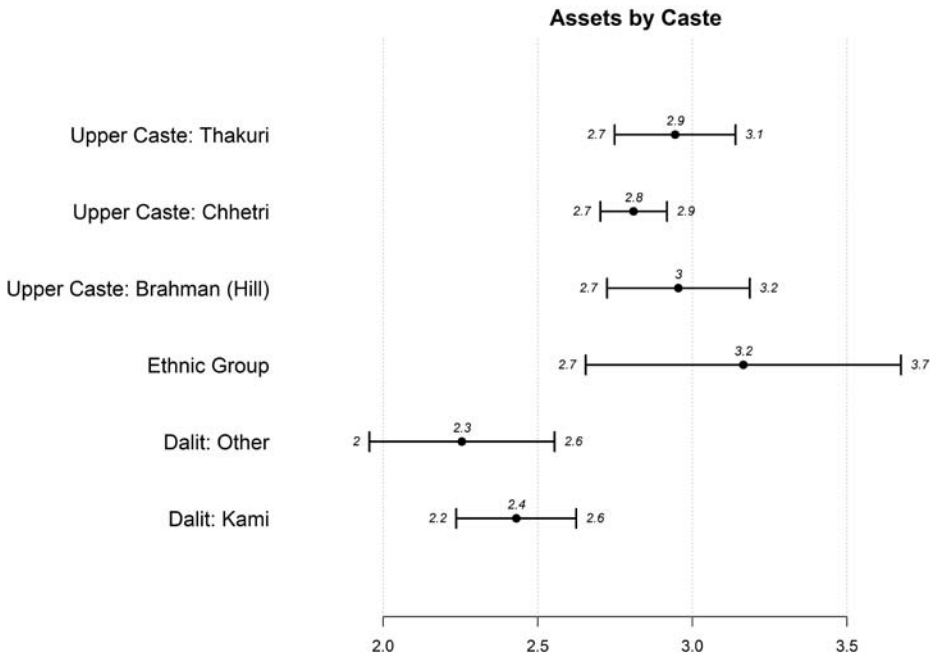


Figure 15: Asset ownership by caste

Asset ownership by location

Figure 16 shows that average asset ownership was highest in Jumla, Mugu and the outer regions of Doti and Dailekh and was low throughout Humla and Kalikot. However in actual terms the variability was not especially large – the average number of assets owned from the list of 12 was 2 for the worst regions and 4 for the best regions.

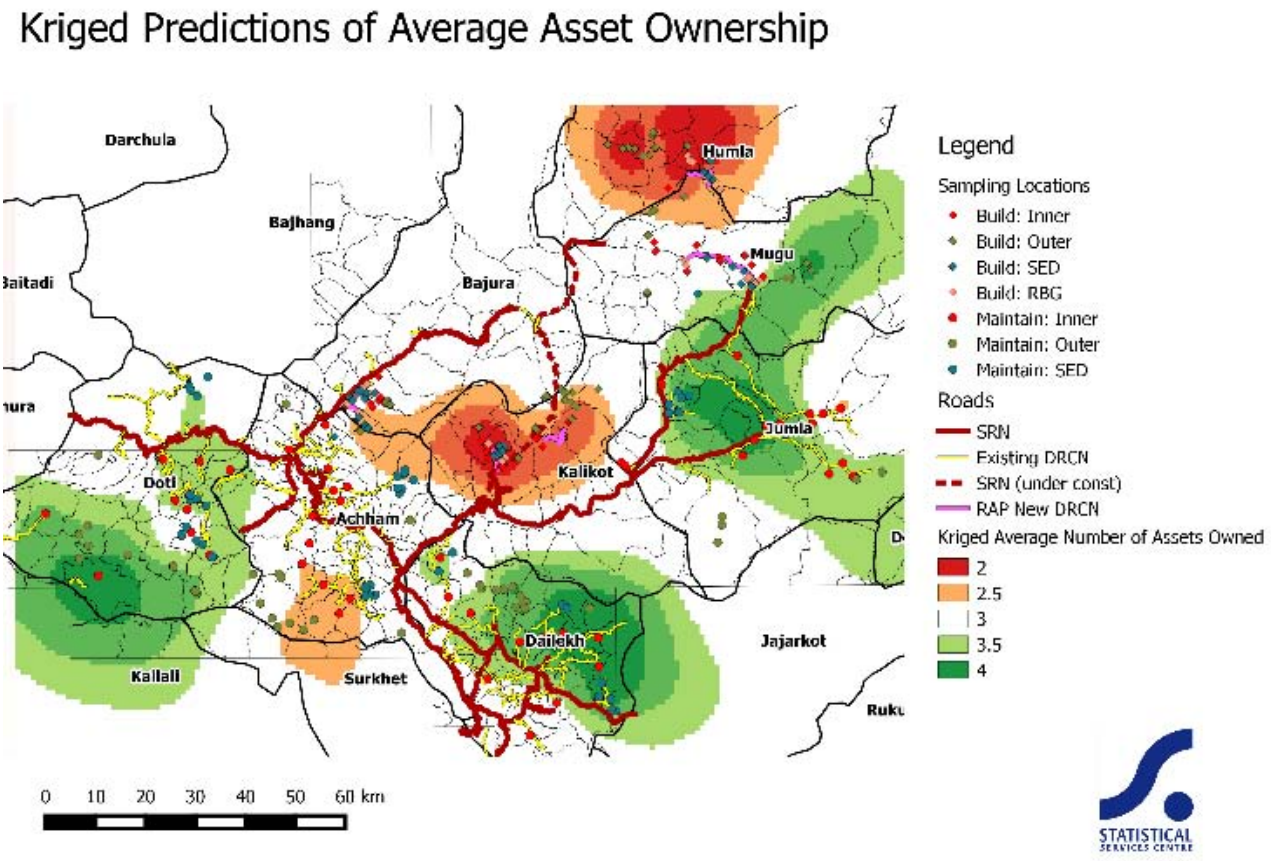


Figure 16: Asset ownership by location

Land ownership

Ethnic groups tend to own more land

The amount of land owned varies significantly by caste, with **Dalit and Chhetri households owning the least land ethnic groups owning the most land.** The average size of land owned by the ethnic groups castes is three times larger than Dalits, and twice as large as the upper castes as a whole[16].

Caste	N	Mean	95% CI Lower	95% CI Upper	Min	Median	Max
Dalit: Kami	348	0.5	0.4	0.8	0.0	0.5	25.1
Dalit: Other	231	0.4	0.3	0.6	0.0	0.3	12.6
Ethnic Group	103	1.6	0.9	2.6	0.0	1.6	41.7
Upper Caste: Brahman (Hill)	290	1.0	0.7	1.5	0.0	1.2	169.9
Upper Caste: Chhetri	1,714	0.6	0.5	0.8	0.0	0.6	134.3
Upper Caste: Thakuri	469	0.9	0.6	1.4	0.0	1.4	52.4

Table 9: Land owned in hectares by caste. P-value for differences between groups <0.001

[16]It should be noted that the data recorded for the ethnic groups came from two villages and was therefore very clustered. The results for the ethnic groups are therefore unlikely to be representative of the region as a whole.

The survey asked households about land sales or purchase over the last 12 months. An average of around 3% of households across the domains purchased and / or sold land. The majority of this was for agriculture. Whilst these transactions are small scale, it will be interesting to monitor these over time: the RCA (and experience from previous RAP phases) noted that there were strong linkages between land sales / purchases and the establishment of a new road corridor as people buy up land close to the new road location for small businesses and guest houses, and sell off agricultural land further away.

Adoption of improved crop varieties

Adoption rates to new crop varieties varied significantly across RAP3 areas, with the **adoption rates considerably higher for RAP3 SED members that any of the other domains.** Given that many SED group members have previously worked on RAP roads and associated savings and livelihoods activities, one could reasonably expect that these groups would be more likely to be early adopters and more receptive to changes in agricultural practices.

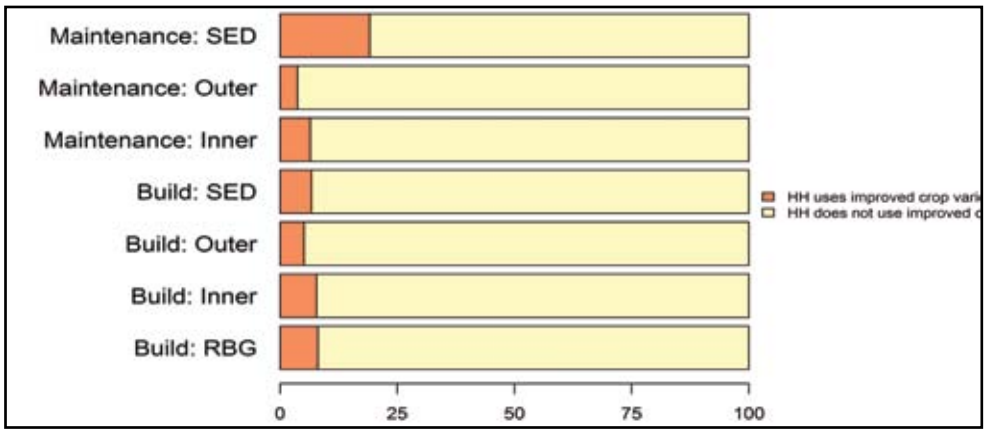


Figure 17: Households using improved crop variety by domain

This may be an important indicator to focus on in future analysis. The RCA noted across all their research sites the strong negative views on agriculture as a viable future. In many cases, it is left to the female/young/older household members due to the male adults migrating.

There were interesting RCA findings on perceptions of the risks associated with diversifying agricultural production, coupled with low confidence in the future viability of agriculture. Households viewed migration to India as much lower risk (and with much better earning potential) than diversifying their agricultural practices.

Loans outstanding

There was some evidence of a link between consumption quintile and whether loans were outstanding ($p=0.028$). **There was strong evidence that the value of the loans increased with consumption quintile** ($p=0.001$). The mean loan size for the highest quintile was 94,000 NPRs compared to 47,000 NPRs for the lowest quintile. This is suggestive of better off households being simply better placed to secure loans and take on associated risk.

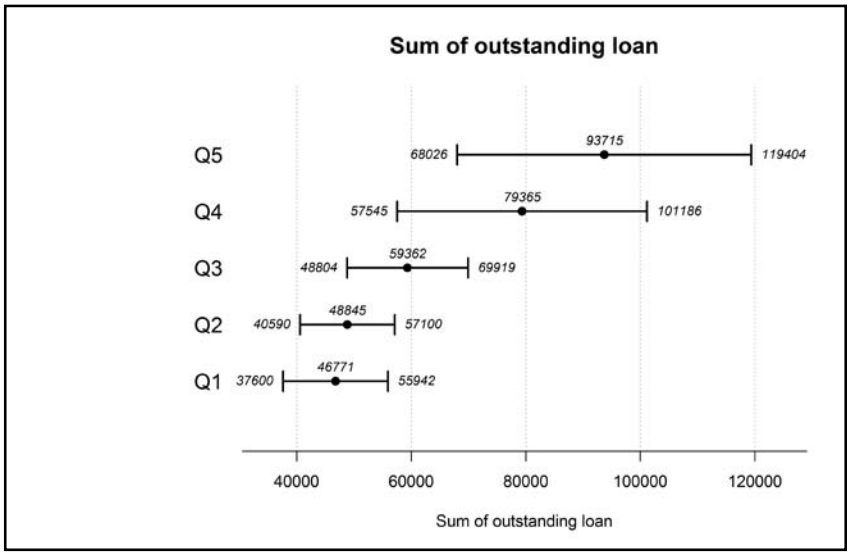


Figure 18: Sum of outstanding loans by consumption quintiles

5. Access

An access index was developed based on the travel times recorded for households to six different services. For each service, limits for a 'good' travel time and an 'acceptable' travel time were laid out; households within these limits scored 2 or 1 points respectively for that service and the overall index was calculated as the sum of these scores. The total index score is therefore on a scale from 0-12, with 12 indicating good access to all 6 services and 0 indicating poor access to all six services.

Service	'Good' Travel Time (2)	'Acceptable' Travel Time (1)	'Poor' Travel Time (0)
Primary school	*<30 mins*	*30-60 mins*	*>60 mins*
	91.6%	6.0%	2.4%
Secondary school	*<30mins*	*30-60 mins*	*>60 mins*
	44.5%	25.9%	29.6%
Shops	*<30 mins*	*30-60 mins*	*>60 mins*
	86.9%	6.7%	6.5%
Hospital	*<4 hours*	*4-12 hours*	*>12 hours*
	31.9%	24.9%	43.2%
Agriculture Centre	*<4 hours*	*4-12 hours*	*>12 hours*
	66.9%	19.6%	13.5%
VDC HQ	*<4 hours*	*4-12 hours*	*>12 hours*
	16.9%	31.7%	51.4%

Table 10: Categories applied for the access index

Access and wellbeing

A clear relationship between access and predicted consumption is shown in Figure 19, which shows a positive correlation between access and predicted consumption, and a large jump at Access Index =12, (i.e. those with 'good' access to all 6 of the services in the index).

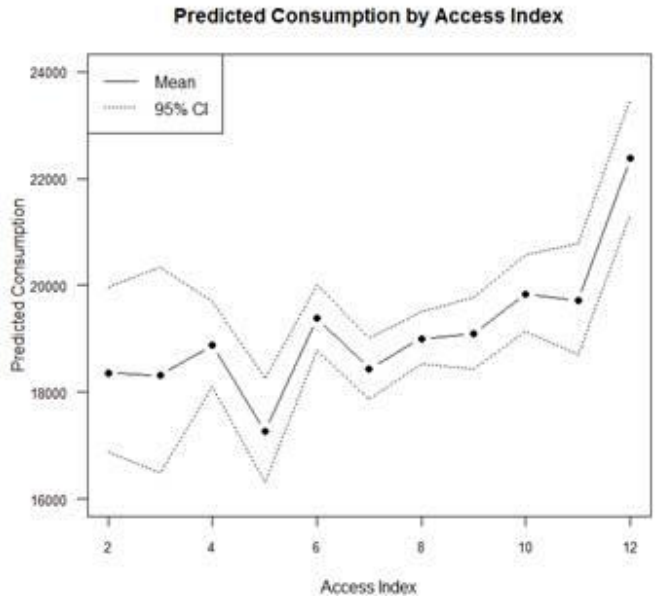


Figure 19: Predicted consumption by access index

Spatial dimensions of access

The access index scores vary significantly by region ($p<0.001$) – see Table 11, with the inner areas showing higher scores.

	Region	Mean	95% CI	Median
Maintenance	Inner	8.83	[8.47, 9.19]	9
	Outer	6.31	[5.84, 6.78]	6
Build	Inner	8.24	[7.93, 8.54]	8
	Outer	6.60	[6.07, 7.13]	7

Table 11: Access index scores by RAP domain

The kriged map of access index predictions over the entire sampling area (Figure 20) shows clear areas with poor accessibility, following the generally expected patterns. In general, the access index is highest in areas where there are existing road networks, and lowest in the areas furthest from existing road networks. The southern region of Achham, the northern region of Dailekh, Humla, Western Mugu and northern Kalikot have especially poor access.

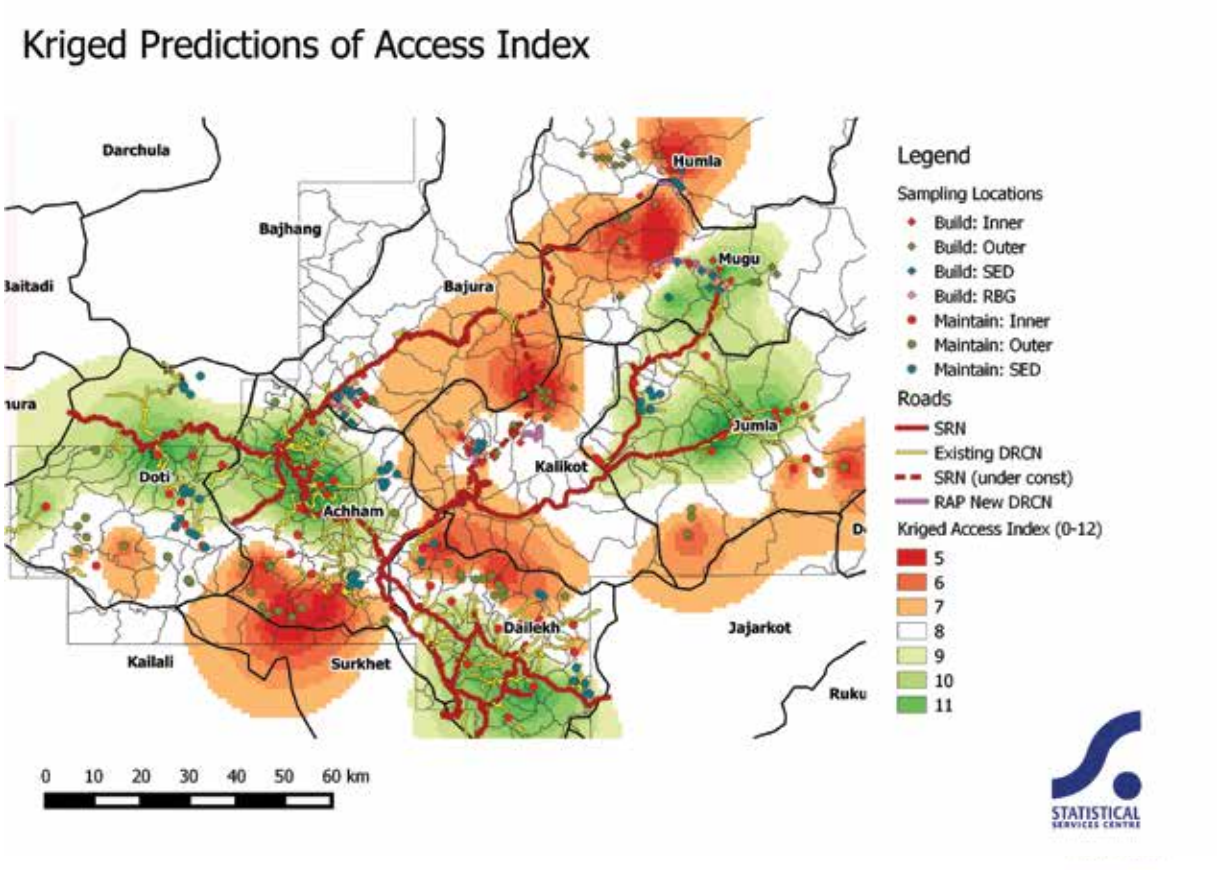


Figure 20: Kriged predictions of access index

An analysis of the access index scores by category shows clear trends, particularly for the less accessible services (see Table 12: Access index scores by RAP domain and category):

- **Primary school** access was very consistent across all of the areas surveyed, with over 87% of all households located within 30 minutes of a primary school.
- Households in the inner areas of the RAP3 build districts had significantly better access to **secondary schools** than those in other areas; over half of households surveyed were within 30 minutes of a secondary school compared to 41% or less in all other regions.
- Over 80% of households were located within 30 minutes of a shop across the areas surveyed.
- **Access to hospitals, agricultural centres and the VDC HQs** showed clear divides between the inner and outer areas, with accessibility much better for the inner areas.

		Prim Sch <30 mins	Second Sch <30 mins	Shops <30 mins	Hospital <4 hours	Ag Centre <4 hours	VDC HQ <4 hours
Maintenance	Inner	89.5	40.9	84.9	48.3	76.3	23.0
	Outer	87.4	33.2	81.6	12.6	32.2	1.3
Build	Inner	94.6	54.7	88.5	29.8	76.6	19.6
	Outer	91.5	34.4	90.7	19.9	51.2	10.6

Table 12: Access index scores by RAP domain and category

Variations in access by caste

Highly significant variations in access was found between castes (p<0.001). This effect is entirely driven by the low average access score for the Ethnic Group category, which is significantly lower than any of the groupings considered. There were no significant differences in access between any of the upper castes or Dalit castes.

Group	Sub-Group	N	Mean	95% CI	Median
Upper Caste	Brahman	290	7.92	[7.30, 8.54]	8
	Chhetri	1,714	7.95	[7.68, 8.22]	8
	Thakuri	469	8.04	[7.56, 8.53]	8
Dalit	Kami	348	8.11	[7.70, 8.53]	8
	Other Dalit	226	7.91	[7.25, 8.56]	8
Ethnic Group	Ethnic Group	102	6.46	[5.82, 7.10]	7

Table 13: Access index scores by caste

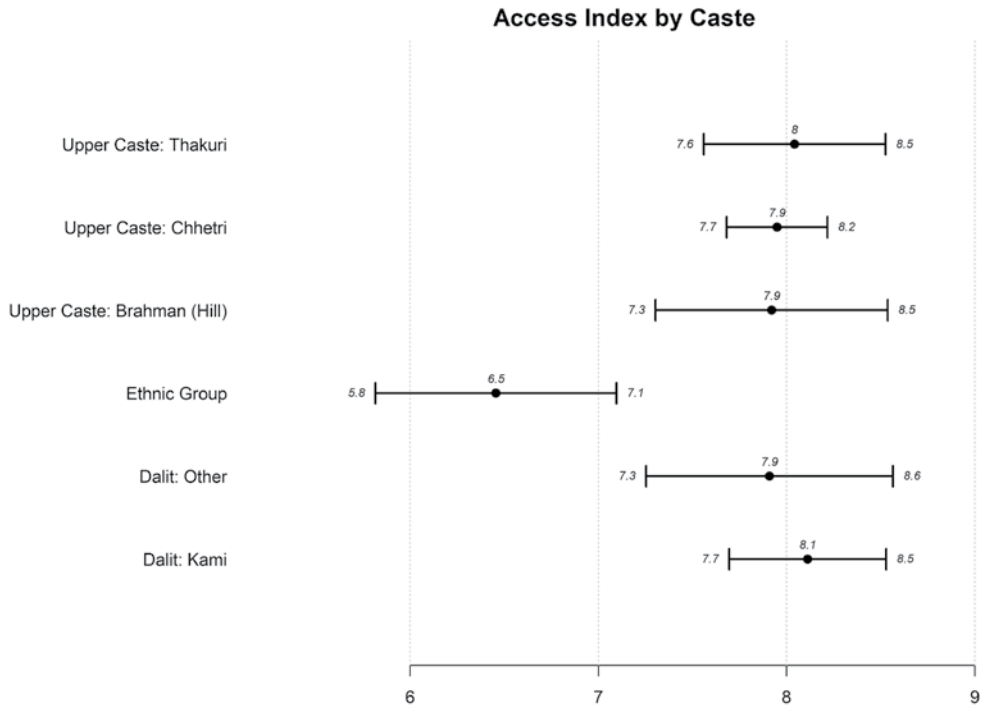


Figure 21: Access index scores by caste

		Prim Sch <30 mins	Second Sch <30 mins	Shops <30 mins	Hospital <4 hours	Ag Centre <4 hours	VDC HQ <4 hours
Upper Caste	Brahman (Hill)	90.3	50.0	84.5	32.1	67.9	9.7
	Chhetri	91.0	41.1	85.1	33.8	66.5	19.7
	Thakuri	95.7	53.7	91.0	32.2	69.3	15.8
Dalit	Kami	93.1	51.7	94.5	27.9	68.1	17.2
	Other	93.1	47.2	93.1	31.2	64.9	13.9
Ethnic Group		84.5	18.4	63.1	10.7	61.2	1.9

Table 14: Access index scores by caste and category

Use of local shop

Nearly all respondents indicated using local shops at some point. There were many differences in frequency of usage by area, but there were no noticeable differences by caste. **There were clear differences in frequency of shop usage by accessibility to the shops**. Those who indicated that they used shops daily were an average of less than 10 minutes' walk from a shop; those using shops weekly or when needed were on average 20 minutes' walk away; and those indicating rare or monthly usage were an average of more than 25 minutes away.

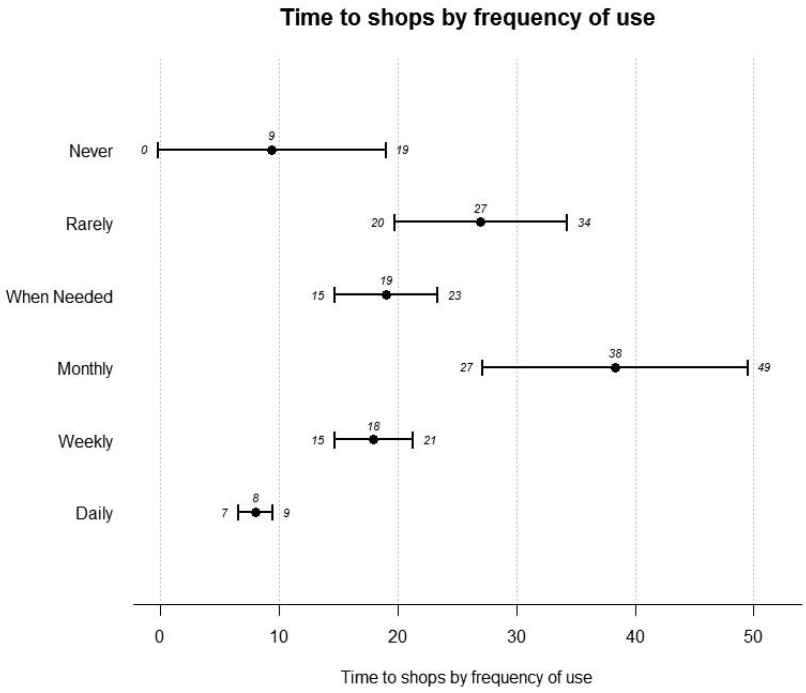


Figure 22: Time in minutes to shops by frequency of use

Health: use of health post

Concern about health facilities being less than adequate was greatest in the two most remote sampling domains where around 65% of respondents indicated the facilities were not adequate. This was significantly higher than in the other domains where around 55% indicated facilities were not adequate. The majority of respondents indicated that they used health posts, 'rarely' or 'not needed'. The RCA study noted huge diversity in the quality of health services available from those which were relatively well resourced to one which was permanently locked and had no medicines.

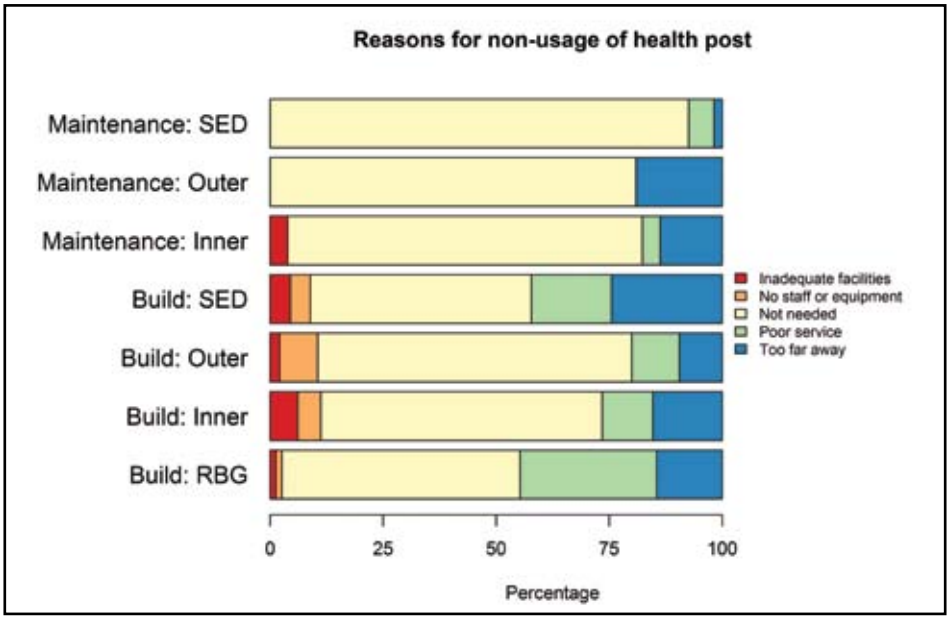


Figure 23: Use of health post by domain

There were no noticeable differences between caste in health post usage. Reasons for non-usage varied noticeably by domain. In the RAP3 maintenance areas, the overwhelming majority of non-users indicated that lack of use was because they did not need to go to health posts. The RCA suggests that non-use/'no need' may, in part, be due to the higher prevalence of and preference for private medicine shops in maintenance areas. Medicine shops are preferred because people can pick up medicines easily and quickly, shops are open long, observe regular hours, and are well stocked.

Use of health workers in birth deliveries

Of the households where a woman had given birth in the past 24 months, the proportion of households in which a delivery took place in the presence of a professional trained health worker varied significantly across the surveyed region – between 22% and 43%, with the percentage at its lowest level in the two outer areas (Table 15).

The RCA study notes that many mothers prefer to give birth at home because it is more comfortable, friendly and free, and are concerned about the long distances to health centres and, where there is better road access, the unreliability and discomfort of ambulance transportation.

Domain	All deliveries in presence of health worker in past 24months	All deliveries in absence of health worker in past 24 months
Build: RBG	57 (38.8%)	90 (61.2%)
Build: Inner	51 (34.2%)	98 (65.8%)
Build: Outer	44 (24.6%)	135 (75.4%)
Build: SED	39 (31.5%)	85 (68.5%)
Maintenance: Inner	59 (42.8%)	79 (57.2%)
Maintenance: Outer	25 (21.6%)	91 (78.4%)
Maintenance: SED	58 (43.0%)	77 (57.0%)

Table 15: Prevalence of deliveries in presence of a professional trained health worker in the last 24 months disaggregated by RAP strata. P-value for differences between strata = 0.020

Use of district centre

The vast majority of all households in all domains and all castes indicated that they never used the district HQ. 97% of those who never used the district HQ indicated that they did not need to use the facility. The RCA study noted that use of district HQ was generally for one-time needs such as getting citizen cards.

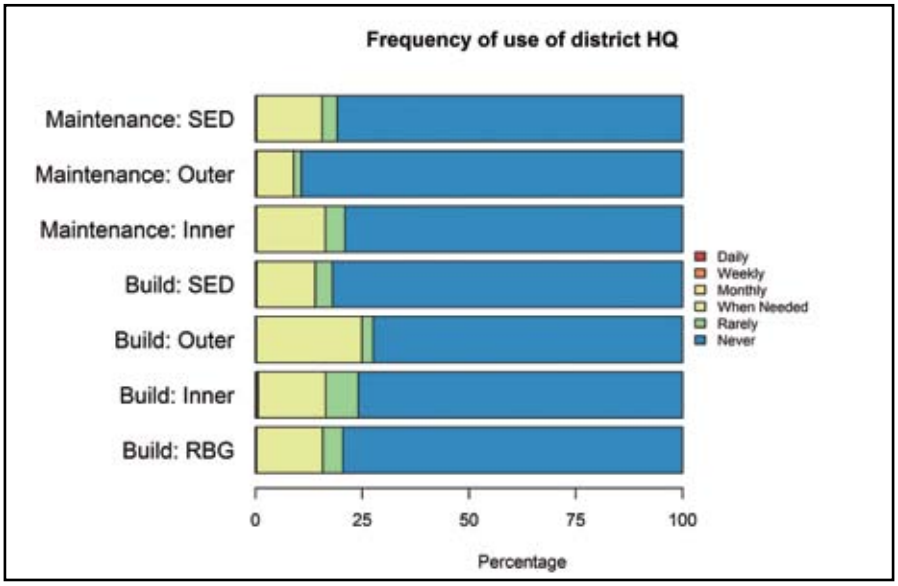


Figure 24: Use of district centre

Accessing micro-credit

Use of micro-credit is far less frequent for the Ethnic Group category than for other caste categories. There is also some evidence of usage of micro-credit being higher for Dalit households than upper caste households. Over 90% of households not using micro-credit indicated that they did not use the facility because they did not need it.

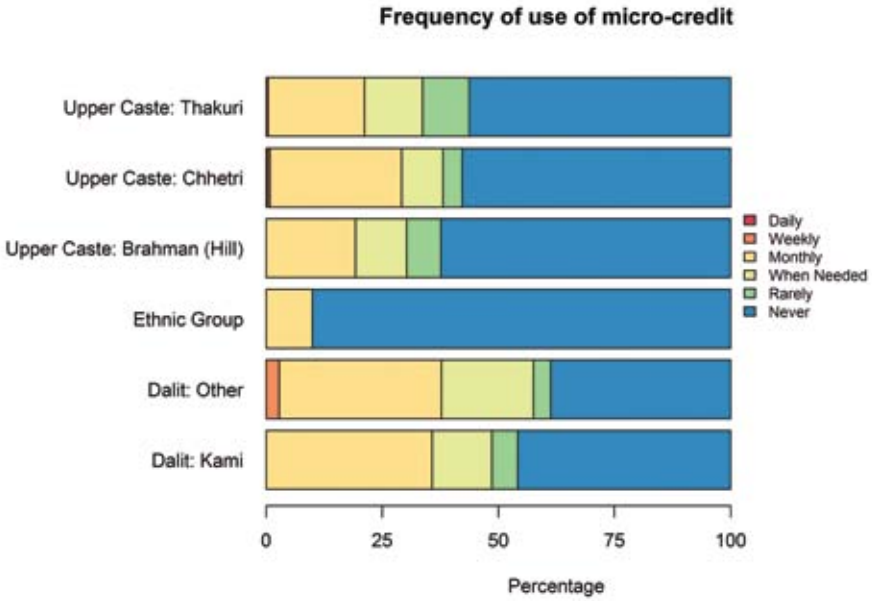


Figure 25: Frequency of use of micro-credit by caste

Time to agricultural centre

Figure 26 presents the spatial variation in predicted travel time to an agricultural centre. It shows four areas where there is particularly poor access to an agricultural centre (the dark orange / red areas on the map).

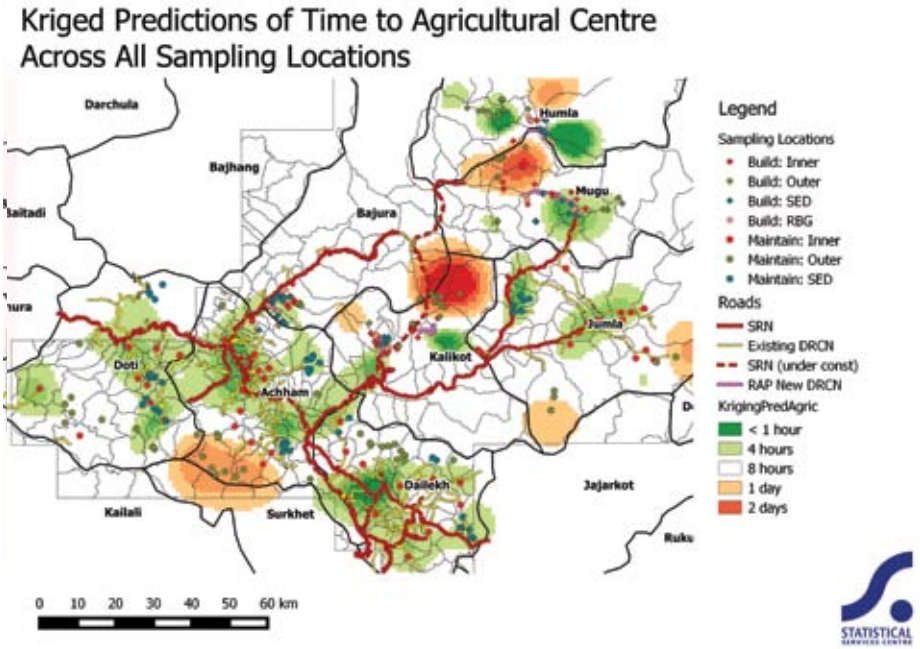


Figure 26: Kriged predictions of time to agricultural centre across all sampling locations

Time to dirt road

Perhaps surprisingly, dirt roads were on average most accessible to the Ethnic Group category, with an average travel time of around 2 hours with only a small amount of variability in this estimate[17]. **The variation in times to dirt road for the remaining castes was very large**, and average travel times to dirt roads were over 7 hours.

Caste	N	Mean	Standard Error	95% CI Lower	95% CI Upper	Min	Median	Max
Dalit: Kami	318	415.3	86	246.8	583.9	0	150	4,320
Dalit: Other	212	547.2	80.8	388.7	705.6	0	300	2,880
Ethnic Group	93	115.5	21.7	73.1	158	0	90	480
Upper Caste: Brahman (Hill)	254	594.8	149.3	302.2	887.5	0	120	4,320
Upper Caste: Chhetri	1,511	316.3	36.1	245.5	387	0	120	4,920
Upper Caste: Thakuri	375	679.2	110.3	463	895.4	0	180	4,320

Table 16: Time to dirt road by caste. P-value for differences between groups <0.001

[17]It should be noted that the data recorded for the ethnic groups came from two villages and was therefore very clustered. These results are therefore unlikely to be representative of the region as a whole.

6. Food consumption and security

The food consumption score (FCS) is devised by WFP as a weighted frequency of food group consumption in the last 7 days. The FCS is an explanatory variable in the RAP PMT model.

Food consumption by caste

Average food consumption showed considerable differences between the caste groupings. The food consumption scores were significantly higher for the three upper castes than for the Dalit and Ethnic Group categories, and the scores for the Dalit castes were significantly higher than those for the Ethnic Group category. **The average consumption scores were well above the cut-off point for poor consumption.** 18% of the ethnic group households were classified as having poor food consumption, in comparison to just 5% of the Thakuri caste.

		Mean	95% CI	Median	% with Poor Food Consumption (FCS<28)
Upper Caste	Brahman (Hill)	51.0	[47.6, 54.3]	48	12.4%
	Chhetri	52.5	[51.1, 53.9]	48	6.4%
	Thakuri	55.7	[53.6, 57.8]	53	5.1%
Dalit	Kami	46.2	[44.2, 48.2]	42.5	12.6%
	Other	47.1	[44.2, 50.0]	43.5	12.1%
Ethnic Group		41.9	[37.8, 46.1]	37.5	17.5%

Table 17: Food Consumption Score by Caste

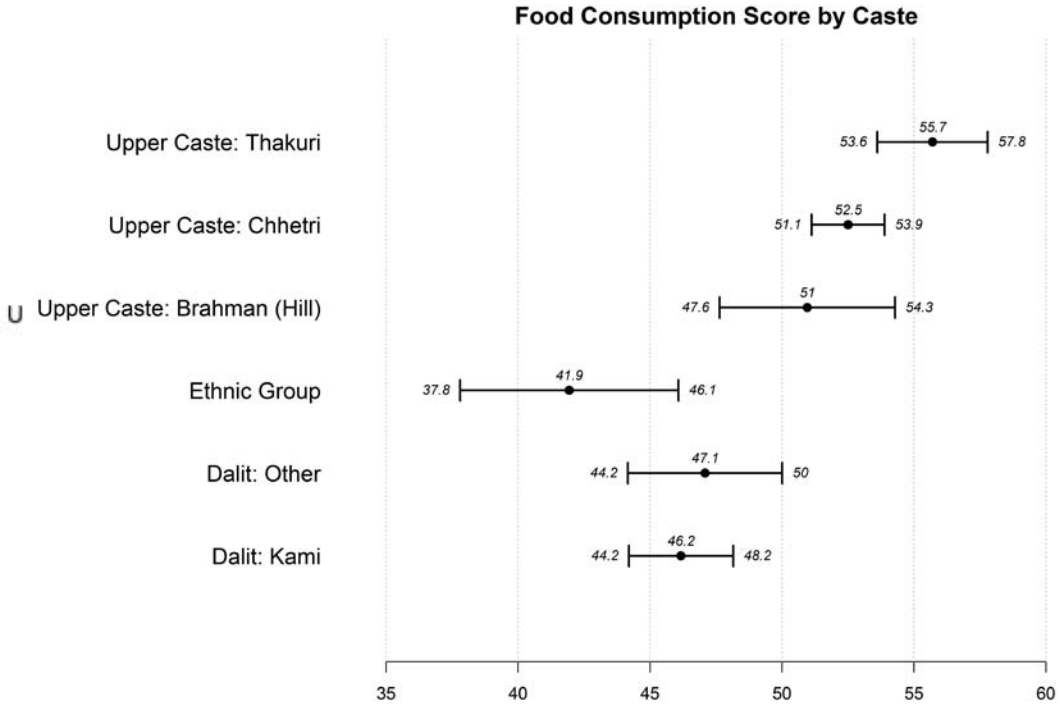


Figure 27: Food Consumption Score by Caste

Food consumption by location

The food consumption score did not significantly vary between the different RAP domains. However there were clear spatial patterns seen in the kriged analysis (see Figure 28). Food consumption is high throughout Doti, but in particular in the outer areas. The areas with the lowest food consumption are the outer areas towards the south of Accham and Dailekh. Food consumption is also seen to be a little higher than average in Mugu and lower than average in some areas of Kalikot, and Jumla.

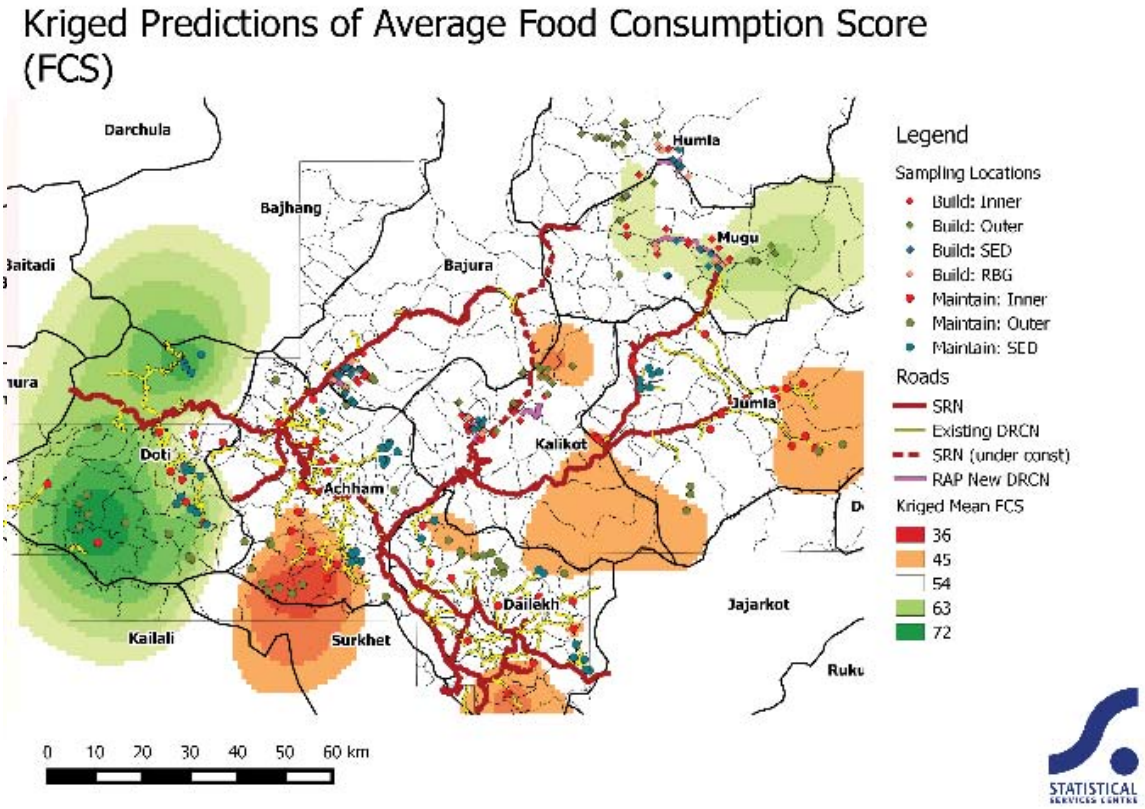


Figure 28: Kriged predictions of average Food Consumption Score

Food shortages

Food shortages more common in build areas

Households were asked if they had had not enough food in the past 30 days, and if so for how many days out of the last 30 had that been the case. As can be seen in Figure 29, the proportion varied between 5% and 30% between RAP3 areas. The RAP3 build areas generally report a much higher incidence of food insecurity in the last month than in the maintenance areas, clearly driving the significance and differences between strata ($p < 0.001$). Also there were significant differences between consumption quintiles across all of the strata, with the **poorest quintile (Q1) showing significantly higher prevalence of households indicating that they had experienced food insecurity in the last month** (Figure 30).

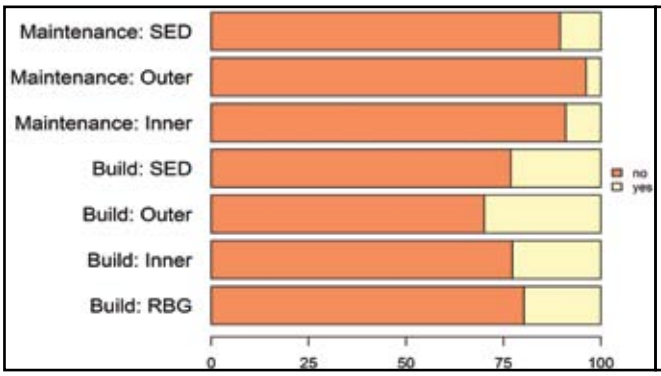


Figure 29: Prevalence of households indicating that they had not had enough food in the last 30 days disaggregated by RAP strata. P-value for differences between strata <0.001

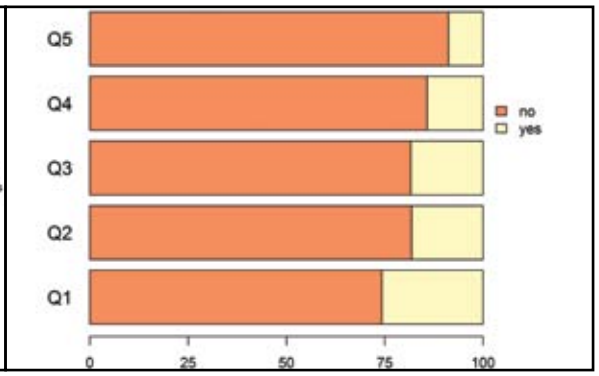


Figure 30: Prevalence of households indicating that they had not had enough food in the last 30 days disaggregated by RAP PMT consumption quintiles. P-value for differences between strata <0.001

This indicator of days in the last 30 days where there was not enough food or money for food was not used in the RAP PMT model. Therefore the disaggregation of this indicator by consumption quintiles and the distribution indicated in Figure 31 provides some reassurance that the RAP PMT is reflecting well-being insomuch as it is independently assessed by days of food insecurity in the last 30.

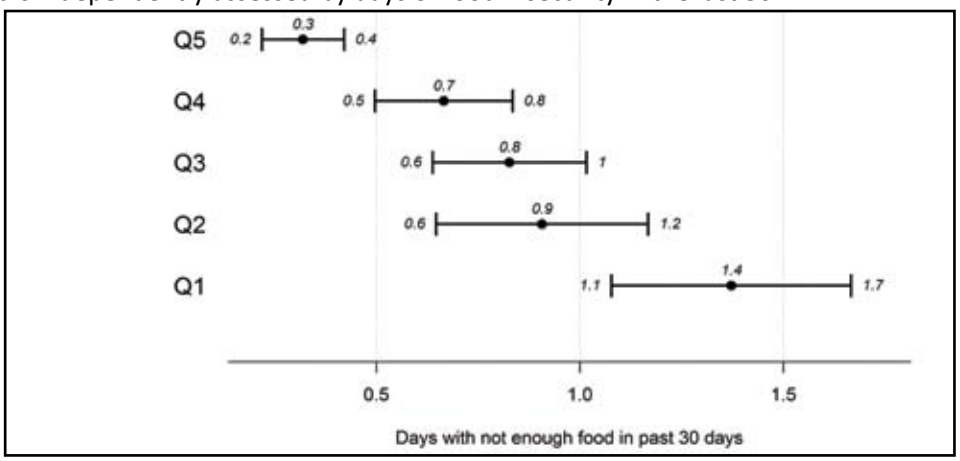


Figure 31: Households reporting days when the household members didn't have enough food or money to buy food in the last 30 days by consumption quintiles. P-value for differences between strata <0.001

7. Migration and remittances

Migration is hugely significant throughout Nepal and the mid and far western districts are no exception, although migration flows remain predominantly to India rather than further afield. The following boxed extracts from the RCA report gives some good insight into migration at household level. These are further illustrated by the data tables that follow.

Migration was almost exclusively by men and mostly in the age range 20-45[18] years. They use the well-functioning networks developed over generations to secure jobs as security guards, unskilled construction work, hotel work (including cooks), car washing or work in textile factories primarily in Mumbai, Delhi, Uttar Pradesh and Punjab. They have their own Indian based cooperatives which function as savings and credit organisations but also provide welfare support when migrants face difficulties. Nepali workers, we were told, are regarded as trustworthy and hardworking and they are in demand in India.

Some men had worked for between 15-25 years in India and had since retired, often opening small businesses (shops, teashops) with their savings. The only variation to this was found in Achham where men practice seasonal migration returning during the agricultural season. This system is made possible by 'job sharing' with Nepalis more permanently based in India.

The number of households with migrant members varies across RAP3 regions between 14% and 35%.Figure 33 presents the spatial variation of the predicted proportion of households with migrants in the last two years. It shows that **people in Doti have a high propensity to migrate and people in Humla are highly unlikely to migrate. Elsewhere, migration levels broadly confirm to the average**.

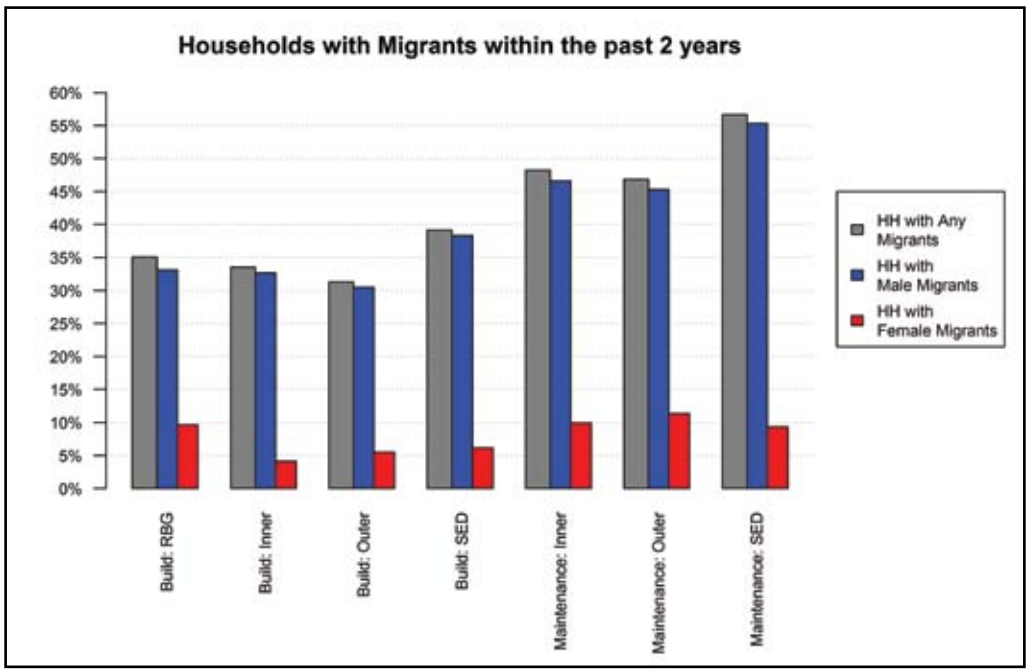


Figure 32: Households with migrants within the last two years

[18] People told us they start migration when they '*get married and start a family'* and continue until their children are educated and leave home. Some older men were still practising migration but told us they were keen to stop and remain at home.

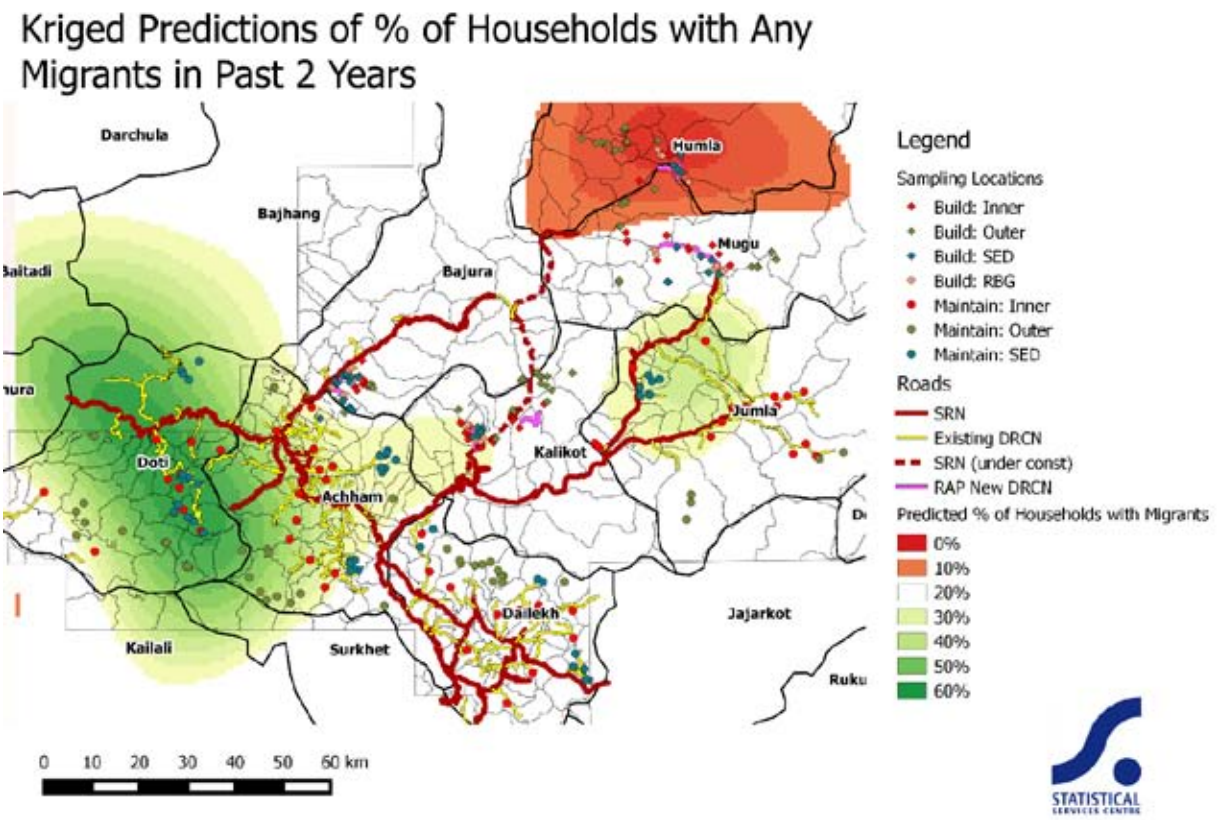


Figure 33: Kriged predictions of % of households with any migrants in past 2 years

In households with members who are currently away, there is not much variance in the average migrant numbers per household. As clearly illustrated, the **vast majority of migrants are male**. The **majority of migrants made a single trip** within the past two years (73.7%).

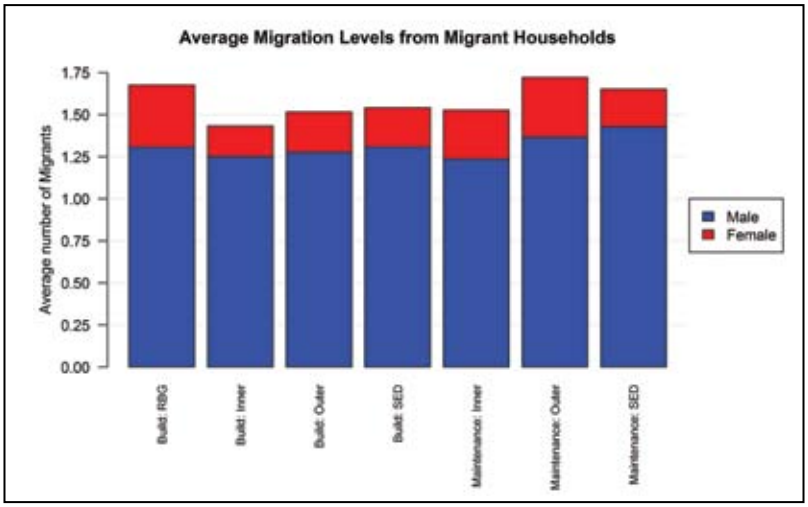


Figure 34: Average migration levels from households that have migrant members

Migrant destinations

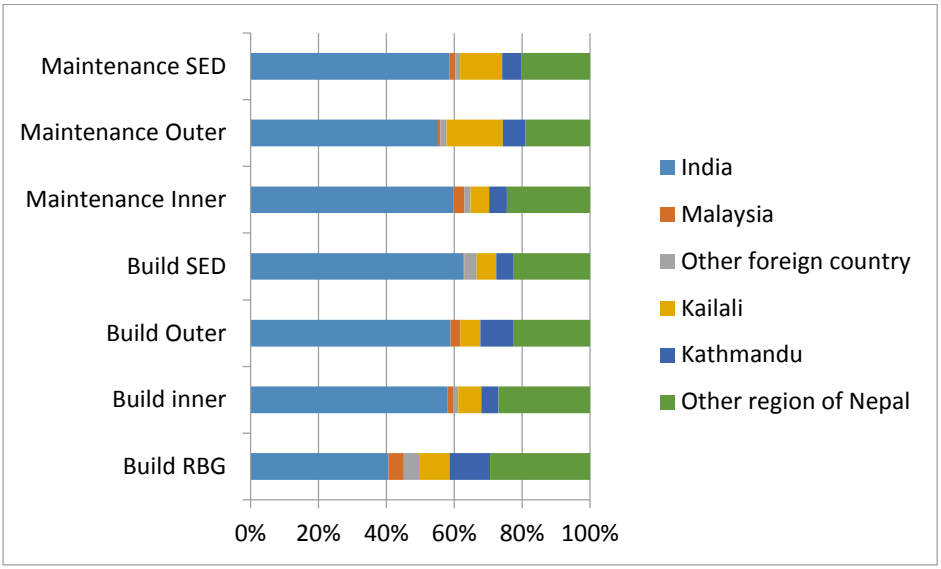


Figure 35: Migration destinations

India is the destination for the majority of migrants. A sizeable minority of migrants are in Malaysia, but there are no other foreign countries receiving more than three migrants in total from across the entire survey (other regions of Nepal export much greater numbers to Gulf states, East Asia and elsewhere). Many migrants stay in Nepal, **particularly Kailali District and Kathmandu**, but with a wide distribution across many areas of the country.

RCA findings on migration

Migrant worker incomes are said to be in the range of 12,000 – 15,000 Indian rupees /month ('but *5,000 Indian rupees is worth 8,000 Nepali rupees – so this is a good living'*[19] migrant informant).However, people indicated that workers conceal their real incomes[20]. Accommodation in India is generally shared and cheap and transport costs are minimal. Furthermore, there are no passport requirements or restrictions on employment for Nepalis in India making access, people say, to these jobs very easy. Remittances are generally carried by those returning on visits rather than through money transfer agencies so families do not necessarily receive regular payments[21]. Returning migrants also bring goods for the family as well as to sell. On the whole families could not put a monetary value on these goods. There is some concern in some communities that returning migrants squander their earnings on return, especially at Dashain, by '*throwing their money around', 'showing off*', '*drinking and gambling'*. As a result, in some cases they have to take loans to pay for return transport to India.

Migrant workers to other countries (other than India) and their families were much more vague about the jobs they undertake and the wages they make. Families are often not told what work their relative has and people shared with us that this may be because of the low status of jobs abroad or the dubious legal position of some jobs (e.g. working on student visas to Japan) but it may also be because they want to hide their true income to avoid demands in the village.

Why do household members migrate?

A sizeable proportion of migrants leave home for **education**. If totals for 'looking for work' and 'starting a new job' are taken together, **work related migration accounts for around 40% to 50% of respondent households with migrant members**.

[19] This means purchasing power of equivalent of 19.200- 24,000 NPR. Compare this to a GON teacher's salary of 15,000 NPR per month.

[20] Observation of assets and purchasing suggests that these may be underestimates as proxy indicators show e.g. one HH recently spent 200,000 NPR on a marriage ceremony, others purchase TVs and dish, pay for education and hostel accommodation for their children (5,000-8,000NPR /month) and buy land.

[21] This was a reason why women, in particular said they appreciated cash income earning opportunities as they feel vulnerable to the uncertainty of remittance payments.

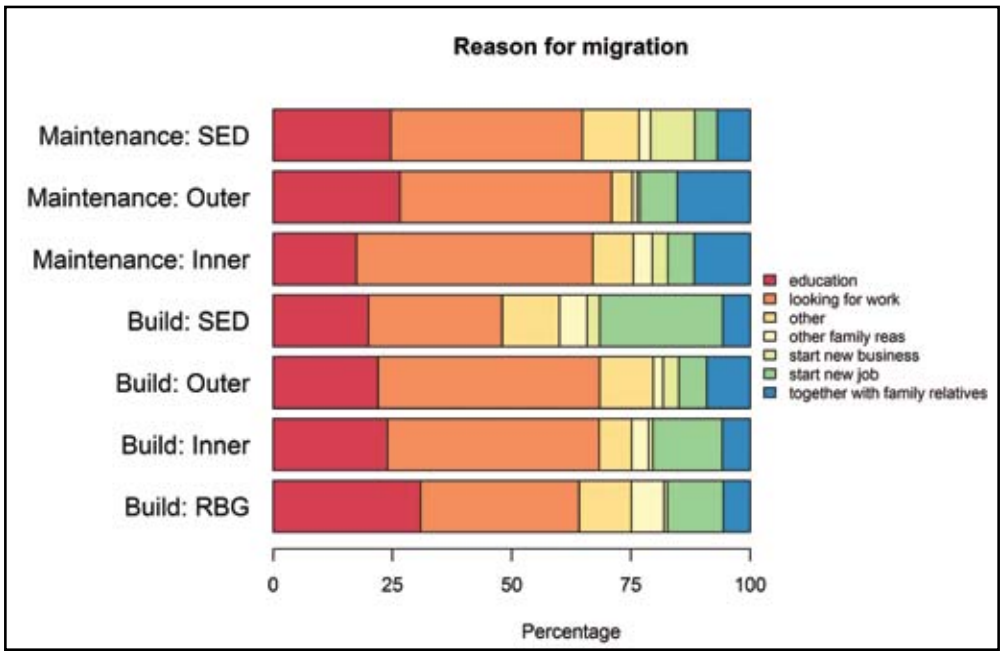


Figure 36: Reasons given for migration by domain

Of those that are working, what jobs are they doing?

Migrants find quite a variety of occupations. There is perhaps a smaller than expected proportion working in agriculture, with **larger numbers working in construction**, **hotel/restaurant workers, and insecurity**.

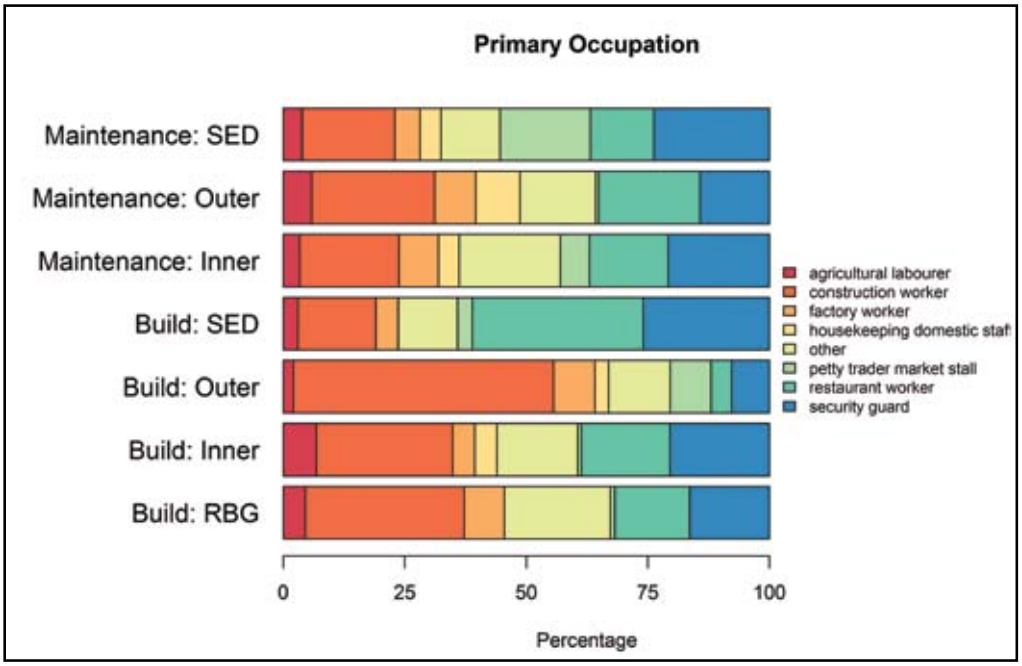


Figure 37: Primary occupation of migrant workers

What contributions do migrants make? Cash remittances

The **proportion of households receiving remittances varies across RAP3 areas from 15% to 34%** (see Table 18)[22].

Domain	Received remittances? Yes
Build: RBG	115 (25.2%)
Build: Inner	93 (20.1%)
Build: Outer	77 (15.2%)
Build: SED	91 (24.4%)
Maintenance: Inner	175 (32.2%)
Maintenance: Outer	134 (33.8%)
Maintenance: SED	167 (37.1%)

Table 18: Remittances received by domain

Remittance value by consumption quintiles: better off households earn more from remittances

Remittance income is positively associated with increasing consumption in the PMT model, which partly explains the striking distribution of remittance income showing **better off households gaining significantly more income from this source.**

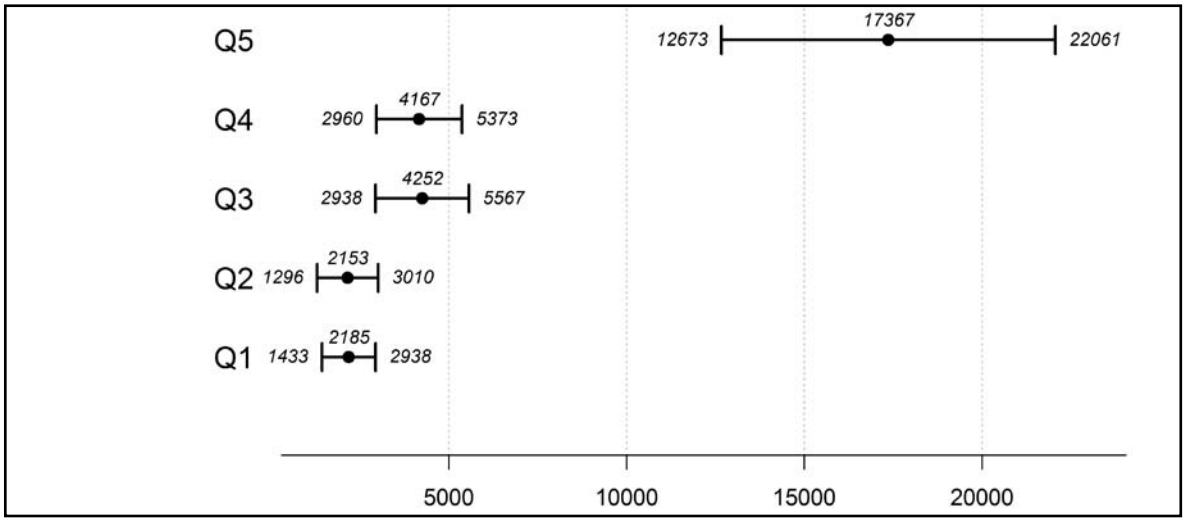


Figure 38: Income from remittances in the last 12 months disaggregated by RAP PMT consumption quintiles. P-value for differences between strata <0.001

[22] It should be noted that the figures in the table provide a snapshot of remittances received in the last 12 months. The RCA found that having once had a migrant worker in the household is a highly significant determinant of wellbeing – whether or not remittances have been received in the last 12 months. Additionally, the RCA found that cash was not the only modality through which remittances were received. Many returning migrants bring goods home with them in addition to cash.

Migration and remittances by caste

The notable differences in the results when disaggregated by category for both migration and remittances (Table 19) are driven by the Ethnic Group category, which had considerably lower levels of migration and remittances than the other categories. The only other difference is seen for the Kami Dalit caste where a higher percentage of households were in receipt of any remittances than the other caste groupings.

		% of HH with any migrants in past 12 months	% of HH with any remittances received in past 12 months
Upper Caste	Brahman (Hill)	21.7	24.5
	Chhetri	26.1	28.4
	Thakuri	26.7	23.5
Dalit	Kami	25.3	35.9
	Other	23.4	26.8
Ethnic Group		16.5	17.5

Table 19: Migration and remittances by caste

8. Social capital

Women's involvement in community processes and institutions

An examination of participation in formal community structures (village planning and Ward meetings set out below) reveals that on average, around 18-20% of men and 3% of women are involved in village planning processes, with a similar proportion for Ward meetings.

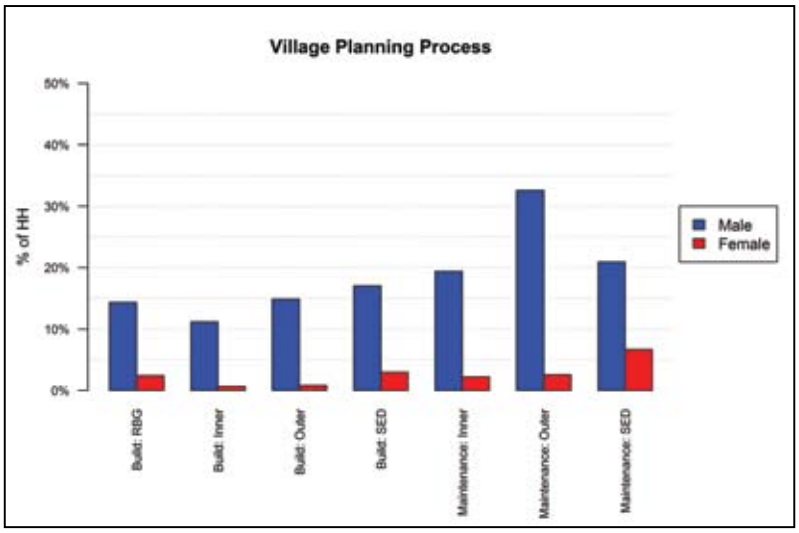


Figure 39: Men and women's involvement in village planning processes

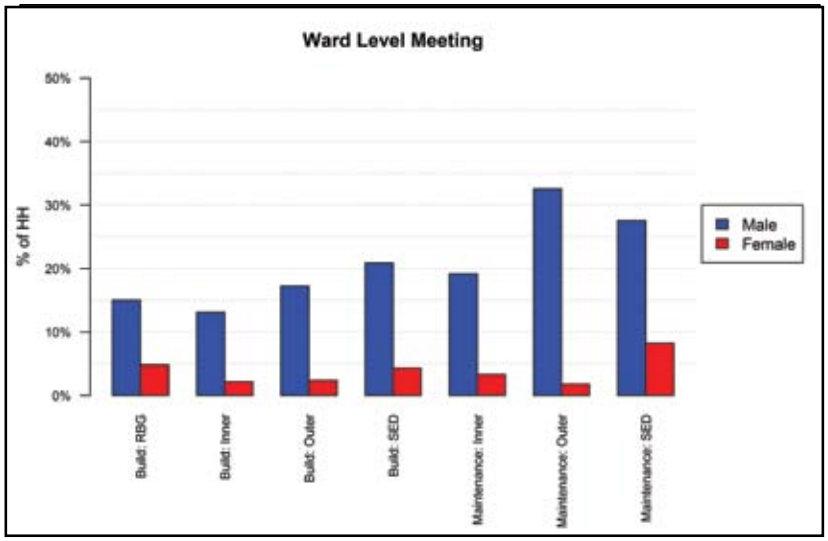


Figure 40: Men and women's involvement in Ward meetings

Other groups

Women's involvement in Women's Group meetings varies significantly between RAP areas – from 15-50%, with involvement **noticeably higher in maintenance districts**. There is a similar pattern in women's involvement in **savings groups**. It is not possible to tell whether this is due to differences in women's interest, the availability of such groups in the different areas, or other reasons.

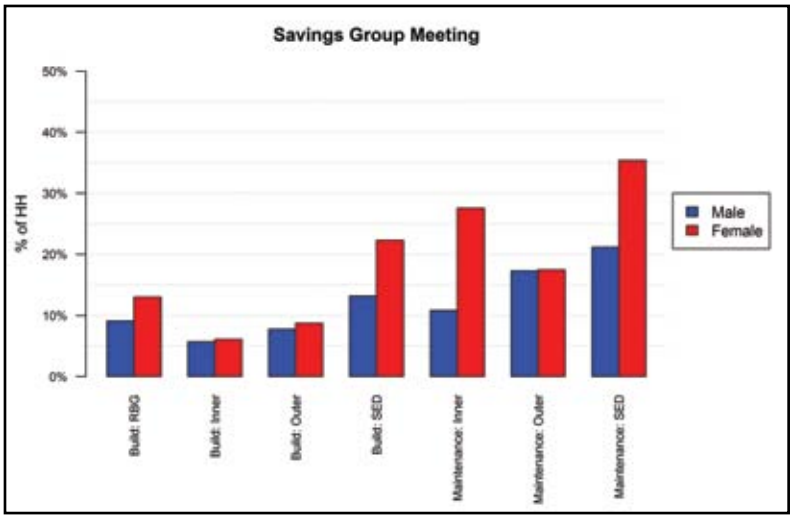


Figure 41: Men and women's involvement in Savings group meetings

9. Negative impact

The analysis presented in this section was motivated by the results of the RCA pilot in the November 2013 – such data was not collected in NLSS-III. It focuses look at people's perceptions of crime and insecurity and other non-crime-insecurity over the last 12 months.

How has crime changed in past 12 months?

The percentage of people believing that crime had increased was less than 5% across the sample. The work of the RCA led to a hypothesis that increased rural road access increased immigration by strangers and increased availability of alcohol, both of which were thought to lead to greater levels of crime and insecurity. The maintenance districts are where an increase in rural access should have been experienced, yet broadly speaking, they are reporting higher prevalence of perceptions that rates of crime and insecurity over the past year have *decreased*.

Domain	Crime decreased	Crime Stayed the Same	Crime Increased	Don't Know
Build: RBG	174 (38.2%)	241 (52.9%)	8 (1.8%)	33 (7.2%)
Build: Inner	161 (34.8%)	260 (56.3%)	12 (2.6%)	29 (6.3%)
Build: Outer	152 (29.9%)	303 (59.6%)	22 (4.3%)	31 (6.1%)
Build: SED	119 (31.9%)	215 (57.6%)	15 (4.0%)	24 (6.4%)
Maintenance: Inner	264 (48.6%)	212 (39.0%)	15 (2.8%)	52 (9.6%)
Maintenance: Outer	151 (38.0%)	196 (49.4%)	10 (2.5%)	40 (10.1%)
Maintenance: SED	226 (50.2%)	187 (41.6%)	4 (0.9%)	33 (7.3%)

Table 20: Household prevalence of different how perceptions of crime of changed over the last 12 months. P-value for differences between strata = 0.002.

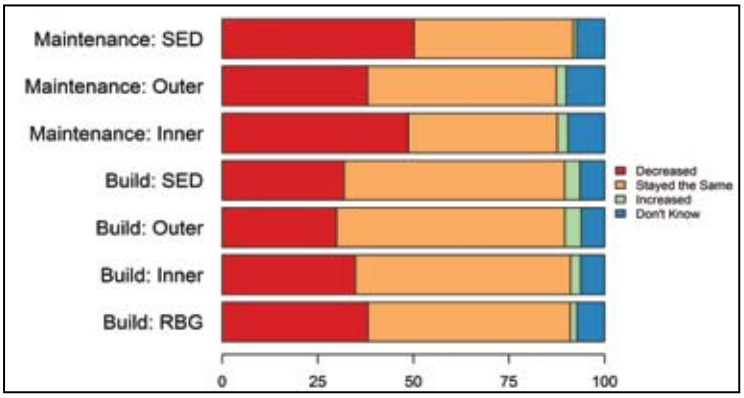


Figure 42: Stacked bar chart indicating how perceptions of crime of changed over the last 12 months, disaggregated by RAP strata.

10.RAP3 domains

This section draws on the analysis presented in the preceding sections to comment on noteworthy findings in relation to the different RAP3 analytical domains. As noted in the introductory sections, the whole rationale for sampling against the seven RAP3 domains in this study was to provide rigorous baseline data on:

- ***Households that will directly benefit from infrastructure waged labour and associated SED activities*** (direct beneficiaries)…
- …and compare progress of these households over time to ***households living close by in the inner zones*** around the new or better maintained road corridors (were one could expect to see ripple benefits in the community)…
- …and compare also with ***households living further away from these interventions*** (where one would expect to see least effects).

The analysis below seeks to pick out / differentiate stand-out patterns around direct beneficiary groups and other groups sampled.

- **Land ownership:** households in maintenance districts are much more likely to own land (95% probability in maintenance districts compared to 60% in build areas). But where land is owned, the average quantity of land owned is generally higher in build districts.
- **Migration and remittances:** migration is higher and remittances are received by a significantly larger proportion of households in the maintenance districts (average around 35%) than the build districts (average around 20%) – confirming that migration and remittances tend to be more prevalent in better-connected areas. This is because higher possession of assets and connectivity with the outside world in maintenance areas enables people to take more opportunity from migration than in the build districts.
- **Food security:** households in the build districts reported a higher incidence of food insecurity than in the maintenance districts.
- **Public works:** households in the build districts are more involved in public works, but household earnings from public works are on average higher in maintenance district.

The SED maintenance group domain: early adopters who can benefit from a range of more favourable factors?

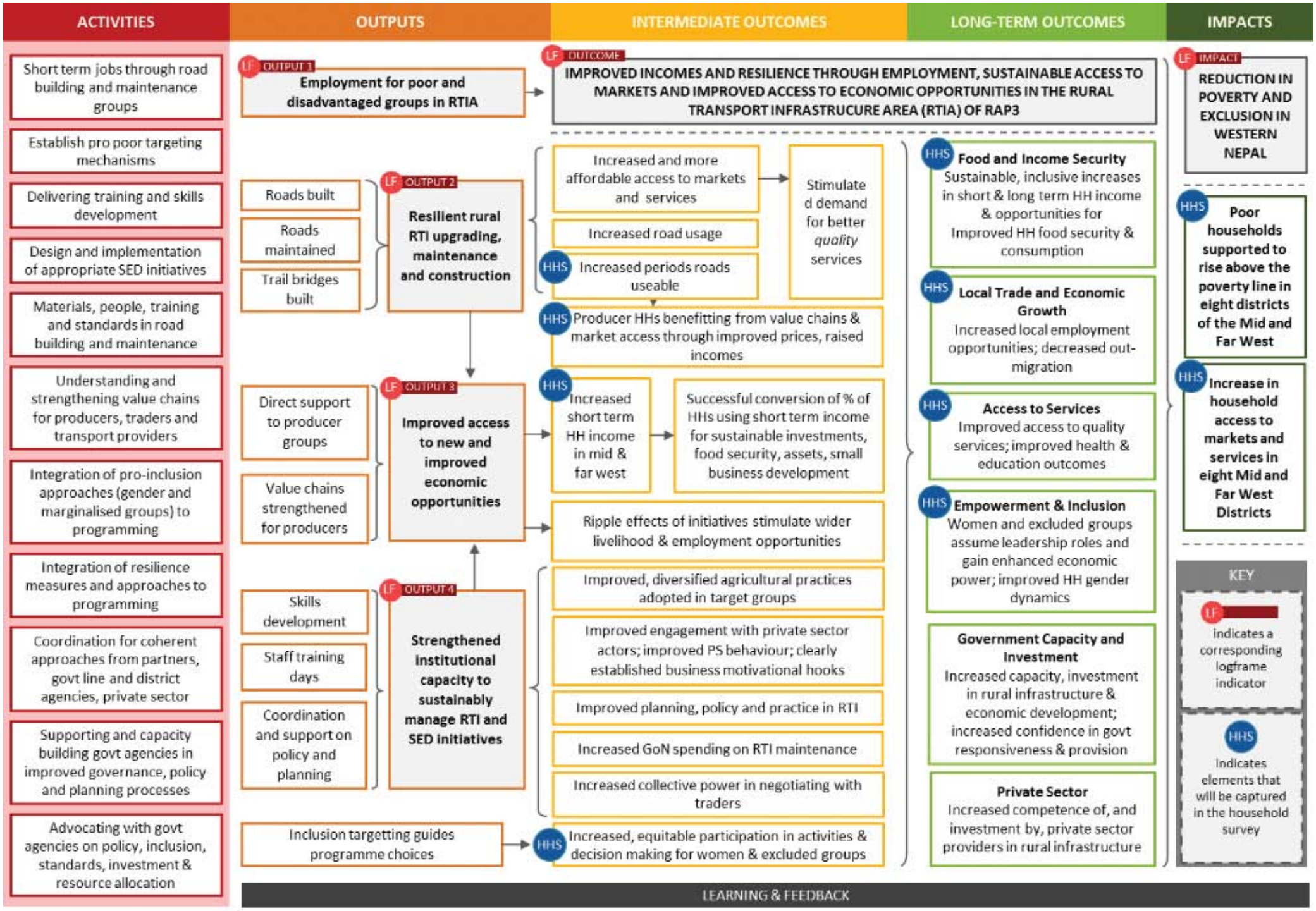
Given that many members of maintenance SED groups took part in RBGs and associated savings and livelihoods initiatives in previous phases of RAP, these households would logically be more familiar with, and possibly confident in, such development initiatives. The fact that they have opted to join a range of SED initiatives tends to support this. They have better access than remoter areas, largely located close to road networks that they helped to build, they own reasonable amounts of land, and appear more receptive to diversification of farming practices. They have a lower involvement in public works but receive decent earnings compared to others, and are amongst the lowest non-remittance income earners. However, they have the highest proportion of migrant workers and the second highest remittance earnings. Almost half of these households use micro-credit on a monthly basis. They are relatively food secure and score well on food consumption compared to other domains. They appear to be the group most involved in community affairs and have the best female participation rates – many of their men-folk are migrants. Monitoring progress on this group will be interesting in the coming years to see if the above factors and the more favourable location are enough to stimulate economic growth.

Annex 1: RAP3 Theory of Change: extracted from the MEL Framework

The diagram overleaf illustrates the Theory of Change to complement the narrative [in the Framework document]. It does *not* contain an exhaustive list of possibilities, but focuses on the main ones. This is much broader than the level of detail expected in a logframe (and other documents sources). Many of these are not stated objectives of RAP but are logical areas where broader impact can be expected.

Working from left to right there is a flow of columns:

1. The **activities** summarise the interventions that will be undertaken under RAP3.
2. The **outputs** are the direct results of the activities. These should be readily observable and measurable. The RAP3 monitoring and MIS will monitor progress against these. The MEL unit will provide process monitoring and verification against samples of work.
3. The **intermediate outcomes** follow from the outputs and represent the wider benefits generated by RAP3, albeit with a greater degree of attribution and a shorter time to achievement than the long-term outcomes. Whilst the RAP3 team will be able to provide information on some outcome areas, the responsibility for measurement of results from this level and beyond lie increasingly with the MEL unit.
4. The **long-term outcomes** of RAP3 are likely to take several years to come about, and are characterised by being much broader and less easily attributable to the programme itself than previous stages in the Theory of Change. Broader, systemic changes are more likely to be observed at this level. By this stage, the evaluation is primarily about estimating RAP3's *contribution* to discernable change observed over time in the broader developmental context of western Nepal.
5. The **impact** level is the highest level of the Theory of Change, and is the end goal of intervention – sustainable, inclusive poverty reduction. At this level, the degree of attribution to RAP3 for any observed changes are likely to be extremely narrow, with a great multitude of factors feeding in to the determination of poverty levels in the region. What is more, the full impacts of RAP3 interventions are likely to take many years to feed through.


ACTIVITIES
OUTPUTS
INTERMEDIATE OUTCOMES
LONG-TERM OUTCOMES
IMPACTS
Short term jobs through road building and maintenance groups
Establish pro poor targeting mechanisms
Delivering training and skills development
Design and implementation of appropriate SED initiatives
Materials, people, training and standards in road building and maintenance
Understanding and strengthening value chains for producers, traders and transport providers
Integration of pro-inclusion approaches (gender and marginalised groups) to programming
Integration of resilience measures and approaches to programming
Coordination for coherent approaches from partners, govt line and district agencies, private sector
Supporting and capacity building govt agencies in improved governance, policy and planning processes
Advocating with govt agencies on policy, inclusion, standards, investment & resource allocation
LF OUTPUT 1
Employment for poor and disadvantaged groups in RTIA
LF OUTCOME
IMPROVED INCOMES AND RESILIENCE THROUGH EMPLOYMENT, SUSTAINABLE ACCESS TO MARKETS AND IMPROVED ACCESS TO ECONOMIC OPPORTUNITIES IN THE RURAL TRANSPORT INFRASTRUCURE AREA (RTIA) OF RAP3
LF IMPACT
REDUCTION IN POVERTY AND EXCLUSION IN WESTERN NEPAL
Roads built
Roads maintained
Trail bridges built
LF OUTPUT 2
Resilient rural RTI upgrading, maintenance and construction
Increased and more affordable access to markets and services
Stimulated demand for better quality services
Increased road usage
HHS Increased periods roads useable
HHS Producer HHs benefitting from value chains & market access through improved prices, raised incomes
HHS Food and Income Security
Sustainable, inclusive increases in short & long term HH income & opportunities for Improved HH food security & consumption
HHS Local Trade and Economic Growth
Increased local employment opportunities; decreased out-migration
HHS Access to Services
Improved access to quality services; improved health & education outcomes
HHS Empowerment & Inclusion
Women and excluded groups assume leadership roles and gain enhanced economic power; improved HH gender dynamics
HHS Poor households supported to rise above the poverty line in eight districts of the Mid and Far West
HHS Increase in household access to markets and services in eight Mid and Far West Districts
Direct support to producer groups
Value chains strengthened for producers
LF OUTPUT 3
Improved access to new and improved economic opportunities
HHS Increased short term HH income in mid & far west
Successful conversion of % of HHs using short term income for sustainable investments, food security, assets, small business development
Ripple effects of initiatives stimulate wider livelihood & employment opportunities
Skills development
Staff training days
Coordination and support on policy and planning
LF OUTPUT 4
Strengthened institutional capacity to sustainably manage RTI and SED initiatives
Improved, diversified agricultural practices adopted in target groups
Improved engagement with private sector actors; improved PS behaviour; clearly established business motivational hooks
Improved planning, policy and practice in RTI
Increased GoN spending on RTI maintenance
Increased collective power in negotiating with traders
Government Capacity and Investment
Increased capacity, investment in rural infrastructure & economic development; increased confidence in govt responsiveness & provision
Private Sector
Increased competence of, and investment by, private sector providers in rural infrastructure
Inclusion targetting guides programme choices
HHS Increased, equitable participation in activities & decision making for women & excluded groups
KEY
LF indicates a corresponding logframe indicator
HHS Indicates elements that will be captured in the household survey
LEARNING & FEEDBACK

Annex 2: Household survey methodology

1. RAP3 baseline questionnaire development

The RAP3 baseline survey was designed to give a broad estimate of the changes in poverty and wellbeing in the districts where RAP3 interventions are taking place. A number of considerations informed the design of the survey, including the need to observe any hypothesised effects of RAP3 intervention (particularly those captured in the RAP3 logframe), and our initial experience working in the relevant districts (i.e. the Reality Check Approach work).

The starting point for the baseline design, however, was the Government of Nepal's *Nepal Living Standards Survey* (NLSS).

Nepal Living Standards Survey (NLSS)

The official government source of data for estimating per capita consumption and poverty rates is the Nepal Living Standard Survey (NLSS). The NLSS is a multi-topic household survey containing information on a wide range of topics related to livelihoods and the determinants of living standards in Nepal. A considerable part of the questionnaire is taken up with detailed consumption questions that come together to create a consumption aggregate, which is in turn used to determine official poverty statistics.

The NLSS was conducted for the first time in 1995-96 (NLSS-I).Since then, two more survey rounds have been implemented – one in 1995-96 (NLSS-II), and the most recent one in 2010-11 (NLSS-III). The NLSS sampling covers the RAP3 implementation districts in the Mid- and Far-West of the country.

In developing the RAP3 baseline questionnaire, we took the NLSS III questionnaire as a starting point, before stripping out questions that we considered surplus to our requirements and adding additional questions where necessary. This ensures definitional consistency of a good number of indicators between the RAP3 baseline and the NLSS, allowing cross comparison between the two, and potentially allowing for additional analysis to be conducted if another NLSS round is conducted in the lifetime of RAP3.

Questionnaire design considerations

A number of considerations drove the design of RAP3 baseline questionnaire following the NLSS-III starting point:

- **Logframe indicators** – the RAP3 baseline needs to capture the headline indicators of the logframe, as presented in Table 21.

Indicator	Description
Impact 1	Number of households directly lifted out of poverty by RAP (indicator to be finalised through RAP/MEL baseline)
Impact 2	Number of households with improved standard of living index (SOLI) (Indicator to be developed through RAP/MEL baseline)
Outcome 1	Number of people benefiting from improved access A) travel time and B) cost of transportation
Outcome 2	Increased local market activity in the RAP road networks corridors (over baseline year)
Outcome 3	Number of households with reduced economic insecurity OR Number of HH with increased annual income of NRP 10,000 due in RTIA of RAP

Table 21: Logframe indicators

- Other **hypothesised effects of RAP3**, as set out in Table 22.

• Reduced transport cost for passengers	• Reduced distress migration
• Increased household income	• Increased non-distress migration
• Increased household income diversity	• Reduced cost of credit/ greater diversity of institutions offering credit resulting in lower interest rates
• Increased added value from primary producers income	
• Improved nutritional status/food diversity	• Increased female participation in the labour force and household decision-making
• Increased school enrolment and attendance.	• Increased household spending on asset creation activities
• Improved immunisation rates.	• Increased non-farm employment activities
• Increased utilisation of health facilities and other government services	• Increased utilisation of improved agricultural technology and agriculture and livestock service centres

Table 22: Hypothesised effects of RAP3 intervention

- An **abbreviated food consumption module**: Because the RAP3 baseline questionnaire was not attempting to construct a full consumption aggregate (as in the NLSS), the level of detail required on type, weight and cost of food consumed could be reduced. The food consumption score (FCS) methodology developed by WFP was used as a framework to guide the construction of the food consumption module, and this module was harmonised with the corresponding module in The Nepal Food Security Monitoring System (NeKSAP) household questionnaire[23].
- **Lessons learned from the Reality Check Approach (RCA)**: The Scoping Reality Check Approach (RCA) was conducted in November 2013 in order to allow findings to be reflected in the design of the baseline questionnaire. Two key outcomes emerged.
    - ✓ **The inclusion of a negative impact module in the household questionnaire as a result of the following summarised findings:**
        - Increasing access and purchase of poor quality snack foods (junk food) displacing more traditional and nutritious forms of cooking and consumption, increasing the need for cash.
        - Loss of portering jobs, local skills and livelihoods threatened by cheaper imported goods
        - Increased newcomers 'strangers' to the hill and mountain areas, making long-term hill and mountain residents feel more insecure, especially around illegal activities.
        - A breakdown in some of the taboos for the higher castes, e.g. drinking alcohol, which is more common now.

[23]Collects, analyzes and presents information on household food security, emerging crises, markets and nutrition from across Nepal. The NeKSAP was initially established by the World Food Programme but is currently being institutionalized by the Government of Nepal in collaboration with the Ministry of Agriculture and Cooperatives and the National Planning Commission.

- Increasing need for cash displacing traditional reciprocal labour arrangements.

- **Consideration of alternative approaches to measuring poverty.** These are discussed in the next section.

Measuring poverty

The first impact indicator of the RAP logframe is the "number of households directly lifted out of poverty by RAP3". This demands a measurement of household wellbeing, and a threshold below which a household is categorised as "poor".

As discussed above, the NLSS is the Government of Nepal's official data source for poverty statistics, and we once again intend to be consistent with NLSS definitions here. However, for resource constraint reasons, enumerating a full consumption aggregate for the RAP3 baseline, midline and endline was not feasible. Therefore, a set of **proxy means test** approach was adopted in order to model household consumption.

The Proxy Means Test (PMT) approach

The Proxy Means Test (PMT) approach sought to model household consumption upon a range of explanatory variables.

In order to construct the PMT model, NLSS-III was once again used as the starting point, drawing upon analysis conducted by the World Bank/Nepal Central Bureau of Statistics (WB/CBS) in 2013 that sought to calculate small area estimates of poverty across Nepal based upon NLSS-III data[24]. The WB/CBS analysis constructed three poverty models – one for Central and Eastern regions, one for the Western region, and one for the Mid- and Far-West regions, with the latter containing 240 villages in the eight RAP3 districts.

For our PMT model, the WB/CBS Mid- and Far-West model was adapted, removing coverage of the Terai, where the terrain is flatter and more fertile than the hill and mountain districts of RAP3. This left a sample of 660 villages, of which 240 fall within the RAP3 districts. Having removed the Terai, it was not believed that the remaining 420 villages outside of the RAP3 districts would create significant bias, as many of these share similar agro-ecological conditions and livelihood profiles with the RAP3 beneficiaries.

Further refinement of the model required careful selection of explanatory variables to be included in the RAP3 baseline survey. Selection of indicators was based upon the following criteria:

- Good coverage of **multiple dimensions of poverty**, which a recent World Bank paper cites as important in maximising the predictive power of the model[25]. The dimensions that were ultimately incorporated into the model were as follows: (i) demography; (ii) education and employment; (iii) housing; (iv) physical assets; (v) productive assets, (vi) health; and (vii)geography.

- Indicators that are **inexpensive to collect**, **easy to answer**, and **simple to verify** – these were the motivations for pursuing a PMT model rather than a comprehensive consumption aggregate, and should seek to ensure greatest value for money to DFID when conducting the survey.

- Indicators that are **strongly correlated with poverty**.

- Indicators that are **liable to change over an appropriate time period**. For example, literacy rates may not vary over the time of RAP3, but the extent to which children are tutored may well do.

- Indicators that are **not an immediate physical manifestation of improved road access**. For

[24]Government of Nepal National Planning Commission Secretariat/Central Bureau of Statistics/World Bank (2013).*Small Area Estimation of Poverty, 2011*. April 2013.

[25]Christiansen, L, Lanjow P, Luoto J & Stifel D. Small Area Estimation-Based Prediction Methods to Track Poverty. Policy Research Working Paper 5683 World Bank Development Research Group, June 2011.

example, the model should not include explanatory variables that quantify time or cost travel to nearest facility or road. If the model was dominated by these access indicators, simply increasing access would change the consumption estimate of the model without any indirect access outcomes and impacts having been observed.

Based upon these criteria, a range of possible indicators were identified, before the model was fitted using the GLLAMM procedure in Stata, with random effects used to model each district. The selection of variables to be entered as fixed effects was conducted in a two-stage process. Firstly, stepwise procedures were conducted to identify the variables that had a strong level of statistical significance within an overall model. Secondly, additional model terms were considered so that the ultimate model would include parameters from a variety of different domains.

The final model is summarised below in Table 23.

Domains	Variable	Coef.	SE	z	P>z
Constant		10.082	0.117	86.010	<0.001
Household level variables					
Demography	Caste of Head = Dalit	-0.074	0.025	-2.970	0.003
	% of house aged <=6	-0.004	0.001	-6.590	<0.001
	% of house aged 7-15	-0.002	0.001	-3.370	0.001
	Household Size	-0.203	0.019	-10.740	<0.001
	Household Size squared	0.008	0.001	6.160	<0.001
Education and employment	Tutor used for children	0.070	0.039	1.820	0.068
	Log (Income from Employment or Sales)	0.015	0.005	3.380	0.001
	Income from Remittances	$3.31x10^{-6}$	$1.30x10^{-6}$	2.550	0.011
Housing	Number of rooms in house	0.021	0.008	2.590	0.010
	Roof is galvanised iron or concrete	0.065	0.030	2.150	0.032
	Firewood or dung as cooking fuel	-0.214	0.043	-4.940	<0.001
Physical Assets	Number of assets owned	0.020	0.013	1.480	0.140
	Phone owned = Yes	0.114	0.035	3.210	0.001
	Log (Land Owned)	0.062	0.025	2.470	0.013
Productive Assets	Use any improved crop varieties	0.063	0.020	3.200	0.001
Health	Food Consumption Score	0.009	0.001	12.690	<0.001
	Health facilities is perceived to be less than adequate	0.059	0.035	1.680	0.092
Village level variables					
Education & Employment	Complete secondary education	0.258	0.072	3.590	<0.001
Health	Unsafe deliveries	0.189	0.022	8.560	<0.001
	Children under 24m vaccinated against measles	-0.177	0.046	-3.890	<0.001
District Random Effects (only RAP sampling districts shown)					
Geography	Aacham	0.054			
	Bajura	0.054			
	Dailekh	-0.054			
	Doti	-0.164			
	Jumla	0.054			
	Kalikot	0.164			
	Mugu/Humla	0.164			

Table 23: PMT explanatory variables used in final model with coefficients standard error, Z score and probability

Our model has anR^2 (or *coefficient of determination*) of 0.70 – i.e. 70% of the variation in consumption in the Mid- and Far-West regions can explained by the model. This compares to a lower $R^2$of 0.55 in the WB/CBS Mid and Far-West model discussed earlier. We believe this to be a particularly strong goodness of fit, as depicted in Figure 43, below.

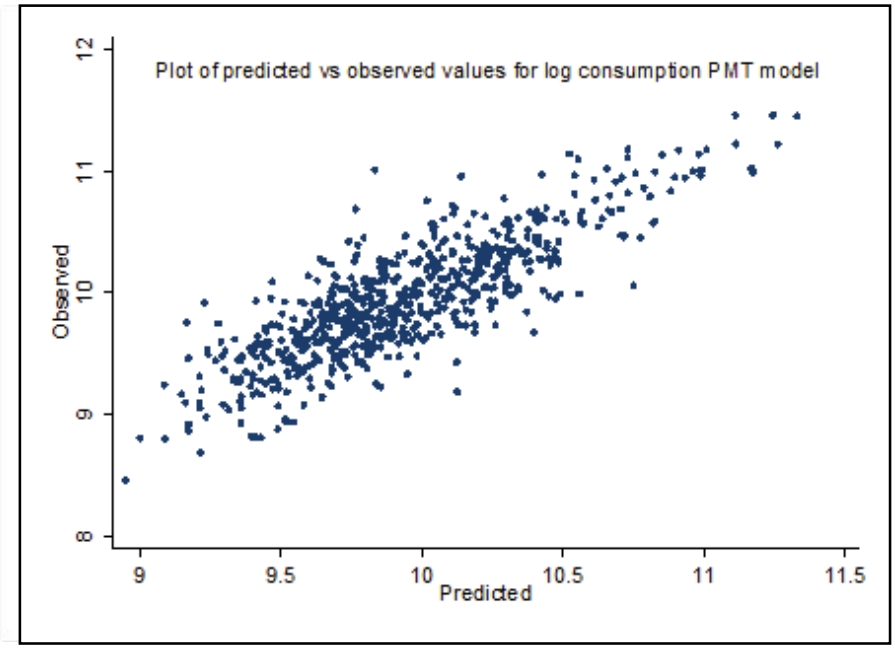


Figure 43: Plot of annual per capita normalised household consumption against consumption predicted by PMT model

Overfitting

With only a small sample of 660 households available, all of these households were used to generate the final RAP3 PMT model. This leaves the model open to criticism that it may suffer from overfitting, meaning that the explanatory power of the variables set out above may be specific to the idiosyncrasies (or random errors) of the specific households upon which they were modelled. This would reduce the explanatory power of the model when faced with a different set of households from the same area.

There are a number of ways to test for overfitting. One is to divide the sample in two, before modelling one half and testing it against the other. Another is to iteratively remove individual households from the overall model in order to seek variations in the results. Whilst these tests for overfitting have not been conducted here, it is recommended they are conducted prior to comparison of the baseline and midline surveys.

Box 1: Standard of Living Index (SOLI)

At the initial survey design stage, there were discussions around the potential development of a multidimensional Standard of Living Index (SOLI). This would give a broader view of 'poverty' than income or consumption alone, and would reduce the risks of over-reliance upon potentially inaccurate income data (due to, e.g., multiple formal and informal household income sources making income recollection difficult, or sensititivities around sharing household income information).

However, the construction of such multidimensional indices requires careful thought as to the weighting of its components – either by a subjective expert judgement, or by a more objective statistical contribution analysis, or some combination of the two.

At present, the baseline survey analysis focuses upon the income estimates, and the multivariate proxy means test for household consumption, as discussed above. However, a range of other indicators of 'poverty' are also captured by the survey. Whilst no effort has been made to formally compile these into a SOLI, we set out here the potential components of a SOLI that could be constructed in future based upon our survey results:

- Livelihood intensification and expansion assessed through diversification of crops, utilisation of improved varieties, increased input use, intensification of land use, starting or expanding enterprises, increased employment, and accessibility of credit, loan interest rates and migration patterns.
- Reduction in impact of shocks and coping strategies assessed through distress livestock sales, sales of land and other livelihood damaging coping strategies, distress debt burden, distress land sales, food security, reduced concern over health and education security, distress land sales, gold sales, improved morbidity.
- Household capabilities assessed through family member education attendance & training received.
- Access and resources assessed through improved access to road and services, and improvement of perceptions of quality of services.
- Social capital assessed through financial services inclusion, participation in decisions, absence of negative social influences (e.g. crime, insecurity and negative social trends), discrimination and voice.

RAP3 baseline questionnaire topics

In light of the above discussions, Table 24sets out the finalised baseline questionnaire topics.

Table 24: Survey topics

Topic	Indicators covered	Analytical outputs
Household type utilities and amenities	Occupation type, number of rooms, construction type, access to key utilities and amenities.	Key indicators contributing to proxy means test and progress out of poverty multivariate indexes.
Access to services and facilities	Travel type, time and cost to range of infrastructure and services, frequency of use of these infrastructure and services, reason for occasional or non-use and satisfaction perception with the service.	Current and changes in physical access to range of infrastructure and services as well as the cost to get to these services. Changes in people's perception of the quality of the services.
Food consumption	Number of days that household has consumed a range of 16 food groups.	Food Consumption Score calculated in line with WFP NeKSAP food security monitoring. This weights the importance of the food group by the number of days consumed so provides both intensity of food consumption with a value of diversity of important food groups. Dietary diversity can be assessed in its own right with individual food group data.
Household assets	11 household assets enumerated, ranging from radios to jewellery.	Household asset score, and contribution to PMT explanatory variables.
Wage Labour	Diversity of daily, long-term and contract wage labour by sector.	Diversity and changing diversity of different types of wage labour.
Non-agricultural enterprises	Diversity of non-agricultural enterprises operated by household members by sector, with length of operation and ownership profile. Includes problems encountered running these businesses.	Change in non-agricultural enterprise diversity over time.
Agricultural land ownership and use	Number, size and type of agricultural plot including access to irrigation by season. Plot cultivation pattern for dry and wet season, revenues from sharecropping or fixed renting.	Change in household agricultural land access and utilisation.
Agricultural crop diversity and cultivation in intensity	Diversity of crops cultivated in the last year, indicating where improved varieties have been planted, value of sales, intensity of agricultural fertilisers and manures.	Changing agricultural crop diversity, with specific interest in monitoring adoption uptake of crops promoted by RAP SEG activities.
Landholding increase / decrease	Area of land purchases and sales over the past 12 months.	Change in productive assets, and extent of land sales to facilitate labour migration or education investment
Additional agricultural revenues	Income revenue from renting out draught animals and machinery, sales from wood and charcoal and non-timber forest products.	Changing income from wood and non-timber forest products.
Livestock ownership	Type, value and number of livestock and numbers of sales and purchases in the last 12 months. Income from eggs, milk, meat hides and other livestock related production.	Change in livestock ownership patterns, herd value and value of sales of livestock products.

Topic	Indicators covered	Analytical outputs
Credit and savings	Number of loans, source and purpose of loan, principle borrowed, interest rates number, posts.	Changes in household level indebtedness and interest rates paid.
Household absentees / migration	Roster of household member absentees, reason for current absence from household, level of remittances sent in cash or in kind.	Household migration profile and level of remittance income
Remittances from non-members	Value and use of remittances from anybody that is not considered a household member.	Extent of remittances from non-household members.
Other income and savings	Diversity of receipts from in-kind transfer programs, social protection payments and public work programmes. Saving group membership (can triangulate information from Credit and Savings section).	Contribution to total income of government transfer and public works programmes.
Household roster	Enumeration of household members, age sex and relationship to head of household.	Household size, dependency ratio.
Health	Chronic illness, disability and illness or injury in the last 30 days prevalence among household members with associated health seeking behaviour and costs. Reasons for non-consultation.	Household vulnerability indicators of presence of chronic illness/disability, indication of health seeking behaviour constrained by costs of services.
Maternity	Ever married women aged 15-49 given birth over the last 2 years use of pre- and post-natal, who assisted in birth and where, with reasons for not using pre-and postnatal services.	Professional birth attendance rates and pre-and postnatal service delivery rate.
Education	Literacy, educational attainment, current attendance, reasons for non-attendance, time commuting to school and education expenses including private tuition.	Gross and net enrolment rates at different levels of education, literacy rates, household education expenses.
Migration history of current household	Migration history of current household members over the past 2 years, including where and why they migrated to, reasons for return, and remittance value housing cash in kind.	Migration profile for household and proportion of income from migration.
Household decisions	Occurrence, involvement and final decision-making of a range of decision topics by both male and female head of household/spouse.	Degree of gender equity in key household decision-making.
Adequacy of consumption and coping strategies	Adequacy of food security, housing, clothing, health care, education; food security experience in last 30 days and coping strategies employed.	Household respondent perception of adequacy of food security and other welfare aspects along with incidence of insecure periods during the last 30 days and range of coping strategies employed.

Topic	Indicators covered	Analytical outputs
Negative influences	Perceptions of increase or decrease in crime and insecurity, type of crime in security and suggested reasons for change. Other negative changes enumerated with suggested causes. Households not of government service opening times and other performance factors, concerns complaints with the services and whether respondent has voiced any complaints or grievances about the services.	Evaluation of people's perceptions of change in their safety and security as well as indication of the respondent's ability to voice complaints and concerns about shortcomings in a range of government services.

2. Sampling and analytical domains

Having set out the design of the questionnaire, the following sections deal with the sampling methodology that led to the selection of households to be surveyed.

Panel vs. cross-sectional data

A series of panel surveys (at baseline, midline and endline) are proposed instead of multiple cross-sectional surveys for the following reasons:

- The most efficient sampling for estimating change in wellbeing and other aspects of life and livelihoods over time come from repeated observations on the same respondents.
- Panel datasets reduce the burden of relisting and selecting households for each repeated survey.

Sampling domains

RAP3 consists of two road engineering components:

1. **Road construction** in 4 districts (Humla, Mugu, Bajura & Kalikot), (coloured pink in Figure 44).
2. **Road maintenance** in 4 districts (Doti, Achham, Dialekh & Jumla), (coloured yellow in Figure 44).

Surveys will be conducted in all eight districts.

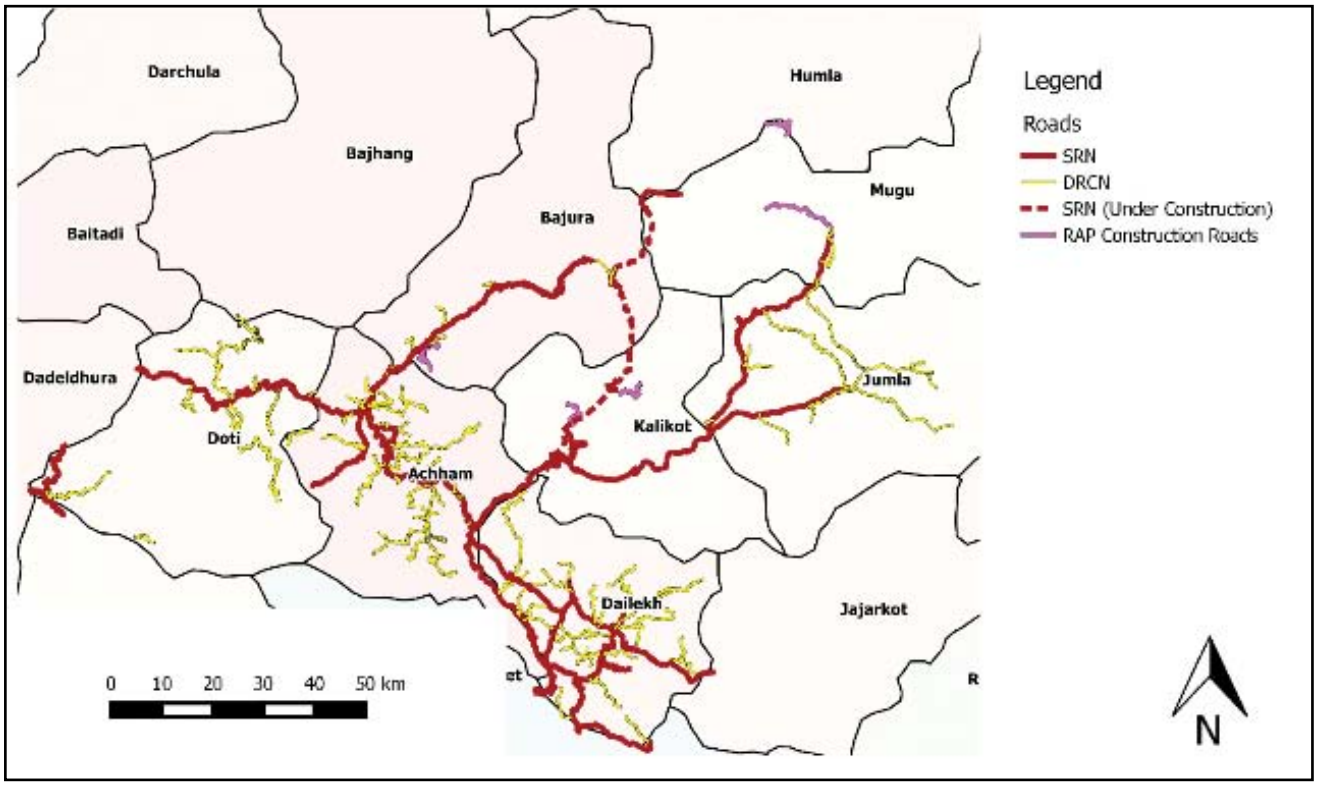


Figure 44: Map of RAP 3 construction and maintenance roads

Buffers

In order to give a richer picture of the different impacts of RAP3, "buffer zones" were drawn up around the relevant roads, with "inner buffers" containing direct beneficiaries within 1.5 hours' walking distance of a RAP3 road, and "outer buffers" containing beneficiaries up to 5 hours' walk from the road. The latter cohorts are still expected to benefit from the roads, albeit in a more indirect manner.

In order to map these buffers spatially (and identify relevant villages within each), the walking times needed to be translated into distances. In such a mountainous area as the RAP3 implementation districts, a standard conversion of one hour walking equivalent to 4km distance is not appropriate. We therefore adjusted our calculations according to the slope of the roads (see Box 2), which can often slow movement through these districts.

In order to complete the buffer design, spatial data containing the location of existing roads and construction sites was obtained from RAP; the locations of all inhabited villages within the region were obtained from NGIIP26, and high-resolution altitude data was obtained from CIAT. Figure 45 (p67) illustrates the buffer zones within the RAP3 districts.

[26]An error in coding the GIS layers required on the part of NGIIP meant that the GIS layers for northern Doti were not supplied. Unfortunately there was no time before a sample had to be drawn to acquire these missing shape files to ensure that there was full coverage of Doti.

Box 2: Adjusting walking time for varying gradients

Walking times across the region were estimated using the formula from Aitken 1977/Langmuir 1984 (based on Naismith's rule for walking times):

T= [(a)*(Delta S)] + [(b)*(Delta H uphill)] + [(c)*(Delta H moderate downhill)] + [(d)*(Delta H steep downhill)]

…where:

- T is time of movement in seconds,
- Delta S is the distance covered in meters,
- Delta H is the altitude difference in meter.

The a, b, c, d parameters take in account movement speed in the different conditions and are linked to:

- a: underfoot condition (a=1/walking speed)
- b: underfoot condition and cost associated to movement uphill
- c: underfoot condition and cost associated to movement moderate downhill
- d: underfoot condition and cost associated to movement steep downhill

These adjustments are based upon the fact that walking downhill is preferable, but only up to a certain gradient, after which walking actually slows.

This approach is taken purely as a guide for the relative proximities of the villages to the road, rather than an actual estimate of the true walking time. There are two particular assumptions that are unlikely to hold up to scrutiny. Firstly, the default parameters used in the model were not calibrated under the extreme conditions seen in Nepal, so can only be treated as an approximation. Secondly, this assumes that no factor other than the gradient will affect the walking speed; considerations are not made as to differing underfoot conditions which would slow walking pace (e.g. swamps, dense forest etc.) or completely prohibit passage and force a diversion (e.g. private land, un-crossable rivers). It was not possible to incorporate this into the model due to a lack of reliable data on the terrain and how restrictive the differing terrains would be to movement.

RGB and SED Groups

In addition to households located near the roads, the RAP3 survey also targeted the RBGs and the SED groups. In the case of the latter, SEDs were sampled in both road building and maintenance districts.

Sampling domains

This yields seven sampling domains in total:

- Road building – inner buffer zone
- Road building – outer buffer zone
- Road maintenance – inner buffer zone
- Road maintenance – outer buffer zone
- SED – road building districts
- SED – road maintenance districts
- RBGs

The counterfactual

Given the great diversity of results expected across these seven domains, it was decided **not** to select additional control groups. Instead, comparison across the seven existing domains should yield an informative picture of the counterfactual scenario.

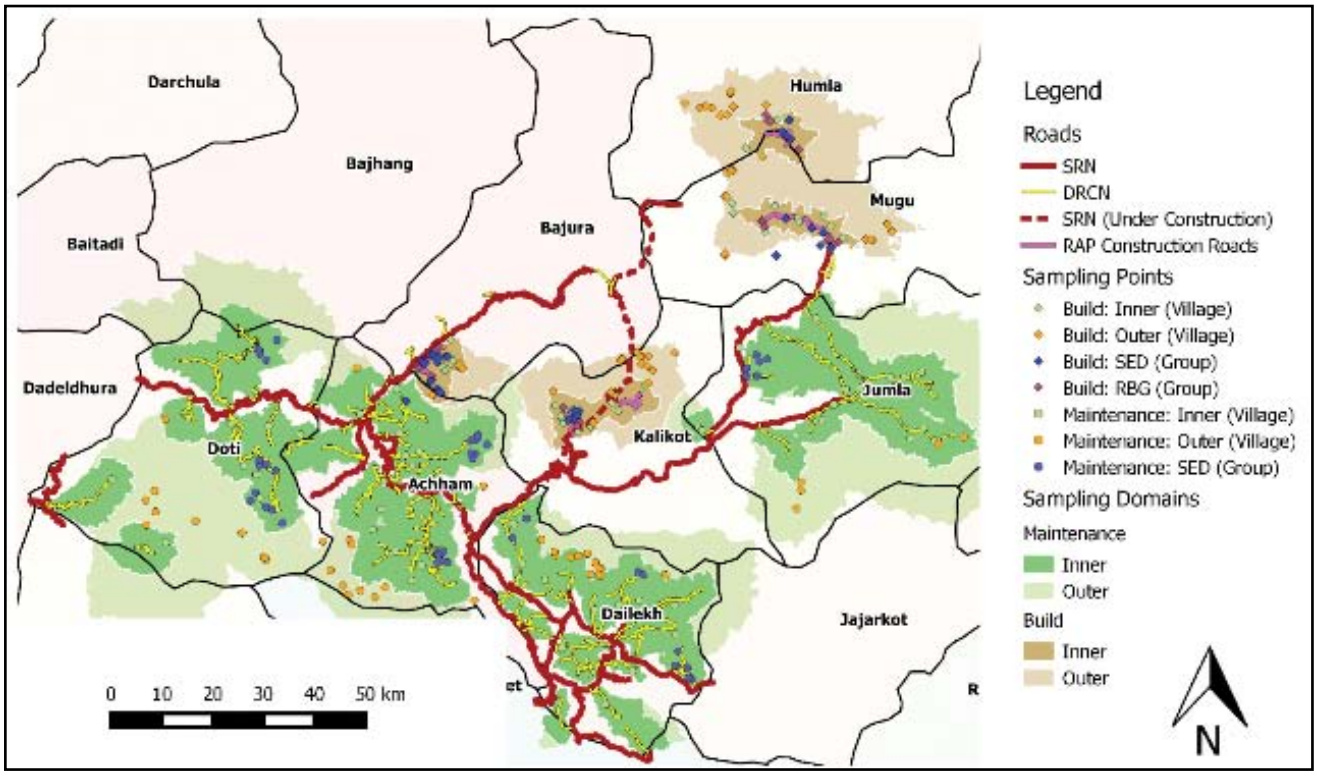


Figure 45: RAP3 sampling domains

Sample selection

Road building and maintenance

In the inner and outer buffers of the road building and maintenance districts the primary sample unit (PSU) is the village. For the **build** districts, 199 eligible villages were identified in the inner buffer and 251 in the outer buffer. For the **maintenance** districts, 2,769 eligible villages were identified in the inner buffer and 1,020 in the outer. From these sample frames, villages were sampled to ensure roughly equal coverage of the districts (Table 25).

Table 25: Sampling in the road building and maintenance districts

Road building domains		
District-buffer	# Villages in frame	# Villages in sample
Bajura-inner	54	12
Bajura-outer	15	9
Humla-inner	18	12
Humla-outer	89	13
Kalikot-inner	92	12
Kalikot-outer	77	13
Mugu-inner	31	12
Mugu-outer	74	13
Grand Total	450	96

Road maintenance domains		
District-buffer	# Villages in frame	# Villages in sample
Achham-inner	962	12
Achham-outer	134	12
Dailekh-inner	825	12
Dailekh-outer	31	12
Doti-inner	627	12
Doti-outer	555	12
Jumla-inner	315	12
Jumla-outer	26	12
Grand Total	3789	96

RBG and SED groups

For the RBG and SED groups, the groups themselves were the PSUs. The sample frames were constructed from registration lists of road building gang (RBG) members and social economic development (SED) members.

Table 26: RBG/SED sampling

RBGs		
Domain	Groups	Sample
Bajura-RBG	64	14
Humla-RBG	45	9
Kalikot-RBG	54	10
Mugu-RBG	55	12
Grand Total	218	45

SEDs (Build)		
Domain	Groups	Sample
Bajura-SED_Build	38	19
Humla-SED_Build	7	4
Kalikot-SED_Build	14	5
Mugu-SED_Build	21	10
Grand Total	80	38

SEDs (Maintenance)		
Domain	Groups	Sample
Achham-SED_Maintain	72	14
Dailekh-SED_Maintain	57	9
Doti-SED_Maintain	69	14
Jumla-SED_Maintain	34	8
Grand Total	232	45

In the case of the RBG groups, most consist of around 20 members (with some exceptions). The sizes of the SED groups are more variable, with an average of 23 members, but with variation from 5 to 61 members across all groups. Members of a single RBG or SED group were not always drawn from a single ward, hence the group sampling frame was constructed with RBG and SED groups as PSUs. From these sample frames, samples were selected proportional to the size of the groups (Table 26).

Estimation of number of households per domain

Design effect estimation

The design effect was estimated based upon NLSS-III design effects relating to estimates of the poverty headcount rate, depth of poverty and depth of poverty squared in the mountain and hill areas of the Mid-

and Far-West regions. All design effects in NLSS-III were less than two. However, due to a relatively small sample size in the RAP3 districts under NLSS-III, we are assuming a conservative design effect value of two.

Offsetting the design effect is the correlation between the same unit observed on two occasions. This was estimated at 0.5, due to the decision to use panel data described above.

Panel household attrition rate

As it is a panel sample and households will be returned to for the midline and endline enumerations, loss of households to the panel must be anticipated. Attrition rates of approximately 20% between survey rounds have been encountered in other surveys, although Nepal-specific attrition rates are not known.

This attrition rate should be anticipated to occur twice, baseline-midline and midline-end line, giving an attrition multiplier of 1/(.8*.8)= 1.56 (this implies that the minimal sample size should be multiplied by 1.56 for the baseline survey in order to arrive at the minimal sample size by the endline, after two rounds of lost households).

Number of households per cluster

NLSS-III used 12 households per PSU. For the enumeration of the RAP baseline, 10 households per PSU were chosen in order to insulate against design effects and ensure a good geographic spread within the sample domains.

Sample size calculation and resource constraints

A minimal sample size per domain of 590 households – or 4,130 households in total – was estimated based upon the considerations described above, and summarised in Table 27, below.

Table 27: Minimum sample size calculations

Acceptable margin of error (width of the confidence limits)	+/- 5% points
Required confidence level true value falls within confidence level	95%
Poverty headcount prevalence rate	0.5
Design effect	2
Correlation between two repeated observations	0.5
Sample size required	383
Sample size multiplier to account for panel household attrition rate x2 survey rounds	1.5625
Households per sampling domain	590
Total households (7 domains)	4,130

However, the resource envelope available for the survey only allowed for the enumeration of an estimated 3,000 households per survey round. These resource constraints were accordingly factored in to the final sampling exercise.

In order to achieve similarly robust results to the original sampling calculations in Table 27, the panel attrition rate would have to fall to 13%, rather than 20%. This is less than ideal, but the use of ODK mobile phone data collection platform enables every household to be easily geo-referenced, photographed and telephone number collected (where the respondent does not object to sharing telephone number). The historical attrition rate used in the sample size calculations above comes from household surveys where geo-referencing of individual households was not undertaken. It is therefore hoped that the extra geographic information collected on households enumerated in the baseline will reduce attrition rates so that the core sample is not significantly eroded, and an attrition rate closer to 13% can be achieved.

Baseline enumeration

Table 28shows the actual baseline enumeration rates, compared to the expected number of households based upon the earlier calculations.

Table 28: Baseline enumeration

Sampling domain	Expected # HHs from sample	Count of enumerated HHs
build_inner	480	462
build_outer	480	498
maintain_inner	480	543
maintain_outer	480	407
rbg	450	447
sed_build	382	382
sed_maintain	450	450
out of zone	0	10
Grand Total	3,202	3,199

The number of households for the RBG and SED groups was enumerated as planned. There was greater deviation from the enumeration plan for the inner and outer buffers, as the actual geo-references recorded during the enumeration for the villages did not always coincide with the geo-references in the GIS shape used for the sampling. This resulted in some villages being recoded because of the change from anticipated to actual proximity to a RAP3 road. In addition, there would 10 households from the Jumla maintenance outer buffer (Nundina village) that were so far from any of the zones that there was no sensible recoding possible.

PSU replacement

Replacement of primary sample units were provided for all the sampling domains. Only six villages out of a total 192 sampled had to be replaced, due to either villages not being found, or villages being found to be uninhabited. Considering the very difficult and relatively under-researched areas covered, this is an acceptably low level of PSU replacement. Replacement villages are listed in Table 29.

Table 29: Village replacement

Original village	Replacement village
Achham-maintain_outer-Tusarepani	Maike
Jumla-maintain_inner-Rajikot	Ratamata
Mugu-build_outer-Lama Odar Lek	Jamphai
Mugu-build_outer-Tauli	Chimat
Mugu-build_inner-Goth	Luma
Humla-build_outer-Kud Goth	Chhann goth

RBG and SED replacements

Out of the sample proposed for RBG and SED groups, only 1 SED group (Achham-SED_maintain-Sagarmatha_Krishak_Samuha) was replaced.

Construction of weights

This first analysis of the baseline data is un-weighted, as when the analysis was undertaken, there were still village-level questionnaires remaining to be submitted, which are required to provide the estimated number of households per village. These estimates are essential for the construction of household weights for the inner and outer sampling domains in the build and maintenance districts. Without them the un-weighted analysis will include bias arising from:

1. The number of households in each of the villages in the sample frame was unknown and therefore selection of villages could not be done proportional to the size of that village. To get an estimate of the selection probability of a household within a given village, it is essential to have the number of households resident in each of the villages sampled.
2. The original sampling of villages across four districts for either the inner or outer buffers was to be unconstrained in terms of the number of villages to be selected from each district. Once the village sample frame was constructed and initial sampling procedures run, it became apparent that some zones in some districts were under-represented or excluded completely, as some outer buffers have very few villages in them. It was therefore decided to ensure a similar number of households would be enumerated in each of the zones in each of the districts. To achieve this, different sampling intensities were calculated for each of the buffers within a given district, meaning that the un-weighted analysis reported for the build or maintenance district inner or outer buffer domains will be biased in favour of those buffers in districts that have small numbers of villages.

On the other hand, for the RBG and SED groups the sample frame that include the size of each group from a very recent listing of the RBG and SED group membership. Therefore household weights have been calculated, and the selection of groups within strata was proportional to size of the group. However, rather than presenting a mix of weighted and un-weighted analysis in this draft report, the next version of this report will include a weighted analysis.

Seasonality

The urgency to enumerate the RAP3 baseline before implementation activities started meant that it was not possible to conduct an extended enumeration over a 12-month period, which would have helped to neutralise variations in consumption throughout the year. Therefore it must be recognised that this baseline - enumerated between 3rd May and 8th June 2014 - should be enumeration at the same time of year for the midline and endline surveys in order to neutralise seasonality distortions between the survey rounds.

Annex 3: Reality Check Approach

Important characteristics of the RCA are:

- ***living*** with rather than visiting (thereby meeting the family in their own environment, understanding family dynamics, how days and nights are spent, etc).
- ***conversations*** rather than interviews (there is no note taking, thereby putting people at ease and on an equal footing with the outsider).
- ***learning*** rather than finding out (suspending judgement, letting people who experience poverty take the lead in defining the agenda and what is important).
- ***household-centred***, interacting with families rather than users, communities, and groups.
- ***experiential*** – in that researchers themselves take part in daily activities (collecting water, cooking, cultivation) and accompany household members (to school, to market).
- ***inclusion*** of all members of households.
- ***Private*** space rather than public space disclosure (an emphasis on normal, ordinary lives).
- ***multiple realities*** rather than public consensus (gathering diversity of opinion, including 'smaller voices').
- ***Ordinary interaction*** with front line service providers (accompanying host household members in their interactions with local service providers, meeting service providers as they go about their usual routines).
- ***cross-sectoral*** although each RCA may have a special focus, the enquiry is situated within the context of everyday life rather than simply (and arguably artificially) looking at one aspect of people's lives.
- ***longitudinal*** change- understanding how change happens over time.

Study location selection

The RCA study villages were selected purposively to illustrate different elements of the RAP3 project. Two districts represented 'new' areas where new road construction is planned (Humla and Bajura) while two other districts were old RAP1 and 2 areas where the emphasis is to ensure improved maintenance with small amount of upgrade work (Accham and Doti). The locations were selected using the same criteria as the quantitative survey. Purposive sampling resulted in study villages being selected along the road corridor and within 1.5 hours walk of the road corridor. Socio-economic development (SED) is planned for all areas.

Table 30provides information on the study locations with remoteness and type of RAP intervention key determinants for selection. The poverty scale on the left of the table was not pre-determined but has been assessed post study based on study observations. This ranking was made based on the study team's assessment of predominantly public poverty. It represents an assessment of access to services, perceived quality of services, remoteness, income diversity and extent of economic activity in the vicinity as well as levels of social capital. Four teams of researchers comprising members from each study location developed their own matrices to compare and rank these aspects of poverty and developed their own priority rankings which were then combined to produce the final ranking noted in this and subsequent tables. The locations are listed in this order to provide the reader with some pointers to interpreting findings.

The villages are not named in order to protect the identity, anonymity and confidentiality of participants in what is intended to be a longitudinal study.

Table 30: Study locations

Poverty	VILLAGE CODE	LOCATION	REMOTENESS	ETHNIC MIX	RAP intervention
poorest	C	Humla	3.5 days trek from district town	Brahmin and Chettri (few dalits live segregated) Settlement= 64 HH across 4 wards)	New road- just started
	D1	Doti	2 hours walk from district town. RAP road access (1.5 hours)	Chettri and Brahmin with about 20% dallit Settlement= 90HH across 2 wards	RAP road built 10 years ago. Road upgrade- planned
	B1	Bajura	1.5 hours from sub district town but difficult access to VDC	All Chettri Settlement= 161 across 3 wards	New road – just started
	A	Accham	Along main road, thriving market area & growth centre for 6 VDCs .Some hamlets up to one hour walk to this sub district town.	Chettri majority – 20-40% dallit- some hamlets dallit majority. Settlement=160HH across 2 wards	RAP road built 5 years ago. Road upgrade, maintenance
	B2	Bajura	7 hours walk from sub district town town	Predominantly Brahmins Settlement= 75 HH across 2 wards	New road- just started
Least poor	D2	Doti	Small market town with VDC office and other government offices, 3 hours walk to district town.	Chettri & Brahmins majority in most villages. Some with equal number of dalits. Settlement= 200HH across 3 wards	RAP road built 10 years ago. Road upgrade- planned

A total of 24 host households were included in the baseline study, most of which were regarded in the village as comparatively poorer. A further 100 focal or neighbouring households were also included. Approximately 900 participants were included in conversations over the four day/four night periods which researcher stayed in the homes of people living in poverty in each location. More than 1,300 hours of interaction (equivalent to more than 250 focus group discussions).