

RAPID DESK- BASED STUDY: Nepal Road Safety



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August 2013



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This report has been produced by TRL for Evidence on Demand with the assistance of the UK Department for International Development (DFID) contracted through the Climate, Environment, Infrastructure and Livelihoods Professional Evidence and Applied Knowledge Services (CEIL PEAKS) programme, jointly managed by HTSPE Limited and IMC Worldwide Limited.

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DOI: http://dx.doi.org/10.12774/eod_hd079.aug2013.fletcher



Contents

Report Summary	iii
SECTION 1	1
Introduction	1
The current global approach to road safety.....	1
The road safety evidence base in Low and Middle Income Countries	2
Research and advice.....	2
SECTION 2	3
Research/advice	3
Poverty and road crash injury.....	3
Poor countries with improving road safety (2007-2010)	4
Barrier issues	6
Are the returns from investment in infrastructure greater than for Education or enforcement?	8
Nepal Road Safety Action Plan assessment.....	8
Scope	9
Funding	9
Targets.....	9
Targeted funding.....	10
Other issues	10
Summary.....	10
Nepal's global road safety position.....	11
References.....	14

List of Boxes

Box 1 Summary of main results of Aeron Thomas et al 2004.....	4
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List of Figures

Figure 1 Road accidents vehicle involvement compared to vehicle mix on strategic roads in Nepal (from Shrestha, 2006).....	7
Figure 2 WHO point estimates for fatalities in Nepal in 2007 and 2010 (90% and 95% confidence intervals shown respectively)	12

List of Tables

Table 1 The modelled point estimates of fatality numbers reported for 2007 (The WHO Global Status Report on Road Safety (2009)) were compared with the figures reported for 2010 (from the 2013 report).	6
Table 2 Comparison of fatality rates and risks, Nepal versus UK	13



List of Case Studies

Case Studies 1 Assessment of bend and junction treatments in Nepal 7



Report Summary

Evidence on Demand was requested by DFID to undertake a rapid desk based study to provide evidence to support improved road safety in Nepal. Wide ranging advice was sought on a diverse but related series of road safety issues which are of current interest. These questions range from quite specific technical issues on road safety infrastructure performance to wider questions relating to the relative road safety levels of Nepal in global terms.

A short summary of the main findings for each point are given below for each question.

- What evidence exists to support the assumption that the poorest sections of communities in Nepal are being most affected by injury in road crashes?

TRL found that the poor were more likely to be killed in road crashes in India and Bangladesh. A stronger finding was that involvement of a family member in a crash (usually a young male, non-household head but an earner) led to the family becoming much poorer. Given Nepal is geographically close to these countries it is reasonable to expect that similar patterns may be occurring there. Studies from Nepal note that young working age males from poorer families are being injured more greatly than other groups. The local studies identified pedestrians, motorcyclists and drink drivers as the major injury groups. These studies support the assumption that road crashes are having similar effects in Nepal as has been found by TRL in India and Bangladesh; which is that road injuries and fatalities have a major impact on individual family units and poverty levels.


- A number of Low Income Countries (LICs) report improvements in their road fatality numbers, is there information on how this has been achieved?

In order to examine this trend the changes in reported and estimated road deaths for Low Income Countries has been investigated. It has not been possible to reproduce the patterns which the WHO state in the 2013 Global Status Report. Here it is stated that 88 countries reduced their annual fatalities between 2007 and 2010. Only five of these countries were LICs. This question therefore could not be answered, however, estimates of the numbers of road deaths reported for many countries in this report, especially for Low and Middle Income Countries are so poor that it is hard to give the reported trends significant credence.

- What evidence is there that W type steel crash barriers significantly improve road safety on sharp bends, bridges and where there are steep embankments?

International evaluations indicate that road side barriers at steep drops and similar immovable hazards do significantly reduce the severity of injuries occurring; however these studies are exclusively from High Income Countries where the majority of vehicles on roads are cars. W steel beam type barriers may be inappropriate for many situations in Nepal since they are unsuitable for motorcyclists and heavy vehicles and where there is limited roadside space. An unpublished report indicated that barrier treatments evaluated in Nepal were highly effective, but details on the specifics were very vague.

- It has been reported that investment in safe road infrastructure delivers twice the economic returns of investment in enforcement or education approaches, how strong is the evidence for this?



This statement was reported to be made in the international Road Assessment Programme (iRAP) literature; the assertion has indeed been stated in a recent report. However it is further explained that this situation might only be the case in High Income Countries which have been effectively improving vehicle safety, enforcement and road user behaviour over many years.

- To what extent are the targets set in the recent Nepal Road Safety Action Plan feasible and achievable?

This document is very well intentioned and the initiatives being set-out seem to be reasonable. The whole tone of the document is very ambitious in scope and the high level goals are extremely challenging. However, too much hinges on the re-invigorated National Road Safety Councils (NRSC) being effective, which from international experience, is far from certain. Funding levels set out as requirements seem too low across the board to achieve any significant improvements in road safety levels which is the ultimate target. There is no indication that the new and additional funds required will be available or how additional funding could be obtained (for example using increased fines to support road safety activities). This kind of initiative is not addressed.

The action plan does not set out clear targets in terms of casualty reduction numbers (although the development of these is an action). Monitoring and evaluation methods are not given enough emphasis. This is more of an aspirational document rather than a practical plan in many ways. This is not a bad document of its type, but it is light on technical detail and real practical, feasible steps.

- What is Nepal's position in regional and world ranking terms for road safety and can it be compared meaningfully to other countries?

The easiest and most straightforward way that levels of safety are compared between countries is through comparisons of road fatality rates (per capita) and risk (per Licenced vehicle) using the systematically collected road death figures collated by WHO. However, the accuracy of these figures for road deaths is very uncertain due to high underreporting rates, especially for Low and Middle Income Countries and varying sources; the value of these comparisons is therefore questionable. WHO has estimated more realistic figures but these are also subject to large errors.

In global terms (using 2007 data) Nepal is ranked 20th in the world for fatality rate and 127th for fatality risk.

This pattern reflects that Nepal has very dangerous roads but low vehicle ownership. In comparison with the UK, using each country's official fatality figures, Nepal's fatality rate is similar, but the fatality risk is very much worse. Using the WHO fatality estimates to calculate these statistics, Nepal is very much worse in terms of fatality rate and nearly 70 times worse in terms of the fatality risk which in these circumstances is the better indicator of the problem magnitude.

In regional terms, these kinds of comparisons can also be made with surrounding countries, but the results will not be particularly useful because there is so much error surrounding the estimates of the fatality numbers reported. A more useful exercise would be to identify some countries or perhaps Indian States which have similar terrain and development levels but are reported to have a better organised response to their road safety problem.



SECTION 1

Introduction

DFID has requested some research to set out and assess the strength of the evidence base for supporting strategic road safety investments and activities in Nepal.

A number of specific questions have been posed by DFID Nepal which are in summary as follows:

- What evidence exists to support the assumption that the poorest sections of communities in Nepal are being most affected by injury in road crashes?
- A number of LICs report improvements in their road fatality numbers, is there information on how this has been achieved?
- What evidence is there that W type steel crash barriers significantly improve road safety on sharp bends, bridges and where there are steep embankments?
- It has been reported that investment in safe road infrastructure delivers twice the economic returns of investment in enforcement or education approaches, how strong is the evidence for this?
- To what extent are the targets set in the recent Nepal Road Safety Action Plan feasible and achievable?
- What is Nepal's position in world ranking terms for road safety and can it be compared meaning fully to other countries?

These are all extremely sensible questions given that any proposed investment targeted at improving road safety must be supported as far as is possible by clear, scientifically derived and defensible cases. This report will address each of these points in detail, given the constraints on time and resources available to the consultant to undertake this task.

The current global approach to road safety

The questions above need to be considered in the context of the current United Nations (UN) Decade of Action (DoA) for Road Safety. This global initiative has been brought into being because investment in road safety, despite being a significant factor in life expectancy, continues to lag behind investment levels in other development sectors. Thus, the DoA is primarily a call to get significantly greater investment in all areas that promote fewer road deaths and serious injuries.

In response, and as a commitment to the DoA, the Government of Nepal has produced a Road Safety Action Plan (2013-2020) which is structured along the lines recommended by the United Nations Road Safety Collaboration (UNRSC) as coordinator of the technical aspects of the DoA. This approach organises the response to road safety into 5 pillars and follows the Safe System approach which is the framework for achieving safer roads recommended by the main international stakeholders such as the World Bank, the World Health Organisation (WHO) and the United Nations (UN) amongst others.

This approach places a great emphasis on effective road safety management, which means that the activities of the many and various actors in Road Safety are well coordinated. This is perhaps the major challenge to improving road safety.



The road safety evidence base in Low and Middle Income Countries

There is generally a very poor evidence base to indicate the effectiveness of road safety measures from comprehensive evaluations done in Low and Middle Income Countries (LMICs). A key reason for this is the lack of adequate police crash data. The main viewpoint on applying measures in LMICs is that the effectiveness of a wide variety of approaches is well established from High Income Country (HIC) experiences, and this justifies the adoption of these approaches in LMICs, given that common sense is applied and these approaches are made applicable to local conditions (Peden et al 2004).

Research and advice

The following sections give a review and assessment relating to the questions put by DFID Nepal.



SECTION 2

Research/advice

Poverty and road crash injury

- What evidence exists to support the assumption that the poorest sections of communities in Nepal are being most affected by injury in road crashes?

TRL and Ross Silcock conducted work for DFID investigating the socio-economic effect of road crash involvement on families which was based on large household survey data collected in India and Bangladesh (Ross Silcock/TRL, 2003). This data set was further researched (Aeron-Thomas et al., 2004) and it was identified that road crash deaths and injuries to members of families significantly increased poverty in households. The poorest sections of communities tended to suffer more greatly from road deaths than the non-poor, although this result was only statistically significant for one of the stratified groups sampled (see Box 1).

Significantly, injury of a family member (typically a male wage earner but not the family head) pushed families into poverty that were previously not poor. It should be noted that the definitions of poverty used were from official sources for each country in the study and these definitions of poor may be relatively extreme, with the majority of the populations being poor by HIC standards.


This work is particularly significant because it indicates clearly that there are hidden effects on whole family units and the sustainability of livelihoods. Thus the impacts of crash involvement go beyond problems affecting those directly killed or injured; since the victims tend to be young males and organisations such as DFID tend to have a very strong focus on decreasing gender-based inequalities (for women), this may contribute to a lack of focus on road safety as a development and health issue.

These results are not greatly surprising but had not been investigated scientifically previously; although it was expected that clearer results showing that those who were relatively poor might be more involved in crashes than proved to be the situation. However, trip rate differences between the poor and those that are relatively richer may well mean that the poor are, in reality, at much higher risk of crash injury when exposure is taken into account.

What was clear was that vulnerable road users made up the majority of the victims; these being pedestrians, bicyclists, powered two wheelers riders and three wheeler occupants and also public transport passengers. These are travel modes which are much more expected to be adopted by the poorer segments of societies.

Given that this study was conducted in countries geographically close to Nepal and in some ways comparable, similar patterns in the road fatalities might be reasonably expected.

Crash data reporting and collection systems in Nepal are reported to be poor which means it is very difficult to get a clear impression of crash and casualty patterns across the country



from systematically collected sources. However, some available studies do investigate patterns in those killed and injured across the country.

Joshi and Shrestha (2009) identified and analysed all available studies which investigated patterns in injuries and violence (not just road crashes) in Nepal. They identified that road crashes were the most common source of injury, with pedestrians and motorcyclists being most commonly injured. They state that injured males outnumbered females 2.1:1 and that the injured were primarily those of economically active ages, which would impact family incomes significantly as found by Aeron-Thomas et al. (2004). They state they could not examine differences in patterns between rural and more urban areas.

One study addressed road traffic cases from Western Nepal, (Mishra, Sinha, Sukhla, and Sinha 2010). They conducted research on Pokhara City, focussing on road injury patients attending Manipal Teaching Hospital in a one year period from 1/6/2004 to 31/5/2005. They concluded that most victims were from the middle and lower socioeconomic groups and tended to be young and unmarried, with males again greatly out-numbering females (by five times). Pedestrians and drink drivers represented the largest road user groups injured in their study.

These studies support the assumption that road crashes are having similar effects in Nepal as has been found by TRL in India and Bangladesh; which is that road injuries and fatalities have a major impact on individual family units and poverty levels.

Box 1 Summary of main results of Aeron Thomas et al 2004

Summary of Results: Aeron Thomas et al., 2004

- The poor were reported to have higher death rates, but only in Bangalore rural areas did the poor have a statistically significantly higher death rate. However, many of the poor households identified were not poor before the death or serious injury.
- The poor victims contributed the most to their household's earnings, and the loss of income tipped many households into poverty.
- In Bangladesh the poor households paid a significantly greater proportion of their household income than the non-poor on funerals (almost 3 months income in urban areas) and medical cost (4 months income in rural areas).
- In Bangalore the majority of poor households reported at least one person having to give up working/studying to care for the injured. The poor injured also had less job security and fewer were able to return to their previous job.
- The rural poor in Bangladesh took longer to find a new job. The consequence of a fatal crash or serious injury for more than seven out of ten poor families in Bangladesh was that food consumption decreased as a result of the lower household income.
- The surveys also found that many more people, both poor and non-poor, are being killed and seriously injured in road crashes than police data indicate.

(Adapted from GRSP: Impact of road crashes on the poor Research Note)

Poor countries with improving road safety (2007-2010)

- A number of low income countries report improvements in their road fatality numbers, is there information on how this has been achieved?

The WHO Global Status Report on Road Safety (2013) indicates that from 2007 to 2010, 88 countries decreased their road death toll. Of these countries with reported improved road safety most were categorised as being High or Middle Income whilst only 5 were indicated to be Low Income Countries. The report does not explicitly indicate exactly which 5 Low Income countries had a reported decrease in road deaths between these years.

The report does not indicate whether the judgement of whether fatalities were increasing or decreasing was based on raw country reported fatality numbers, fatalities corrected for the 30 police reporting day rule, or were the modelled point estimates (discussed below) calculated by WHO.

Given that WHO reports the modelled point estimates for fatalities to be the fairest and most accurate figures, the 2010 values were subtracted from the 2007 figures (from WHO Global Status Report 2009) for the Low Income countries. The exact figure quoted (5) for Low Income Countries which had falling road deaths in the 2013 report could not be obtained, 4 were identified as having increasing road deaths (see table 1, countries below the line have increasing fatality estimates). An additional complication was that quite a few Low Income Countries were reclassified as Middle Income Countries between 2007 and 2010.

The modelled figures in the WHO report are actually extremely inaccurate. 95% confidence Intervals are given which are generally very broad hence these reported improvements are not statistically significant.

COUNTRY	Development level	Fatality point estimate 2007	Fatality point estimate 2010	Change from 07-10
Ethiopia	Low	29114	14606	-14508
DR of the Congo	Low	20133	13764	-6369
Kenya	Low	12913	8484	-4429
Afghanistan	Low	10593	6209	-4384
Myanmar	Low	11422	7177	-4245
United Republic of Tanzania	Low	13836	10162	-3674
Mozambique	Low	7432	4315	-3117
Madagascar	Low	6641	3805	-2836
Bangladesh	Low	20033	17289	-2744
Eritrea	Low	2350	80	-2270
Zimbabwe	Low	3669	1832	-1837
Niger (the)	Low	5357	3673	-1684
Ghana	Low	6942	5407	-1535
Rwanda	Low	3077	2118	-959
Togo	Low	1851	1037	-814
Central African Republic (the)	Low	1399	644	-755
Malawi	Low	3614	2904	-710
Benin	Low	2815	2119	-696
Liberia	Low	1235	760	-475
Mali	Low	3959	3544	-415
Chad	Low	3696	3339	-357
Sierra Leone	Low	1661	1323	-338
Gambia (the)	Low	625	325	-300
Burundi	Low	1939	1788	-151
Mauritania	Low	1109	970	-139
Comoros (the)	Low	254	160	-94
Guinea-Bissau	Low	533	472	-61
Burkina Faso	Low	4595	4566	-29
Tajikistan	Low	951	1244	293
Nepal	Low	4245	4787	542
Cambodia	Low	1749	2431	682
Uganda	Low	7634	9655	2021




Table 1 The modelled point estimates of fatality numbers reported for 2007 (The WHO Global Status Report on Road Safety (2009)) were compared with the figures reported for 2010 (from the 2013 report).

All this means that it is not possible to answer this question. A request for clarity is being sent to the WHO staff responsible for the data and analyses.

Barrier issues

- What evidence is there that W type steel crash barriers significantly improve road safety on sharp bends and where there are steep embankments?

Use of barriers or guard rails at sharp bends, to protect at steep slopes and cliff faces, and also at bridges is a well-accepted element of safe and appropriate road design. The primary advice is to remove aggressive features if possible to increase clear recovery zones. If it is not possible to remove features or decrease slopes the advice is “protect them” behind safety fence or barrier to lessen run-off road crash injury severities. This kind of measure will be a key issue for road safety in Nepal which has notably mountainous terrain. Typically provision of barrier is reported to be about 40-60% effective (see iRAP Toolkit for example).

Barriers do not act primarily to prevent crashes, although their presence close to the road side may make some drivers be more careful; they work by reducing the severity of injuries when crashes do occur. There is much evidence from before and after studies that barrier implemented at high risk or dangerous locations in general, significantly reduce the severity of crashes which do occur. The cost effectiveness of Safety Fence type barriers is slightly more complex an issue which typically relates to the flows on the roads on which they are provided since this closely correlates with crash likelihoods.

Elvik and Vaa’s (2004) “Handbook of road safety measures” is the key reference which has assessed and compiled the evidence on the effectiveness of road safety measures from the available scientific literature. From 20 studies of the effectiveness of safety barrier (from 1967 to 2000) they state that the average benefit of barrier provision at embankment or steep slopes is as follows:

- 44% lower fatalities
- 47% lower injuries
- 7% fewer road crashes

The results from their meta-studies reported above are stated to be statistically significant so the evidence that barriers are an effective measure is very strong.

The question here is more specifically about what evidence exists to support the effectiveness of “W” type steel beam barriers for Nepal conditions and situations. There are a number of issues with implementation of this specific type of barrier which are likely to be relevant to their use in Nepal, in brief these are:

- They are primarily designed to restrain cars and smaller vehicles and so may be unsuitable for restraining trucks and buses
- They can be unsafe for motorcyclists
- Because they work by “giving” when struck they should not be implemented where space is limited
- Poor implementation such as poor end treatments can make these a significant safety risk in themselves

- They can require a great deal of maintenance, if this is not done quickly and properly after being struck they can again constitute a safety hazard

(see Towards Safer Roads, TRL 1991/1994 and the iRAP toolkit).

This issue means that the W beam barrier may be inappropriate for Nepal in many situations, specifically where road side space is limited and where a greater proportion of vehicles are large (see Figure 1: Shrestha (2006) indicates that vehicles in crashes on the Strategic roads match their mix using these roads). Higher steel barriers or parapet or heavy fixed concrete barriers are more appropriate (see also in Jones, 1999).

Figure 1 Road accidents vehicle involvement compared to vehicle mix on strategic roads in Nepal (from Shrestha, 2006)

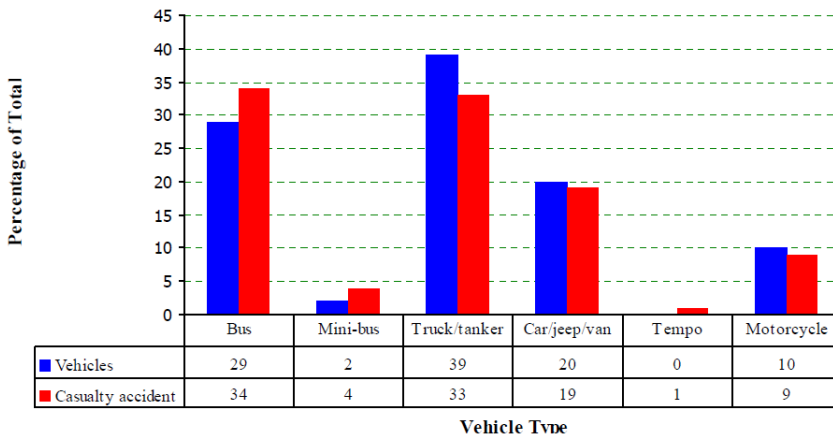


Figure 7: Road Accidents in Highway and Vulnerable

Fixed concrete barrier is more expensive than flexible barriers and there have been successful trials of much cheaper gabion fencing as a restraint system as a substitute in Nepal (see Jones, 1999 and Shrestha, 2006).

Case Studies 1 Assessment of bend and junction treatments in Nepal

On the basis of road accident studies, the DOR implemented various road safety treatment measures in unsafe bends and approaches to bridges in Naubise to Mugling section of Prithvi Highway. Ten important intersections in Kathmandu valley, with high accident rate, were improved with assistance from Japan. Performance evaluation of such treatment and junction improvement works showed a success of up to 80% reduction in accidents and over 1000% First Year Rate of Return.

From Shrestha (2006)

Shrestha (2006) reports that bend and junction treatments applied on the strategic network in Nepal have been evaluated to be extremely effective. This work is not specific about what the bend treatments actually were and it is not published in a peer reviewed journal. However, the precise evaluation details should be available from DOR in Nepal.



Are the returns from investment in infrastructure greater than for Education or enforcement?

- It has been reported that investment in safe road infrastructure delivers twice the economic returns of investment in enforcement or education approaches, how strong is the evidence for this?

iRAP was contacted to discuss this issue since the original statement was believed to originate from their materials. They state that infrastructure safety investment may give greater returns than other measures only in High Income Countries which have had advanced and effective programmes to improve enforcement, vehicle safety, education and campaigns in place for some years.

They stated the following in a 2009 report:

“In leading developed countries where great progress has already been made on driver behaviour and vehicle safety, national safety strategies show investment in safer infrastructure is expected to deliver twice the casualty saving provided by investment in either behaviour or vehicles.”

From iRAP 2009: <http://irap.org/about-irap-3/assessment-reports?download=78:costa-rica-results-2009>).

This assertion is based on work such as the SUNflower reports and the Australian road safety strategy, which estimated that about half (19%) of the targeted reduction (40%) in the fatality rate would come from safer roads. It was estimated that improved road user behaviour would contribute 9%.

The reports also state “There are still many countries in which fundamental road-safety education and enforcement (seat belts, helmets, drink-driving and general adherence to traffic law) are not in place. In these countries basic infrastructure, such as clear signs and road markings, is essential if road users are to know what they are expected to do and if traffic law is to be effectively enforced.”


Thus for Low and Middle Income Countries, investment in road safe infrastructure is not likely to give significantly higher long-term benefits compared with investment in other well established road safety sector areas and counter-measures.

Nepal Road Safety Action Plan assessment

- To what extent are the targets set in the recent Nepal Road Safety Action Plan feasible and achievable?

Another task for this advice request is to make an assessment of the Nepal Road Safety Action Plan (2013-2020) and to comment on how achievable the aims are. Given the time available for this assessment and a lack of in-depth knowledge of current local road safety issues in Nepal, a very detailed analysis is not possible. However this report should provide practical steps to significantly improve road safety in Nepal and the feasibility of the general approaches in the document can be usefully reviewed.

In this work, the background of the road safety situation in Nepal in local Regional terms is set fairly competently, as are the general safety problems within the country. The report uses the officially reported police fatalities as a basis for comparisons and not the higher and potentially more realistic WHO point estimates, which means the real scale of the issue is



somewhat hidden. In Section 3, an attempt to report figures which take account of underreporting of road deaths in Nepal is very confused.

There are a number of minor problems such as an unintended double negative in the text of Section 1 and use of unexplained abbreviations in Tables 1 and 2. There is use of calendar and possibly financial year figures in some tables (Tables 3 and 4) which makes cross-referencing the numbers difficult.

Scope

The scope of this document is actually quite limited despite the apparent level of detail reported throughout. It is actually more aspirational in character rather than being a practical action plan.

Arguably the main aim of this document is to make the case for reforming and re-energising the NRSC in Nepal.

There are two schools of thought on achieving all important road safety coordination as the report identifies, one is to form National Road Safety Councils and the other is to have a Lead Agency. The Lead Agency approach is more widely advocated at present, primarily because this can use a currently functioning organisation to coordinate and manage road safety efforts; it should have the advantage of permitting more straight forward procurement processes and easier allocation of budgets. This approach has been more prevalent recently because relatively few NRSCs setup in the 1990s are regarded as being really effective. However, the Lead Agency approach brings its own problems. It is rare to find a Lead Agency that provides good coordination across all sectors of road safety working and, perhaps most importantly, often there is too much focus on the organisation's own main sector of interest and influence to the detriment and neglect of the other sectors.

One of the main problems with the Action Plan document is that there is not enough focus on how the new NRSC will be made really functional in practical ways. The main issues are that there must be adequate, sustainable funding and a functional secretariat with technical capacity; there also need to be high calibre staff which can really drive road safety improvements and it must have real influence, either through very active participation of powerful politicians, through effective laws or by consensus.

Funding


The document does identify that this is a key issue and a lack of financing will be a risk to virtually all of the proposed actions.

The levels of funding seem to be on the low side throughout and there is no really clear link between the proposed spends and safety improvements which are the desired outcomes. There is no clear indication of the sources of funding or that the additional budgets set out have been agreed with the core agencies responsible.

The way the proposed budget estimates are set out lacks clarity (short/medium/long term all going from 2013).

Targets

No clear over-all target is set in this document as a commitment for desired casualty reduction. Since the strategy is aligned to the DoA the 50% reduction by 2020 is assumed, though not specifically adopted, and the possible target of 35% reduction in fatalities and



serious injuries (a UNESCAP agreement) is also mentioned, though no baseline or specific timescale is indicated.

The basis for setting realistic casualty reduction targets is not clearly addressed. Increasing traffic levels will have an effect on what might be feasible, but this is not addressed in the context of targets. Targets linked to specific actions and investments should ideally be developed (see below).

Targeted funding

There is no effort to tie the proposed actions and spending to any particular level of reduction in fatalities or serious injuries. Although the available crash data information is poor, this targeting of efforts is difficult but not impossible to do, and this would help to keep the various stakeholders focussed and more clearly answerable.

The vital issue of monitoring and evaluation is not dealt with comprehensively, except that there are proposals to improve crash data collection by the Police and Health sectors.

In addition there is no clear plan for benchmarking other measures that correlate closely with safety (intermediate indicators) such as speeds, seatbelt wearing levels and drink driving levels, except in very vague terms.

Other issues

There is some emphasis on increased police activity and enforcement but this is probably inadequate. This is the area that is most likely to produce the greatest and most immediate wins in terms of significantly safer roads in the short term.

There is quite a lot of faith that changes to national laws and adoption of UN resolutions and global standards will in themselves result in safer roads. Greater policing of these changes is likely to be of much greater importance.

There is no mention of the current iRAP surveys (ADB supported) or other on-going projects.

The low levels of front seatbelt wearing (though it is a legal requirement) is mentioned, however there is no mention of any intention to introduce rear seatbelt wearing or the use of child restraints. This lack of attention to detail is also apparent in other parts of the document.

Summary

This document is very well intentioned and the initiatives being set-out seem to be reasonable. The whole tone of the document is very ambitious in scope and the high level goals are extremely challenging. However, too much hinges on the re-invigorated NRSC being effective, which from international experience is far from certain. Funding levels set out as requirements seem too low across the board to achieve any significant improvements in road safety levels which is the ultimate target.

There is no indication that the new and additional funds required will be available. There is a lack of innovative thinking apparent on obtaining funding, for example the Police efforts could benefit from using increased fines to support road safety activities, but this kind of initiative is not addressed.



The action plan does not set out clear targets in terms of casualty reduction numbers (development of these are an action). Monitoring and evaluation methods are not given enough emphasis.

This is more of an aspirational document rather than a practical plan in many ways. This is not a bad document of its type, but it is light on technical detail and real practical, feasible steps.

A number the initiatives should already have begun; it would be interesting to see if indeed they have been started and if there are plans for evaluating their effectiveness.

Nepal's global road safety position

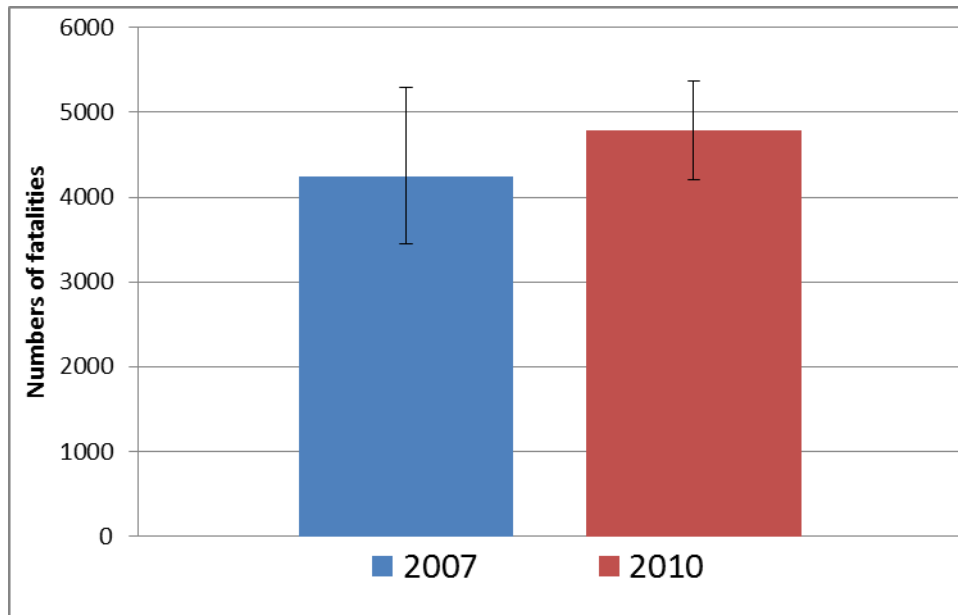
- What is Nepal's position in world ranking terms for road safety and can it be compared meaning fully to other countries?

The best data by far which might be used to assess the comparative level of safety in a country is available in the two reports produced by the WHO in the Global Status Reports on Road Safety (2010, 2013). This the most recent and comprehensive attempt to collect comparable figures on the numbers of road fatalities country by country for United Nation member states.

This is not an easy under-taking because crash data collection and storage in many countries is very poor. As a result the data comes from a variety of sources (mainly police or medical sector sectors) and figures supplied are ratified by officials within each country before release.

Under-reporting is a considerable problem and as a result WHO have had to produce estimated numbers of fatalities for many Low and Middle Income countries. These estimates correct some very low stated official figures and are based on developed regression relationships with factors such as population size, registered vehicle numbers and a number of road safety related characteristics of countries. These point estimates are also fairly inaccurate which is reflected in the relatively large 90% and 95% confidence intervals (see Figure 2) which have been calculated.

Figure 2 WHO point estimates for fatalities in Nepal in 2007 and 2010 (90% and 95% confidence intervals shown respectively)



The WHO estimate for the real road fatality numbers in Nepal is about 4 times higher than the official reported figures for the country which gives another indication of the levels of uncertainty surrounding these various statistics.

What this means is that only limited weight can be placed on any analysis of Nepal's relative position in road safety terms in comparison to other local countries or against "good performers".

Clearly the raw numbers of deaths cannot be compared from country to country since the general numbers of road fatalities will be influenced heavily by population size and how much traffic is on the roads.

Countries are therefore usually compared on two statistics, these being the:

- Fatality rate
 - The number of road deaths in a year divided by the population
 - Multiplied by 100,000 by convention
- Fatality risk
 - The number of road deaths in a year divided by the number of licensed vehicles
 - Multiplied by 10,000 by convention

(A better comparator is the number of road deaths per vehicle kilometre driven, however it is rare that such exposure data exists.)

The fatality rate gives a guide as to how risky a country is in relative terms of over-all risk per head of population. This statistic is useful to benchmark the over-all scale of the problem in health terms.

The fatality risk is perhaps a better all-round indicator of individual safety per trip, this takes into account that some countries may actually have very few vehicles (which generally relates to their development stage).

So a country can have a large population and few fatalities which will lead to a low fatality rate, but if it has low vehicle ownership rates the calculated fatality risk may be high indicating that exposure (presence or magnitude of factors that lead or correlate with injury crashes) is low but the roads and individual trips are very dangerous for road users.

The pattern outlined above is apparent for Nepal. Using 2007 data reported from the WHO World Status Report (2010), Nepal has the 123rd worst fatality risk (15.6) in global terms and 20th worst fatality rate (3.4), out of a total of 178 countries. These results were obtained using the raw reported fatality figures supplied by Nepal Police.

What is clear is that in 2010 (Table 2) compared to good performers such as the UK, Nepal had a higher but comparable fatality rate per 100,000 population and a very much higher fatality risk per 10,000 vehicles, whether the countries reported fatality figures are used, or if WHO's point estimates are used (see Table 2).

Using the WHO point estimates rather than official reported death figures makes the scale of the problem in Nepal look significantly worse in comparison to the good performing countries.

Similar countries to Nepal in the region have similarly uncertain fatality numbers reported and estimated.

2010	Reported road fatalities	WHO Point estimates fatalities	Population	Registered vehicles	Using country reported road deaths		Using WHO estimated road deaths	
					fatality rate	Fatality risk	fatality rate	Fatality risk
UK	1,905	2,278	62,035,568	35,170,629	3.1	0.5	3.7	0.6
Nepal	1,689	4,787	29,959,364	1,178,911	5.6	14.3	16.0	40.6

Table 2 Comparison of fatality rates and risks, Nepal versus UK

In regional terms, these kinds of comparisons can also be made with surrounding countries, but the results will not be particularly useful because there is so much error surrounding the estimates of the fatality numbers reported.

A more useful exercise would be to identify some countries or perhaps Indian States which have similar terrains and development levels but are reported to have a better organised response to their road safety problem, and to identify their particular good practices and ways of working. This could be done with some high Income countries too.



References

Ross Silcock/TRL (2003) 'Guidelines for Estimating the Cost of Road Crashes in Developing Countries' *Department for International Development DFID Project R7780*
http://www.transport-links.org/transport_links/filearea/documentstore/105_R%207780.PDF
[Accessed 29 July 2012].

A Aeron-Thomas, Dr G D Jacobs, Mr B Sexton, Dr G Gururaj, and Dr F Rahman (2004) 'The involvement and impact of road crashes on the poor: Bangladesh and India case studies'
TRL Published Report PPR 010

Joshi, S.K. and Shrestha, S. (2009) 'A Study of Injuries and Violence Related Articles in Nepal' *Journal of Nepal Medical Association* 2009; 48(175): 209-216

Mishra, B. Sinha, N.D. Sukhla, S.K. and Sinha, A.K. (2010)
'Epidemiological Study of Road Traffic Accident Cases from Western Nepal', *Indian Journal of Community Medicine*. 2010 January; 35(1): 115–121.

WHO Global Status Report on Road Safety 2013: supporting a decade of action
http://www.who.int/violence_injury_prevention/road_safety_status/2013/report/en/index.html
[Accessed 29 July 2012].

Global status report on road safety: time for action. Geneva, World Health Organization, 2009 (www.who.int/violence_injury_prevention/road_safety_status/2009) [Accessed 29 July 2012].

iRAP Toolkit, barriers web page
<http://toolkit.irap.org/default.asp?page=treatment&id=28> [Accessed 29 July 2012].

Elvik, R. and Vaa, T. (2004) 'The Handbook of Road Safety Measures' (1st edition), *Elsevier*

TRL (1991) 'Towards Safer Roads'
http://www.transport-links.org/transport_links/publications/publications_v.asp?id=826&title=TOWARDS+SAFER+ROADS+IN+DEVELOPING+COUNTRIES [Accessed 29 July 2012].

Shrestha, D.M.S. (2006) Senior Divisional Engineer, Ministry of Physical Planning and Works
Road Safety Experiences in Nepal, Expert Group Meeting on the Development of Asian Highway Network United Nations Economic and Social Commission for Asia and Pacific Bangkok, Thailand
http://www.unescap.org/ttdw/common/TIS/AH/files/egm06/roadsafety_nepal.pdf [Accessed 28 July 2012].

Jones, A. (1999). 'An Affordable Safety Barrier for Nepal' Highways and Transportation. *Institution of Highways and Transportation, London. Volume 46, No. 3, March 1999.*

iRAP: Costa Rica results 2009
<http://irap.org/about-irap-3/assessment-reports?download=78:costa-rica-results-2009>
[Accessed 31 July 2012].



SUNflower (2002): Koornstra, M., Lynam, D. Nilsson, G., Noordzij, P., Pettersson, H., Wegman, F. and Wouters P. 'A comparative study of the development of road safety in Sweden, the United Kingdom, and the Netherlands'

http://ec.europa.eu/transport/roadsafety_library/publications/sunflower_report.pdf

[Accessed 31 July 2012].

National Road safety Action plan 2003 and 2004, Australian Transport Council

(<http://www.atcouncil.gov.au/documents/files/actionplan.pdf>)

[Accessed 31 July 2012].

Nepal Road safety Action Plan (2013-2020) Ministry of Physical Planning and Transport Management (2013)