Interactions between improved rural access infrastructure and transport services provision

Report of an Inter-regional Workshop held 12-13 November 2018, Arusha, Tanzania

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Abstract

The 'Interactions: Maintenance-Provision of Access for Rural Transport Services (IMPARTS)' research project held an inter-regional workshop between 12-13 November 2018 in Arusha, Tanzania to discuss how investments in low-volume rural roads (LVRR) affect rural transport services (RTS). Most of the 37 participants were from AfCAP road authorities. There were IMPARTS presentations on RTS, LVRR and evidence from road surveys, and inputs from other ReCAP projects. Half the workshop comprised small groups including visits to local LVRRs to survey RTS operators and users. Groups discussed observations, including the importance of motorcycle taxis when roads cannot be used by minibuses. Further group work endorsed the need for integrated approaches to RTS-LVRR planning. This will require institutional collaboration (roads-transport), and survey data of RTS, that could be included in Maintenance Management Systems. Data and simple indicators on RTS volumes and prices can be collected easily. LVRR road guidelines should consider motorcycle safety and options for motorcycle trails. RTS could be stimulated by multi-sectoral logistic strategies, with funding options to assist new RTS initiatives, including an RTS fund. The various innovative approaches for integrated RTS-LVRR planning will require capacity building and modest funding. The anonymous evaluation rated the workshop highly.

Key words

Transport services improvements; Transport services indicators; Traffic counts; Rural mobility; Rural road outcomes; Rural road impacts; Rural road preservation; Rural road provision; Motorcycle Taxis

Acronyms, Units and Currencies

$	United States Dollar. At time of workshop USD 1 ≈ GBP 0.78 ≈ TZS 2300
4WD	Four-wheel drive
AfCAP	Africa Community Access Partnership
ANE	Administração Nacional de Estradas
AsCAP	Asia Community Access Partnership
c	cent (USD)
CSR	Corporate social responsibility
DFID	Department for International Development, UK
DFR	Department of Feeder Roads
DoLIDAR	Department for Local Infrastructure Development and Agricultural Roads, Nepal
DRC	Democratic Republic of Congo
eg	for example
ERA	Ethiopian Roads Authority
EU	European Union
GBP	Great Britain Pound (UK pound sterling) At workshop, GDP 1 ≈ USD 1.29 ≈ TZS 3000
GDP	Gross Domestic Product
GDPR	General Data Project Regulation
GIS	Geographical information system
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GPS	Global positioning system
HDM4	Highway Development and Management Model
IFRTD	International Forum for Rural Transport and Development
IMPARTS	Interactions: Maintenance-Provision of Access for Rural Transport Services
IMT	Intermediate means of transport
kg	kilogram
km	kilometre
LGED	Local Government Engineering Department
LVRR	Low-volume rural road
NGO	Non-governmental organisation
NTA	National Transit Authority
PIARC	World Road Association
PMU	Project Management Unit
PO-RALG	President's Office, Regional Administration and Local Government (Tanzania)
PPP	Public-private partnerships
RAI	Rural Access Index
ReCAP	Research for Community Access Partnership
RED	Roads Economic Decision (software)
RTS	Rural transport services
SDG	Sustainable Development Goal
SLRA	Sierra Leone Roads Authority
TARURA	Tanzania Rural and Urban Roads Agency
ToR	Terms of Reference
Tsh	Tanzania shilling (see also TZS)
TZS	Tanzania shilling. At time of workshop USD 1 ≈ TZS 2300; GBP 1 ≈ TZS 3000
UK	United Kingdom (of Great Britain and Northern Ireland)
UKAid	United Kingdom Aid (Department for International Development, UK)
USD	United States Dollar. At time of workshop USD 1 ≈ GBP 0.78 ≈ TZS 2300
VAT	Value Added Tax
VOC	Vehicle operating costs
WTP	Willingness to pay

Executive Summary

The 'Interactions: Maintenance-Provision of Access for Rural Transport Services (IMPARTS)' research project is studying how the provision and maintenance of low-volume rural roads (LVRRs) impact rural transport services (RTS) and the mobility of people and their goods. The premise is the need for an integrated approach to the provision-preservation-services continuum to ensure road investments are well-planned, cost-effective and appropriate to the transport needs of rural communities.

An inter-regional workshop was held from 12-13 November 2018 in Arusha, Tanzania, with 37 participants from 12 ReCAP countries. All AfCAP and AsCAP countries were invited to nominate participants in the fields of rural roads and transport services. Most of the 29 AfCAP and three AsCAP participants worked for roads authorities. To maximise professional synergies and exchanges, the workshop had contributions from three other ReCAP projects and was timed to allow participation in a PIARC international transport workshop.

The workshop aimed to discuss RTS-LVRR interactions issues raised in the IMPARTS draft scoping report, to increase country interest in the topics raised and to obtain institutional support for the project design framework for implementation in Phase 2 and 3. The workshop methodology was designed to encourage interactions and joint learning, with half the work in small groups, including the field visits, which allowed participants to 'survey' rural transport services operators and users.

The workshop started with IMPARTS presentations on RTS, LVRR infrastructure issues affecting RTS and survey evidence of LVRR outcomes and impacts. Three invited ReCAP projects ('Motorcycle safety', 'First Mile' and 'RAI') made presentations. Day one concluded with group discussions on the issues raised, including how road agencies should plan for RTS; road, RTS baseline and outcome information to be collected; and country-based RTS data, expertise and research/training needs. Groups agreed that roads authorities should consider RTS in investment planning. They need relevant data on roads, socio-economic contexts, production and RTS, including modes, passenger/freight volumes, tariffs, loading and safety. Road authorities had little information on RTS and need capacity building and funding for this new approach.

The second day started with three groups visiting LVRRs and learning of road agency practices. Participants interviewed transport operators (motorcycle taxis and minibuses) and different transport users. On return, they discussed their findings and the implications of road condition on RTS and users, the implications for road planning and the data needed to understand LVRR-RTS interactions. Groups were very motivated, presenting many interesting observations and suggestions. Poor roads in the rainy season restricted minibus operations and on all roads motorcycle taxis were the most numerous vehicles. While motorcycles now seem irreplaceable on poor roads, passengers would happily shift to regular minibus services if roads were improved. All groups agreed that an integrated approach to road planning was required, with understanding the local environment, stakeholder consultations and data collection on transport needs and RTS. This needed institutional collaboration, capacity building and funding.

Participants selected four topics to be addressed by the concluding discussion groups. The **policy group** discussed how integrated LVRR-RTS planning strategies could be achieved. Institutional collaboration or integration is needed (roads agencies and transport authorities). Capacity building on RTS issues, and funding is required. Relevant RTS data could be included in Maintenance Management Systems.
The **infrastructure group** discussed appropriate infrastructure where motorcycles are the main RTS. LVRR standards need to consider motorcycle use (including width, gravel and concrete strips/edges). Motorcycle trails could be inexpensive and valuable and are increasingly important, with policy and planning implications. Guidelines and advice are needed. The **indicator group** considered useful planning and evaluation data options and easily-collected outcome indicators. Most were RTS-specific relating to transport modes, volumes, fares and tariffs, obtainable from traffic counts and surveys of operators and users. Safety was important, but a difficult indicator due to data reliability and traffic speeds. The **transport services group** proposed multi-sector RTS Logistic Strategies to identify and promote transport demand. Options to fund investments included RTS funds, PPPs and credit to help start-ups as demand develops. Road Funds could support (and require) an integrated approach to stimulating RTS. **Final discussions** endorsed the need for an integrated approach to LVRRs and RTS, requiring high-level policy support, institutional cooperation, capacity building and modest funding.

Participants rated the workshop very highly in anonymous evaluation forms, particularly field visits and group discussions. They learned about RTS and associated policy/survey issues, and how road design/ condition affects RTS. Many would have preferred that the workshop had been longer than two days.

1 Background

1.1 Project overview

The Research for Community Access Partnership (ReCAP), funded by UKAid, commissioned TRL to undertake a research study to gain, and to disseminate, a greater understanding of how investments in low-volume rural roads (LVRRs) impact rural transport services (RTS) and the mobility of people and their goods. This project is known as IMPARTS (Interactions: Maintenance-Provision of Access for Rural Transport Services). It is exploring the interaction between the effective use of rural access and its dependency on the appropriate provision and preservation of LVRRs, and the resultant changes in rural transport service provision that are brought about through improved sustainable road performance.

The many benefits of LVRRs are largely dependent on a sustained level of infrastructure performance linked to there being appropriate and affordable transport services: rural roads must be fit for purpose in terms of facilitating the movement of people and freight. Currently, infrastructure provision and preservation are largely disassociated from service provision. Therefore, this project is examining the existing and desirable relationships between LVRRs and transport services, and the links between LVRR-investment planning for provision and preservation and the actual achievement in terms of rural transport provision.

The overall aim of the project is to research changes occurring in rural transport provision consequent to the rehabilitation or upgrade and improved maintenance of LVRRs and networks, and to help identify and optimise transport solutions to poverty caused by poor access. The core objective is to examine the conditions in which rural transport services succeed or fail, and the relevance of infrastructure standards, condition and level of service to that outcome.

Output: definitive guidelines on how the provision-preservation-access continuum can be improved in support of better livelihood opportunities for rural communities and have a positive impact on poverty reduction.

Impact: to improve accessibility and mobility for rural communities, and to improve the overall livelihood outcomes of those communities, and, in particular, vulnerable groups and individuals within those communities.

This research is exploring how infrastructure projects are planned, designed and implemented in relation to the end user and the extent to which projected demand for transport service provision is factored into the planning processes. Through literature reviews, stakeholder consultations and Phase 2 field work, this research will consider the experiences of selected LVRR projects in Africa and Asia to examine whether transport service objectives and accessibility outcomes are being achieved as a result of the planned investment in road infrastructure. In doing so, it will determine whether LVRRs are fit-for-purpose for the generated traffic post-construction, rehabilitation or upgrade, and under what conditions these roads may be over- or under-designed relative to potential and actual demand for passenger and freight trip-making.

The results of this research should eventually lead to:

- A good practice approach to the planning, design and maintenance of new, rehabilitated or upgraded LVRRs and networks that result in improved service access
- Better advice to road planners and engineers on how to engage with beneficiaries of the road infrastructure, including the end user (households, farmers, transport operators, etc.), at the design stage, to optimise integration between roads and transport services
- Assessment of the effectiveness of different engineering solutions on wider transport service provision and accessibility based on empirical evidence
- Better understanding of the role of the private sector in delivering RTS, the institutional limitations within government structures of ensuring appropriate RTS, and identifying enablers for public-private partnerships where appropriate.

Further background, information and analysis is available in the project's Draft Scoping Report (Starkey et al, 2018) that formed a basis for many of the presentations and discussions at this workshop.

2 Inter-regional workshop

2.1 Workshop objectives, context and timing

The inter-regional workshop was designed to share and discuss the findings of the IMPARTS Draft Scoping Report and engage senior professionals from ReCAP partner countries in discussing and planning research options for Phases 2 and 3 of this project. One objective was to share the initial IMPARTS findings, including the results of the literature review. A second important objective was to assist and encourage participants to engage with the practicalities of how transport services providers respond to changes in rural road infrastructure and the implications for this in terms of research needs and planning processes. Given that most participants were expected to be road engineers, with relatively little experience relating to transport services research, this workshop was intended to assist with high-level capacity building towards a more integrated approach to rural road infrastructure and transport services, consistent with the ReCAP concept of a 'provision−preservation−services' continuum.

The workshop was held over a period of two days (12-13 November 2018) in Arusha, Tanzania, immediately before the World Road Association (PIARC) International Seminar on 'Transport in the Fourth Revolution: Dynamic Low-Income World'. The context was to allow participants to benefit from more than one event, and to create synergies through intellectual cross-fertilisation with other professional colleagues. To increase these exchanges and synergies, there was also a separate workshop with ReCAP 'First Mile' project stakeholders (Workman et al, 2018) and there were presentations at the IMPARTS workshop relating to three other ReCAP projects concerning First Mile connectivity, Motorcycle and Three-wheeler Safety and the Rural Access Index (RAI). These are summarised, with bibliographic references, later in this report.

Originally, the workshop had been planned for a two-and-a-half-day period in October, but this was not practicable due to various administrative constraints relating to recent data sharing restrictions (the European General Data Project Regulation or GDPR). Therefore, the planned content of the workshop had to fit into just two days, which made the schedule tight and the working days long (as many participants noted in their evaluation comments).

2.2 Workshop participants

Invitations were sent out to the ReCAP representatives in all AfCAP countries (Democratic Republic of Congo, Ethiopia, Ghana, Kenya, Liberia, Malawi, Mozambique, Sierra Leone, South Sudan, Tanzania, Uganda and Zambia) and all AsCAP countries (Afghanistan, Bangladesh, Myanmar, Nepal, Pakistan), as well as various organisations associated with ReCAP and transport services research. ReCAP member countries were asked to nominate up to two people, one specialising in rural road engineering and one specialising in transport services. There were some people who could not attend due to visa issues or their work schedules. Finally, 37 people participated from 13 countries. Of the 32 participants from AfCAP (29) and AsCAP (3) countries, 28 worked for roads authorities and four worked for organisations concerned with transport services. The names, countries and organisations of participants are provided in Annex A.

2.3 Workshop methodology and programme

The methodology was intended to be very interactive and practical, with almost half the time spent working on issues in small groups, including the field visit assignments. The first morning was allocated to presentations, informing the participants about the IMPARTS research and its scoping report conclusions, taking perspectives relating to transport services, engineering and researching the impacts and outcomes of changes in rural road infrastructure and transport services. Some of this session was attended by the Secretary General of the World Roads Association (PIARC) who was introduced and welcomed participants to attend the PIARC Seminar being held after the IMPARTS workshop. The beginning of the first afternoon, provided an opportunity to introduce other relevant ReCAP-supported research (Motorcycle Safety, the First Mile and the Rural Access Index). The participants were then divided into three groups (balanced as far as practicable for countries, regions, gender and specialisations). The groups all had to address several questions and issues arising from the IMPARTS scoping report including:

- How road agencies, engineers and planners should plan for appropriate transport services?

- What key information is required for baseline surveys and impact surveys?
- What interest, expertise and data resources relevant to IMPARTS exist in ReCAP countries?
- What are the needs in terms of research gaps and capacity building?

The second day started early, with the same three groups leaving to visit three different low-volume rural roads and talk with stakeholders about recent changes to the roads and to transport services. The groups had been recommended to sub-divide into smaller units to ensure that discussions with transport operators, market stall holders, and passengers was not intimidating, and all participants would have an opportunity to pose questions. Participants had been asked to talk with stakeholders to find out information on tariffs, transport frequencies, and the seasonality of access and transport services. On returning to the workshop venue, the same groups deliberated the lessons they had learned, before presenting these in a plenary session.

In the afternoon of Day 2, four key topics were agreed for further group discussions. Participants were free to go to their preferred topic (with some minor voluntary balancing for group sizes). The groups discussed:

- **Policy.** Policy and institutional implications of integrating the planning of rural transport services and rural transport infrastructure
- **Appropriate infrastructure.** The rural transport infrastructure that is appropriate where motorcycles and IMTs are the main transport services
- **Research and outcome indicators.** Key indicators of transport services that are easily measurable
- **Transport services.** Planning mechanisms or incentives that can be used to improve the quality and quantity of rural transport services.

In the final session, the groups presented their conclusions in a plenary session, allowing for clarifications, comments and some discussion. Following the conclusions of the group work, the workshop was formally closed with words from the host country, ReCAP and the project team. This then allowed optional attendance at an additional session in which some participants presented examples of transport services and rural infrastructure in their countries. All participants stayed on to benefit from these presentations.

The detailed workshop programme is provided in Annex B.

Figure 1 Photo montage of plenary sessions

2.4 Workshop thematic and country-based presentations

The PowerPoint presentations made at the workshop are attached in Annex D and summarised briefly in the following paragraphs.

Introduction to IMPARTS and the ReCAP 'transport services event'
Robin Workman, IMPARTS Researcher, introduced the workshop in the context of a series of linked transport services events, supported by ReCAP and clustered to enable professional exchanges and synergy. Following the IMPARTS workshop, there was a workshop for the 'First Mile' project, also funded by ReCAP and managed by TRL. More details about the First Mile Research were presented during the IMPARTS workshop, along with information concerning the ReCAP Safe Motorcycle and Three-wheeler project and the Rural Access Index (RAI) project. The day after the IMPARTS workshop there was a World Road Association (PIARC) conference in Arusha to which participants were welcome.

Transport services on low-volume rural roads
Paul Starkey, the IMPARTS Team Leader, presented information on rural transport services, going through the characteristics of different types of transport services on low volume rural road and issues relating to their operations and the regulatory authorities. The importance of the 'first mile' of connectivity was illustrated as well as the growing importance of motorcycle taxis in many ReCAP countries.

LVRR engineering issues that affect rural transport services
Robin Workman presented information on infrastructure issues to be considered when planning for the LVRR provision-preservation-services continuum. This presentation covered numerous factors to consider when planning road construction, upgrading, rehabilitation and routine maintenance, and how these affect transport services in various ways.

Reflections on earlier rural road traffic studies
John Hine, IMPARTS Consultant, presented information from the literature and recent studies on the effects road investments have had on traffic volumes. Examples were discussed of road investments in Ethiopia, Kenya and Tanzania. More details on some of these examples are available in the IMPARTS Scoping Report (Starkey et al, 2018).

Introduction to IMPARTS Phase 2/3 work, implications and reactions
Paul Starkey introduced the research questions to be addressed in Phases 2 and 3. He discussed the outcomes and impacts of road investments, with theories of change following LVRR road investment and road neglect, as well as potential data to be collected and possible indicators of changes.

Safe use of motorcycles and three-wheelers for rural transport
George Malekela, of the NGO Amend, presented the work of the ReCAP RAF2114A project on the use of motorcycles and three-wheelers, that is being led by Transaid and working in Ghana, Kenya, Tanzania and Uganda. The work had focused on motorcycles and their benefits (including widespread use for emergency transport) and disbenefits (including crashes, some of which were ascribed to poor road condition). Further information is available on the ReCAP website (including Bishop et al, 2018a and 2018b).

Importance of first mile infrastructure and transport services
Robin Workman, John Hine and Shedrack Willio (IFRTD Consultant) made a joint presentation concerning the ReCAP RAF2109A project researching the costs and benefits of improving first mile access for small scale farmers. Examples were provided of changing first mile access and marketing conditions for several crops grown in the research study areas of Kenya and Tanzania. Further information is available on the ReCAP website (including Workman et al, 2018).

Introduction to the ReCAP Rural Access Index (RAI) project
Robin Workman, TRL RAI Team Leader, introduced the ReCAP GEN2033D project that aims to work with the World Bank and other stakeholders to harmonise approaches for the measurement of the Rural Access Index (RAI) and increase the number of countries actively using this SDG indicator. Further information concerning this project (and the RAI) is available on the ReCAP website.

Rural road database and traffic volumes in Bangladesh
Syed Abdur Rahim, of the Local Government Engineering Department (LGED) in Bangladesh, presented the

work of the LGED and its database of rural roads, showing traffic count information. Examples were given of interventions and the wide variety of transport services modes in use on LVRR. Due to the complicated links to the database contained within the presentation, it is not available in Annex D.

Impact of the rural access infrastructure on transport services provision in the DRC
Théodore Ngambila, of the Ministry of Infrastructure and Public Works in the Democratic Republic of the Congo, presented some statistics concerning rural road upgrades in South Ubangi Province. Prior to the upgrades, the main means of transport were walking, bicycles and motorcycles. Following the upgrade bicycle use decreased, motorcycles increased greatly, and light trucks started to operate on the roads. The fares charged to passengers decreased by 43% while freight tariffs fell by 18%.

Rural roads and transport services in Nepal
Ram Chandra Shrestha of the Department of Local Infrastructure (DoLI), Nepal, presented illustrations of rural road upgrading in Nepal. Two examples were provided of very large increases in traffic volumes, following rehabilitation. All vehicle types including motorcycles, jeeps/pickups, trucks and minibuses increased significantly (up to ten fold), and the numbers of shops along the road increased greatly too.

Rural roads and transport services in Sierra Leone
Tamba Amara of the Sierra Leone Roads Authority presented examples of LVRR improvements and their effect on transport services which are mainly motorcycle taxis, with some minibuses ('poda-podas'). Data on traffic volumes and passenger and freight tariffs have been recorded for three years on upgraded and non-upgraded roads. So far, there has been significant variation between the years, but no clear trends have been identified.

South Sudan Rural Roads
George Duku and Aduot Madit of the Ministry of Roads and Bridges, South Sudan presented the South Sudan Rural Roads project that is rehabilitating 150 km or roads and providing spot improvements on a further 300 km. One of the monitoring indicators used is the Rural Access Index (RAI).

2.5 Workshop group discussions on Day 1

The first group work was designed to allow all participants to start to explore the various IMPARTS themes, as highlighted in the scoping report and the various plenary presentations. Each of the three groups had been given the same four questions to help guide the discussions:

- How road agencies, engineers and planners should plan for appropriate transport services?
- What key information is required for baseline surveys and impact surveys?
- What interest, expertise and data resources relevant to IMPARTS exist in ReCAP countries?
- What are the needs in terms of research gaps and capacity building?

In practice, much of the group work was very wide-ranging, as participants shared their many and diverse experiences and opinions. Most group members were familiar with infrastructure issues, but were only beginning to explore issues relating to transport services and how changes in infrastructure impact them. The group reporting reflected the relatively short time available for discussions and the exploratory nature of these initial discussions.

It was widely agreed that planning for rural roads should be based on a range of data and survey tools, taking into consideration a broad spectrum of transport needs, stakeholder opinions, transport services, environmental issues, technical feasibility and cost benefit analyses. When surveying for road improvement feasibility, baseline studies and impact surveys, there were many parameters to study including, type of road, road condition, terrain, population served, levels of production, traffic data, transport modes, passenger numbers and mix, travel times, fares and tariffs, income of transporters, the reliability and safety of transport services (including crash information). Options for road funding should be considered in the planning as well as local resources that would be available (human and materials). However, it was recognised that in many countries the political agenda drove resource allocation and decision making relating to road investment. Road construction/rehabilitation was generally prioritised over essential routine maintenance.

Within participating ReCAP countries, there was thought to be little data available about transport services within road authorities. Information collection seldom went beyond traffic counts. In most countries, there appeared to be no active policies or strategies to improve rural transport services. Identified constraints included the poor institutional links between roads authorities and transport services specialists, and the fact that people tended to work (and think) in isolated 'silos', surrounded by people of the same disciplinary background. There is a need for more inter-disciplinary collaboration, with associated training and capacity building. This would require guidance and financial resources for road planning individuals and departments as well as funding for transport research institutes with integrated (infrastructure-transport services) approaches and mandates. Research and resources were required to obtain more information.

It was generally agreed that all participating countries were interested in a more integrated approach to infrastructure and transport services, but that the road authorities and agencies lacked specific expertise relating to transport services. There were both resource issues (lack of budgets for survey work and work relating to transport services) and institutional hurdles (understanding transport services was not considered part of the mandates of roads authorities). Capacity building in this area was clearly important and would be welcome. Participants would welcome collaborating with ReCAP, IMPARTS researchers and other stakeholders to further develop the various ideas presented.

2.6 Workshop field visit and related small group discussions

2.6.1 Objectives

The field visit was intended to:

- Allow participants to visit a road and learn from the TARURA hosts the processes for prioritising road interventions.
- Give an opportunity for participants to question transport operators concerning the importance of rural road conditions for transport services and how they react to changing conditions
- Give an opportunity for participants to question rural people (different transport services users) concerning the importance to them of transport services and rural road condition
- Provide shared examples from the visited roads and transport services stakeholders to inform subsequent group-discussions relating to infrastructure-transport services interactions and research issues relevant to IMPARTS Phase 2 work.

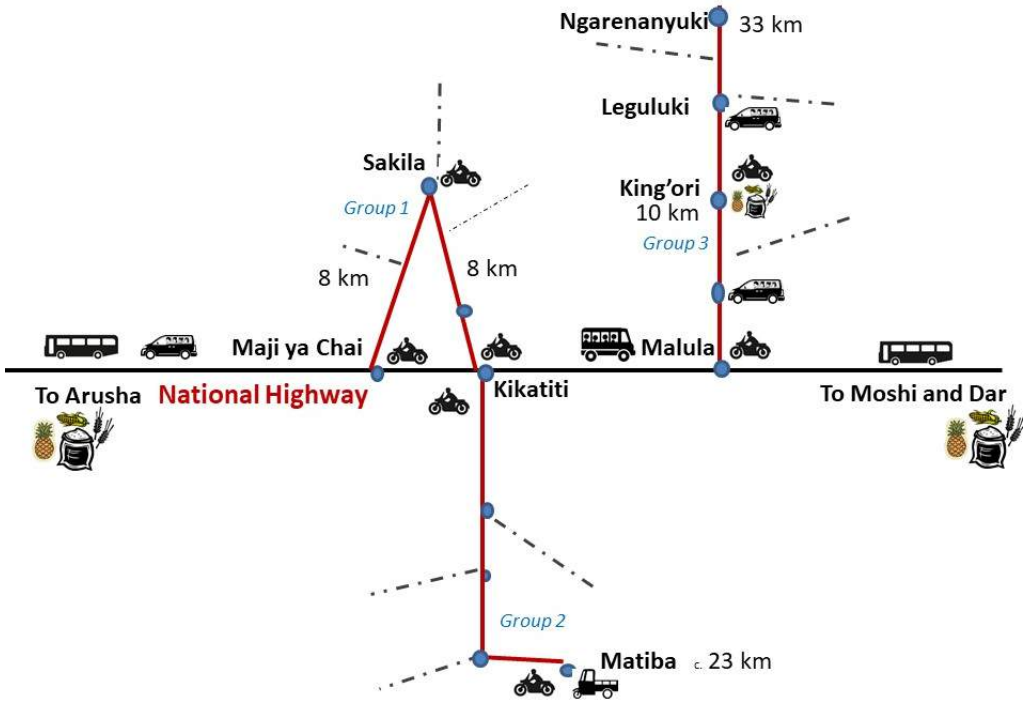
2.6.2 Organisation and activities

Participants were divided into three groups (one minibus per group) each with about 10 people, selected to ensure diversity (countries, disciplines, gender, etc). All groups had at least two Tanzanians to allow on-site explanation of TARURA rehabilitation and maintenance planning issues, as well as ensure there were no problems related to language or local protocols. Each group went to a separate road, the context of which had been briefly explained, with the help of a schematic map (see Figure 1). Following an initial joint introduction to the road and its infrastructure issues by a TARURA engineer, the participants split into smaller groups to interview transport operators (including motorcycle taxi operators) and transport users. Structured questionnaires were not used, as the aim was open-ended information collection through talking with local stakeholders to jointly explore the issues that arose spontaneously from the introductory questions and discussions.

Participants were asked to try to interview a range of different types of transport operators and a diversity of transport users (differing as far as practicable by age, gender, occupation and physical ability). Notes had been provided about appropriate introductions, and some suggested lines of questioning. These included changes in infrastructure and transport services in recent years, and suggested reasons for the changes. There were also questions relating to users' and operators' preferences and opinions relating to rural infrastructure and transport modes, how transport services could be improved and various questions relating to costs, schedules, waiting times, comfort, over-crowding, safety and security and carrying freight. Participants were encouraged to mentally 'triangulate' the different sources of information including what they saw and what the different stakeholders said. This methodology allows people to identify discrepancies and explore the reasons for the diversity of people's opinions or understanding. Naturally,

the various stakeholders were thanked for their time and given opportunities to ask questions to the participants.

Figure 2 Schematic map showing the three different rural roads visited by workshop groups



2.6.3 Discussions and presentations of the lessons and issues

On returning to the workshop venue, the field visit groups each discussed what they had learned, and did so in the context of the following questions:

- How do different transport services respond to changes in LVRR condition?
- What are the implications for rural people?
- What lessons (if any) can be carried forward relating to LVRR designs and LVRR planning?
- What data collection is needed to understand rural transport services?
- What research is needed to understand how transport services respond to infrastructure changes?

The three groups then reported on what they had seen and learned from the field visits, as well as the implications of this for planning rural road infrastructure and transport services, and related survey data requirements.

Group visit to Sakila Road

Group 1 had visited the 16 km, U-shaped alignment that reaches Sakila on the foothills of Mount Meru, as it climbs from and descends back to the main Arusha-Moshi highway. It is a hilly area, where soils are good, allowing a wide variety of marketed crops including vegetables and bananas. The unsealed road was very rough, but some recent work had been done to improve drainage issues on some sections. The majority of vehicles were motorcycles, carrying people and goods. There were some minibus services, but the road was both rough and steep (in places), and minibus services were unreliable. This was a particular problem in the rainy season (and fares increased at this time). Pickups were widely used to collect farm produce, and they often carried passengers but their schedules were unpredictable, and were not considered reliable public transport services. Therefore, motorcycle taxis were the most widely used means of transport for passengers and small freight loads. If the roads were rehabilitated, minibuses would be likely to become the main means of public transport, and the group felt that research was needed on the implications of such a change for the motorcycle taxi operators, and how their earnings would be affected by road investments.

Figure 3 Photo montage illustrating some aspects of the Sakila Road

Based on their on-road observations, the group thought that key data needed for road planning should include levels of agricultural production, road condition, transport times, costs and fares, crash data and the potential funding available. In terms of research requirements, key issues appeared to be how transport services tariffs respond to changing road conditions, how transport services composition changes with road improvements and deterioration (in particular, the shift between motorcycle taxis and taxis/minibuses) and how such changes impact rural communities and the vehicle operators (including motorcycle taxis operators). There was also a perceived need to research how best to regulate transport services and their operators on low-volume rural roads. The group also suggested there was a need to share studies showing how local economies could be transformed by rural road investments and transport services.

Group visit to Matiba Road

Group 2 travelled the 23 km road to Matiba, in a very different area to the south of the Arusha-Moshi highway. This was not in the mountain foothills, but on a more arid plain, with poorer soils and less potential for crop production. Animal production, notably cattle grazing, was very important here, and the villages were mainly populated by people of the Masai ethnic group with a tradition of cattle herding. Donkeys and ox carts assisted with rural transport. The unpaved road was very rough and poor, and sections of it were flooded during the rainy season. Ideally, the carriageway should be raised in places to prevent this. There used to be minibus services during the dry season, but the poor state of the road now meant that motorcycle taxis were the main (and often only) means of transport. Typical fares are TZS 5000 (about USD 2) from Matiba village to the highway. This is about USD 10c per passenger-kilometre. Because the road is bad, this rate per person does not change if two people are carried. However, motorcycle fares do increase considerably in the evening, rising to TZS 8000 (about USD 15c per passenger-kilometre).

Before the road was built, people had to walk long distances. When the road was first constructed, there were minibus services, and people came to install electricity, water pumps and health services. As the road deteriorated through lack of maintenance, minibuses were reduced and motorcycles became the main means of transport. Freight volumes were thought to decrease, although animal drawn carts are still used to bring some farm produce to the markets on the highway. Maize can be stored before sale, and so is often transported in the dry season, at TZS 20,000 or USD 9 per 500 kg ox cart load to the highway. This represents about USD 0.9 per tonne-kilometre, which is cheaper than motorcycle transport. Even

motorcycles struggle in the rainy season, with slippery surfaces, and motorcyclists unwilling to carry large loads.

Figure 4 Photo montage illustrating some aspects of the Matiba Road

The group considered that given the population and productive environment, additional road investment including raising some low sections and sealing the surface, would probably be justified and bring many social and economic benefits to the area. Data should be collected on local production, existing transport services and their tariffs. An integrated approach to rural road planning was required with research into how transport services respond to road improvements and deterioration.

Group visit to King'ori Road

Group 3 visited the first section of the 33 km Malula to Ngarenanyuki Road, which is classified as a 'collector' road as it serves a large catchment area, with many roads feeding into it and at Ngarenanyuki it links with a road that joins the A104 Kenya Border Highway. Nevertheless, the road surface is very rough and beyond the King'ori market there are difficult sections that are sometimes impassable and frequently cut off for much of the rainy season. The road gradually rises towards the slopes of Mount Meru and serves quite a fertile agricultural area. The carriageway is nominally 7 m wide, but with a rough, eroded surface, vehicles follow meandering routes, trying to avoid the roughest parts. In 2017/18, the Road Fund provided TZS 60 million (USD 25,000) to improve a 5 km section of the road, but there is no contractor undertaking routine maintenance.

Due to the large catchment population, there are many transport services options, mainly minibuses and motorcycle taxis. There are also some larger buses, but these are infrequent and travel slowly on the rough road. Minibuses and large buses charge the same fares. Minibuses often travel beyond the main highway and reach Arusha, but only make one trip a day, due to market saturation. Minibuses carry loads, but these are relatively expensive at TZS 5000 (about USD 2) per 50 kg, or USD 4 per tonne-kilometre. Minibuses charge TZS 2000 (about USD 90c) for the 10 km from King'ori to the highway, which is about USD 9c per passenger-kilometre. Motorcycles charge 50% more than this, because they provide a faster service, with no waiting and faster travel speeds along the poor-quality road.

The group noted that with the road in poor condition, the cost of maintaining vehicles was high. The number and range of services decreased with the road in poor condition, with many fewer services along the whole road in the rainy season. The group felt that greater attention should be given to good drainage and maintenance by the road engineers, in order to provide an all-season road. In the short term, emphasis should be on spot improvement to ensure basic access so that transport services can operate. The cost of

transporting people and goods was high, but rural people could not increase the sale price of their produce to compensate, as this was determined by the market competition along the main highway.

Figure 5 Photo montage illustrating some aspects of the King'ori Road

When they had the option, rural women preferred to travel in minibuses rather than motorcycles, because they considered the minibuses to be safer and cheaper, although they took more time. However, when there was no option, for example in emergencies, they travelled on motorcycle taxis.

The group considered that there was a need for institutional harmonisation to allow multi-disciplinary research relating to roads and transport services. Some key parameters needed to understand rural transport services, were people's economic activities, journey purposes, key travel origins and destinations and the goods that needed to be transported. These had to be understood in relation to the different transport types available, their costs of operation and the fares and freight tariffs they charged.

2.7 Concluding group discussions

2.7.1 Policy

The group discussed 'Policy and institutional implications of integrating the planning of rural transport services and rural transport infrastructure'. There was clear consensus that an integrated approach was needed, and that road planning should take into consideration existing and planned transport services. One key problem was that road agencies seldom had a mandate to work on transport services issues, and until recently they had not really considered this as a desirable option. The second big problem was that road agencies have very little knowledge, understanding or experience of the transport services issues and the types of transport services data that might be needed for planning purposes. Arguably, there is an immediate need for training and capacity building relating to transport services, and for road agencies to consider wider transport services issues and not simply traffic counts. In the longer term, this also has implications for the curricula of road engineering and road planning courses at universities.

One suggestion to start the process of integration was for agencies to start collecting transport services data and store this in roads-orientated databases, such as Maintenance Management Systems. Such a roads-and-transport-services database could be developed as an integral component of the existing Maintenance Management System, or it could be a separate database with appropriate links to the Maintenance Management software. There would be road-linked data on the traffic volumes (which should exist already) but also more information on the numbers of transport services operators, fares, tariffs,

frequencies, travel times, loads and other characteristics of the various modes of transport services operating along the road. Data collection could be done in collaboration with transport services authorities (encouraging active collaboration) or the road agencies could be mandated to collect this information for LVRR. When it came to planning road investments, the database could be interrogated, providing transport services planning information on the target road and associated linked roads.

Figure 6 Photo montage of group discussions

2.7.2 Appropriate infrastructure

The group discussed 'The rural transport infrastructure that is appropriate where motorcycles and Intermediate Means of Transport (IMTs) are the main transport services'. The group listed many of the infrastructure-related issues that need to be taken into consideration when planning rural roads including traffic, population served, geometry/alignment, material availability, surface options, structures and maintenance costs. There were also various economic issues, including agricultural potential and markets, and social issues, notably access to public services including health and education. There was a need to understand existing transport services, including bicycles, motorcycles and three-wheelers. It was also crucial to have a reliable understanding of how transport services would change if the infrastructure was upgraded. Most existing standards assumed significant use by 'conventional' vehicles (with four or more wheels) and these could be over-designed and excessively expensive if they were to be used mainly by motorcycles and other IMTs.

It was acknowledged that motorcycle trails have particular benefits as low-cost options for linking off-road villages to the road network. Few countries had appropriate standards or even guidelines for the construction and maintenance of motorcycle trails. Some guidelines should be made available to advise community groups or contactors developing new trails. There was clearly a case for developing a lower-level category of rural infrastructure in the recognition that motorcycle trails and tracks were increasingly important in many (but not all) countries. Some participants believed that when motorcycle trails are developed there would be quick uptake, leading to demand for full-width roads within maybe three years. In such a scenario it would be more cost effective to construct the full road in the first place, rather than upgrade a trail after just three years.

In terms of conventional roads, there were many issues that needed to be considered and, where appropriate, addressed. Gravel roads could provide safety issues for motorcycles (e.g. loss of traction around bends) and so low-cost seals should be used if possible if there are many motorcycles. Parallel

concrete strips are designed for four-wheel vehicles on LVRR where two vehicles seldom meet. However, they pose dangers for motorcycles, as these vehicles often meet and pass each other. Getting on and off the strips can be hazardous for motorcycles if the concrete is 'proud' with ridges that can induce skidding. Concrete joiners between the concrete strips that are proud make the use of three-wheelers impractical. Any concrete road that is proud of the surrounding shoulders present hazards to motorcycles if they have to leave the carriageway due to an on-coming vehicle. The group could not reach a consensus on appropriate carriageway widths, particularly if there were mixed traffic (some conventional vehicles and some motorcycles or three-wheelers). Lane marking is seldom practicable on LVRRs, and, whatever the lane markings, both conventional vehicles and motorcycles tend to make their own rules on LVRRs.

2.7.3 Research and outcome indicators

The group discussed 'Key indicators of transport services that are easily measurable'. The emphasis was on 'outcome' indicators that change quite rapidly (in one-to-three years) rather than impact indicators (that often change over timescales of five years or more). Changes to transport services (fares, freight tariffs, frequencies, modal composition, loading levels) are considered to be outcome indicators that can be easy to measure through small surveys, including traffic counts, operator and user surveys. Changes to incomes, agricultural production, public health, housing and educational levels are generally considered impact indicators which require quite large-scale surveys to obtain reliable data. Although impact indicators are important, the large amount of data needed is expensive to collect, and the indicators tend to change gradually over periods of 5-10 years, and this limits their widespread application in planning rural transport services.

Various measures of transport services (modal split, passenger and freight volumes, prices, frequency, reliability, seasonality, etc) are easy to measure and generally reliable as indicators of road use and outcomes of road investments. Safety is clearly important but a difficult indicator to measure. Police and hospital records of crashes can be difficult to access and are seldom accurate when it comes to individual roads. The recall of community leaders, focus groups, transport operators and transport users can be used to assess crashes. However, it is generally found that despite the appearance of dangerous practices on LVRRs, serious crashes are rare, compared to the crash rates on national roads and in urban/peri-urban areas. In general, crash severity increases with speed, and so road investments and improvements in road conditions actually reduce safety, making it a 'perverse' indicator to measure, albeit an important one.

Transport planning software, such as the Highway Development and Management Model (HDM4) and Road Economic Decision Model (RED), includes estimates of vehicle operating costs (VOCs). However, the VOCs of informal sector operators are notoriously difficult to capture accurately, with 'make-do and mend' vehicles that often operate on several different roads. Thus, while HDM4 can be calibrated for rural roads, VOCs are not suggested as easily-measurable outcome indicators.

Other suggested outcome indicators for rural roads were visible enterprises along the road, numbers and size of market stalls and employment levels and supervisory visits in local schools and clinics. These are all expected to increase as road and transport services improve and decrease as roads and transport services decline due to poor maintenance.

2.7.4 Transport services

The group discussed 'What planning mechanisms or incentives can be used to improve the quality and quantity of rural transport services?' The group considered issues affecting transport services from the operators' perspectives (e.g. transport demand, quality of the infrastructure), and the users' perspectives (e.g. socio-economic needs for mobility and transport tariffs, reliability and efficiency). To encourage transport services there was a need to stimulate the market demand, for example by stimulating increased agricultural production. There should be an integrated, multi-sectoral approach to developing a Rural Transport Services Logistics strategy, which could identify areas with real and intrinsic demand for rural transport services, where investment in transport services would be profitable for the private sector or Public Private Partnerships (PPP). Many ministries concerned with rural areas should be involved with local stakeholders in developing Rural Transport Logistics Strategies. They would include, where appropriate,

Ministries of Public Works, Transport, Agriculture, Health, Labour, Industry, Trade (inland trade corridors), etc. Such a transport strategy should be linked to integrated land-use planning in rural areas.

The group discussed ways in which improvements in rural transport services could be funded. One option would be to encourage private firms to invest in rural transport services as part of their corporate social responsibility (CSR). To create synergies between road investments and transport services the option of performance-based contracts for rural road maintenance should be considered where possible with labour-based practices. With the successful establishment of road funds, similar funds could be established to promote transport services. To assist potential investors in rural transport services, there could be scoping data available on actual and latent transport demand and willingness to pay (WTP). There could be inducements to the private sector, including potential guarantee schemes for loans to invest in vehicles and initial operations. Public-private partnerships (PPP) could be established to fund the initial viability gaps of new rural transport services, allowing start-up enterprises in areas of below-optimal demand, that could become profitable once people adapt to the new services, leading to increased demand and operational profitability.

There was general agreement that the way forward would be easier if roads agencies were actively involved in the planning of improved transport services. There should be clear planning links between road construction, maintenance and rural transport services. Road funds could not only support this, but could make financial disbursements conditional on such integrated approaches.

2.8 Workshop concluding remarks and follow-up actions

The final discussions confirmed the general agreement that a more integrated approach to road investments is required, in line with the idea of a roads 'provision−preservation−services' continuum. This involves inter-institutional and inter-disciplinary collaboration and needs to be anchored at high level, through clear policy objectives. When a policy is in place, the institutional structures and responsibilities need to be defined at all levels. There was agreement for a need to capture data relating to rural transport services to inform decisions relating to road maintenance and rehabilitation. Where motorcycle taxis are widely used, this should inform planning investments for appropriate access infrastructure suitable for ensuring safe use of such modes of transport services. With the need for road agencies to engage with, and understand, rural transport services, there is a clear need for relevant training and capacity building. For this to happen there would need to be national and regional champions and clear examples of good practice. The amount of additional funding required would not be great, especially if there were options to obtain both funding and enforcement of good practices through the road funds. All participants and their departments need to be motivated to ensure that this integrated approach is adopted, and would benefit rural people.

In their closing remarks, both the ReCAP and Project Team representatives thanked the participants for attending and their great enthusiasm and commitment as they worked very productively for two very hard days. The various organisers and facilitators were thanked, including the TARURA engineers who assisted with field visit planning and implementation.

The Tanzanian hosts thanked all participants for their many inputs and dedication to the subject matter, and formally closed the workshop.

2.9 Workshop evaluation

At the end of the workshop, evaluation forms were distributed, and participants were asked to complete them anonymously. A total of 30 completed forms were returned. The full evaluation report is provided in Annex C, but highlights are summarised here.

Participants were asked to assess 25 different aspects of the workshop on a five-point scale. Participant responses were mainly very positive, with 89% of assessments made being 'very good' or 'good', and 10% being 'OK'. There were high scores for the 'overall impression' and 'usefulness' of the workshop, as well as for the workshop facilitation and travel arrangements. The programme elements rated the highest were

the field visits and their associated briefings and the small group discussions. Most of the presentations were closely clustered, with scores better than 'good'.

Participants were asked to note three things they had learned from the workshop. The most commonly cited lessons were about rural transport services and related policy issues. A second cluster of things learned related to outcome indicators for road investments and surveys of rural transport services. A third key lesson related to the infrastructure-transport services continuum and the need for integrated infrastructure-transport services policy and planning. A fourth cluster of responses related to planning and designing roads for rural transport services.

Participants were asked 'what was the best and most useful aspect of the workshop?' Most answers related to the field visits and the group discussions. When asked how the workshop could have been improved, most people wanted more time. It was clear from the participants' comments and rating of the timetable that compressing the two-and-a-half-day programme into two days had been tough, but valuable. Participants appeared to have wanted more time, rather than less content.

3 Next steps

Following the workshop there will be a series of follow-ups. The workshop report (this document: Starkey et al., 2019a) will be circulated to participants and uploaded to the ReCAP website. It should be noted that this document reports the activities, deliberations and conclusions of the workshop participants. While the IMPARTS team and the ReCAP PMU will assess the various opinions expressed, these may not necessarily reflect the views of the IMPARTS team and/or the ReCAP PMU.

The revised Phase 1 Scoping Study Report (Starkey et al., 2019b) will be finalised, and will also be circulated to participants and be made available through the ReCAP website. This will contain more concrete plans for Phases 2 and 3, that will build upon Phase 1 research and the formal and informal discussions held during the workshop. As most participants stayed on for the PIARC workshop, there had been several opportunities for the team to discuss in greater detail options for Phase 2 research with participants from several possible countries. There will be a break of about one month, to allow the revised Scoping Study Report to be reviewed and, if the proposals are approved, for the work of Phases 2 and 3 to be contracted. Subject to contract agreements, Phase 2 is likely to start in February 2019.

4 References

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Annex A: Workshop participants

Name	Institution	Country
Mr Tamba Amara	Sierra Leone Roads Authority	Sierra Leone
Mr Salvatory Antipasy	TARURA	Tanzania
Mr Richard Augustino	TARURA	Tanzania
Mr Bernard Badu	Department of Feeder Roads	Ghana
Mr Patrick Bekoe	Ministry of Roads and Highways	Ghana
Mr Francis Bockarie	Sierra Leone Roads Authority	Sierra Leone
Dr Annabel Bradbury	Cardno/ReCAP PMU	United Kingdom
Mr Francis Dimu	Roads Authority	Malawi
Mr George Duku	Ministry of Roads and Bridges	South Sudan
Mr Moises Dzimba	Administração Nacional de Estradas	Mozambique
Mr Alemayehu Endale	Ethiopian Roads Authority	Ethiopia
Mr Luis Fernandes	Administração Nacional de Estradas	Mozambique
Mr Yitagesu Halala	Ethiopian Roads Authority	Ethiopia
Mr Sumoiwuo Harris	Ministry of Public Works	Liberia
Mr John Hine	Independent consultant (TRL)	United Kingdom
Ms Joseline Kagombora	Tanzania Rural and Urban Roads Agency	Tanzania
Mr Willard Kaunde	Roads Authority Malawi	Malawi
Mr Alibaba Kpakolo	Ministry of Public Works	Liberia
Ms Siaruth kimaro	TARURA	Tanzania
Mr Bruno Kinyaga	Tanzania Roads Association	Tanzania
Mr Vincent Lwanda	Tanzania Rural and Urban Roads Agency	Tanzania
Mr Aduot Madit	Ministry of Roads and Bridges	South Sudan
Ms Josephine Mwankusye	Independent consultant (STET)	Tanzania
Mr George Malekela	Amend.Org	Tanzania
Mr Théodore Ngambila	Ministère des Infrastructures et Travaux Publics	Democratic Republic of the Congo
Dr Emmerentian Mbabazi	Uganda National Roads Authority	Uganda
Mr Henry Nkwanga	Cardno/ReCAP PMU	Uganda
Mr Benedictus Dotu Nyan	National Transit Authority	Liberia
Mr Syed Abdur Rahim	Local Government Engineering Department	Bangladesh
Mr Hira Lal Regmi	Department of Local Infrastructure	Nepal
Dr Mark Henry Rubarenzya	Uganda National Roads Authority	Uganda
Mr Baraka Sanga	TARURA	Tanzania
Mr Ram Chandra Shrestha	Department of Local Infrastructure	Nepal
Mr Paul Starkey	Independent consultant (TRL)	United Kingdom
Mr Billy Tshibambe	Ministère des Infrastructures et Travaux Publics	Democratic Republic of the Congo
Mr Shedrack Willilo	STET International Limited	Tanzania
Mr Robin Workman	TRL	United Kingdom

Annex B: Workshop programme

IMPARTS Workshop 12-13 November 2018, Mount Meru Hotel, Arusha, Tanzania

Workshop Programme

DAY 0: Sunday 11th November 2018		
Time	**Activity**	**Responsibility**
07.00-22.00	Arrivals of IMPARTS international participants	Millennium XL
IMPARTS Workshop Day 1: Monday 12th November 2018. *Chairing/Reporting: Joseline Kagombora and Vincent Lwanda (TBC)*		
Time	**Activity**	**Responsibility**
08.00 -08.45	Registration	Millennium XL
09.00-09.30	**Welcome, introductions, objectives and schedule**	Vincent Lwanda (TARURA), Robin Workman (TRL) and Annabel Bradbury (ReCAP)
09.30-09.50	**Transport services on LVRR**	Paul Starkey
09.50–10.20 *10.20–10.30*	Introduction to workshop themes, issues and outputs *Clarifications and questions*	Paul Starkey
10.30-11.00	**Coffee/Tea Break**	
Chairing: Vincent Lwanda (TARURA). Facilitation: Josephine Mwankusye. Reporting: Henry Nkwanga		
11.00-11.20 *11.20-11.30*	**LVRR Engineering issues that affect rural transport services** *Clarifications and questions*	Robin Workman
11.30–11.50 *11.50–12.00*	**Measuring impacts of roads on Rural Transport Service: literature overview and key studies** *Clarifications and questions*	John Hine
12.00-12.20 *12.20-12.30*	Introduction to Phase 2/3 work, implications and reactions *Clarifications and questions*	Paul Starkey
12.30-13.00	Plenary reactions on implications of all presentations	Josephine Mwankusye
13.00-14.00	**Lunch Break**	
Chairing: Vincent Lwanda (TARURA). Facilitation: Josephine Mwankusye. Reporting: Henry Nkwanga		
14.00-14.20 *14.20-14.30*	Motorcycle and three-wheeler transport services *Clarifications and questions*	George Malekela, AMEND
14.30-14.50 *14.50-15.00*	Importance of first mile infrastructure and transport services *Clarifications and questions*	Shedrack Willio, John Hine and Robin Workman
15.00-15.15	Introduction to the ReCAP Rural Access Index (RAI) project	Robin Workman
15.15-15.45	Plenary reactions and implications	Josephine Mwankusye
15.45-16.00	Introduction to group discussions, objectives and outputs	Paul Starkey
16.00-17.30 (including working coffee break)	**GROUP DISCUSSIONS (with working coffee/tea break).** **Working groups building on presentations/scoping report focussing on key issues relating to the IMPARTS guideline requirements and/or research needs. All groups discuss:** • How road agencies, engineers and planners should plan for appropriate transport services? • What key information is required for baseline surveys and impact surveys? • What interest, expertise and data resources exist in ReCAP countries? What are the needs in terms of research gaps and capacity building?	
17.30-18.00	Plenary reporting/feedback on group discussions	Josephine Mwankusye
18.00-18.15	Briefing on field visits	Paul Starkey

IMPARTS Workshop Day 2: Tuesday 13th November 2018. *Chairing: Vincent Lwanda (TARURA). Facilitation: Josephine Mwankusye. Reporting: Various*		
TIME	**ACTIVITY**	**Responsibility**
7.30-12.30	**Field visits in small groups**: How do transport services respond to changes in rural roads? Each group will visit LVRR and discuss infrastructure quality and issues with stakeholders including transport services operators (minibuses, taxis, motorcycle taxis/'bodabodas', small trucks) and rural transport users (women, men, farmers, etc).	
12.30-13.30	**Lunch** *(packed lunch on return journey)*	
13.30-14.30	**Thematic working groups** orientated to summarising lessons learned and key issues raised by visit, and the research requirements and policy implications of their thematic group. How have transport services have responded to changes in LVRR condition? What were the implications for rural people? What lessons (if any) can be carried forward relating to LVRR designs? LVRR planning? Data needed to understand rural transport services? What research needs seem important to understand how transport services respond to infrastructure changes?	
14.30-15.00	**Brief reporting, feedback and introduction of thematic groups**	Josephine Mwankusye
15.00-15.30	Tea/Coffee break	
15.30-16.30	**Thematic working groups**: **Policy:** Policy and institutional implications of integrating the planning of rural transport services and rural transport infrastructure **Appropriate infrastructure**: Type(s) of infrastructure are needed where motorcycles and IMTs are the main transport services **Research and outcome indicators:** key indicators of transport services that are easily measurable **Transport services**: Planning mechanisms or incentives can be used to improve the quality and quantity of rural transport services	
16.30-17.00	**Brief reporting and feedback**	Josephine Mwankusye
17.00-17.30	**Key recommendations and follow ups**	Paul Starkey
17.30-18.00	**Workshop conclusions and closure**	Vincent Lwanda, Robin Workman and Annabel Bradbury
18,00-19.00	**Optional additional session: Presentations of several country experiences**	

Annex C: Workshop evaluation report

At the end of the workshop, evaluation forms were distributed, and participants were asked to complete them anonymously. A total of 30 completed forms were returned. In the following paragraphs, the figures in brackets give an indication of the numbers of participants that referred to the various issues noted.

Participant assessments

Participants were asked to assess 25 different aspects of the workshop on a scale of A (very useful, very good) through C (OK) to E (very poor). The information on the various forms was consolidated and the average responses were ranked using a scoring system (see Table D1). Responses were generally very positive. Of 733 assessments made, 89% were 'very good' or 'good', 10% were 'OK', 1% were 'rather weak' and none was 'very poor'. This level of approval is considered high, given the diversity of the participants and the tendency of disgruntled people to use evaluation forms to complain.

The overall impression and usefulness of the workshop were rated very highly, as was the workshop facilitation, and the travel arrangements and role of XL Millennium. The only organisational element rated below 'good' was the workshop timetable, and it was clear from participants comments (see section on 'suggestions for improvement') that they felt that the workshop was too short.

The programme elements rated the highest were the field visits and their associated briefings, small group discussions and group presentations, the first thematic group discussion, the workshop introduction and the presentation on transport services. However, most of the programme elements were closely clustered, with scores better than 'good'.

Things learned

Participants were asked to note three things they had learned from the workshop. Many participants wrote complex sentences, referring to multiple issues, which have had to be simplified in this summary. The most commonly cited thing that was learned related to rural transport services. In particular, **rural transport services:**

- policy issues (18)
- research needs (8)
- transport types (6)
- motorcycle taxis (4)
- planning and data needs (4)
- overall importance (3)
- regulation issues (1)
- safety (1)
- fares (1).

The second major element learned related to **measuring changes in rural transport services**, and specifically:

- outcome indicators (15)
- monitoring and evaluation systems (3).

The third major lesson related to the **infrastructure-transport services continuum** discussed, and specifically:

- road infrastructure-transport services interactions (7)
- need for integrated infrastructure-services policy and planning (6)
- involvement of rural stakeholders (2).

The fourth cluster of responses centred around **lessons relating to infrastructure design and planning**, including:

- designing roads for rural transport services (5)
- planning roads (2).

There were also mentions of sharing experiences (4), ReCAP (3), the RAI (2), learning Tanzanian experiences (2), the field visit (2), 'first mile' issues (1) and presentations (1).

Best and most useful aspects

Participants were asked 'what was the best and most useful aspect of the workshop?' Most answers clustered around two main programme elements:

- field visits (16) (one participant described them as "awesome"), and the
- group discussions (16).

People also liked the

- sharing of experiences (6)
- interactive nature of the workshop (4).

Specific topics mentioned included understanding rural transport services (5), outcome indicators (4), "everything" (4), phase 2/3 research (2) and various [different] presentations (5).

Suggestions for improvement

When asked how the workshop could have been improved, most people wanted a **longer workshop**. Some simply wrote 'workshop timing' (8) and others were more specific with:

- more time overall (19)
- more time for field visits (4)
- more time for country presentations (3)
- more time for presentations and discussions (3).

Some people (4) wanted some form of touristic visit as part of the programme while some simply said 'all good' (3). There were single mentions of certain aspects of the group discussions, field visits and presentations.

Other comments

In response to the opportunity to give 'any other comments', several participants commented, with thanks, on the fact it had be a valuable workshop (8) that had been well organised and planned (2) although it needed more time (2). There was a single mention of the need to develop a rural road HDM4 and one person said they were looking forward to the IMPARTS outputs and guidelines.

Table D1: Summary of numbers of different evaluation responses (ranked by average score)

Question	A*	B*	C*	D*	E*	Score*
Workshop overview and organisation						
Workshop: overall impression	19	9	1	0	0	**8.9**
Travel arrangements and XL Millennium	20	8	2	0	0	**8.9**
Workshop: Facilitation	18	8	4	0	0	**8.5**
Workshop: Overall usefulness	15	14	1	0	0	**8.4**
Hotel: Workshop facilities	13	16	1	0	0	**8.2**
Workshop: Meeting expectations	12	15	2	0	0	**8.1**
Hotel: Accommodation and food	12	15	3	0	0	**8.0**
Workshop: Logistical organisation	13	13	3	1	0	**8.0**
Workshop: Meeting objectives	11	14	5	0	0	**7.8**
Workshop: Schedule and timetable	6	13	8	3	0	**6.7**
Workshop programme elements						
Field visit	19	7	3	0	0	**8.8**
Presentation on 'Transport Services'	16	11	1	0	0	**8.6**
Workshop introduction	16	9	2	0	0	**8.6**
Group presentations after field visits	17	11	2	0	0	**8.6**
Field visit briefing and organisation	19	6	4	1	0	**8.5**
Group discussions after field visit	17	9	4	0	0	**8.4**
Group discussions Day 1	15	12	2	0	0	**8.4**
Presentation on 'Measuring Outcomes'	12	15	1	0	0	**8.2**
Presentation on 'First Mile'	12	14	2	0	0	**8.1**
Presentation on 'Rural Access Index'	14	12	4	0	0	**8.1**
Presentation on 'Infrastructure Issues'	13	12	4	0	0	**8.1**
Plenary presentations of groups Day 1	12	16	2	0	0	**8.1**
Final plenary reporting and discussions	10	16	3	0	0	**7.8**
Group discussions on Themes Day 2	10	16	4	0	0	**7.7**
Presentation on 'Motorcycles and 3-wheelers'	3	19	5	1	0	**6.8**

Scores over 7.0 have an overall rating better than 'Good'

**Scoring system based on Very Good = 10; Good = 7; OK = 5; Poor = 3; Very poor = 0*

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Interactions between improved rural access infrastructure and transport services provision

Report of an Inter-regional Workshop
held 12-13 November 2018, Arusha, Tanzania

Annex D: Plenary Presentations and Country Presentations

Introduction to the ReCAP workshop and transport services event
Robin Workman, TRL Researcher, UK

IMPARTS Workshop, 12-13 November 2018, Arusha, Tanzania

Introduction to the ReCAP workshop and transport services event
Robin Workman, TRL Researcher, UK

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Interactions: **M**aintenance and **P**rovision of **A**ccess for **R**ural **T**ransport **S**ervices

Title: Interactions between improved rural access infrastructure and transport services provision

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Research study to gain and disseminate a **greater understanding** of how **investments** in **low-volume rural roads** impact **rural transport services** and the **mobility of people** and their **goods**.

- How can infrastructure provision and maintenance be managed to encourage appropriate transport services on low volume rural roads?

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The problems:

- Planning carried out in isolation
- Needs of communities are not considered
- Roads do not automatically generate transport services
- The transport services generated may be inappropriate
- Transport use may be inequitable
- There may be negative effects of new transport

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Phase 1

Scoping study:

- Strategic review of existing and prevailing research into the relationships between current practice in provision and preservation of rural access and the end-product delivery of effective transport services.
  - Literature review
  - Project design framework
  - Seek support from partners (Asia and Africa)

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Phase 2

- Acquire secondary data on 'post-upgrade' transport service changes (both passenger and freight), and undertake field data collection to examine such changes (including cost differentials) compared to before any infrastructure interventions were implemented.

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Key research questions in Phase 2:

- Have changes to passenger and freight transport service provision brought about benefits or disbenefits for the rural poor and low income communities?
- Are the engineering solutions sustainable and fit-for-purpose in terms of wider transport service provision and accessibility?
- What are the effects of poor maintenance/road deterioration on RTS provision following rehabilitation/upgrading?
- What other constraints to transport service expansion exist?

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Phase 3

- Explore market based solutions to transport service issues within the provision-preservation-access use continuum,
- Investigate the motivations of the private sector to provide transport services in rural areas,
- Consider the government structures that organise and regulate these services along with the legal and policy frameworks in which they operate, both in Africa and Asia.

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Key research questions in Phase 3:

- What is preventing services being scaled up and extended to remote areas where they would have most impact?
- Are rural transport subsidies an option in low income countries?
- What can be learnt from rural transport service operations and the institutional environment in which they function in Africa and Asia?

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- **Output:** definitive guidelines on how the ***provision-preservation-access*** continuum can be improved in support of better livelihood opportunities for rural communities and have a positive impact on poverty reduction.
- **Impact:** to improve accessibility and mobility for rural communities and to improve the overall livelihood outcomes of those communities, and, in particular, vulnerable groups and individuals within those communities.

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First Mile

Title: Evaluation of the cost-beneficial improvement of first mile access on small-scale farming and agricultural marketing

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Concept of the 'First Mile':

- **Definition:** A primary transport segment from the farm to a collection/consolidation point, typically found at the key junctions of a motorable (low volume) road.
- **Context: Potential exploitable benefits** of **smallholder farming productivity** and the impact that **improved access** to **rural markets** can have for **local small-scale economies**.

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Aim of the First Mile research:

- To extend the evidence base for the benefits associated with access improvements to small-scale farmers, and the potential impact that those benefits have on food security and poverty reduction on a much wider scale.

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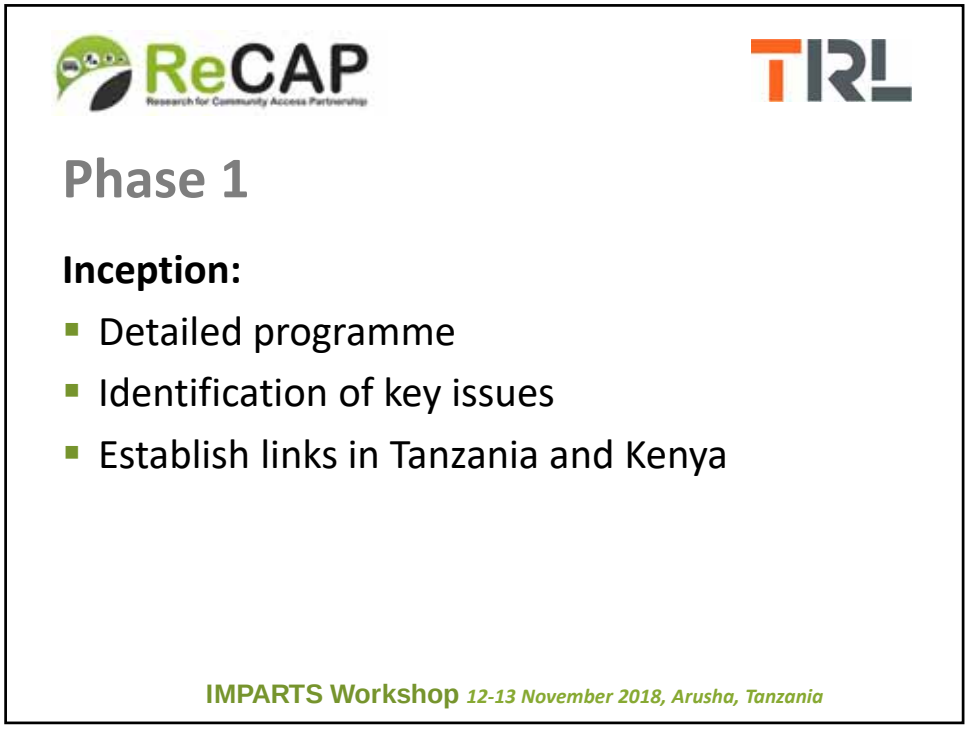

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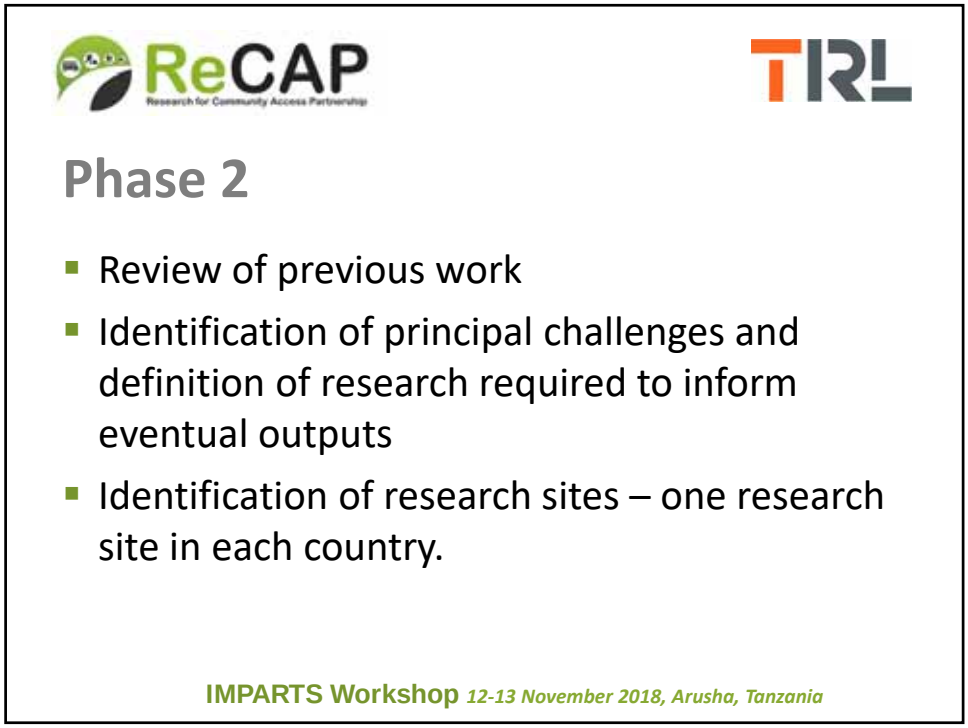

Phase 3

- Undertake targeted data collection, gender disaggregated where applicable, gathering in a range of identified small holding environments followed by analysis.
- Summarise the implications of this research
- Identify how it may be carried forward into practical application.

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Phase 4

- Draft the range of outputs
- Undertake a number of knowledge dissemination exercises, including those most suited to output uptake at the farm and village level.

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PIARC conference

- Transport in the fourth revolution: "A complex and dynamical low-income world"

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- Focus on the impact of investment in transport infrastructure on low-income countries
- The objective of the seminar is to raise awareness, share expertise, experience and best practice on the importance and benefits of investing in transport infrastructure

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The Transport Revolutions

First Revolution:

- 1800's: Steam engine, industrialisation, urbanisation (railways in 1830's)

Second Revolution:

- Early 1900's: Industrial growth triggered by electric power (motor vehicles and aviation)

Third Revolution:

- 1980's to now: The digital revolution (computers in vehicles, GPS, satellites, navigation)

Fourth Revolution:

- The new digital revolution, smart technologies, total connectivity, a sociological space enabling interconnectedness

Other:

Enhancing the understanding on safe motorcycle and three-wheeler use for rural transport

- Transaid, Amend: Africa

Rural Access Index (RAI)

- TRL


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Transport services on low volume rural roads
Paul Starkey, TRL IMPARTS Team Leader, UK

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Transport services

Paul Starkey
Team Leader, IMPARTS Project

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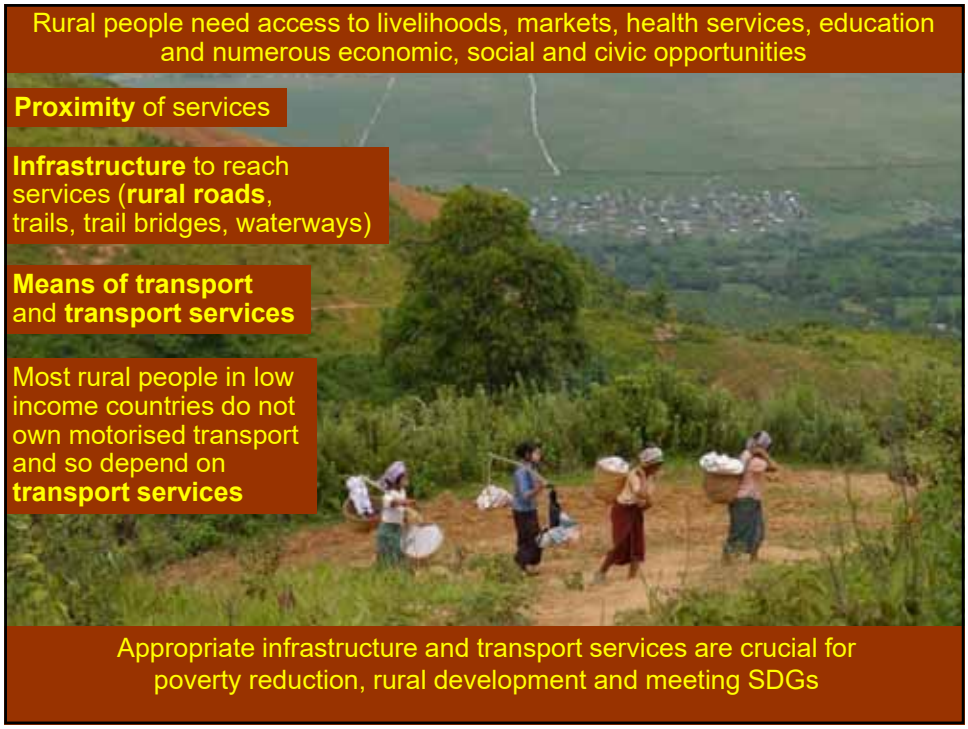
Outline of presentation

- Rural access and transport services
  'provision, preservation and transport services continuum'
- Types of transport services
- Key issues in rural transport services
- Crucial importance of 'first mile' connectivity to road network
- Need for proactive planning from authorities (including roads authorities)

Transport services on low volume rural roads
Paul Starkey, TRL IMPARTS Team Leader, UK



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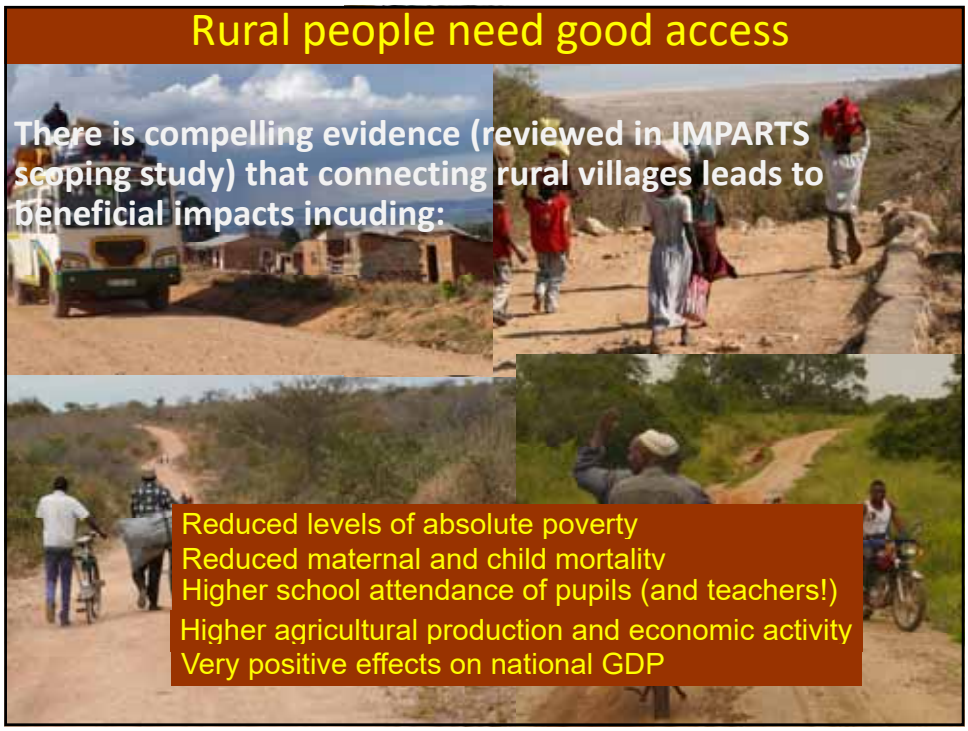

Need for roads and transport services

- Where practicable, all villages should be connected to, or close to, suitable all-season roads
- Most people do not have their own motorised transport, so there must also be suitable public 'transport services' that can carry people and their goods

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'Improved transport services' is a major justification for investing in rural roads

- Many investments in roads are 'justified' by assumptions that they will lead to 'improved transport services' (an outcome) that will in turn allow beneficial impacts
- Yet most countries are not 'measuring' rural transport services to gather evidence of this
- Most road authorities have little involvement with transport services to understand and to 'measure' how road investments are 'fit-for-purpose' for rural mobility and the local transport services

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Rural transport services

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Rural men and women want transport services that are:

In many countries it is illegal to mix passengers and freight!

Rural transport services

Transport is a gender issue

Rural women generally want transport services that are:

Timely (guaranteed same-day return is a key gender issue)

Affordable: women often have less access to money for transport

Appropriate and safe (crowded vehicles can be threatening)

Allow multi-tasking journeys

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- Buses (mainly inter-urban roads)
- Minibuses (need quite good infrastructure)

- Jeeps and rural taxis

- Passenger trucks and passenger pickups (strong, very flexible and appreciated)

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- Motorcycles and motorcycle taxis
  - Transforming rural transport in many countries
  - Villages 2 km from road can be 'on the road'

- Power tillers

- Three wheelers

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- Bicycles, tricycles

Rural transport services characteristics

- Informal sector, some associations
- Often owner-operators or operators renting vehicles on daily basis
- Often old vehicles (low capital costs)
- Need full (or over-full) loads to cover costs and make modest operating profit
- Operate from hubs (often district hubs) and may operated on various roads on different days of the week

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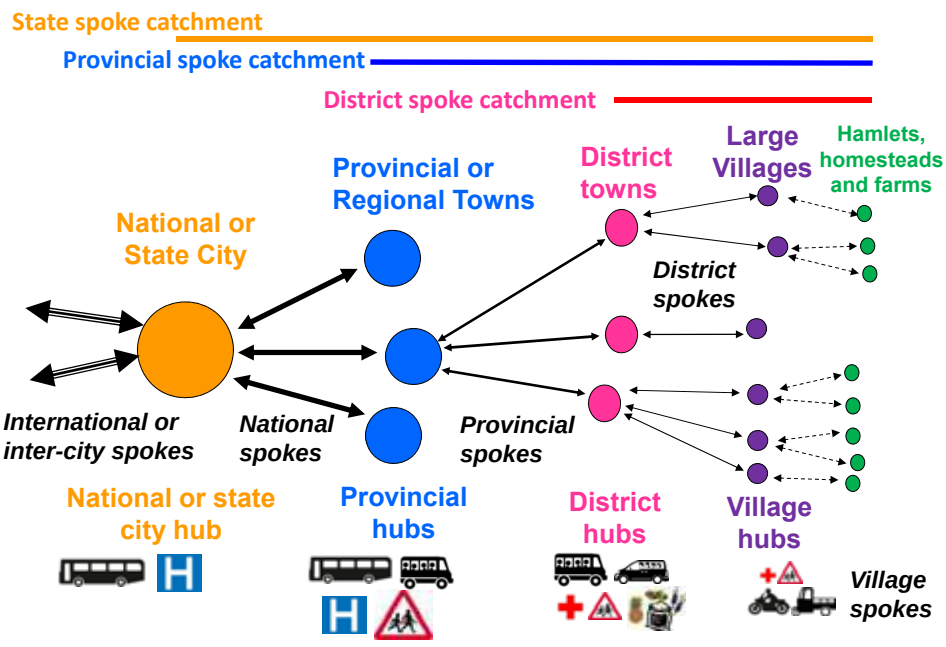

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Rural transport services issues

- Most rural people want transport that carries people and small freight (mixed transport)
- Availability/frequency and price are crucial
- Safety looks very poor, but little evidence of key concern (insufficient disaggregated data)
- Enforcement weak as rural enforcers sympathetic (some corruption)
- Cartels can be serious problem (eg, Nepal).

Rural transport services authorities

- Small and underfunded (compared to roads agencies)
- Urban based, urban perspectives
- Concentrate on administrative regulation
- May engage with urban and inter-urban transport services
- Often not present at devolved rural level
- Any rural regulation is negative prohibition
- No proactive positive planning for rural transport

Example of Talawanda-Bago road in Bagamoyo District, Tanzania

In 2013, no district roads in Bagamoyo had regular public transport services apart from motorcycles

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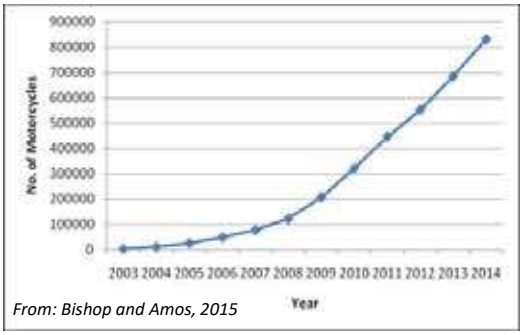
Motorcycles increasing rapidly worldwide



From: Bishop and Amos, 2015

- In Tanzania motorcycle numbers increased from about 2,000 in 2003 to over 800,000 in 2014

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Transport services on low volume rural roads
Paul Starkey, TRL IMPARTS Team Leader, UK

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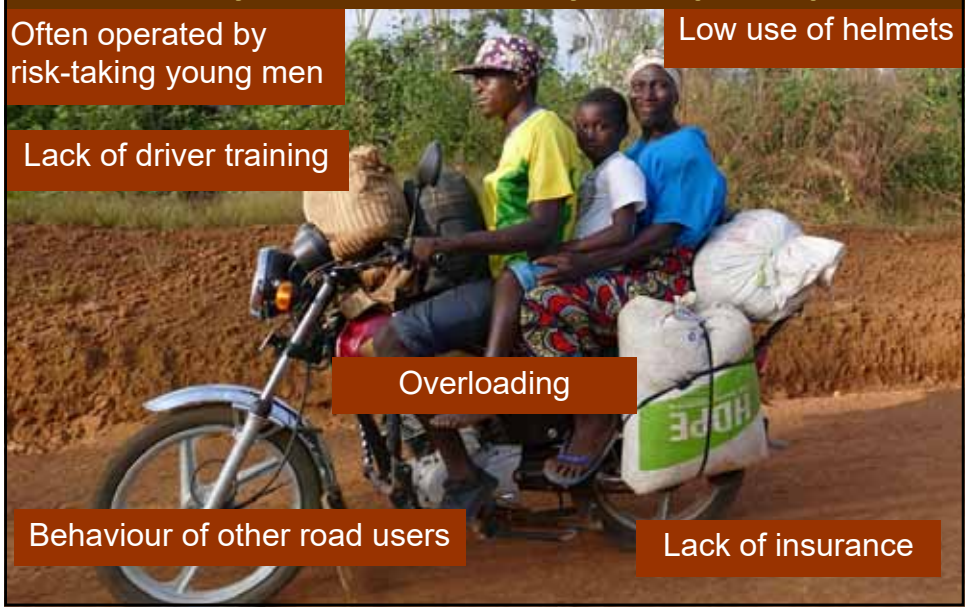
Motorcycles are transforming rural access

Motorcycles can be a risky transport option



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Three-wheelers also important and have a role

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Transport services on low volume rural roads
Paul Starkey, TRL IMPARTS Team Leader, UK

Investments in suspension bridges

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Transport Services/Infrastructure issues

- Develop integrated approaches to rural roads, and the transport provision-preservation-services continuum
- Develop integrated approaches to planning road investments in infrastructure (road agencies to engage with transport services)
- Collect transport services data for planning and monitoring purposes
- ensure roads are fit-for-purpose' and appropriate to the transport needs and prevailing transport services
- Ensure some 'first mile' connectivity to all villages (m/c trails)
- Understand rural transport needs and options from the point of view of rural people: be tolerant and do not over-regulate
- Seek solutions that positively improve rural access and mobility
- Develop sustainable integrated transport systems with several complementary transport modes


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LVRR Engineering issues that affect Transport Services

Robin Workman
Senior Researcher

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Contents

- Planning
  - Construction
  - Upgrading
  - Rehabilitation
  - Routine/recurrent maintenance

Provision – Preservation - Services

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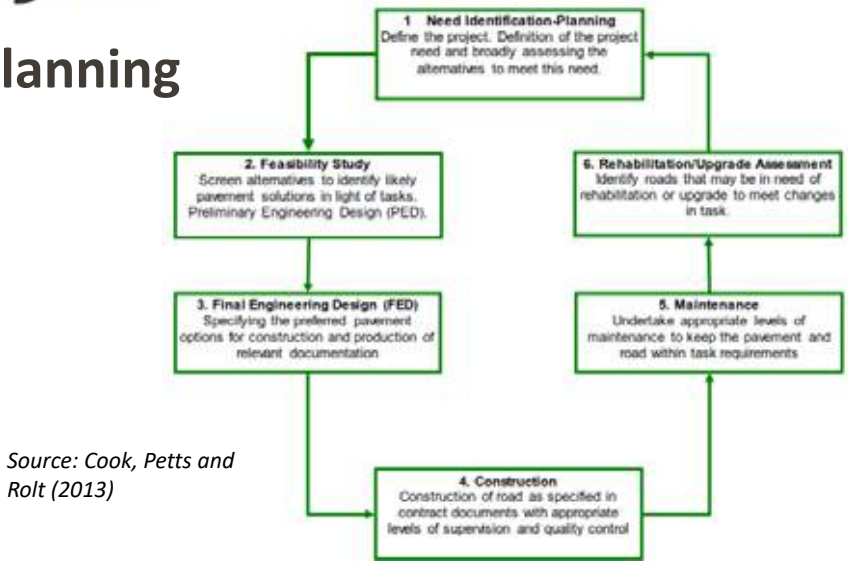
Planning



Source: Cook, Petts and Rolt (2013)

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Factors to consider in LVRR planning

- Traffic✓
- Traffic growth✓
- Population served **?**
- Geometry/Alignment: gradient, width, hairpins, etc. **?**
- Surface type: paved, gravel, earth, cobbles, etc. **?**
- Maintenance: cost, roughness, riding quality **?**
- Structures: water crossings, bridges, culverts, walls, etc. **?**
- Access to public services **?**
- Economic development **?**
- Cost/affordability of future transport services **×**
- Impact on poverty **×**
- Travel time **×**
- Road Safety **×**
- Vehicle operating costs **×**
- Pollution **×**

Factors to consider in LVRR planning

- Traffic✓
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- **Maintenance: cost, roughness, riding quality, time ?**
- **Structures: water crossings, bridges, culverts, walls, etc. ?**
- Access to public services **?**
- Economic development **?**
- Cost/affordability of future transport services ✗
- Impact on poverty ✗
- Travel time ✗
- **Road Safety ✗**
- **Vehicle operating costs ✗**
- **Pollution ✗**

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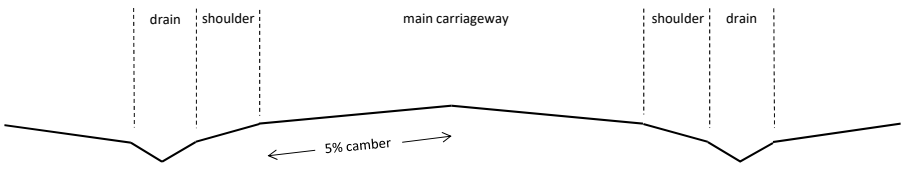
Road Geometry/Alignment

Typical LVRR cross section



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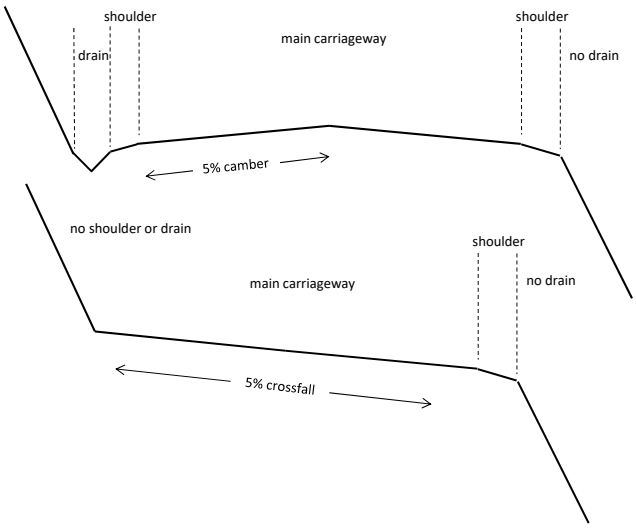
Hill cross section



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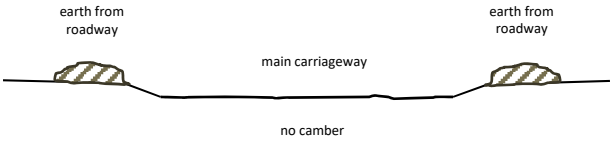
Dry areas



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Road width

- Different vehicles for access
- Single / double lane
- Passing points

Road Function	Design class	Traffic (ADT)	Surface type	Roadway width (m)	Passing places
Basic access	D	100–300	Paved/Unpaved	4.5–5.5	As required
Basic access	E	100–300	Paved/Unpaved	3.5–4.5	As required
Basic access	F	100–300	Earth/Gravel	3.0–3.5	As required

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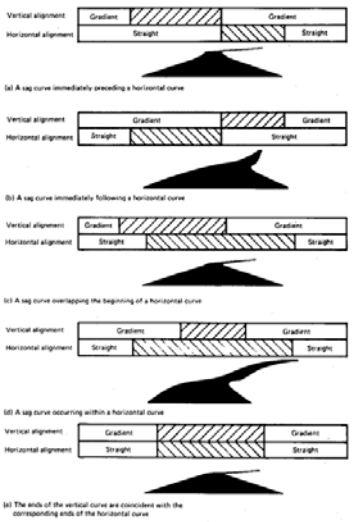
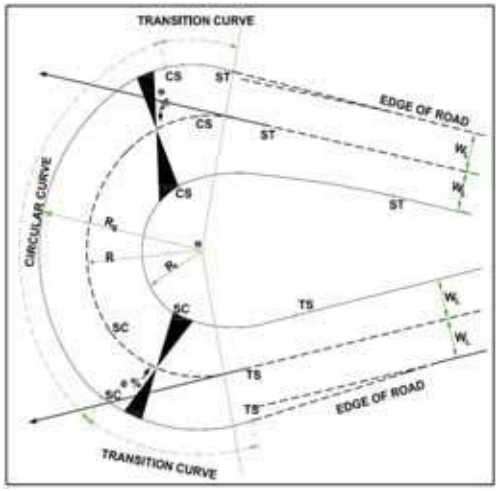
Vertical and horizontal options



Hairpin bend



Source: ANE, Geometric design manual (2017)

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Surface type

Paved

- Bituminous
- Concrete
- Cobblestone
- Stone soling

Unpaved

- Gravel
- Earth

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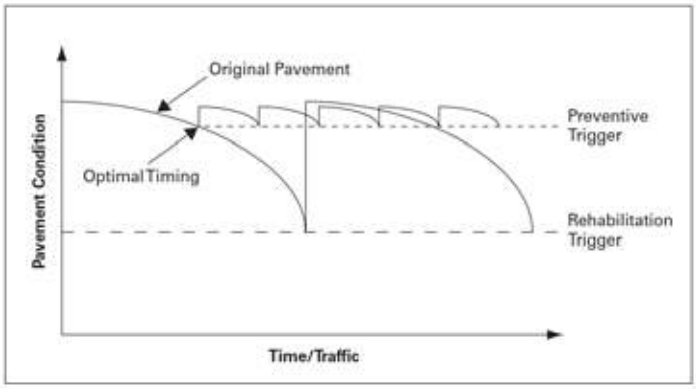
Road Maintenance



Source: adapted from Galehouse et al. (2006)

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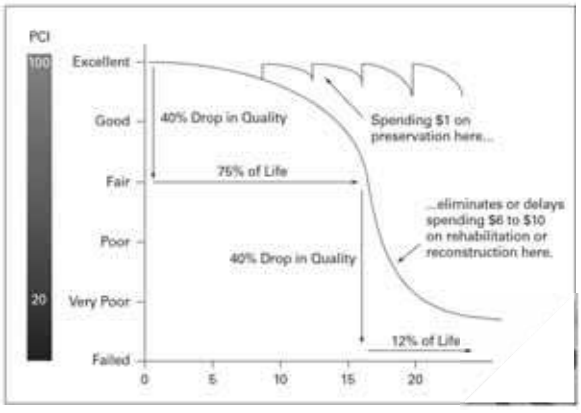

Source: adapted from Galehouse et al. (2006)

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Maintenance

Managerial

- Manuals
- Guidelines
- Asset Management systems

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Maintenance

Technical

- Standards
- Specifications
- Routine, recurrent, periodic
- Pavement, structures, drainage
- Materials
- Training and techniques

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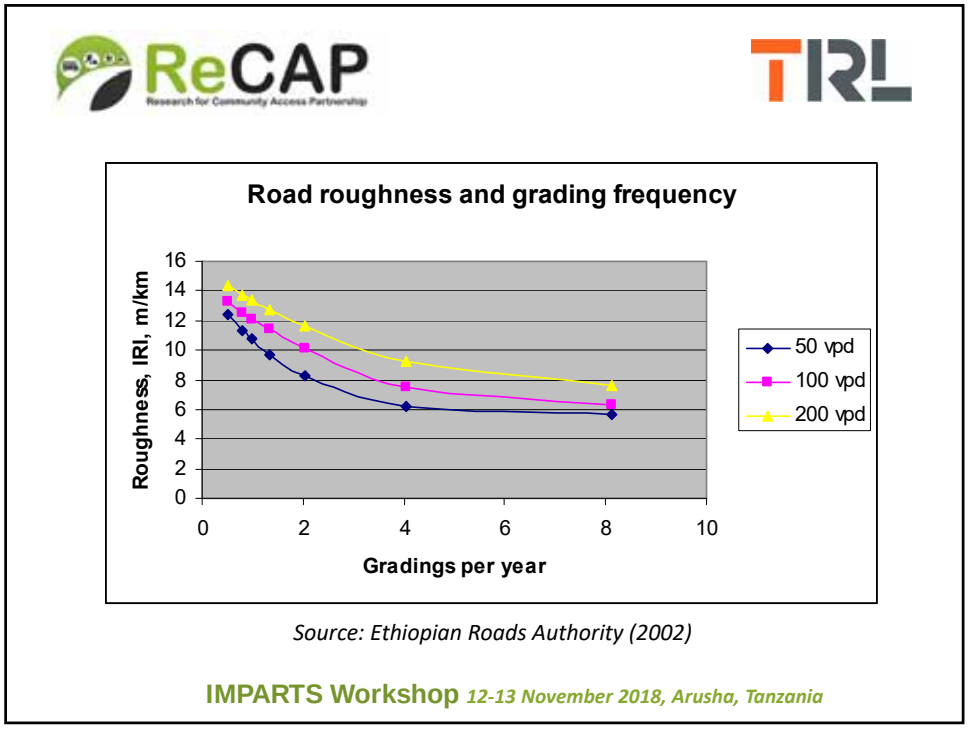

Source: Ethiopian Roads Authority (2002)

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Maintenance

Economic

- Cost of the asset
- Maintenance burden
- Competing against new construction funds
- Increasing backlog
- HDM-4, RED
- Vehicle operating costs

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Maintenance

Political

- Focus on new construction
- Maintenance more administration
- Tendering issues

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Roughness

Causes

- Potholes
- Erosion
- Soft spots
- Loss of gravel
- Loss of shape

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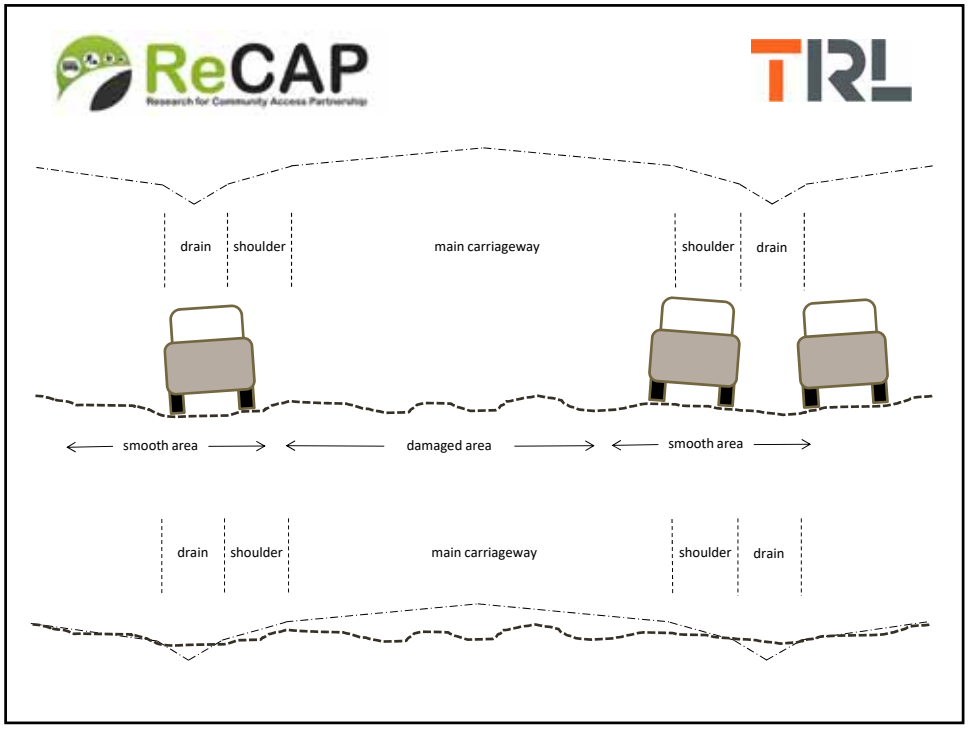

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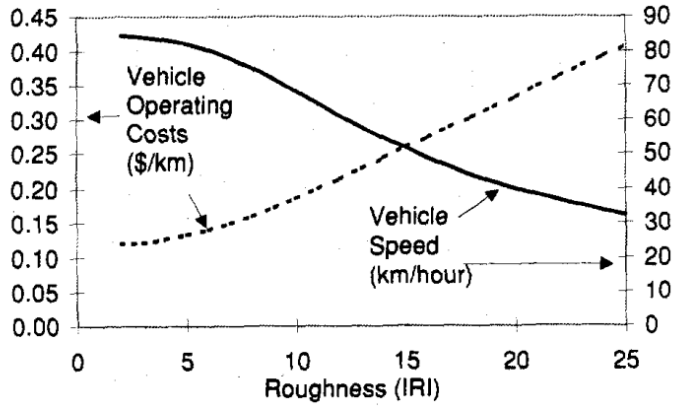
Roughness

Measurement (IRI)

- Visual
- Profilometer
- Bump integrator
- Smartphone apps
- Accelerometers
- UAVs

Speed and VOCs as a consideration



Source: Archondo-Callao (1999)

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Structures

Water crossings

- Ford
- Drift/causeway
- Vented causeway
- Bridge
- Culvert

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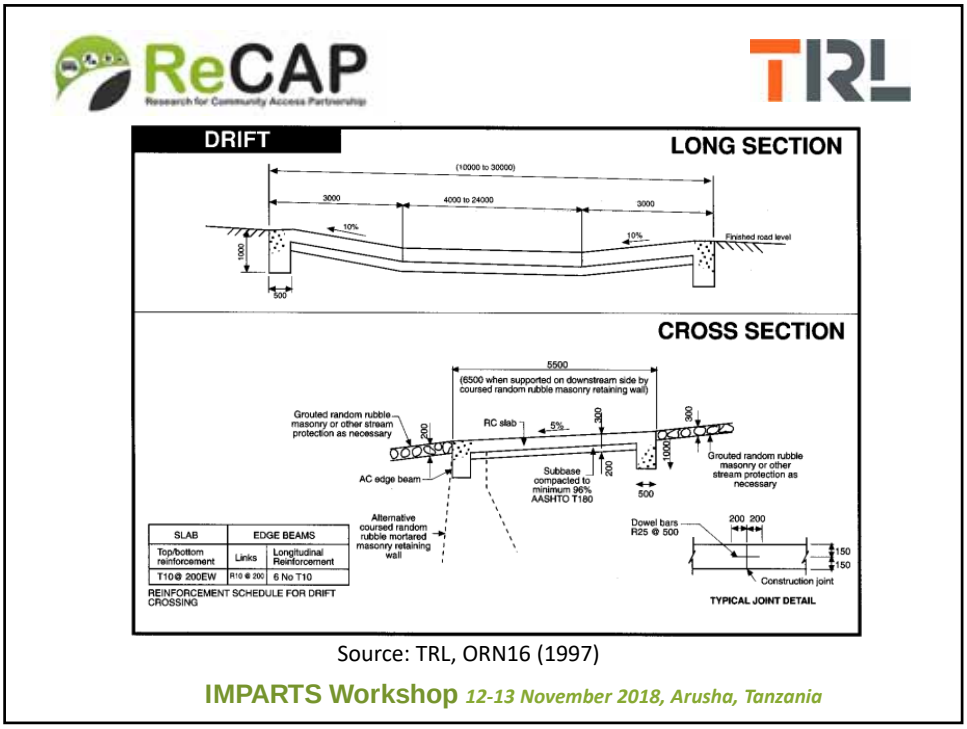

Source: TRL, ORN16 (1997)

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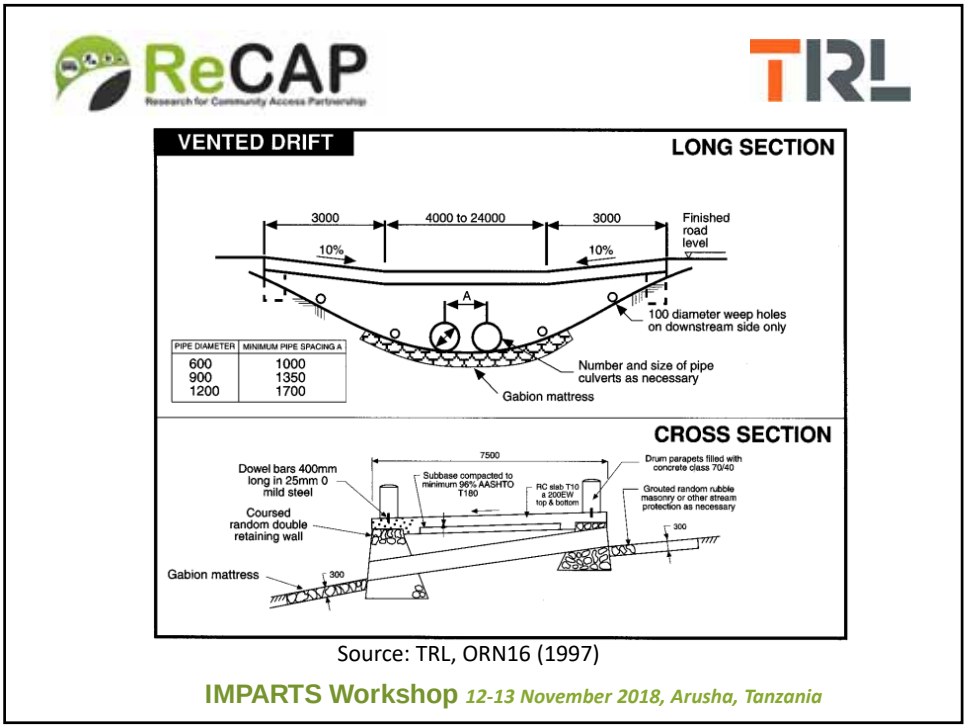

Source: TRL, ORN16 (1997)

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Road Safety

- Alignment
- Confidence blocks
- Crash barriers
- Lighting

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Vehicle Operating Costs

Cost to vehicles due to the road

- Tyres
- Fuel
- Suspension
- Air filters
- General maintenance

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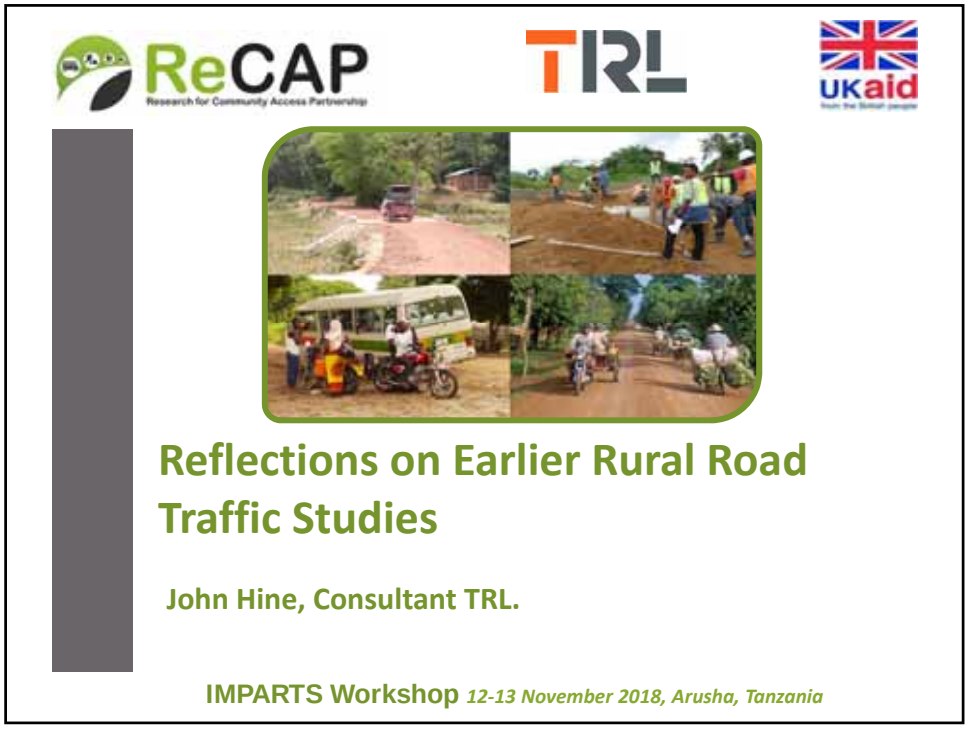

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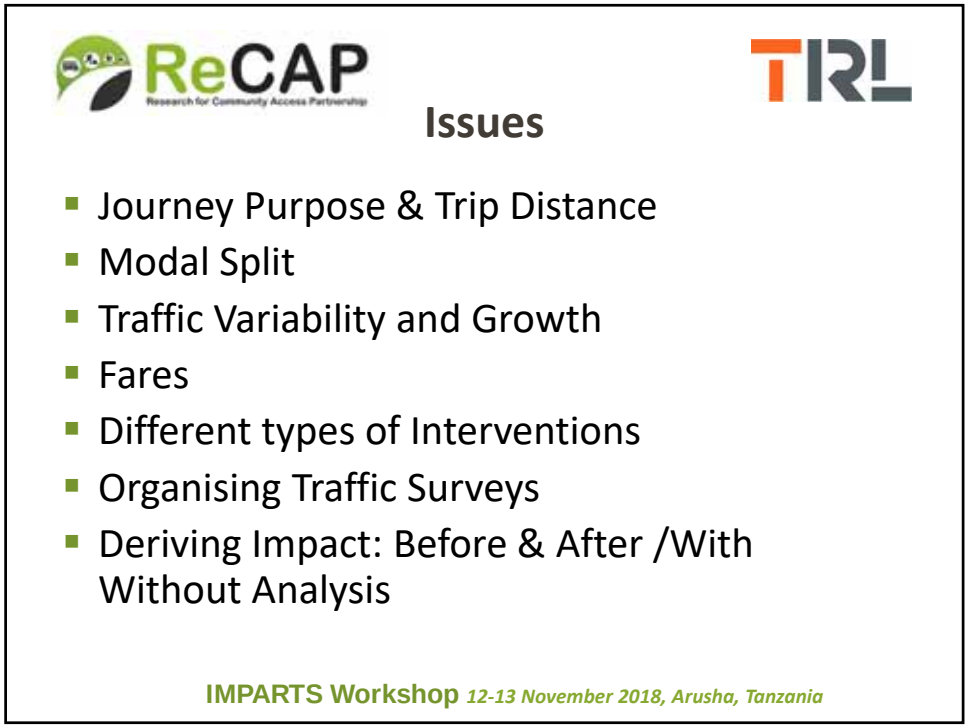

Survey Data

Main Sources of Data:

- TRL Household Surveys in Ghana & Malawi, in 2001
- Ethiopian Surveys for ERA carried out by WT Consult and Wabekbon, 2015 to 2017. In support of the large Universal Rural Road Access Programme (URRAP).
- Traffic Surveys in Tanzania 2015-2017 under the IRAT (Improving Rural Access in Tanzania) DFID supported (£35m) programme to remove rural road bottlenecks.
- Traffic Surveys in Kenya for the AfD supported Roads 2000 rural roads programme in Murang'a and Nyandarua Districts.

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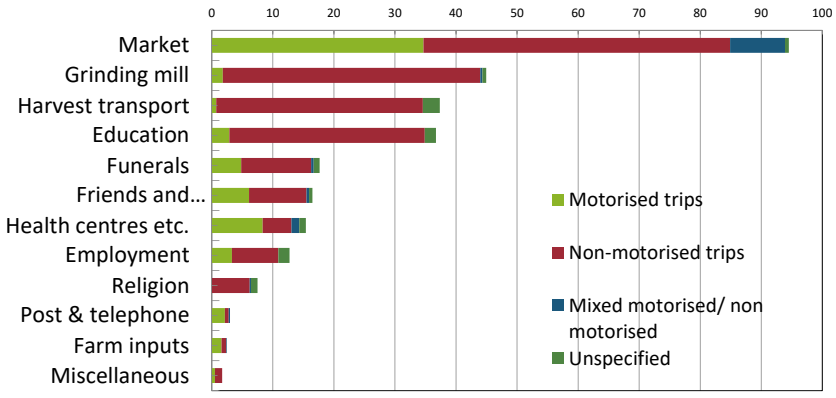
Average number of household trips per year: Rural Ghana, TRL 2001



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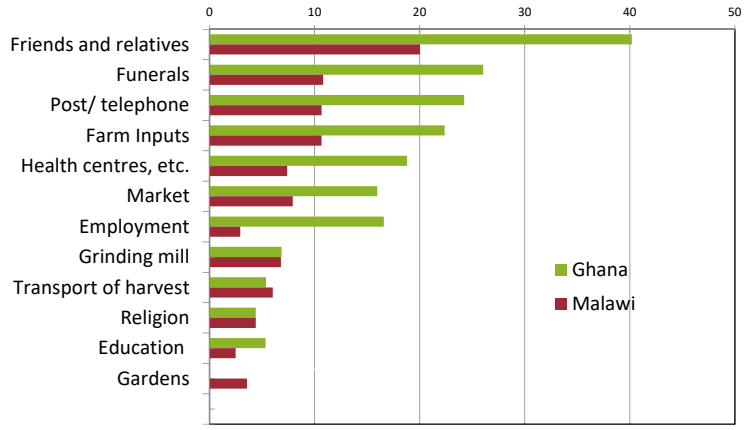
Trip Distances for rural Ghana and Malawi (source TRL, 2001)



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Trip frequency in 4 regions of Ethiopia. Source: WT Consult. for ERA (2015)

Destination	Relative frequency %	Means of transport used			Distance km	
		Walking %	Motorcycle/ bajaj %	Bus/ minibus %	Project Area	Control Area
Market	15.8	56	16	14	7.7	9.3
Hospital	3.6	17	14	67		
Clinic	3.6	56	23	15	8.2	11
Health post	6.2	97	1.3	0	1.9	3.1
Health centre	6.8	59	18	9.9	6.8	7.4
School	5.7	96	1.8	1.4	1.5	2.5
Religious centre	11.2	98	0.9	0.5	1.5	1.9
Recreation place	2.4	67	12	13	4.8	9.8
Relatives	7.7	60	12	24	19	20
Kebele centre	8.9	88	4.2	5.1		
Woreda centre	8.1	29	25	35		
Regional centre	1.7	6.3	7.8	84		

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Average daily non-motorised traffic volumes, 4 Regions of Ethiopia Source: Wabekon, 2017

Mode	2015	2016	2017
Bicycle	14	20	3
Animal cart	81	64	28
Pack animals	196	170	147
Pedestrians	522	593	897
Others	8	112	50
Total	**820**	**960**	**1,125**

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Average motorised traffic volumes, 4 regions in Ethiopia, Source: Wabekbon, 2017

Mode	2015	2016	2017
Motorcycles	28.9	99.1	66.2
Bajaj three-wheelers	9.8	14.7	7.0
Cars	1.7	0.2	0.0
Pickups/4WD	5.0	4.3	1.7
Mini buses	6.7	3.9	1.8
Large buses	2.7	1.5	0.3
Small trucks	4.7	5.1	4.1
Heavy trucks	5.6	0.9	0.4
Truck with trailer	0.2	0.2	0.0
Total	**73.7**	**138.7**	**83.7**

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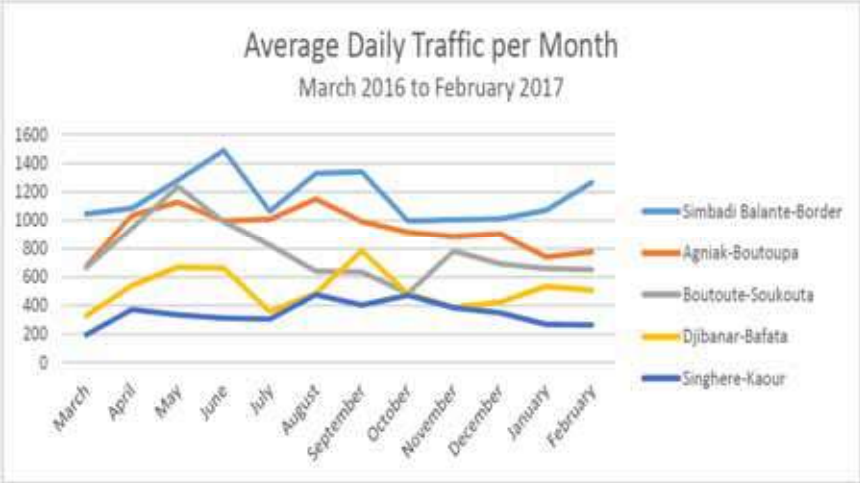
Traffic Variability in Senegal 2017



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Fares and freight tariffs on LVRRs in Kenya, Tanzania and Cameroon. Source: Starkey et.al 2013

Road location *(all roads were graded, all-season roads)*	**Transport mode**	**Passenger fares** *(US cents per passenger-km)*	**Small freight costs** *(US cents per tonne-km)*
Kilolo, Iringa, Tanzania,	Bus	4	45
	Midi-bus	5	46
	Minibus	5	43
Gitugi, Murang'a, Kenya	Midi-bus	6	68
	Minibus	10	103
Pitoa, Northern Cameroon	Open truck	8	86
	Minibus	6	138
Kilolo, Iringa, Tanzania,	Motorcycle	34	602
Gitugi, Murang'a, Kenya	Motorcycle	18	116
Pitoa, Northern Cameroon	Motorcycle	13	151

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Reflections on earlier rural road traffic studies
John Hine, TRL Consultant, UK

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IRAT Traffic Surveys

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Example of IRAT Road in Siha (on side of Mt. Kilimanjaro) Before and during construction

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IRAT Programme : Some difficult conditions

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IRAT: Different types of construction

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IRAT:

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Wet & Dry Season Counts

TRAFFIC COUNT FORM BOTTLENECK STUDY BAHI DISTRICT DODOMA (2016)									
MPUNGUZI-MWITIKIRA ROAD (MPUNGUZI TRAFFIC COUNT, TC2)									
COORDINATES;(06°23'52.8"S,35°44'33.9"E)									
Day	22-Mar	23-Mar	24-Mar	Mar, 2016	07-Sep	08-Sep	09-Sep	Sep,2016	Jul,2015
Time	6am-6pm	6am-6pm	6am-6pm	12 hr Count	7am-6pm	6am-6pm	6am-6pm	12 hr Count	12 hr Count
Mode	Tues	Wed	Thu	T,W,T	Wed	Thur	Friday	W,T,F	T,W,T
Cars	1	1	7	3.0	21	41	19	32.0	18.5
Pickup 4wheel dr.	11	9	8	9.3	11	25	13	19.0	15.2
Minibus	9	6	5	6.7	12	48	17	28.5	8.1
Large bus	12	8	6	8.7	6	24	13	15.8	12.6
Truck	1	1	5	2.3	10	24	16	19.0	5.5
Tractor	2	3	1	2.0	6	11	10	10.4	1.3
Animal	38	56	29	41.0	32	57	41	51.0	5.5
M.Cycle	74	76	66	72.0	73	162	124	137.0	60.3
Bicycle	74	57	61	64.0	73	122	98	115.0	52.2
Pedestrian	165	132	166	154.3	108	181	213	193.0	80.1
Motorised - ex m.bikes	36	28	32	32.0	66.0	173.0	88.0	124.7	61.2

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Tanzania IRAT project: traffic data (median observation) for 10 completed roads and controls. Source: Cardno, 2017

	10 project roads		Control/connecting roads	
Traffic	2015	2017	2015	2017
Cars	2.5	4.7	17.5	22.3
Pickups and 4WD	8.8	3.3	17.5	10.7
Minibuses	1.1	0.9	3.2	9.4
Large buses	0.0	0.0	0.0	0.0
Trucks	0.2	3.4	3.4	8.2
Tractors	2.9	1.3	2.3	1.8
Motorcycles	86.0	174.8	292.2	301.8
Bicycles	52.0	93.4	195.6	99.7
Pedestrians	184.1	185.9	212.8	129.4
Animals	1.4	0.2	6.4	0.0

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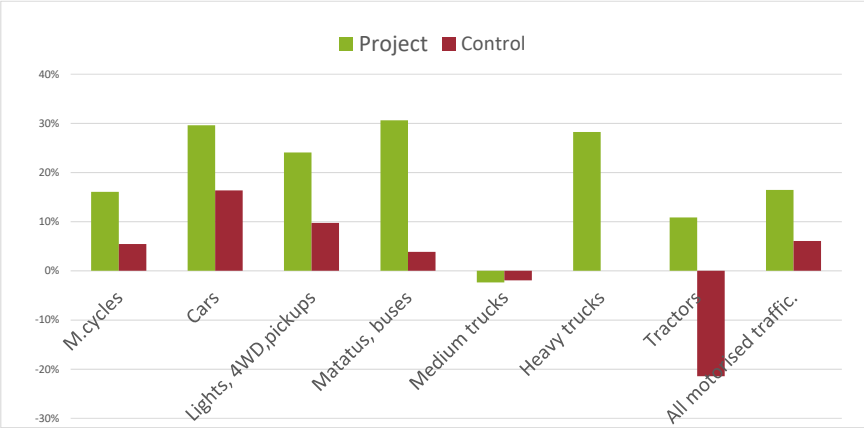
Annual Traffic Growth, for 8 project and 4 control roads.
Kenya Roads 2000 (AfD financed) Programme.
Before surveys: 2012,2014; After surveys: 2016. Source TRL.



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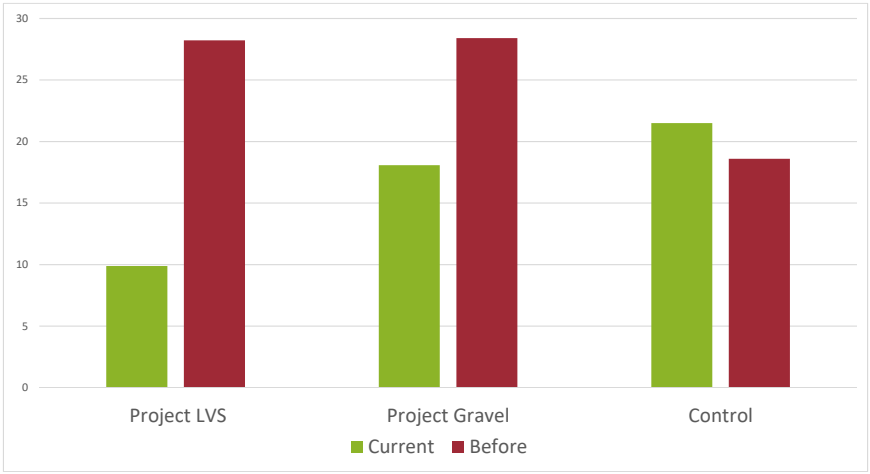
Kenya Roads 2000 Programme:
Motorcycle Fares Ksh per km, Source TRL, 2016



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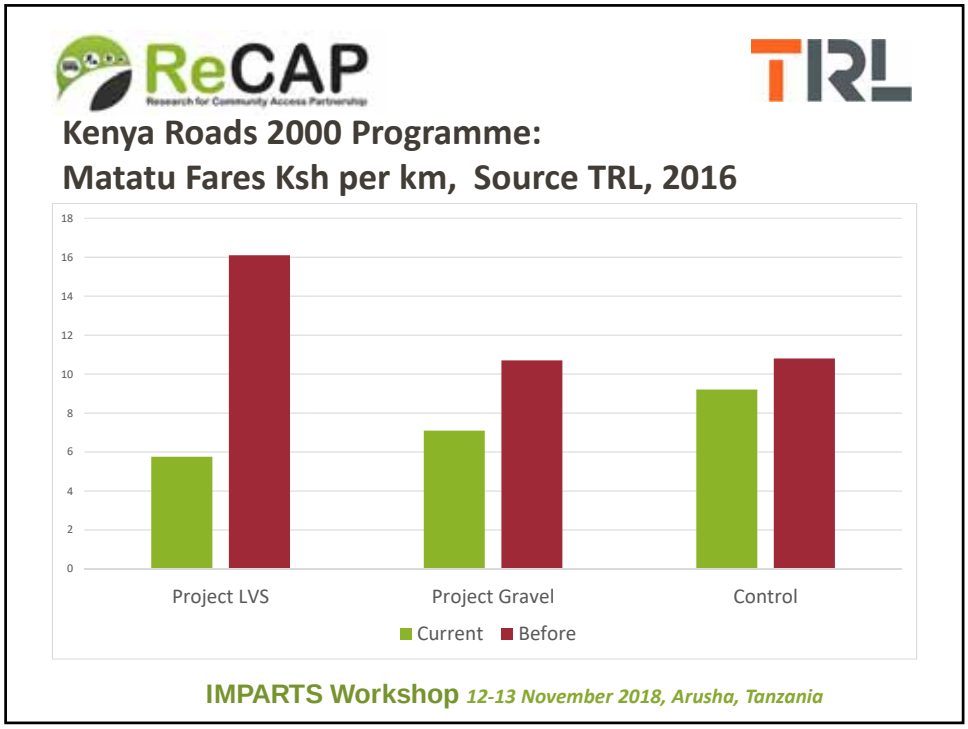

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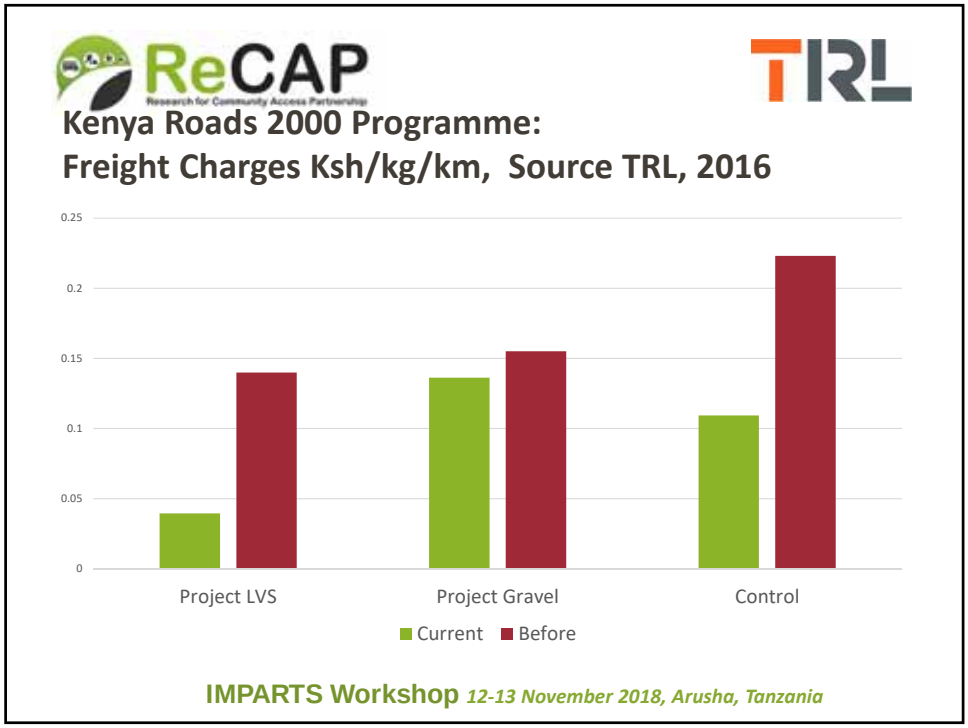

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Roads 2000: Is roughness the issue?

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Roads 2000: Well Maintained ?

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IMPARTS Project Phases 2 and 3

Paul Starkey
Team Leader, IMPARTS Project

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Interactions: Maintenance and Provision of Access for Rural Transport Services

Title: Interactions between improved rural access infrastructure and transport services provision

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Research study to gain and disseminate a **greater understanding** of how **investments** in **low-volume rural roads** impact **rural transport services** and the **mobility of people** and their **goods**.

- How can infrastructure provision and maintenance be managed to encourage appropriate transport services on low volume rural roads?

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Phase 2

- Acquire secondary data on 'post-upgrade' transport service changes (both passenger and freight), and undertake field data collection to examine such changes (including cost differentials) compared to before any infrastructure interventions were implemented.

Key research questions in Phase 2:

- Have changes to passenger and freight transport service provision brought about benefits or disbenefits for the rural poor and low income communities?
- Are the engineering solutions sustainable and fit-for-purpose in terms of wider transport service provision and accessibility?
- What are the effects of poor maintenance/road deterioration on RTS provision following rehabilitation/upgrading?
- What other constraints to transport service expansion exist?

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Phase 3

- Explore market based solutions to transport service issues within the provision-preservation-access use continuum,
- Investigate the motivations of the private sector to provide transport services in rural areas,
- Consider the government structures that organise and regulate these services along with the legal and policy frameworks in which they operate, both in Africa and Asia.

Key research questions in Phase 3:

- What is preventing services being scaled up and extended to remote areas where they would have most impact?
- Are rural transport subsidies an option in low income countries?
- What can be learnt from rural transport service operations and the institutional environment in which they function in Africa and Asia?

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- **Output:** definitive guidelines on how the ***provision-preservation-services*** continuum can be improved in support of better livelihood opportunities for rural communities and have a positive impact on poverty reduction.
- **Impact:** to improve accessibility and mobility for rural communities and to improve the overall livelihood outcomes of those communities, and, in particular, vulnerable groups and individuals within those communities.

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Understanding outcomes and impact: why LVRR?

- Rural people need access to markets, health facilities, education, employment, livelihood opportunities, civic services and social interactions
- Service providers and traders need access to rural people
- National, international and country-level mobility of people and freight is provided by the primary and secondary road networks
- LVRR connect to this and so allow rural people to access markets, health centres, education and the national road network, and allow service providers to reach villages
- In ReCAP countries, most people do not own motorised transport and so depend on transport services and service providers in order to benefit from LVRR roads (the beneficial outcomes and impacts)

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Theory of changes for LVRR investments

- As road conditions improve, transport services increase
- Gradual modal shift (eg, from walking/carrying and motorcycle taxis to larger vehicles such as taxis, pickups, minibuses and trucks).
- Reductions in vehicle operating costs, together larger vehicles permitting economies of scale, should be reflected in lower passenger fares and freight tariffs
- As a result, more people will travel and more goods be carried, benefitting businesses and markets.
- This will contribute to beneficial outcomes and impacts relating to agricultural production, community health, education and economic activities, benefitting men, women and children.

Theory of changes for LVRR deterioration

- As road conditions deteriorate, transport services decrease
- Gradual modal shift (eg, from minibuses to 4x4 pickups and motorcycle taxis and walking/carrying).
- Increases in vehicle operating costs, together smaller vehicles reduce economies of scale and will be reflected in higher passenger fares and freight tariffs
- As a result, fewer people will travel and less goods are carried, restricting businesses and markets.
- This will contribute to worsening outcomes and impacts relating to agricultural production, community health, education and economic activities, with men, women and children suffering the consequences.

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Theory of change evidence and examples

- **Virtuous circle of investment examples**
  - **Nepal, Bangladesh, Kenya, Tanzania**
- **Vicious circle of deterioration examples**
  - **Eg, Liberia**
- **Unexpected examples**
  - **Eg, Ethiopia (***Hintalo Wajirat***), Ghana (***Hatorgodo-Abor, Wechiau-Wa***), Liberia** *(maintenance correlation)*
- **What has changed and why and what are the lessons?**

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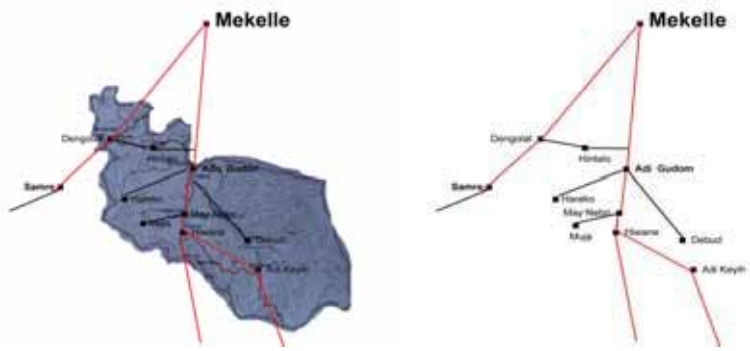
Theory of change evidence and examples

- **Unexpected examples**
  - **Eg, Ethiopia (*Hintalo Wajirat*)**



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Monitoring and Evaluation data collection

- 'Before' and 'After' data to compare
- Baseline surveys to establish current situation concentrating on SMART indicators (Specific, Measurable, Agreed, Relevant and Time-bound)
- Annual or follow-up surveys to re-measure SMART indicators and so measure outcomes and impacts

Information needed and appropriate indicators

- **Road information**
  - **Design, purpose, conditions, critical points, etc**
- **Transport services information**
  - **Transport numbers and volumes disaggregated**
  - **Transport operators**
  - **Transport users**
  - **Transport regulators**
  - **Safety and security**
- **General and external issues**
  - **Climate, prices, security, national events**
- **Information about different 'beneficiaries'**
  - **Men, Women, Children**
  - **People with disabilities, disadvantaged groups, older persons**
  - **Businesses, commuters**
  - **Farmers and markets, etc**
- **What has changed and why and what are the lessons?**

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Where to carry out Phase 2 research?

- **Where are relevant and reliable LVRR datasets available to measure the 'before' situation?**
- **Is there interest and capacity to collect and interpret the current 'after' situation?**
- **Will we be able to determine and measure 'what has changed and why' and will people be able to make use of this information to improve their future policy and practices?**
- **Will the lessons be sufficiently 'representative' to contribute to the final 'guidelines' output?**

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Phase 2 research

- **What information to collect and methodology?**
  - **Scoping report ideas**
  - **Workshop ideas**
- **Where to undertake the research?**
  - **Scoping report ideas**
  - **Workshop ideas**

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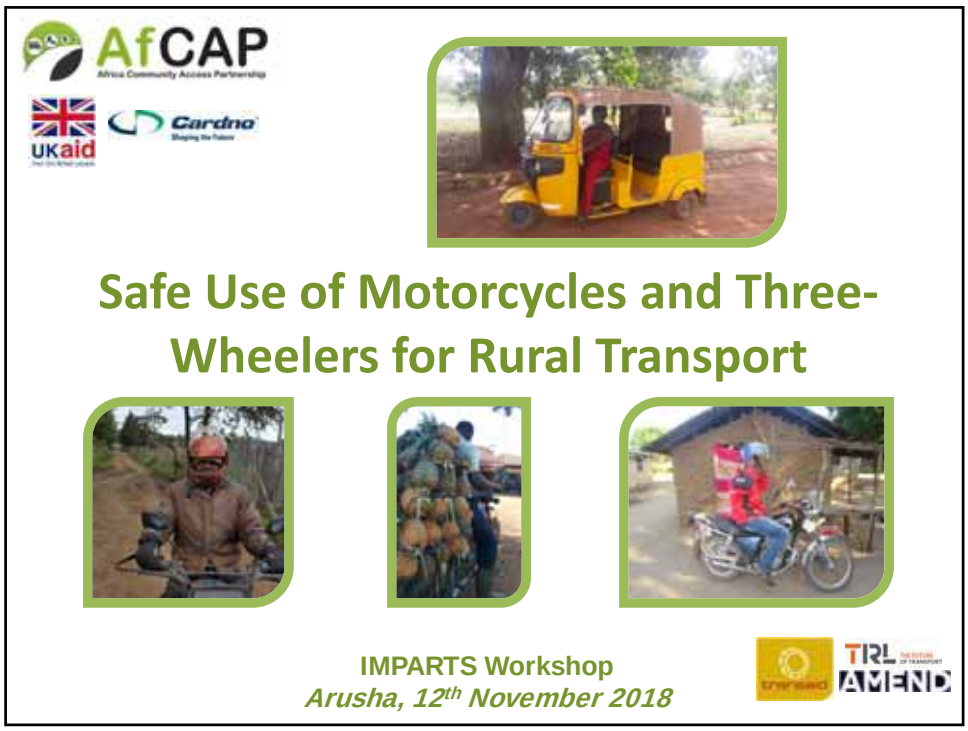

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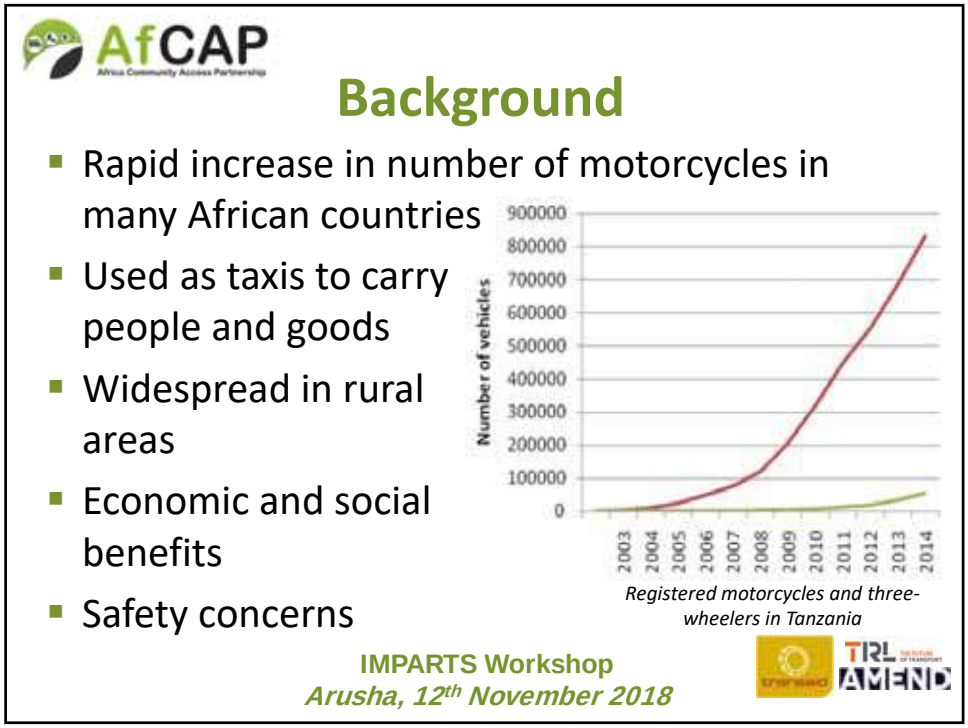

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Research Project

- 'Enhancing understanding on safe motorcycle and three-wheeler use for rural transport and the implications for appropriate training and regulatory frameworks'

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Project Aims and Objectives

- **Aim:** To improve knowledge and understanding concerning effective ways of ***enabling rural people to benefit*** from the ***safe use*** of motorcycles and three-wheelers
- **Objective:** To enable the safe operation of rural motorcycles and three-wheelers ***to provide good, affordable and inclusive rural access*** for different groups of people
- **Emphasis:** Rural motorcycle taxis, rider ***training***, ***appropriate regulatory*** frameworks and ***realistic enforcement*** methods
- **Essence:** Country studies and ***inter-country exchanges***

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Scope of Work

- Inception Phase:
  - Stakeholder engagement
  - Literature review
  - Inception report
- Research Phase
  - Development of methodology
  - Research activities
  - Data analysis
- Uptake and Embedment Phase
  - Country Discussion Papers
  - Workshops
  - Final Report
  - Policy briefs, journal articles and conference presentations

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4-Country Activities

- Reviews of motorcycle- and three-wheeler-related legislation and policy
- Reviews of training
- Survey of benefits and disbenefits
- Investigations into potential of technology (excluding Ghana, including Rwanda)

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Country-Specific Activities (1)

- Ghana:
  - Reanalysis of existing data
- Kenya:
  - Investigations into health issues
- Uganda:
  - Investigations into barriers to use

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Country-Specific Activities (2)

- Tanzania:
  - Development of 'Operations Manual' for motorcycle taxi associations
  - Development of Instructor's Manual for motorcycle and three-wheeler training
  - Review of existing training and licensing initiatives: training curriculum and mobile licensing service

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Tanzanian Survey of Benefits and Disbenefits

- 282 respondents:
  - 103 Riders
  - 118 Passengers
  - 28 Owners
  - 29 Owners of freight who transport goods
  - 4 Non users
  - Zero 3-wheelers
- Topics covered:
  - Overall opinions
  - Economics and finance
  - Access and mobility
  - Injuries and health
  - Crime and personal security
  - Access to services and protective equipment

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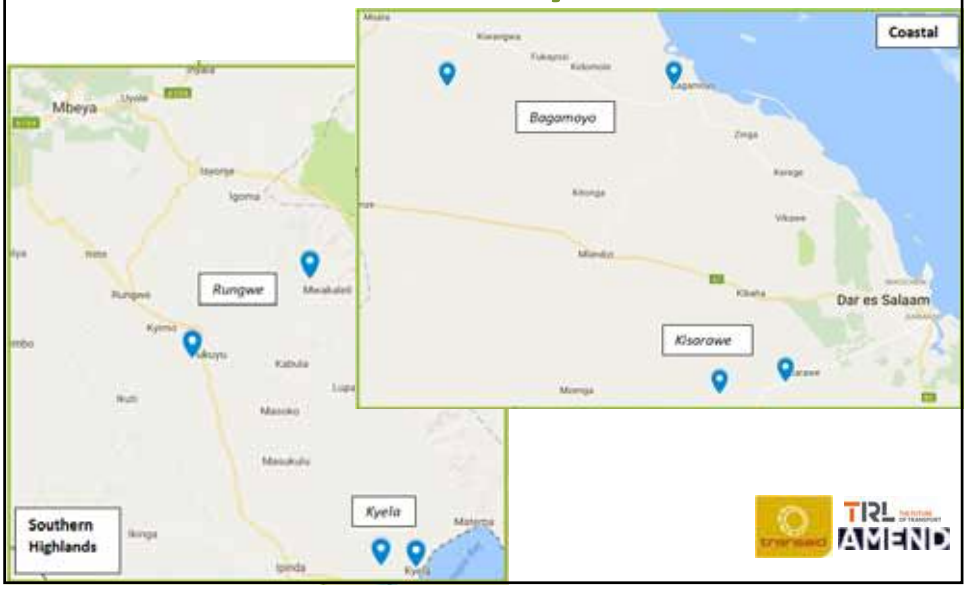
Tanzanian Survey Locations



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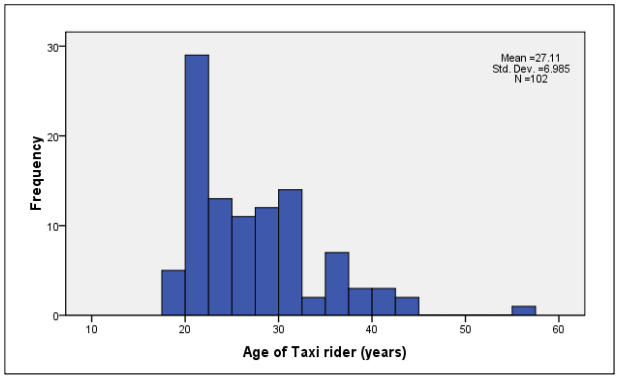
Riders' demographics

- **Number:** 103 motorcycle taxi riders (no three-wheelers)
- **Age:** Majority 20 to 30 years old, average 27 years
- **Gender:** 2 females & 101 males
- **Education:** 65% completed no higher than primary school



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Riders' characteristics

- **Vehicle ownership:** 51% riders, 36% commercial agreement
- **Driving licence:** 29% **Road Licence:** 14% **Insurance:** 24%
- **Association membership:** 26%
- **Mobile phone ownership:** 79%
- **Training:** Vast majority self-taught or taught by friends or family. 3% formal training
- **Helmet use:** 81% always wear

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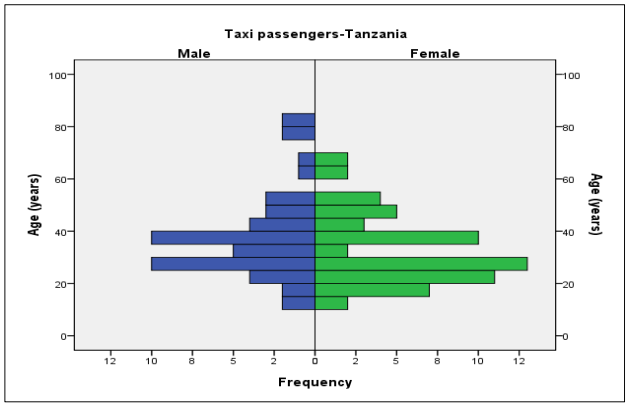
Passengers' demographics

- **Number:** 118 motorcycle taxi passengers
- **Age:** Majority under 40 years old
- **Gender:** More female than male
- **Mobile phone ownership**: 72% **Internet:** 42%



Benefits

- Riders
  - **Employment and income:** Average profit for last seven days was TZS 43,400 (GBP 14.70) – after all expenses paid. (110% of Gross National Income)
  - **Transport for health:** 85% transported someone in emergency; 78% believe they have saved someone's life
- Freight owners
  - **Freight:** 52% is items for sale in a shop
  - **Gender:** 41% were female (small business and farming)
  - **Mobile phones:** 52% use mobile phone to arrange transport

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Benefits

- Passengers
  - **Access to health services:** 46% for health emergency (either themselves or household member), 68% for non-emergency
  - **Travel to markets and social engagements:** Most common destinations:
    - Market / shops (41%)
    - Health services (24%)
    - Social events (17%)
    - Work (10%)
  - **Convenience:** 90% said it was 'very easy' or 'quite easy' to arrange motorcycle transport. Valued for being convenient and fast (they go where no other mode can go)
  - **Mobile phone:** 44% use mobile phone to arrange transport

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Disbenefits

- **Risk of injury:**
  - 75% of riders and 81% of passengers said risk of injury was 'the worst thing about motorcycle and three-wheeler taxis'
  - 41% of riders and 13% of passengers had suffered an injury that led to loss of income, required medical attention or affected their family life
  - 37% reported 'single vehicle crash/fall' as the most common type of incident
  - 36% reported 'roadway condition/damage/obstacle' as the most common cause of the incident
- **Crime:**
  - 10% of riders had been victims of crime (of which 50% robbery, 40% verbal abuse). 3% of passengers had been victims of crime (all verbal abuse)

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Key Findings - Tanzania

- Motorcycles are widely available
- No three-wheelers were found at any of the locations
- Difficult to find non-users
- Important for providing access to health facilities
- Mobile phones important in linking riders and passengers
- Injuries sustained in single-vehicle incidents when rider is alone, caused by rider error or road condition
- Vast majority learnt from friends/family or self-taught
- Low proportion of riders belonging to associations

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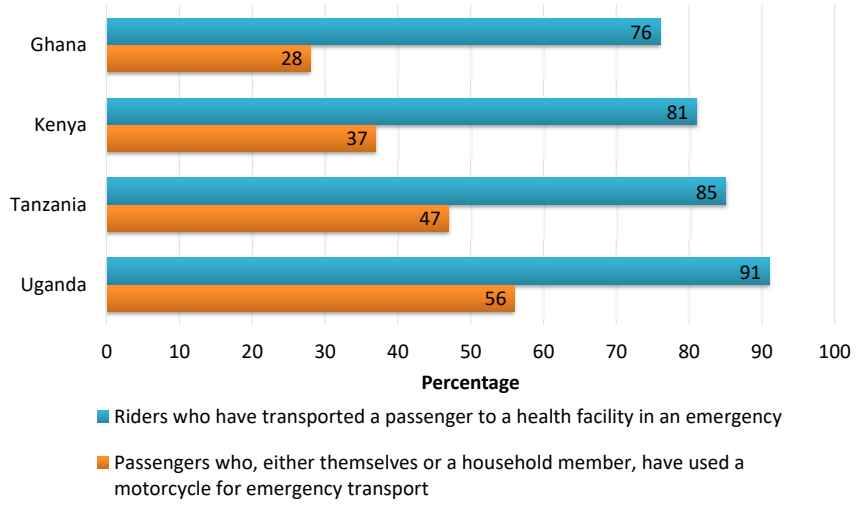
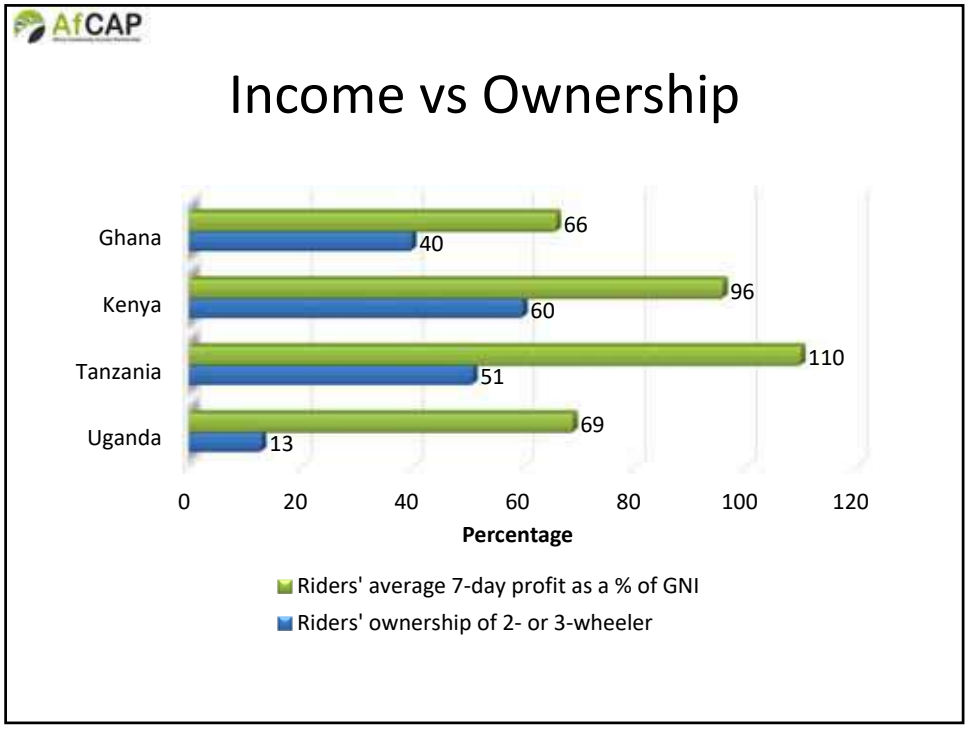
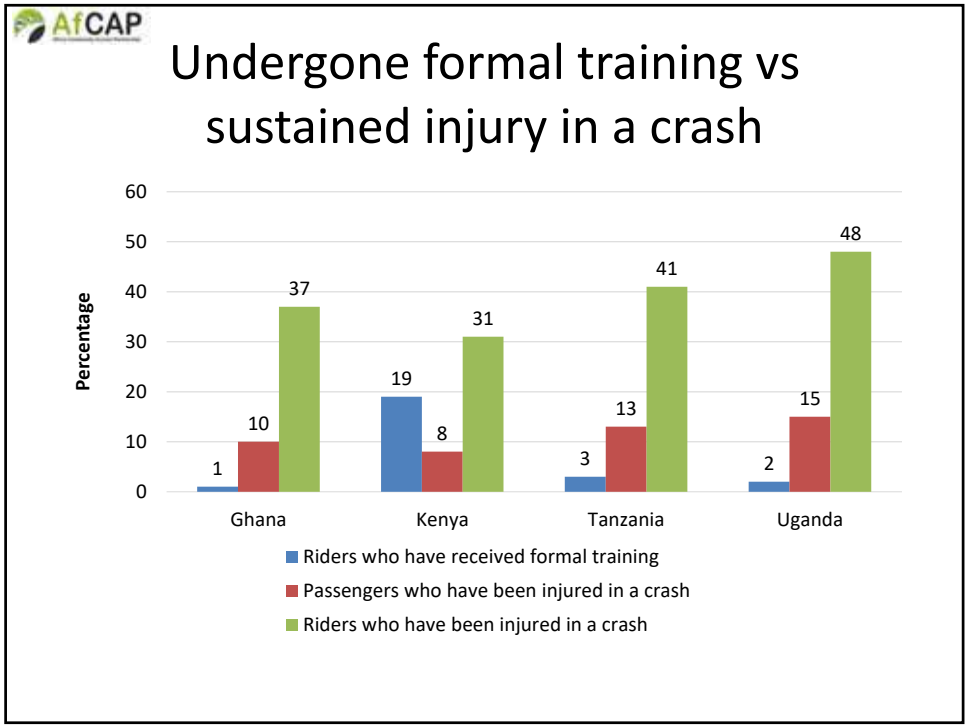
Use as Emergency Transport

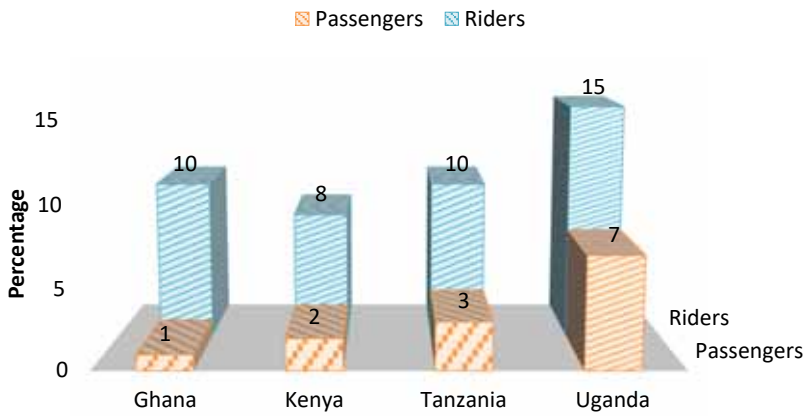



AfCAP
Income vs Ownership
Ghana
Kenya
Tanzania
Uganda
66
40
96
60
110
51
69
13
0
20
40
60
80
100
120
Percentage
Riders' average 7-day profit as a % of GNI
Riders' ownership of 2- or 3-wheeler


AfCAP
Undergone formal training vs sustained injury in a crash
Percentage
60
50
40
30
20
10
0
1
10
37
19
8
31
3
13
41
2
15
48
Ghana
Kenya
Tanzania
Uganda
Riders who have received formal training
Passengers who have been injured in a crash
Riders who have been injured in a crash

AfCAP

Victims of Crime



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AfCAP

Discussion

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Tom Bishop: tbishop@amend.org

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Evaluation of the cost-beneficial improvement of first mile access on small-scale farming and agricultural marketing

November 2018

Robin Workman *First Mile Team Leader*

IMPARTS Workshop *12-13 November 2018, Arusha, Tanzania*

IMPARTS Workshop, 12-13 November 2018, Arusha, Tanzania

The Team

- **Robin Workman – Team Leader**
- Andrew Otto – Senior Researcher: LVRR Engineering Specialist
- **John Hine – Senior Researcher: Rural Transport Economics**
- Peter Njenga – Rural Transport Access Planning Specialist
- Fridah Mugo – Gender and Social Impact Specialist
- Grace Muhia – Local Researcher (Kenya)
- **Shedrack Willilo – Local Researcher (Tanzania)**
- Wynand Bezuidenhout - Transport Specialist

Background

- First Mile: up to 4 miles…
- First Mile issue explored by IFRTD in 2014/15
- Looks at benefits of improved access for small-scale farmers
- Kenya and Tanzania, two sites in each place

Research Objectives

- Identification of the specific elements of the transport system that can be improved in order to unlock growth in the smallholder value chain sector.
- Better advice to road planners on the best location for access improvements.
- Quantification of the economic benefits of better initial access.

Research Objectives

- A framework to provide advice to farmers and the authorities on the best pattern of transport in different circumstances.
- Better understanding of the role of different forms of transport in the small-scale agricultural environment, and the gender dimensions therein, and the needs to regulate them.

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Progress

Phase 1 complete

- Inception

Phase 2 complete

- Literature review, scope, workshops

Phase 3 complete

- Data collection

Progress

Phase 4 planned

- Joint stakeholder workshop (Arusha)
- Dissemination
- Final report
- Scientific paper

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Development

- Capacity Building and Knowledge Exchange
  - Partners: TARURA
  - Consider all levels from Ministry to Community
  - Steering group
- Uptake and Embedment
  - Dissemination
  - Informing policy

Provision – Preservation – Services Continuum

- Provision: Road construction, why and how they are provided, planning of new roads or upgrading
- Preservation: Road maintenance, preservation of the asset, how this is decided and prioritised
- Services: How the roads are used and what transport services are able to use them

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Type of farms

- Smallholders
- Farmers that produce surplus for the market (not subsistence)
- Farms connected by rural roads
- Farms that have the same market
- At least 35% female farmers

Type of roads

- Access roads
- First Mile from farm to first collection point
- Earth or gravel standard

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Kenya: trial sites

Tanzania: trial sites

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Objectives

The third phase of the work had the main objectives to:

- Undertake targeted data collection as outlined in the Phase 2 report
  - Household surveys,
  - Key Informant Interviews
  - Focus Group Discussions
  - Road Condition Surveys

➢ Road Condition Surveys

Measurement (IRI)

- Visual
- DashCams
- Smartphone apps
- Accelerometers

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Objectives

The fourth phase of the work has the main objectives to:

- Draft the range of outputs
- Undertake a number of knowledge dissemination exercises, including those most suited to output uptake at the farm and village level

Outputs

- Reports
- Technical papers / presentations:
  - Durban, October 2018
  - Arusha, November 2018
- Workshops:
  - Kenya and Tanzania, July 2017
  - Kenya and Tanzania, September 2018
  - Joint workshop in Arusha, part of Transport Services event, November 2018
- Scientific paper based on research outputs

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Road survey results

- Roads/tracks generally in 'Poor' condition with poor drainage.
- Bottlenecks a major hindrance (mud, slipperiness, gradient, watercrossings/seasonal streams). High roughness in dry season
- Problems can be solved with minor investment (watercrossing structures & spot-improvement) and routine maintenance.
- Realignment of access roads could help with gradient and slipperiness

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RAF2109A - First Mile- Phase 3 - Stakeholder Workshop

Agricultural Production

Kenya. Small farms (1.2 acres Kithimani, 0.4 acres Meru) and low net incomes (US$ 150 in Meru to $400 in Kithimani). Yields were higher in Meru but very low prices were offered to farmers.

Tanzania. Larger farms (1.9 acres for potatoes and 4.4 acres pineapples) The pineapple farmers had surprising high incomes (US $3000 to $5000).

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Transport and Marketing Challenges

- Big differences between areas in organising transport.
- Major issues in the Meru and Madeke. Both areas rely heavily on head and backloading.
- Less problems in Kithimani and Matola, where a much wider diversity of transport used.

Challenges Farmers face in organising transporters and buyers to take produce in Tanzania (count of issues mentioned)

Easy to organise transport?	Matola potatoes Yes: 64, no 64		Madeke, pineapples Yes 11, No: 111	
	1st Problem	Other problems	1st Problem	Other problems
Farm too remote	7	1	2	0
Quantity to small	7	5	1	8
Not enough buyers	7	5	43	0
Route to difficult	1	0	1	1
Market price too low /worthwhile	1	3	2	2
Difficult to amalgamate loads	0	0	1	0
Traders do not come	6	1	2	2
Not enough transporters	0	0	5	12
Difficult to agree	0	3	0	1
Produce spoilt on journey	0	0	0	1
Poor mobile phone coverage	2	1	35	26

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Tanzanian Transport

Challenges Farmers face in organising transporters and buyers to take produce in Kenya (count of issues mentioned)

Easy to organise transport?	Machakos Yes: 64, no 64		Meru Yes 11, No: 111	
	1st Problem	Other problems	1st Problem	Other problems
Farm too remote	46	15	33	41
Quantity to small	6	21	18	52
Not enough buyers	13	3	19	14
Route to difficult	21	28	38	68
Market price too low /worthwhile	0	10	1	18
Difficult to amalgamate loads	1	27	9	25
Not enough transporters	1	6	4	7
Difficult to agree price Produce	3	15	0	7
spoilt on journey	0	4	2	10

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Meru Transport

Machakos Transport

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Transport Costs

As with the pilot surveys head/backloading is the most expensive when expressed in costs per ton (or kg) -km. But further analysis show less differences once distance is taken into account.

First Mile Transport Data: Tanzania

	Madeke Farmers Pineapples	Matola Farmers, Potatoes				Matola Transporters	
	Head-load	Head-load	Motor - cycle	Donkey cart	Ox cart	Motor -cycle	Donkey cart
Observations	126	53	34	30	14	36	27
Mean load kg	37.1	91.9	85.7	101.9	123.4	96.2	494.4
Mean distance km	0.34	0.67	1.44	1.78	2.15	1.67	2.56
Mean Tsh/kg	33.9	18.9	23.4	24.9	24.9	23.7	23.8
Mean Tsh/kg-km	468.9	120.9	43.7	40.3	19.7	20.3	12.3
Median Tsh/kg-km	172.2	95.2	21.0	21.6	15.2	13.8	8.3

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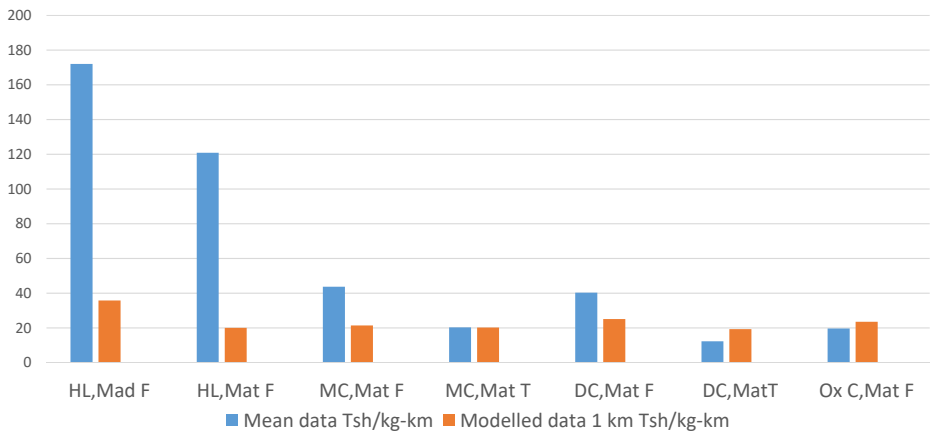
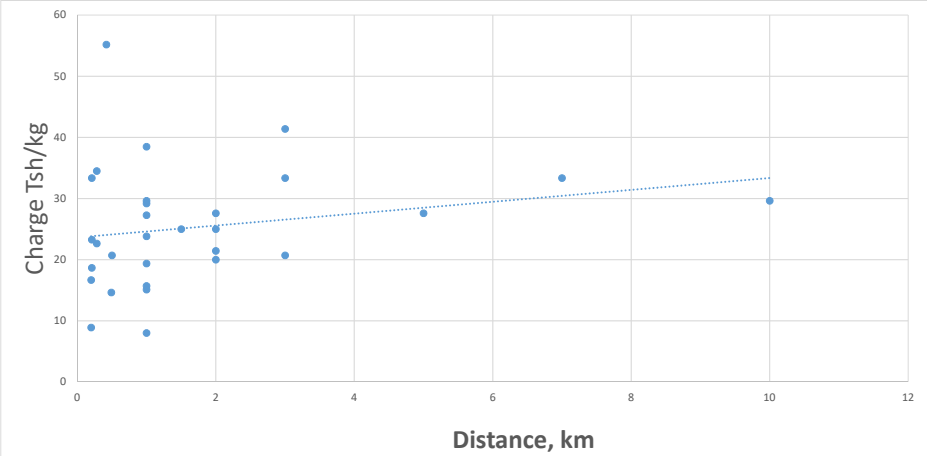
Costs of different forms of transport for Tanzania, Mean data Tsh/kg-km, and modelled data on distance.



Animal cart charge for potatoes Tsh/kg with distance



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The effect of crop spoilage and first transport on net incomes

Two approaches were tried to identify the effect on net incomes. Tabulation and regression analysis.

The total average net effect (from tabulations) from French beans was 10 to 15%. For potatoes it was 30 to 36%, while for pineapples it was 30 to 40%. For the latter crops the results are based on both tabulations and regression analysis. – Meaningful regressions were not possible for French beans.

The Effect of Crop Losses and First Transport Costs on Net Incomes

	Kenya (green beans)		Tanzania	
	Machakos	Meru	Matola (potatoes)	Madeke (pineapples)
Estimated crop losses relating to 1st transport				
Mean	8.7%	4.7%	8.8%	14.3%
Median	7.0%	3.5%	3.4%	6.3%
1st Transport costs as % of net farmers incomes				
Mean	6.4%	7%	23.8%	25%
Median	3.3%	5.8%	15.6%	21.5%

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Prediction of the effect on net incomes of initial transport costs and crop losses from regression analysis

	Matola potatoes		Madeke pineapples	
Net income per acre = f (acres, initial transport costs, yield, produce price, crop losses)				
Observations	98		129	
Regression R squared value	0.855		0.673	
Regression F value	108.6		50.58	
	Initial transport costs	Crop losses	Initial transport costs	Crop losses
Mean effects on net incomes from applying regression coefficients to mean observations	-34.6%	-2.02%	-22.0%	-7.1%

Who pays for what? And when does transfer of ownership take place?

To get a greater understanding of the transport and marketing process data was collected on who pays for what transport and marketing activities. Different arrangements are practised in different places. Farmers can be penalized if crops are damaged during first transport.

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Transfer of Ownership: Kenya

	Kithimani	Meru
When does farmer transfer ownership?		
At farm before harvest	1	0
At farm after harvest	42	2
At collection point	82	111
When is the farmer paid?		
An advance by buyer before transfer of ownership	9	0
When buyer takes possession	3	4
After buyer takes possession	113	107
What credit arrangements are there?		
Through farm inputs (seeds fertilizer, insecticide)	78	95
None	10	2

Farmer's payment arrangements Tanzania

	Potatoes	Pineapples
When is the farmer paid?		
An advance before transfer of produce	22	15
When buyer takes possession	114	60
After buyer takes possession	2	5
Both an advance and when buyer takes possession	0	18
Both when buyer takes possession and afterwards	0	25
If there is a delay in payment how long after the buyer takes possession, is farmer paid?	3.6 days	4.1 days
Are farmers penalized if crop is found damaged after buyer takes possession?		
Not penalized	103	16
Are penalized	33	114
Sometime penalized	3	2

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Gender Issues

Women have smaller farms, lower incomes and less access to transport modes. Women also widely used for head/backloading to take crops from the farm to collection point.

A Gender Breakdown of Farmers' Data

	Machakos		Meru		Matola		Madeke	
	men	women	men	women	men	women	men	women
Number	76	52	79	47	96	43	89	43
Main crop acres	1.2	1.2	0.43	0.36	2.2	1.2	5.2	2.7
Yield kg/acres	1,410	1,132	3,651	3,511	4,594	3,080	12,141	19,163
Net income US$	400	315	179	159	720	340	5,315	3,343
Distance to collection pnt.	1.57	1.03	1.48	1.40	1.32	0.99	0.36	0.41
Ownership of transport %	63%	48%	27%	6%	47%	23%	45%	19%
Cost of 1st transport US cents/kg	1.3	1.4	0.86	1.11	0.95	0.92	1.48	1.39

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Gender breakdown of Kenya Transporters data

	Machakos		Meru	
	Men	Women	Men	Women
Head/backloading	3	6	3	21
Motorcycle	19	0	9	0
Animal cart	6	1	0	0

Recommendations

- Raise awareness
- Extend motorable roads closer to farms
- Improve roads to facilitate truck access
- Stimulate transport services through roads
- Community participation in road maintenance
- Establish framework for community involvement

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Recommendations

- Encourage local government involvement
- Establish district based coordinators
- Form/strengthen farmer's associations
- Encourage farmers to liaise/amalgamate loads
- Increase competition amongst buyers
- Facilitate gender and social inclusion
- Add value at the farm


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RAI Project – Overview

November 2018

Robin Workman, Team Leader

IMPARTS Workshop *12-13 November 2018, Arusha, Tanzania*

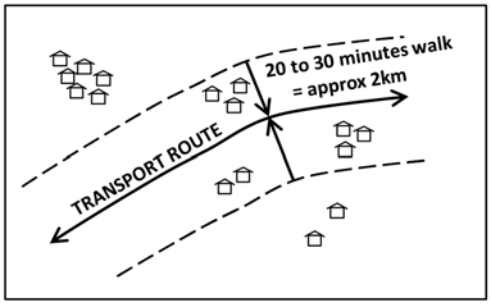
IMPARTS Workshop, 12-13 November 2018, Arusha, Tanzania

Team members and their roles

Team Leader	Robin Workman
Senior Researcher	Paul Starkey
Database Specialist (Data Specialist 1)	Kevin McPherson
Data Analyst (Data Specialist 2)	James Zihni
HDM-4 Specialist	Greg Morosiuk
Rural Transport / RAI Expert	John Hine
Statistician	Sritika Chowdhury
Geospatial / GIS Specialist	Justin Saunders

Definition

- The RAI is defined as 'the proportion of the rural population living within two kilometres of an all-season road'.
- Two kilometres was selected as 'typically equivalent to a walk of 20-25 minutes' (Roberts et al, 2006)



The three factors of RAI

- Population:
  - Identify the rural population
  - Measure it
- Location
  - Identify where the roads are
  - Maps, GIS, etc.
- Condition
  - Use local road organisation data
  - Interpret to identify all-season roads

Aim and Objective

- Aim is to develop, propose and obtain agreement on a harmonised approach to data collection and measurement of the Rural Access Index that is relevant, consistent and sustainable
- Objective is to scale up implementation of the RAI across UN member countries in order to advance the status of SDG Indicator 9.1.1 to Tier II and eventually Tier I in the tier classification of the SDGs.

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Phases

- Phase TG1: Scoping Study – Complete
- Phase TG2: Consolidate existing and proposed methods for data collection, revise the measurement approach with the World Bank
- Phase TG3: launch programme for rolling out measurement framework, collection of RAI data in 30 countries (incl. in all ReCAP countries) - to be implemented and adopted

Work Programme

ACTIVITY and MILESTONE SCHEDULE

TITLE: Consolidation, revision and pilot application of the Rural Access Index (RAI)

No.		M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22
	Month No.																						
	Year	2018			2019												2020						
	TG1 (complete)	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
	TG2																						
0	Inception phase activities																						
1	Establish Framework / methodology and revise																						
2	Consult countries and select																						
3	Agree standards and QA measures and revise																						
4	Liaise with donors for catalogue of existing data																						
5	Establish mechanism to inform WB of data																						
6	Investigate feasibility of accuracy range / correctio																						
7	Explore viability of secondary RAI / calc. values																						
8	Specify custodian framework for RAI																						
9	Trial proposed framework in 4 ReCAP countries																						
10	Identify funding sources for TG3																						
11	Draft framework for scaling up RAI																						
12	Recommnedations for TG3, applied in 30 countries																						
	Milestone Deliverables																						
1	*Inception Report*																						
2	*Progress Statement 1*																						
3	*Progress Statement 2*																						
4	*Draft RAI Guideline*																						
5	*Stakeholder Workshop & report*																						
6	*TG2 Report*																						
7	*Scientific Paper/Presentation*																						
	BREAK																						
	TG3 (to be decided on completion of TG2)																						
1	Liaise with ReCAP ctrys. for RAI data collection																						
2	Continue to get finaincial support for RAI																						
3	Implement uptake/embedment in 17 ReCAP countr																						
4	Support uptake/emnbedment in 30 countries overa																						
	Milestone Deliverables																						
1	*Progress Statement 3*																						
2	*Draft Final Report*																						
3	*Final Report*																						
4	*Scientific Paper*																						
	KEY																						

Example Main tasks — Activity full — Invoice Milestone due
Example Milestones — Activity revision — Intermittent input

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Background

- Adopted as a development indicator for the Results Measurement System for IDA-14 (the 14th replenishment of International Development Association resources) in 2005
- Initial measurements of the RAI (obtained by several methods) for 64 countries were included in the World Bank Report ‘Rural Access Index: A Key Development Indicator’ (Roberts et al, 2006).

- RAI has been widely used in studies and projects, the original 2006 data has not been systematically updated as originally intended
- UN Sustainable Development Goals (SDGs) set 232 SDG Indicators, defined by the UN Inter-agency and Expert Group on SDG Indicators (IAEG-SDGs) in 2016 (UN, 2016).
- SDG Indicator 9.1.1 'Proportion of the rural population who live within 2 km of an all-season road'

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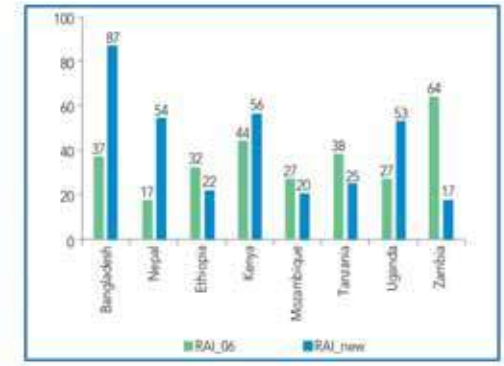
- ReCAP/World Bank project to develop a new methodology for measuring the RAI in 2016
- Pilot measurements of the RAI using this new methodology were carried out in eight ReCAP countries in Africa and Asia with financial support from ReCAP
- The pilot countries were Ethiopia, Kenya, Uganda, Tanzania, Mozambique, Zambia, Nepal and Bangladesh

- ReCAP/WB 'Measuring Rural Access: Using new technologies' (World Bank, 2016).



Source: World Bank Transport & ICT, 2016

- Currently doing for 15 new countries

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Recommendations from TG1

- Develop an RAI database of all UN countries.
- Develop new detailed RAI Measurement Methodology Guidelines
- Establish a web page for the exchange of knowledge about the measurement of the RAI / SDG Indicator 9.1.1.
- Prepare a schedule of actions that need to be taken to move SDG Indicator 9.1.1 to IAEG-SDGs Tier II status.

- Develop one or more additional, alternative SDG Indicator(s) to provide additional relevant assessments of contemporary rural access.
- Carry out additional research activities:

  (i) Consultation with additional organisations

  (ii) Comparative studies between different methods of measuring the RAI

  (iii) Potential for future use of smartphone data

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Key Tasks

2 Consult with ReCAP countries (NSOs, road agencies, transport departments), to explore scaling up the use of spatial data/remote sensing technologies for obtaining population and road network information

4 Liaise with the World Bank and others to develop, assemble and rollout a complete catalogue of all RAI data known to exist (an inventory or database) as a baseline of existing data (2006 onwards), and examine the efficacy of such a catalogue for recording the method used to calculate each dataset and verification of their accuracy;

Key Tasks

5 Establish a mechanism through which any organisation measuring new values of RAI will notify the World Bank as custodian of SDG 9.1.1, so this information can be integrated into a schedule of future RAI measurements

9 Trial the proposed measurement framework, including data collection and verification process, in at least four ReCAP countries

Other Tasks

6. Investigate the feasibility of using an accuracy range across countries, and method-correction factors in order to accommodate variations in data collection by country;

7. Explore the viability of implementing a secondary rural access indicator, and calculate a more realistic value that is deemed more appropriate locally and aligned with the SuM4All Global Tracking Framework;

Tasks

1 Establish a co-ordinated measurement framework with consistent data collection approach and methodology, in co-operation with the World Bank or other donor partners as required:

- Keep RAI definition, but update 'road condition', 'rural populations', other parameters…
- Review existing RAI data, review country data and decide which is relevant to RAI.
- Establish framework to identify appropriate data, minimum quality standards, etc.

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2 Consult with ReCAP member countries (both National Statistics Offices and relevant road agencies and transport departments), and engage with non-member countries and MDBs where appropriate, to explore the feasibility of scaling up the use of spatial data and techniques and high resolution remote sensing technologies for obtaining population data and road network information *across multiple countries;*

- NSOs potential to provide population and spatial data?
- Other sources……

3 Agree data standards and quality assurance measures (i.e. which takes precedence, data collected by individual countries, or data collected by the SDG custodian, the World Bank).

- Agree with whom?
- Population, location, condition
- Desk study of data quality for RAI, from custodian and countries

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4 Liaise with the World Bank, AfDB and ADB (among others) to develop, assemble and rollout a complete catalogue of all RAI data known to exist (which could be in the form of an inventory or database) as a baseline of existing data (2006 onwards), and examine the efficacy of such a catalogue for recording the method used to calculate each dataset and verification of their accuracy;

- Collect all available existing RAI data
- Establish in a database and standardise formats
- Establish as a management system
- **Expect WB to host the database**. Agree format, content, access, etc.

5 Establish a mechanism through which any organisation or project intending to measure new values of RAI will routinely notify the World Bank as the current custodian of SDG 9.1.1, so that this information can be integrated into the World Bank planned schedule of future RAI measurements;

- Learn from other similar systems internationally
- Identify local organisation to manage data (NSO?)

6 Investigate the feasibility of using an accuracy range across countries, and method-correction factors in order to accommodate variations in data collection by country;

- Assess quality and accuracy of data…
- Calculate error ranges
- Establish correction values

7 Explore the viability of implementing a secondary rural access indicator, and calculate a more realistic value that is deemed more appropriate locally and aligned with the SuM4All Global Tracking Framework;

- Identify countries that have 'issues' i.e. IMTs or significant unclassified networks
- Potential for a secondary indicator for access to schools, health centres, etc.
- Link to SuM4All framework

8 Specify a clear custodian framework for collection of RAI datasets and set out roles and responsibilities for populating the RAI catalogue/inventory both centrally and at country level, as well as for quality assurance purposes;

- World Bank involvement
- Set parameters for framework, specifications, date of origin, etc.
- Clear responsibility for data collection
- Draft RAI Guideline

9 Trial the proposed measurement framework, including data collection and verification process, in at least four ReCAP countries;

- Select four ReCAP countries (criteria to follow)
- Carry out trials

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10 Identify other funding sources and financial support outside ReCAP for broadening implementation of the Rural Access Index, with a view to demonstrating uptake and embedment in at least 30 countries during TG3:

- Use links to explore funding options
- Estimate funding required
- Likely funding agencies? -DFID? World Bank? Other donor agencies? Road Fund Boards? ……..?

11 Draft a framework for scaling up RAI data collection and measurement beyond ReCAP member countries, with a view to achieving greater geographic coverage in TG3, and a strategy for promoting SDG Indicator 9.1.1 from Tier III to Tier II, and from Tier II to Tier I in the UN classification;

- Focus on sustainability
- Maintain flexibility, provide options

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12 Provide detailed recommendations on the way forward in TG3, including the application of the upgraded RAI methodology in all ReCAP countries: this being dependent on funding being identified and available.

Criteria for country selection

- Four ReCAP countries (Asia and Africa)
- Should be interested to participate
- At least one or two could be countries that were involved in the 2016 collection, so that results can be compared
- A range of issues could be useful to test different methodologies

Criteria for country selection

Shortlist:

- Data coverage
- Data management
- GIS mapping
- Sustainability in data collection
- Varied environments
- Correction factors and alternative values

Criteria for country selection

Final Decision

- Involvement of National Statistics Offices
- Availability of mobile phone data
- Likelihood of acquiring reliable and quality data
- Consult with ReCAP and other stakeholders

Information needed…..

- Previous RAI data
- Locally available data
- Spatial data
- GIS mapping
- Population databases

Needed from partners…..

- Willingness to work with local NSOs
- Help to search for previous data
- Help to explore new spatial techniques for data collection
- Willingness to participate in data collection, verification and analysis for revised RAI

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Thank you for your attention

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Impact of the rural access infrastructures on transport services provision in DRC
Théodore Ngambila, Ministère des Infrastructures et Travaux Publics, DRC

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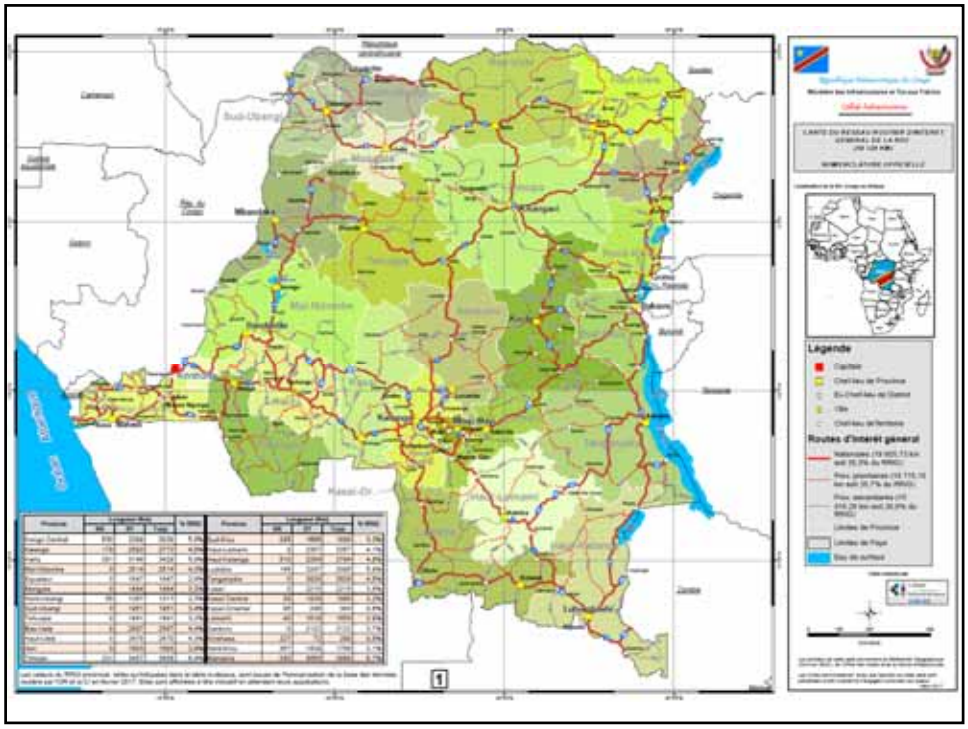
IMPACT OF THE RURAL ACCESS INFRASTRUCTURE ON TRANSPORT SERVICES PROVISION
DRC CASE

1. **DRC Presentation**
   - Superficie : 2 345 000 km²
   - Population: 88 millions habitants
   - Rural population : 51 %
2. **Transport network and modes**

   - 16.238 km of river voies
   - 5.033 km of railways network
   - 152.000 km road network with
     - 58 129 km of trunk roads
     - **86 471 km of rural roads ;**
     - 7 400 km of urban roads



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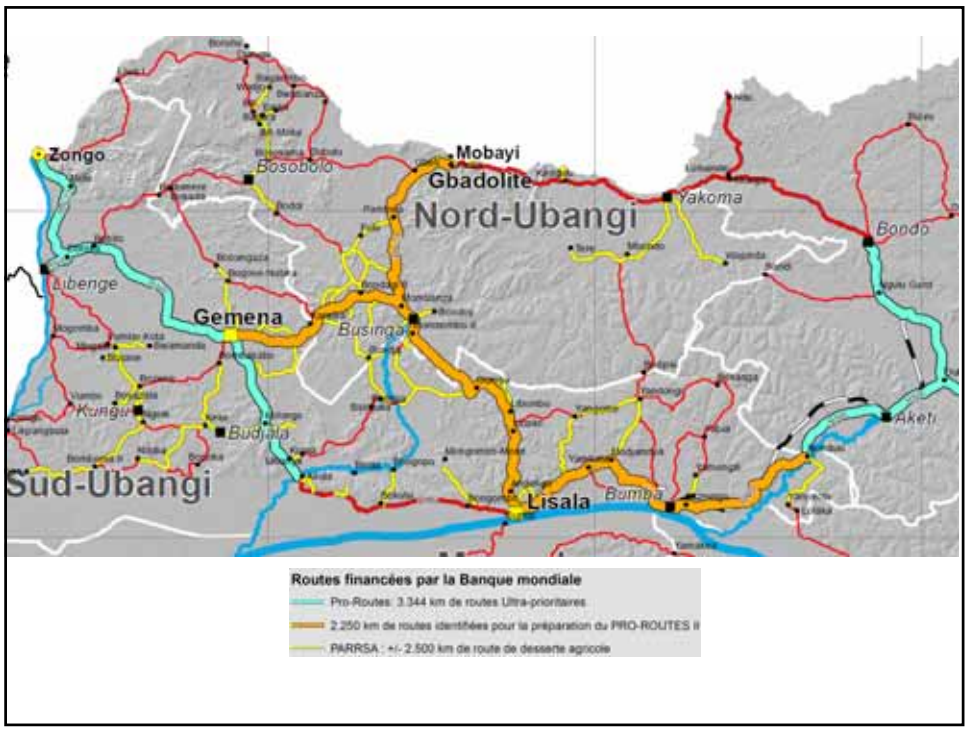
CASE OF RURAL ROADS IN SUD-UBANGI PROVINCE, NORTH-WEST DRC

- Main road Zongo-Gemena-Akula (385 km) rehabilitated in 2017-2018
- 600 km feeder roads converging to the main road rehabilitated in 2016-2017



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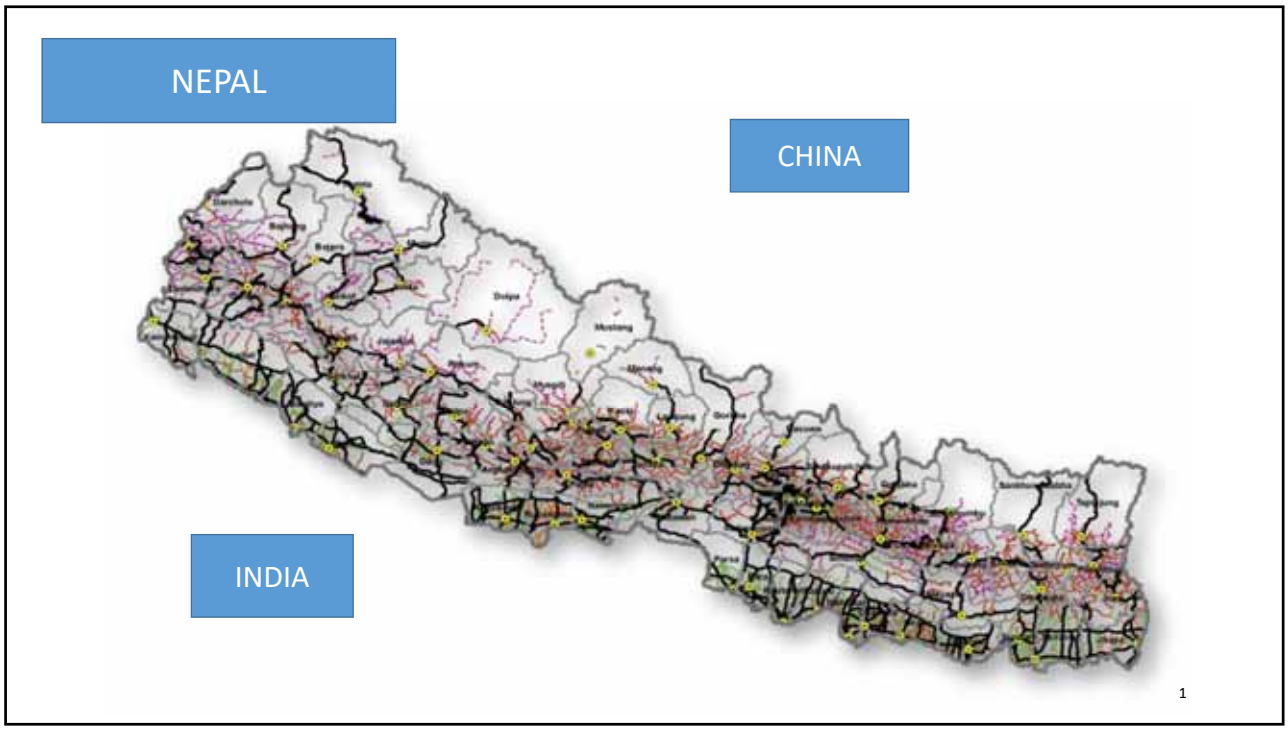
TYPES OF TRANSPORTS BEFORE REHABILITATION	TYPES OF TRANSPORT AFTER REHABILITATION
• Labour carrying • Bikes • Motorcycle taxis • Three-wheelers	• Bikes • Motorcycle taxis • Three-wheelers • Light trucks

MAIN ROAD TRAFFIC BEFORE REHABILITATION	MAIN ROAD TRAFFIC AFTER REHABILITATION
• Vehicules : 1 214 veh/year • Moto taxis : 11 536 motos/year • Bikes : 18 266 bikes/year	• Vehicules: 2 548 veh/year • Moto taxis : 20 812 motos/year • Bikes : 15 841 bikes/year

TRANSPORT COST BEFORE	TRANSPORT COST AFTER
• 145 CDF (0,091 USD)/pessenger/km • 578 CDF (0,361 USD)/ton/km	• 83 CDF (0.052 USD)/pessenger/km : decreasing of 43 % • 474 CDF (0,296 USD)/ton/km : decreasing of 18 %

Rural roads and transport services in Nepal
Mr Ram Chandra Shrestha, DoLIDAR, Kathmandu, Nepal



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- Area: 147141 Sq.km
- Himalaya : 19 %
- Hills : 64 %
- Plain Area : 17 %
- Population : 32 million

Rural roads and transport services in Nepal
Mr Ram Chandra Shrestha, DoLIDAR, Kathmandu, Nepal

Rural Roads in Nepal

Total Local Road Network – 57, 632 km

Black Top	Gravel	Earthen
2004 km (3.5 %)	12,823 km (22.2 %)	42805 km (74%)



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Rural Roads 57,632 + km Conditions


Condition of Road, Bhojpur


Condition of culvert, Bara


Road condition Terahthum


Bridge condition, Parsa

Routine Maintenance Progress

S.N	Description	Unit	Target	Cumulative (up to Y4)	Total	Remarks
1	No of road	No			344	
2	Lengthen of Road	KM	3,067	4,500	**5,167**	546 km reduced due to PM,UG.
3	Crossing structure	m	4,000	3,500	**4,880**	Excluding slab and Hume pipe culvert.

Upgrading of Roads and Bridge Construction

S.N	Activities	POM Target (KM)	Completed		On-going		Total
			Package (No)	Length (Km)	Package	Length (Km)	
1	Roads (km)	1400	29	349	57	857	1206 km
2	Bridge (m)	2000	14	398	8	425	823 m

Rural roads and transport services in Nepal
Mr Ram Chandra Shrestha, DoLIDAR, Kathmandu, Nepal

Livelihood Promotion of RMG






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Livelihoods Promotion by RMG

S.N	Activities	Use of wage income
1.	Member of local cooperative	80%
2.	Engaged family members in animal husbandry, vegetable cultivation, grocery shop etc.	60%
3.	Constructed toilet	40%
4.	Renovation of house	30%
5.	Land purchased at local level	30%



Rural Transport Services: Reaction to Improved Road Infrastructure

1. Naubise – Chautara Road : Connects rural villages to District headquarter

- Length = 10.5 km
- Surface type : Gravel, Stone pitching
- Condition : Good
- Cost of rehabilitation = 1 million US $
- Date of completion = 2016
- Fare per person = 20 cent

Type of Transport Service	Before Improvement	After Improvement
Mini Bus	-	2
Jeep/Pick ups	10	60
Trucks (light and heavy)	5	25
Motorcycles	15	150
No of shops increased	**25**	

Rural Transport Services: Reaction to Improved Road Infrastructure

2. Chautara – Melamchi Road :
(Connecting Melamchi, market centre to District headquarter)

- Length = 23.5 km
- Surface type : Gravel, Stone pitching
- Condition : Good
- Cost of rehabilitation = 1.5 million US $
- Date of completion = 2016
- Fare per person = 1.5 US $

Type of Transport Service	Before Improvement	After Improvement
Mini Bus	2	4
Jeep/Pick ups	15	60
Trucks (light and heavy)	30	510
Motorcycles	30	300
No of shops increased	200	

SIERRA LEONE PRESENTATION

INTERRACTIONS BETWEEN IMPROVED RURAL ACCESS INFRASTRUCTURE AND TRANSPORT SERVICES PROVISION (IMPARTS)

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DISTRICTS OF SIERRA LEONE

PRESENTATION DATA GOT FROM SURVEY DONE IN THE TONKOLILI DISTRICT (CENTRAL SIERRA LEONE

TYPICAL TRANSPORT SERVICES ON LOW VOLUME ROADS IN RURAL SIERRA LEONE

- MOTORBIKES
- CARS
- PICKUPS AND 4 WHEEL DRIVE
- MINI VANS
- FREIGHT TRUCKS

	Road leading to market center and mode of intervention / year			
	Road section	2016	2017	2018
1	Magburaka - Masumbrie	No work	Rehab.	Rehab.
2	Yonibana - Petefu	Grading	Grading	Grading
3	Matham - Masanga	Minor repairs	Rehab.	Maint.
4	Makali - Makong	No work	No work	No work
5	Magburaka - Magbass	No work	No work	No work

Pictures of typical roads leading to 2 separate market centers

Road leading to Masnaga village / market center

Road leading to Makong village / market center

	Availability of transport services over 3 years			
	Village / Market center	2016	2017	2018
1	Masombri	104	54	110
2	Petefu	15	32	23
3	Masanga	55	37	70
4	Makong	70	30	26
5	Magbass	25	34	30

Oct-16							
Indiccators		**Unit**	**Name of village (Tonkolili District - rural)**				
			With intervention on road leading to village/market ct.			Without intervention on road leading to village /market ct.	
Name of market center			Masombrie	Petefu	Masanga	Mokong	Magbass
District center town - Magburaka							
Distance of village from District Ct.		Km	43.6	70.0	15.0	44.0	9.4
Name of road serving market center			Magburaka - Masumbrie	Yonibana - Petefu	Matham - Masanga	Makali - Makong	Magburaka - Magbass
			25.5 km	6.6 km	6.9 km	9.0 km	15.2 km
Available transport services / Number operating along route							
1	Motorbikes / Okadas	No.	100	15	50	70	22
2	Light vehicles	No.	1	0	5	0	0
3	Mini bus / Poda poda	No.	0	0		0	0
4	Freight / Trucks	No.	3	0		0	3
Total		No.	**104**	**15**	**55**	**70**	**25**
No. of trips per day (nornal day)							
1	Motorbikes / Okadas	No.	63	8	50	10	8
2	Light vehicles	No.	1	0	2	0	0
3	Mini bus / Poda poda	No.		0	0	0	0
4	Freight / Trucks	No.	1	0	0	0	0
Total		No.	**65**	**8**	**52**	**10**	**8**
Fares to District Centers							
1	Motorbikes / Okadas	Le/Person	20,000.00	30,000.00	5,000.00	25,000.00	3,000.00
2	Light vehicles	Le/Person	15,000.00	-	7,000.00	-	-
Freight transport							
1	Motorbikes- rice	Le/50kg	150,000.00	80,000.00	3,000.00	12,000.00	40,000.00
2	Lignt vehicle - rice	Le/50kg	100,000.00	-	2,000.00	-	-
3	Truck - rice	Le/50kg	80,000.00	-	-	-	-

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Oct-17							
Indiccators		**Unit**	**Name of village (Tonkolili District - rural)**				
			With intervention on road leading to			Without intervention on road	
Name of market center			Masombrie	Petefu	Masanga	Mokong	Magbass
District center town - Magburaka							
Distance of village from District Ct.		Km	43.6	70.0	15.0	44.0	9.4
Name of road serving market center			Magburaka - Masumbrie	Yonibana - Petefu	Matham - Masanga	Makali - Makong	Magburaka - Magbass
			25.5 km	6.6 km	6.9 km	9.0 km	15.2 km
Availablel transport services / Number operating along route							
1	Motorbikes / Okadas	No.	50	20	35	30	30
2	Light vehicles	No.	4	4	0	0	4
3	Mini bus / Poda poda	No.	0	5	0	0	0
4	Freight / Trucks	No.	0	3	2	0	0
Total		No.	**54**	**32**	**37**	**30**	**34**
No. of trips per day (nornal day)							
1	Motorbikes / Okadas	No.	50	20	35	30	30
2	Light vehicles	No.	0	0	2	0	0
3	Mini bus / Poda poda	No.	0	0	0	0	0
4	Freight / Trucks	No.	0	0	0	0	0
Total		No.	**50**	**20**	**37**	**30**	**30**
Fares to District Centers							
1	Motorbikes / Okadas	Le/Person	25,000.00	40,000.00	10,000.00	30,000.00	6,000.00
2	Light vehicles	Le/Person	15,000.00	25,000.00	6,000.00	25,000.00	-
Freight transport							
1	Motorbikes- rice	Le/50kg	15,000.00	-	5,000.00	15,000.00	5,000.00
2	Lignt vehicle - rice	Le/50kg	10,000.00	-	4,000.00	-	-
3	Truck - rice	Le/50kg	-	-	-	-	-

Oct-18							
Indiccators		**Unit**	**Name of village (Tonkolili District - rural)**				
			With intervention on road leading to			Without intervention on road	
Name of market center			Masombrie	Petefu	Masanga	Mokong	Magbass
District center town - Magburaka							
Distance of village from District Ct.		Km	43.6	70.0	15.0	44.0	9.4
Name of road serving market center			Magburaka - Masumbrie	Yonibana - Petefu	Matham - Masanga	Makali - Makong	Magburaka - Magbass
			25.5 km	6.6 km	6.9 km	9.0 km	15.2 km
Availablel transport services / Number operating along route							
1	Motorbikes / Okadas	No.	100	22	64	26	27
2	Light vehicles	No.	1	1	6	0	2
3	Mini bus / Poda poda	No.	2	0	0	0	0
4	Freight / Trucks	No.	7	0	0	0	1
Total		No.	**110**	**23**	**70**	**26**	**30**
No. of trips per day (nornal day)							
1	Motorbikes / Okadas	No.	80	8	44	9	8
2	Light vehicles	No.	1	0	1	0	0
3	Mini bus / Poda poda	No.	1	0	0	0	0
4	Freight / Trucks	No.	1	0	0	0	0
Total		No.	**83**	**8**	**45**	**9**	**8**
Fares to District Centers							
1	Motorbikes / Okadas	Le/Person	20,000.00	30,000.00	20,000.00	25,000.00	10,000.00
2	Light vehicles	Le/Person	15,000.00	-	7,000.00	-	5,000.00
Freight transport							
1	Motorbikes- rice	Le/50kg	15,000.00	80,000.00	10,000.00	12,000.00	10,000.00
2	Lignt vehicle - rice	Le/50kg	20,000.00	10,000.00	2,000.00	-	-
3	Truck - rice	Le/50kg	80,000.00	-	-	-	7,500.00

Motorbikes are typical for passenger and freight transport in Sierra Leone

South Sudan Rural Roads

By: George Duku & Aduot Madit

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Overview of the SSRRP

- Development Objectives - **to enhance all season road connectivity to agricultural services for rural communities in high agricultural potential areas.**

- Components –
  a) Upgrading & Rehabilitation of Selected Rural Roads, 150km
  b) Maintenance & Spot Improvement of Selected Rural Roads, 300km
  c) Institutional Development for Rural Infrastructure Management

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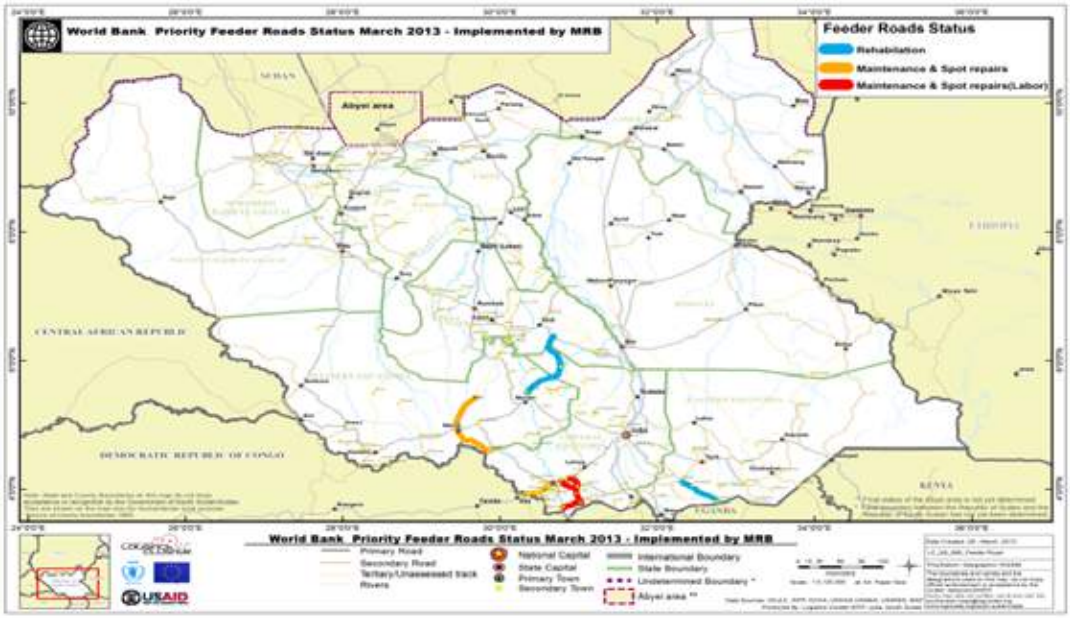
Overview of the SSRRP



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REPUBLIC OF SOUTH SUDAN
MINISTRY OF ROADS AND BRIDGES

Overview of the SSRRP

Maridi Kozi Road Before (left) and After (right)

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igo>

61,048

Overview of the SSRRP

61,048

Yei-New Lasu Road Before (left) and After (right)

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S/N	PDO Indicators	Baseline	Planned	Actual Achieved as 2013	Actual Achieved as 2014	Actual Achieved as 2015	Actual Achieved as 2016	Remarks
1	Share of rural population with all season access	0	36,515	32,863	43,413	43,413	43,413	Increased settlement within 2km of the project roads
2	Reduction in Travel time on targeted project roads	3 m/km	1	2.1	1.8	1.3	1	Average of the travel time on all project roads
3	Number of Agricultural Centers connected to the roads	0	44	15	30	38	39	Number of social and economic infrastructure connected to all season roads
4	Direct project beneficiaries of which % are female	0	91,287 (48.1%)	61,048 (28.5%)	71,290 (30%)	91,090 (30%)	110.8 (30%)	Beneficiaries within 5km of the project roads on both sides of the road
5	Employment Generated by road works	0	-	205	396	601 (535 male, 66 female)	601 (535 male, 66 female)	National Staff employed on road works