

BROADENING THE TRANSPORT SAFETY AGENDA: A RURAL PERSPECTIVE

A Synthesis of pilot case studies from Sri Lanka, India, Madagascar, Cameroon and Peru

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ABSTRACT

The International Forum for Rural Transport and Development (IFRTD) has pioneered a series of small, predominantly qualitative studies, to promote greater understanding of the ways in which transport safety issues affect the lives of women, men and children living in rural areas of developing countries.

In India and Peru the researchers explored safety issues relating to rural roads and argued that safety becomes a critical issue when new or improved rural roads open up formerly isolated areas. This is particularly due to the increased interaction between motorised and non-motorised traffic. The study carried out in India highlights the development of an Accident Potential Index (API), while a study undertaken in Peru concentrates on the gender dimensions of safety and defines the distinction between safety and security. The Peruvian study explores the links between road rehabilitation, tourism and children and women's safety, demonstrating that people, especially women and girl children, feel increasingly unsafe once roads open up. Sexual harassment on transport services is prevalent. For example one respondent confirmed "If I use the car that passes through at 6AM in the morning I won't get a seat when the bus returns, so I would travel crushed or squeezed in the bus, and sometimes they touch me". These types of security risks faced by women and girl children on the move are also reflected in a study carried out in Cameroon of the Bayam Salam (buy and sell) market women.

In Madagascar, a case study found that the interaction between motorised and non-motorised transport caused the most incidents on rural roads. These incidents are rarely fatal and with injuries treated at rural health clinics they generally go unreported. This study also focused on the safety aspects of rural water transport, highlighting the additional risks associated with the use of traditional pirogues.

Finally research undertaken in Sri Lanka assessed safety with respect to local infrastructure, primarily footbridges and other water crossings. The study, carried out across four villages, revealed that the majority of water crossings do not follow any engineering or safety standards. Despite the risks these crossings present, particularly for the elderly, the time savings they afford local communities in accessing critical services means that they are considered a positive advancement.

Some key recommendations for developing a transport safety agenda that is responsive to the needs of rural communities include:

- *The full integration of safety issues in major rural roads and waterways programmes from the design phase through to implementation. This is particularly crucial in encouraging awareness among communities of impending changes.*
- *The participation of communities in the design of safety interventions to ensure a more holistic picture of their safety needs and perceptions.*

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- *The participation of communities in the prioritisation, implementation and maintenance of appropriate local infrastructure, such as water crossings.*
- *The establishment of realistic minimum safety standards that do not compromise rural mobility.*
- *More research, both quantitative and qualitative, to generate knowledge, data and information about men, women and children's perceptions and experiences relating to safety and security risks in rural areas.*

These small studies are only the tip of the iceberg and do not for example touch upon the safety of Intermediate Means of Transport (IMT) use, or the implications of lost and damaged goods, IMTs and personal belongings to sustainable rural livelihoods.

1.1 COUNTRY CONTEXTS AND LITERATURE REVIEW HIGHLIGHTS

In **Madagascar**, during the past five years, the government, with support from donor agencies and development partners, has made remarkable efforts to rebuild the national road network. This has been accompanied by a thorough restructuring of all transport functions, and ongoing institutional reform of the transport sector to adapt to new national challenges. The new roads classification has given more responsibilities to local and community governments for rural roads. These communities lack sufficient resources for maintenance, consequently the roads are abandoned. In the other hands, more attention is given to highways and provincial roads. The better the roads conditions, the more, operators (generally with no experience) tend to speed more up. Bad road conditions in rural areas can cause serious security concerns for the transportation of both persons and goods. The authorities cannot easily move around when there is an incident or an attack and there are many in-accessible areas. Great efforts have been made toward technical capacity building of the Transport Ministry staff. In this framework, an information system has been set up and implemented to manage data injuries caused by roads accidents, on a monthly basis. The information system is primarily focused on physical injuries. However, this improvement excludes rural networks, which are lagging behind compared to regional and national roads.

India has undergone dynamic institutional changes via three national road development plans*. These plans helped to classify roads according to functional hierarchy and set accessibility standards for different areas based on development criteria. They also suggested empirical formulae for estimating the required lengths under different categories of roads for planning the network development. Rural roads received significant attention throughout the implementation of these plans. Special emphasis were given in the third road development plan, with new accessibility criteria for village roads introduced, and several approaches for rural road development also suggested. A number of programmes were launched to achieve the goal of rural connectivity. At present, India has about 2.7 million km of road length and rural roads constitute about 2.2 million km. In the year 2000, the Government of India initiated a programme, popularly known as Prime Minister Gram Sadak Yojana (PMGSY), for the construction of all-weather roads to connect all villages with a population of over 500 by the end of 2007. Rajasthan is one of the very few states which will reach this target.

Motorised traffic on rural roads has been increasing in rural areas over the years as the programme progresses, due to the increase in income level and easy availability of vehicles in the market. However, with improved accessibility, the accidents on such roads have also

* The first (from 1943 to 1961) popularly known as Nagpur Plan, The second one (1961-81), known as Bombay Plan, and the third (1981-2001)

increased considerably as high speed and heavy motorised vehicles are able to reach villages.

In general, rural road crashes are more fatal than crashes on urban roads due to differences in operating speeds (higher on rural roads), road geometry (rural roads have evolved rather than been designed), functionality (rural roads are multi-functional), enforcement levels (rural roads receive a lower priority) and other factors. Thus the possibility of fatal accidents (per kilometre driven) is generally higher on rural roads than on urban roads. There is a perception among village communities about potential safety hazards due to the high speed motorised vehicles that use new roads. In India, villagers were primarily exposed to slow moving vehicles and suddenly, following the construction of high quality PMGSY roads, the scenario has changed considerably. No special initiative has been taken to educate communities about basic traffic safety rules after the construction of the new roads.

In **Sri Lanka**, the RDA (Road Development Authority) has estimated that Sri Lanka has a provincial road network of 15 532km on which around 1 262 bridge crossings are available. The country has an unclassified rural road network exceeding 66 500km that comes under the administrative control of local authorities while a further network of footpaths exceeding 150 000 km falls under none's control. If the government has an eye on the roads, enough attention and control are not given to crossing infrastructures. At present, the structural stability of these crossings is at risk. The vast majority of drainage crossings found in Sri Lanka are relatively narrow and the span of these structures varies from small coconut logs of 5' to 8' long, laid across banks of narrow streams to large suspension cable crossings. A number of these structures were constructed a long time ago, and some have been improved recently with concrete beams/slabs. Paradoxically, nobody bears responsibility for the maintenance of these crossings, except in few cases where small village groups have taken responsibility for maintaining them,

However, communities have no perception of structural deficiencies. In addition because of restrictions due to factors such as narrow width, no handrails and no lighting, communities have lost the full socio-economic development potential of their city dwelling counterparts. The most predominant feature of these crossings is that the decisions regarding location and construction are taken by beneficiary communities, for most of these infrastructures.

The **Peruvian** Ministry of Transport and Communication, through the national Rural Roads Project, guarantees the good condition of the road network. During its second phase (2001-2006), the programme has rehabilitated 4 398 km of rural roads and improved 3 650 km of rural trails. Around 553 community based micro enterprises maintain 2 888 km of the roads, however due to decentralisation the process of road management is in the process of transfer to local governments.

1.2 RATIONALE

To date safety issues in the transport sector have concentrated overwhelmingly on roads, highways and motorised traffic. Available statistics relating to road safety in general and to rural transport safety in particular, paint a bleak picture:

- The World Health Organisation (WHO) predicts that by 2020 road crashes will be the third most important cause of death or disability world wide, and if nothing is done, road crashes will kill more people than malaria and tuberculosis.

- More than 85% of road traffic deaths and injuries occur in low income and middle income countries, yet they own only 40% of the world's motor vehicles.
- The global economic cost of road safety is estimated at between \$64.5 billion and \$100 billion. This compares with total bilateral overseas aid that amounted to \$106.5 billion in 2005.
- Estimates indicate that, over the next 15 years, the number of people dying annually in road crashes may rise to 2.4 million, with the increase occurring in developing and transitional countries.
- Existing records seriously under-report crash and casualty numbers. In some countries, less than half of the deaths that happen as a result of a road crash are reported to the police. And this is even more acute in the context of rural road networks.

There is a need to expand our understanding of Road Safety to look beyond the more visible incidents on highways and main road networks, to encompass the range of transport safety issues that are experienced in rural areas of developing countries. This paper has been written to contribute to the 14th International Conference on Road Safety, and is submitted under the conference theme '*Interurban and rural safety, intersections, incident management*'. More specifically this paper highlights the following issues:

- **Safety regulations and law enforcement**
 - There is a lack of information and data on rural transport and rural transport safety.
 - A broader definition of safety is needed that includes all aspects of rural transport.
 - Minimum safety standards should be developed that are appropriate to the rural context and take into account poverty reduction criteria.
 - The Accident Potential Index (API) could potentially be used more extensively to identify the most dangerous stretches of road.
- **Gender and safety**
 - Safety and security are important issues for women and girls, particularly on community roads and in public vehicles.
 - Sexual harassment is prevalent.
 - More quantitative and qualitative research is needed to develop our understanding of gender and safety issues.
- **Community participation**
 - Communities have developed coping mechanisms, such as using a variety of transport modes or simply not travelling in order to minimise safety risks.
 - Communities should be involved in the design and implementation phase of safety programmes.
 - Communities should be involved in road and infrastructure maintenance.

1.3 OBJECTIVES

IFRTD's main objective in commissioning these 5 studies was to seek a better understanding of transport safety issues in a rural context, looking beyond the traditional approach that has focused on roads and motorised traffic accidents. The studies from India and Peru looked at

safety issues on rural roads. The India study explored the development of an Accident Potential Index (API) while the Peru study concentrated on the gender dimensions of safety, highlighting the distinction between safety and security. In Cameroon, the study also focused on gender by exploring the experiences of the *Bayam-Salam* women who rely upon public transport services between rural and urban areas for their livelihoods. In Madagascar, the study looked at the interaction between motorised and non-motorised transport and their incidents on rural roads. The Sri Lankan case study assessed the safety issues of local infrastructure, primarily footbridges and other water crossings.

1.4 METHODOLOGY

After an open international call for participation five researchers were selected, to develop small qualitative case studies that highlighted specific aspects of rural transport safety. The case studies were expected to explore the following issues:

- i) **safety from harassment** (particularly for women/girls, relating to the design of transport services and facilities)
- ii) **safety of poor peoples' property** (intermediate modes of transport),
- iii) **safety issues on community access roads and,**
- iv) **safety issues on other local infrastructure** (footbridges, other water crossings, paths, tracks and water transport).

The criteria used to select the chosen case studies were; relevance, insightfulness, pertinence and originality and opportunity in relation to the national context. In addition a balance was sought between the studies to ensure that they represented a breadth of geographical, agro- ecological, socio cultural and economic contexts. For example in Madagascar the study area represented almost all of the means of transport that exist in the country.

The research process, from case study selection to final outputs, was led by the IFRTD Secretariat over a two and half month period. The IFRTD Secretariat provided technical guidance and support where required. This paper forms a synthesis of the findings of all five studies.

The issue of safety has been tackled in a holistic manner. Each case study used participatory approaches that involve all stakeholders from decision-makers (central government, local and community authorities), to users as well as operators. Various tools have been used to collect data: literature reviews, individual interviews (structured or informal), focus group sessions, field measurements and observations, quantitative techniques and formula, participatory/rapid rural appraisal. Quantitative, but more qualitative data were gathered and analysed using various analysis frameworks (solution/tree problems, SWOT) according to the objectives given to each study. Results were gender, socio cultural, geographical, technical and economical disaggregated.

2.0 MAIN FINDINGS

The five case studies present transport safety and security issues that pertain to both transport services and infrastructure. Overall it is clear that any efforts towards understanding and addressing transport safety problems in rural areas will require a holistic approach that incorporates the following aspects:

2.1 RURAL TRANSPORT SERVICES

According to the majority of users transport services in rural areas are generally both unreliable and unaffordable. Rural areas require services that transport both people and goods yet rural transport services are not generally suited to this demand. In general, rural areas are served just once or twice a week on market days. In many cases, these transport services are not affordable as the high demand (amount of people traveling) exceeds the limited vehicles available and transport fares become inflated. In Peru, high fares are shown to divide people into groups: poor people are excluded from transport services by fare prices and continue to walk on abandoned paths.

Due to the limited number of vehicles available on market days transport operators are able to increase their fares and often pricing corresponds to safety. For example in Cameroon the Bayam Salam women reported that '*the safer the seat the higher the fare*' is the general principle. Transport fares become a determinant of safe travel. In general, transport used in rural areas is in poor condition and hence favourable to any accident. Vehicles are often highly modified by operators to meet their needs yet the different means of transport (where they exist) do not necessarily meet the needs of users, who generally carry a huge quantity of goods (including animals) when travelling. For the Bayam Salam women of Cameroon, the vehicles they use to transport their goods to urban areas are not well designed to carry perishable goods forcing them to overload the available pick-ups with their goods and then travel on top due to the lack of space inside. This contributes to greater injury risk in the event of an accident and can damage or affect the quality of goods due to the excess pressure placed upon them. The Cameroon study confirmed that available transport is the main determinant of the Bayam Salam women's product selection.

Safety risks vary from one means of transportation to another. In Cameroon and Madagascar, despite the fact that motor bikes and other two-wheelers provide greater mobility to their users, the Bayam Salam women use them to reach farms to purchase goods for example, they are also the cause of the most accidents. In India, the assumption that vulnerability to accidents varies in accordance with the means of transport used was substantiated when all respondents indicated that risk was higher for pedestrians in comparison to cyclists on PMGSY roads. In Peru, in addition to public buses, combis (mini-buses carrying 22 passengers) are frequent. Respondents thought that '*combis*' are the most risky option, particularly during peak hours when they are overloaded, but did not have any other alternatives to using them.

The Madagascar study highlights the variety of transportation means used in rural areas and the types of safety concerns they raise. For example animal traction is widely used in Soavinandriana district and here safety issues concern not only the protection of human health but also animal welfare and the preservation of related equipment, for example carts.

2.2 RURAL TRANSPORT INFRASTRUCTURE

The relationship between the condition of rural infrastructure and rural transport safety was recognised across the different studies as an important factor in the safety of both people and their freight. The study in Cameroon looks at the coupling of bad road conditions with poor transport behaviours (overloading, speeding and bad driving habits) as a recipe for higher accident risk and frequent road crashes that is exacerbated during the rainy season.

In Madagascar approximately 73% of interviewees stated that bad roads limit their mobility. During the rainy season roads are very slippery and water transport across the lake also becomes dangerous. There are not many passable roads and this limits the number of vehicles. Most transport operators that were interviewed claimed to observe the speed limit of 40km per hour, however the better the condition of the road the faster they drive. Interviewees from the Police mentioned some cases of drunk driving however local councillors did not think that risks are high and there is a low level of reported accidents.

During the rainy season in Cameroon women are even more marginalised as drivers prefer to carry men in case the vehicles get stuck and they need manpower to get them out. Because of this most women are forced to stop trading during the rainy season and have to look for other means to generate income.

The Peru study highlights the paradox of road rehabilitation, the positive impacts it delivers in terms of improved mobility and economic opportunity versus the negative impacts on human behaviour (gangs, robberies, assaults and rapes). Overall it was noted that people feel increasingly unsafe following road rehabilitation as the area becomes more accessible to external visitors. In India the study on the PMGSY programme showed that there are higher risks for school-going children traveling by bicycle on these roads than for those who walk.

1.3 GOVERNANCE ISSUES

Among governance issues relating to safety, bribery is the most common practice in rural transport networks (waterways and roads). In a study on Rural Transport Services commissioned by the Sub Saharan African Transport Policy Programme and carried out by a team of rural transport specialists led by Paul Starkey, operators were found to have adopted a regular practice of overloading vehicles to cover the various bribes they are required to pay. In the Southern Province of Cameroon transport operators spend the same amount as they pay in petrol per day to cover bribes to different control stations (there are at least 3 control stations at the entry to each locality). This ‘obligation’ to overload can entail putting more than ten people in a vehicle designed for five. This phenomenon, combined with overloading and speeding contribute to high accident exposure. The study in Cameroon noted that for the Bayam Salam women ‘*bribery is the order of the day, particularly at road blocks*’ and as women often sit on top of their merchandise on the back of pick-up trucks they are more accessible and therefore more prone to become victims of bribery.

Box 1: Summary of the Cameroon study: ‘Gender and Safety: a case study of the Bayam Salam women in rural Cameroon’

The Bayam Salam (from the English *buy and sell*) women, and in some cases men, are micro-entrepreneurs who travel between rural areas to buy food merchandise and then travel to the urban areas to sell. This is a very popular income generating activity for vulnerable populations in Cameroon. For this study, the rural zones of Bagam and Galim (Bamboutos district, western province) were selected alongside the urban zone of Mbouda in between which the Bayam Salam women travel.

The main objective of the study was to document whether the Bayam Salam women in particular face safety issues. To this end, individual interviews and group focus sessions were carried with all stakeholders (men and women), and the behaviour and attitudes of the various actors while en-route were observed.

Bayam Salam women and men depend on mainly motorised transport for transporting their merchandise from the main (tarred) road to the market, using: (1) a pick-up or mini-truck, (2) a bush taxi, or (3) a motor bike. Each represents its own safety hazards pending on the position where he/she is seated. *The safer the seat the higher the fare* is the applied principle. The taxi fare is the main determinant for one's safety while using the various modes of transport, particularly during the rainy season. Those that sit inside the vehicle pay more than those who sit on top of their merchandise on the back.

On community tracks women traders face a lot of safety issues mainly in the form of sexual harassment, when they go directly to producers to buy their goods. Of the 16 women interviewed all had experienced some form of harassment on feeder roads but did not wish to share the details.

Rural transport does not have a high priority in Cameroon's public transport system, let alone rural transport safety. Although with the recent development of a road safety awareness programme this may change. During the rainy season women traders are even more marginalised as drivers prefer male passengers in case the vehicles get stuck and the drivers need manpower to get them out. Hence, most women stop trading during this season and look for other means to generate income.

Motor bikes offer the most mobility but also cause the most accidents. Vehicles are often not fit for the road and in a lot of instances the drivers have no license. Due to the bad state of the roads, overloading, speeding, bad driving habits, no driver's licenses and non-enforcement of the law, road accidents are frequent.

Unreliable and unsafe transport actually prevents women from becoming independent, and is related to the transmission of HIV/AIDS and other sexually transmitted diseases. In order to negotiate a better and safer seat sexual favours are often exchanged, and in some cases demanded, between the transport operator and the traders. Hence a woman's safety may be determined by the sexual services she offers, often unprotected - increasing the chances of contracting a sexually transmitted disease or worse transmitting the HIV virus which may lead to AIDS.

There is also an issue with personal safety and safety of goods. Particularly when traveling at night women run the risk of being mugged or worse personally violated especially in isolated rural areas.

Some recommendations include:

- i) To carry out more in-depth and quantitative studies.
- ii) To tackle corruption and to stop road block bribes.
- iii) To maintain roads on a regular basis.
- iv) To develop safety programmes specifically targeted at the Bayam Salam women.
- v) To develop more regular and affordable transport services.
- vi) To collect more data, particularly at village level.

2.4 HEALTH ISSUES

Unsafe and unreliable transport is related to the transmission of HIV/AIDS and other sexually transmitted diseases. In the Bayam Salam study, it has been found that, in order to negotiate a better and safer seat sexual favours are often exchanged, and in some cases demanded, between the provider and the traders. Hence a woman's safety may be determined by the sexual services she offers, most of the time unprotected. In addition when collecting their goods from farms, these women use community tracks. Here in particular they face sexual harassment and again the risk of contracting sexually transmitted diseases including HIV.

2.5 LOCAL INITIATIVES AND STRATEGIES AS A RESPONSE TO SAFETY PROBLEMS

Over time, while facing different safety problems regarding their person and goods, rural people have adopted several practices to limit the risks of being victimized by an accident, whichever form it takes. In Cameroon, particularly when traveling at night women run the risk of being mugged or worse personally violated especially in isolated rural areas. Women are not indifferent to these risks and have developed survival mechanisms. They use for example a different means of transport for themselves and another for their merchandise in order to reduce the risk. Or, they buy a diversity of goods in smaller quantities and have the potential to stock some of it to reduce transport needs. In addition they contribute financially in cases of community-based road maintenance. Women pool their resources and may ask one man to buy their goods for them. Finally, in the unfortunate event of them getting stuck women will stay together and will support one another.

In Madagascar, people avoid traveling at night in order to escape from gangs and other organised thieves traveling with vehicles. When they have to travel during the night they do it as a whole group of more than 5 vehicles at the time. They also use complementary means of transport to overcome the risks of being injured during a crash.

Box 2: Summary of the India case study: *'Impact of PMGSY Roads on the Traffic Safety of school-going Children in Rural Areas'*

In the year 2000, the Government of India initiated the Prime Minister Gram Sadak Yojana (PMGSY), for the construction of all-weather rural roads to connect all villages with over 500 residents by the end of 2007. Rajasthan, the study site, is one of the few states which should reach this target on time. It is widely acknowledged that these roads have improved social, physical, financial and human capital for the populations of the connected villages. However increased accessibility has meant that more motorised traffic, private as well as public, has begun to ply interior areas. This is particularly true for the PMGSY-all weather roads and has resulted in a significant increase of high speed and heavy motorised vehicles in and around villages. The study argues that accidents on rural roads are more often fatal than those on urban roads because:

- 1) Higher speeds are used on rural roads.
- 2) Rural roads are not specifically designed but have evolved through time.
- 3) Rural roads are multi-functional with a variety of users and means of transport.
- 4) Law enforcement levels on rural roads are lower.

5) Rural communities are not used to heavy and speeding vehicles and need time to adapt their traffic behaviour. This applies particularly to school going children who travel long distances and now face new safety risks.

The main objectives of this study were to:

- i) Identify the parameters to be considered for determining the traffic safety of school going children.
- ii) Determine the weights of the identified parameters as perceived by the villagers.
- iii) Quantify an Accident Potential Index (API) to accidents of school going children travelling along PMGSY roads in a few selected villages in Rajasthan (Mahatwas, Kutina, Chawandi, Bighana Jat and Bhim Singh Pura).

The methodology adopted in this study was to develop a quantification technique by which an accident exposure index along a PMGSY road for school going children in a village could be determined based upon a few selected parameters. This would enable a comparison of villages in the study area based upon the susceptibility levels of school going children to traffic accidents.

The Accident Potential Index (API) for school going children of a village is expressed as:

$$API = \sum w_i V_i$$

N = Number of parameters considered for quantifying accident index;
w_i = weight associated with parameter i;
V_i = score on ith parameter based on the existing situation.

The weights associated with the selected parameters were normalized so that $\sum w_i = 1$ and scores were assigned on the selected parameters which varied between 1 and 5, where 1 represents highly satisfactory and 5 highly dis-satisfactory. Theoretically, the maximum possible value of AEI is 5 representing a very high exposure index to traffic accidents.

Key findings

In developing a simple yet effective API for the PMGSY programme the following parameters had to be included:

- i) The geometric characteristics of the road.
- ii) The width and quality of the shoulder.
- iii) The distances that need to be traveled along the PMGSY road for school-going children.
- iv) The mode(s) of transport used by the students.
- v) The traffic volume and modal-mix on the road.

For the PMGSY context the road geometry was most important (0.26) followed by shoulder width and quality (0.25). This is particularly relevant for single-lane roads as is the case for the PMGSY roads. Traffic volume and modal-mix (0.19) came next especially as it takes time to adjust to a new traffic landscape. Distance of travel (0.15) and mode of transport of user (0.14) were still seen as important but not as highly rated as the others. It was observed that school-going children mainly travel by foot or bicycle. Buses are only used for primary schools.

Among 100 students interviewed (44 girls and 56 boys), both boys and girls use bicycles to go to school. They travel between 4 and 10 km to get to school, always spending at least a portion of their journey on PMGSY roads. Only in two of the five villages do they both walk and cycle. A general sense of insecurity has followed the PGMSY road construction – a boy was killed last year while traveling to school and minor accidents are frequent although data is not systematically collected. Local communities feel that a major accident is waiting to happen due to the:

- i) Increase in fast moving motorised vehicles.
- ii) Speeding and failure to adhere to traffic rules by the majority of motorised vehicle drivers.
- iii) Lack of road markings and sign posts.
- iv) Lack of education on road safety at the local level.

The assumption that vulnerability to accidents varies with transport mode was substantiated as all respondents indicated a higher risk for pedestrians in comparison to cyclists. After entering values into the API equation the results reveal different figures. The Index is the highest for the children going to school from Mahatwas, and the lowest for those from Bighana Jat traveling by bicycle. This is due to the fact that the scores for all the parameters on the road connecting Mahatwas are quite high. Both road geometrics and the quality of shoulder are very poor and also the traffic volume and mix are quite heavy. The API indices help to prioritise the stretches according to exposure to possible accidents. The worst stretches could then be taken up for improvements to reduce the possibility of accidents.

In conclusion, the developed API is a simple technique that allows an assessment of the safety risk of rural roads. Policy makers can use the API to identify stretches that need improvements. For large scale rural road programmes it is important to integrate a safety component to sensitise rural communities on the changes in the traffic environment. Surprisingly cyclists felt safer on rural roads in this study than pedestrians.

Box 3: Summary of the Sri Lanka case study: ‘Safety Issues of Rural Waterway Crossings’

According to the Road Development Authority (RDA), Sri Lanka has a provincial road network of 15,532 km including 1262 bridge crossings. On average, there are about 120,000 engineered rural waterway crossings and it is estimated that Sri Lanka has about 255,000 ‘non-engineered’ waterway crossings. Due to a lack of financial and human resources, local authorities called Pradeshiya Sabas (PS) are unable to maintain these water crossings which they consider to be ‘non-engineered’ and unsafe.

The objectives of the study are:

- 1) To assess the safety-related issues of the ‘non-engineered’ rural waterway crossings.
- 2) To ascertain the safety concerns of communities and marginalised sectors of society.
- 3) To assess the characteristics of rural waterway crossings.

This study was carried out in four rural villages within two provinces (Sabaragamuwa

and Western Provinces of Sri Lanka). Information was collected using a questionnaire and focus group discussions to determine:

- i) A general overview and assessment of rural waterway crossings in Sri Lanka.
- ii) An assessment of the current state of the safety concerns of local and other agencies including those of village communities.
- iii) A qualitative analysis to assess the impact and involvement of rural communities including marginalised people in planning the crossings. Within the four villages, 67 waterway crossings were examined and 142 affected but representative families were interviewed in order to have a representative sample.

Rural waterway crossings can broadly be grouped into those that are constructed and maintained by PS (i.e. engineered structures) and those that are 'non-engineered' and community-based and managed. The non-engineered crossings have significant problems, for example poor attention is given to abutments and the structural stability of the crossings is at risk. Almost all of the examined crossings were constructed in order to shorten the walking distance to critical services and to other villages. 80% of such crossings have alternative access routes but the distance is up to 12 times more than via the water crossing.

In general no one feels responsible for maintaining the water crossings except in a few cases where small village groups have voluntarily claimed ownership. Communities have little perception of the water crossing's structural deficiencies. The crossings are narrow without handrails and lighting and cannot be used to transport load and goods. Their locations are decided by communities – approximately 40% of crossings are constructed to meet an individual need before being opened up for public use. In 27 cases, the PS has provided free construction materials but did not provide any sort of engineering guide or supervision during construction or maintenance.

There is a spatial variation in the density of 'non-engineered' waterway crossings. Density is low in coastal areas but significantly higher when the terrain varies from rolling hills to mountainous. Around 75% of the structures had a width of ≤ 0.91 m, and up to 12% of these structures had a width exceeding 1.8m. Over 92% of the structures do not have any sort of engineered abutments, instead railings, concrete beam, slab or tree trunks have been kept just over the channel banks and these footings are continuously subjected to scouring and erosion. Hence, almost all 'non-engineered' crossings are vulnerable to collapse and need immediate attention to avoid potential accidents. Only 15% were fitted with handrails on either side while another 15% rely on just one railing made out of bamboo or jungle sticks. Only 50% of the crossings had sufficient width for a motorbike or bicycle to pass through.

Villagers tend to use non-engineered waterway crossings despite the risks they present and this is even more likely when the travel distance saved by using them exceeds 50%. In Sabaragamuwa Province 35% of the families didn't have an alternative road to reach critical services and were completely dependent on waterway crossings. Almost all stated that during floods, crossings are not accessible and some families become completely isolated and/or reliant on boats. Around 80% of those interviewed were satisfied with the spatial locations of the crossings. Over 90% of interviewees expressed dissatisfaction towards PS for their attitudes towards the maintenance and improvements of waterway crossings. Of 142 families interviewed about 40% were able to recall incidents where they have been

compelled to keep elderly relatives at home, mainly due to the difficulty of taking them over water crossings in chairs.

Despite their very comprehensive administrative networks, the development potential of remote villages have so far not materialised because “connectivity” to services has not been optimised. Overall there is no government organisation maintaining these ‘non-engineered’ structures. The study recommends an inventory of all water crossings by each PS which can be ranked against key criteria. This approach would assign a unique reference number to each crossing and would further ensure effective utilisation of limited funds. The PS should encourage a participatory approach to planning, construction and maintenance and provide technical guidelines.

2.6 SAFETY REGULATIONS AND LAW ENFORCEMENT

The main challenge put forward by all the studies is the lack of data on rural transport in general and rural transport safety in particular. In some cases, such as Cameroon and Madagascar rural transport is not sufficiently integrated into the national safety policies and focuses primarily on bigger tarred roads and motorised traffic. In Sri Lanka the national draft rural transport policy does not include non-engineered water crossings and to-date no attempt has been made to count and assess these crossings nationwide with reference to safety. The studies recommend a broader definition of safety which would look beyond just roads to also include specifically rural issues. In most instances, accidents in rural areas go unreported due to the distance to health centres and/or police stations; this means that exact data and information on accidents, incidents and safety concerns in rural areas are unknown. A better data collection system is needed.

Many transport operators lack experience and do not have the capacity or the required licence to drive a vehicle. In many cases even when they possess a licence it has been obtained illegally. Although some means of transport are part of the regulatory framework, waterways are notable by their overall absence.

Learning from Peru and India where large rural roads programmes have been implemented the studies recommend the integration of a safety component from the programme’s inception through to preparing communities for impending changes. As a result of these programmes there are increased safety risks due to the interaction between motorised and non-motorised road users and in India the API index has been developed to help to identify the most vulnerable stretches.

2.7 GENDER AND SAFETY

The majority of the studies revealed that safety has many critical gender dimensions. In Peru and Cameroon the studies differentiated between *safety* and *security* in the sense that the latter refers to criminality in transport and mobility. Both researchers assessed that women are particularly vulnerable on community roads and in public vehicles not only in terms of their *safety* but *security* as well. One respondent stated “*If I use the car that passes through at 6AM in the morning I won’t get a seat when the bus returns, so I would travel crushed or squeezed in the bus, and sometimes they touch me*”. The Peruvian study also demonstrates that women and girl children in particular feel increasingly vulnerable once rural road

programmes have opened up an area. More research is required to fully understand the complexities of gender and rural transport safety.

2.8 COMMUNITY INVOLVEMENT

All the researchers felt that communities should have more responsibility in developing appropriate safety programmes. At the moment stakeholders have developed coping mechanisms, such as using a variety of transport modes or simply not traveling in order to minimise safety risks. But these coping mechanisms are obviously not long-term solutions, and in many cases reduce accessibility. Many interviewees expressed an interest in becoming more engaged in safety issues. Stakeholder involvement, including women and children, is key to obtaining a fuller understanding that will enable the design of appropriate interventions. For example in Peru and India communities have been involved in designing a safety programme for the rural roads programme, while in Sri Lanka the researcher recommended that communities be involved in not only prioritising the most dangerous water crossings but also in helping to construct and maintain them. In Cameroon and Madagascar the researchers recommended that communities are contracted for labour-based approaches to road maintenance which will help improve the road conditions and again should help to minimise risks.

3.0 WAYS FORWARD AND KEY RECOMMENDATIONS

3.1 BETTER LAW ENFORCEMENT?

As the small studies have shown rural transport safety is multi-dimensional and a reality for most people in rural areas, and women and girl children in particular. But what are some of the offered solutions? The most obvious answer, introduced by all the studies is better law enforcement. This is a solution that a study on rural transport services commissioned by the Sub Saharan African Transport Policy Programme and carried out by a team of rural transport specialists led by Paul Starkey has shed some light on. The study revealed that operators, regulators and passengers agreed that the enforcement of existing and new safety regulations would bring an end to all existing –already limited- rural transport services. Ultimately a disaster for the accessibility of rural communities and counter-productive to the objectives of most rural roads programmes. A more context-sensitive approach and realistic safety regulations are needed - for example in rural areas with transport scarcity, freight vehicles should be allowed to combine passengers and freight.

3.2 KEY RECOMMENDATIONS

There is clearly a need to expand our perspective of Road Safety, beyond the more visible incidents on highways and the main road networks to encompass the range of transport safety issues experienced in rural areas of developing countries. A sustainable response is required, involving all the different stakeholders at any level, and taking a broader approach to rural transport (services and infrastructure) that will tackle the specific problems of safety in rural areas. The following solutions are a step towards safer rural transport:

- More awareness should be raised among all stakeholders of the importance of road safety in rural areas. Special attention should be given to activities such as the integration of safety issues into school curricula, training for transport operators of

all means transport, the establishment of minimum standards for operator licensing in rural areas, and the need for comprehensive incident reports to enable proper responses.

- Safety needs to be fully integrated into major rural roads and waterways programmes from design through to the implementation phase. This is particularly relevant in order to sensitise communities to pending changes.
- Communities should participate in designing safety interventions to ensure a more holistic picture of safety needs and perceptions.
- Communities should also participate in the prioritisation, construction and maintenance of appropriate local infrastructure, such as water crossings.
- There is a strong case for the establishment of ‘minimum safety standards’ for rural transport. , These should be realistic and appropriate to the rural context,
- Finally, more research, both quantitative and qualitative, is needed to generate more knowledge, data and information about men, women and children’s perceptions and experiences relating to safety and security risks in rural areas. These small studies highlighted here are just the tip of the iceberg and have not, for example, touched upon the safety of IMT use or the implication of lost and damaged goods and personal belongings for rural livelihoods.

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