

The Need for Safety Targets in South Asian Developing Countries

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Abstract

Road deaths in eighteen countries were analyzed in this study to recognize an appropriate next step for south Asian developing countries. Road fatality trend analysis revealed that the annual road deaths in south Asian developing countries are continuously increasing with economic development. Further results from south Asian developing countries revealed that lesser populated countries lose a larger share of their people to road crashes. Target setting to improve road safety together with systematic selection and application of remedial measures considered in developed countries have been found to be working well; thus it is identified as a suitable next step to improve road safety in south Asia. Different strategies implemented in developed countries show that safety interventions need to differ between countries. The need for

methodological approaches to set up a safety office to reduce the road deaths in south Asian developing countries are also highlighted.

Keywords: Road safety, Asian developing countries, Safety targets, South Asia

Background

Road safety means no or fewer crashes. World Health Organization (WHO) reported (Peden et al, 2004) that without increased efforts and new initiatives, the total number of road traffic deaths worldwide is forecast to rise by some 65% between 2000 and 2020, and low income and middle income countries' deaths are expected to increase by as much as 80%. It is also evident from this forecast that the fatality rates in developing countries are higher than those in developed countries. Using a similar investigation, Transport Research Laboratory (TRL) reported (Jacobs et al 2000) that many south Asian developing countries have been experiencing a worsening situation, and the future road safety situations will be more challenging than at present due their economic growth and rapid motorization which are likely to occur in these countries over the next two decades.

According to the experts (Campbell 1992, Hauer 2005a, and Peden 2004), accidents are more likely preventable, because the science of traffic safety has developed to a state where effective strategies for preventing or reducing crashes and injuries are well known, hence appropriate strategies could be developed using these recent developments. During the last three decades, several high-income countries have recognized these developments, and applied them systematically to improve the road safety. In relation to this, several studies have reported on the effectiveness of individual safety improvement strategies implemented in those countries (OECD 2009, ESCAP 2006, Peden 2004 and Jacobs et al 2000).

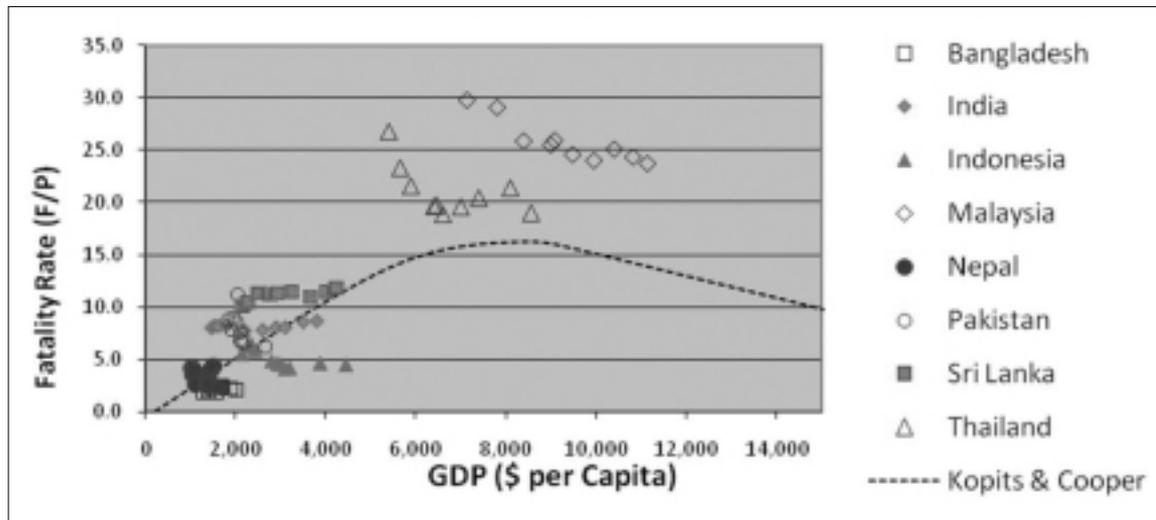
This paper attempts to link these issues and other resources for improving the safety in south Asian developing countries by examining a few actual developments observed in selected countries. The main objective of this paper is to correlate various road safety developments worldwide to explore the most appropriate next safety moves that should be taken up in south Asian developing countries. To accomplish this objective a three-step methodology was adopted as; First, fatality trends in relation to the economic development in South Asian countries were considered for a period from 1996 to 2005. Secondly, fatality levels in selected high-income and highly motorized countries were compared with Asian countries. Finally, successful strategies followed in developed countries were examined to identify the appropriate next step in south Asia.

Fatality trends in Asian developing countries

Fatality trend analysis with economic development is a key investigation to examine whether or not a country or a group of countries as a whole have particularly high or low fatality rates. They also indicate how the relationships are changing over time and whether or not the safety problem is worsening or improving. Over the last fifty years, several general relationships have been used to show the changes in fatality levels with development of a country or a group of countries. For example, Kopits and Cooper (2005) used data from 88 countries to develop models to show a correlation between fatalities and economic development.

This same study used data from 1996 to 2005 to investigate the fatality trend in five south Asian countries namely Bangladesh, India, Nepal, Pakistan and Sri Lanka, however, other south Asian countries such as Afghanistan, Bhutan and Maldives are excluded in this study due to lack of data. Three neighboring countries in Asia (Indonesia, Thailand and Malaysia) were also included in this analysis for a better understanding of the fatality trend with intended economic development. Notably Thailand and Malaysia lose a larger share of their people to road deaths. The variation of annual fatalities per 100,000 population (F/P) with per capita income (GDP measured in 1987 international prices) for all these eight countries are shown in Figure 1 together with the model of Kopits and Cooper.

Figure 1. Comparison of fatalities per 100,000 population in Asian counties



This trend analysis revealed that when considering F/P, the situation in many south Asian developing countries has been experiencing an inexplicable situation. For example, except in India and Sri Lanka, the F/P values for other countries show a slightly healthier trend. It also revealed that each of the selected countries in Asia has its own pattern of road fatality recorded with economic development, but slightly deviates from a generalized trend developed by Kopits and Cooper(2005). The reason for these differences and dissimilarities in the trend is under research by same authors, however in a broad sense the reasons will reflect more on the past and present political, social, educational and economic situations that a country has experienced. Moreover in many countries, for example in India, the number of fatalities is increasing, but on top of this the population is also increasing rapidly; therefore this trend analysis based on F/P does not reflect the true state of the condition in India. Thus in order to see the actual picture, analysis of road safety in future will need to focus for several related issues, for example, urban income, urban vehicle ownership, hospitals per population, and population growth which are likely to be important parameters for survivability during crash investigation.

Comparison of different road safety levels

An initial analysis of the number of fatalities recorded between 1996 and 2005 shows a steady increase in three countries: in Sri Lanka it rose by 31 percent, in Bangladesh by 45 percent and in India by 21 percent. Conversely, during this period road accident deaths in highly motorized developed countries fell: in Great Britain it declined by 9.95 percent, in Japan by 17.1 percent, in Germany by 33.3 percent, Australia by 13.0 percent, New Zealand by 3.0 percent, Canada by 8.1 percent, Switzerland by 15.0 percent and USA by 12.9 percent. Here, we examine two fatality levels namely; fatalities per 10,000 registered vehicles (F/V) and F/P in selected high-income and highly motorized countries. These were compared with south Asian developing countries, as detailed in Table 1.

Like several other studies (Jacobs 2000, ESCAP 2006) this comparison also revealed, that in selected developed countries road safety has improved over a period of a decade. Among the selected countries in East Asia, Indonesia is improving, but Thailand and Malaysia have higher values for F/P among these selected countries. In south Asian countries Bangladesh has a low F/P but has a steadily increasing F/P. Further it was found that a vehicle in these south Asian developing countries on average killed more people than in developing countries.

Table 1. A decade variation of road fatalities in selected countries

Country	GDP ¹ per capita in 2006 (\$)	Population ² in 2006 (million)	Road deaths ³ (F) in 2006**	F/P ³			F/V ³		
				1996	Average 1996-2005	2005	1996	Average 1996-2005	2005
Nepal	1,550	27.1	617(*)	4.1	3.2	2.3	53.6	29.4	13.3
Bangladesh	2,053	144.3	2,960(*)	1.8	2.2	2.1	51.2	55.4	41.5
Pakistan	2,370	155.8	9,753(*)	8.8	8.0	6.3	27.1	23.8	17.8
India	3,452	1094.6	94,968(*)	8.0	8.2	8.7	20.9	16.4	13.0
Indonesia	3,843	256.4	11,610(*)	5.6	4.9	4.5	7.5	5.3	4.3
Sri Lanka	3,896	19.7	2,239	10.0	11.1	11.8	13.3	11.7	9.1
Thailand	8,677	67.8	12,871(*)	26.8	21.0	19.0	95.8	61.0	46.6
Malaysia	13,379	26.6	6,287	29.8	25.8	23.7	8.2	5.7	4.1
South Korea	24,712	48.5	6,327	22.9	19.2	13.2	11.0	8.3	4.1
New Zealand	26,110	4.1	391	14.1	12.5	9.9	2.2	1.9	1.3
Germany	33,154	82.4	5,091	10.7	9.0	6.5	1.9	1.5	1.0
France	33,414	61.5	4,709	13.8	12.2	8.8	2.6	2.3	1.4
Japan	33,525	127.8	7,272	7.9	8.0	6.2	1.2	1.4	1.0
Great Britain	33,535	58.8	3,172	6.1	5.9	5.5	1.5	1.2	1.0
Australia	34,882	20.7	1,598	10.8	9.5	8.0	1.8	1.5	1.2
Canada	35,729	31.6	2,889	10.3	10.0	9.1	1.8	1.7	1.5
Switzerland	39,963	7.5	370	8.7	7.7	5.5	1.4	1.3	0.8
USA	45,790	300.3	42,642	15.8	15.0	14.6	2.0	1.9	1.8

Note: * - Road deaths data in 2005; F/V - Fatalities per 10,000 registered vehicles and F/P - Fatalities per 100,000 Population

Source: 1 - Wikipedia, June 2009; 2 - World Bank development indicators database-April 2009, 3 - <http://www.monash.edu.au/muarc/reports/papers/fatals.html>; OECD 2009; TRL Report 445, UK.

These results highlight notable differences in the fatality levels between developed and developing countries and it also be noted from this Table that a ten year period is required for significant and notable changes.

Planned safety targets

Research studies and reports (OECD 2009, Jacobs 2000 and ESCAP 2006) revealed that reductions in the number of accidents were accelerated in highly motorized countries by introducing healthy planned national safety targets as shown in Table 2. Available information in south Asia was used to illustrate the history of safety targets in this region and found that, except Nepal which set its safety target in 2001 to reduce the fatalities by 6.9 % per year, none of the other south Asian countries so far considered setting road safety targets. Therefore, introducing best practices from developed countries may help these countries to develop this integrated approach of planning safety targets to achieve the road safety improvements.

Any safety target should have clearly defined parameters to be achieved in future. For example, as detailed in Table 2, Thailand and Indonesia established safety targets as saving lives between 2005 and 2010. However road safety experts may find difficulties in understanding and estimating the real life that could be saved, because it is not clear whether it includes various other issues (Hauer and Okura) which may highly influence the similar estimates. For example; New Zealand introduced it's fatality reduction target in 2001, and used four indices such as F, F/P, F/V and F/L to set the targets as detailed in Table 2. This shows that clear multiple targets may be used to scale the improvement from the base condition during a prescribed time frame.

Table 2. Road safety targets in selected countries

Country	Base Year	Target Year	Overall Targets
Nepal	2001	2010	F by - 6.5 % per year
Indonesia	2005	2010	13,000 lives*
Thailand	2005	2010	12,000 lives*
Malaysia	2001	2010	F/V < 2 & F/P < 10
South Korea	2002	2006	F < 4,700 (-34.9%)
New Zealand	2001	2010	F < 300, F/L < 6.1, F/P < 7.3 & F/V < 1.1
Germany ^{EU}	2000	2010	F by - 50 %
France	2007	2012	F < 3,000
Japan	2006	2012	F < 5,750
Great Britain	1994-98	2010	KSI by - 40 %
Australia	2001	2010	F/P by - 40 % (F/P < 5.6)
Canada	1991-96	2008-2010	F by - 30 %
Switzerland	2000	2010	F by - 50 %
USA**	1996	2008	F/L < 1.0

F- Number of Fatalities, KSI - Killed or Seriously Injured, * - Number of lives planned to save between 2005 and 2010

^{EU} - EU set an ambitious target for 2010 of reducing road accident deaths by 50 percents from 2000

** - USA's target of reducing fatalities per 100 million vehicle miles (F/L) traveled (1.7 in 1996 to 1.0 in 2008)

Source: OECD-2009

Among these selected countries, there are three countries without similar road safety targets, namely Sri Lanka, India and Bangladesh. A fatality trend analysis using the data from 1995 to 2005 revealed that in 2010, the fatalities in Sri Lanka, India and Bangladesh will reach 2500, 101500 and 3500, respectively. Controversially, the fatalities in Thailand and Indonesia reveal a downward trend to 11600 and 10150, respectively. Moreover, most of the developed countries with safety targets show significant improvement over the target time frame. Therefore it could be deduced that planning an appropriate road safety target in individual countries is an important tool to improve the road safety in south Asia.

Selected successful strategies from developed countries

OECD summarized the country reports on the road safety performances. As it was reported, many countries have been concentrating on long term road safety visions, for example, Japan and Canada have adopted the vision of having the 'safest roads in the world', Sweden has adopted the initiative 'vision zero' and likewise Netherland introduces 'sustainable safety', Mongolia proposed 'a year without any accidents' and Hong Kong works towards 'Zero deaths on the road'. In order to achieve their vision, each of these nations put forward different remedial measures to bring the vision into action based on their own political, social and environmental characteristics.

In the USA, speeding and trucks are major issues in relation to road fatalities (OECD 2009). The main safety goal of the Department of Transportation (DOT) is to reduce the highway fatalities per 100 million vehicle miles from the value of 1.76 in 2005 to 1.0 by 2008. DOT focuses specifically on reducing fatalities and injuries related to crashes involving large trucks. A strategic plan "One-DOT" effort was developed to address speeding as a contributor to highway crashes and fatalities, and several strategies contained in this plan were recommended. As a result, in 2006, 868 fewer people died in traffic crashes compared to 2005, where the total was 43,510.

The ongoing safety target in Switzerland commenced in 2000 to reduce the number of fatalities by 50% by 2010 compared to the level in 2000. Consequently, several appropriate remedial measures were introduced; in 2003 use of daytime running lights was recommended (based on realized positive impact on accidents involving pedestrians); in 2003 mandatory use of seat belt on all seats (it is estimated that 60 lives could be saved each year); in 2005 the maximum legal blood alcohol content (BAC) was reduced from 0.8 g/l to 0.5 g/l (alcohol was a contributing factor in 30% of serious accidents); similarly in 2005, a comprehensive set of 56 remedial measures has been developed with a new road safety policy.

Canada's vision to reduce the 3,062 fatalities in 1996 to 2,024 in 2010 (~33%) has given serious attention to achieve the overall vision of the 'safest roads in the world'. However 2,889 (-6% less from 1996) fatalities were recorded in 2006. From the available information, very limited new strategies were introduced (eg., photo radar to prevent speeding, lane red light cameras, in-vehicle telematics, and introduction of side-impact regulation) together with ongoing strategies such as daytime running lights, graduated licensing systems, national occupant restraint programme, and strategies to reduce impaired driving.

In Great Britain, by 2007, the number of people killed or seriously injured (KSI) on British roads had dropped by 36 per cent from the average of 1994-98, and is on course to meet its target of a 40 % reduction by 2010. In addition to continuing activities to existing safety improvement programmes, the remarkable major safety improvement interventions in the last decade include: further extension of automatic safety camera enforcement in 2002 (40% reduction in KSI persuaded at camera sites); increased implementation of lower speed limit (32 kmph) at school zones; additional powers to test drivers for drug use at roadsides; continuing major infrastructure improvement are some of the introduced strategies used to achieve the set targets.

The Australian Transport Council (ATC) launched strategies in 2001 with the aim of reducing F/P by 40 per cent (it was aimed at reducing F/P from 9.3 in 1999 to no more than 5.6 in 2010). Australia's current approaches to road safety improvement are guided by the safe system framework, which involves two fundamental objectives: making the road transport system more forgiving of human error, and minimising the level of unsafe road user behaviour (e.g. double demerit points for holiday seasons). Considering these objectives, all follow-up action plans are grouped into four broad areas: safer speeds, safer roads and roadsides, safer vehicles, safer road users and safer behaviour.

Japan introduced its safety target in 2006 to reduce the total number of fatalities in 2010 to below 5,750. All remedial strategies are based on actual facts and some of them are; demerit points for mobile telephone use; new drink driving regulation to maximum legal blood alcohol content (BAC) of 0.3 g/l; conducting a series of safety workshops for the population in accident-prone residential or commercial districts (30% of the fatalities were pedestrians); and compulsory protective helmet wearing for motorized two-wheelers including mopeds.

Germany does not have its own safety targets, but is working towards the target of the European Union. Two recent systems that were considered as necessary tools for reducing accidents at incident prone parts of roads network are namely dynamic route guidance (DRG) and variable message signs (VMS) (Results revealed that a 25% reduction in accident rates and a 30 to 50% reduction in accident severity). A measure, 'intelligent speed management' on the basis of variable message signs was also considered to be very effective, as it has gained higher acceptance from drivers. Another recent approach to reduce accidents is 'winter maintenance on motorways', which comprise two approaches: 'special detection systems (SDS-I)' and 'special de-icing systems (SDS-II)'. SDS-I gives information about the current road conditions and possible changes of the conditions to traffic control centres to drivers. SDS-II have been installed at critical road sections, and activated either automatically by road surface sensors or by the road service teams.

New Zealand is trying to reduce fatalities between 2001 and 2010, by considering four safety levels such as decreasing the number of fatalities from 455 to 300, F/L from 12.6 to 6.1, and F/P from 10.2 to 7.3, and F/V from 1.5 to 1.1. Speed camera zones and warning signs were removed in 2004, and speed cameras are now deployed on an 'anywhere, anytime' basis proving to be more effective. In 2002/03, compulsory breath testing enforcement was intensified in rural areas. Since 2002, increased resources and targeting of heavy vehicle road safety compliance, which includes management of heavy vehicle weight, mechanical safety, and speed. In addition, 'Roadsense' (targeting primary schools), 'Safe Routes' (a pedestrians and cyclists programme) and 'Failure to give way' (advertising campaign targeting high-risk intersection behaviour) are some of the successful stories in New Zealand.

All these strategies proved that there is an obvious trend toward planning and developing new road safety strategies based on fact and science (bottom-up or realistic approach), or they may based on intuition and judgment (top-down or idealistic approach). The top-down or idealistic approach is based on ideal standards such as Sweden's 'vision zero' or Canada's vision of having the 'safest roads in the world', which places priority on preventing death and serious injury before other considerations. On the other hand, the bottom-up or realistic approach adopted by Australia, Great Britain, Japan and New Zealand is based on investigation and analysis of specific safety issues and countermeasures. The bottom-up approach adopted by these countries meant that the targets were not selected arbitrarily but were research-based estimates by professionals of what could be achieved by taking into account the effects of known measures.

It also provides evidence that strategies proved successful in one country might not be directly relevant to another. This is because individual strategies were developed considering local condition therefore those are not always a straightforward matter like: removing black spots, not allowing hand phone users, controlling speeding, reducing drink driving, seatbelts and/or applying similar basic tactics. On the other hand, most of the recent strategies tried to improve common practices and behaviour of road users through improved road infrastructure and vehicle designs to prevent accidents. Therefore it is evident that only integrated approaches consisting of multidisciplinary strategies developed considering local conditions can result in better achievement of road safety goals and targets.

Conclusion

Road safety means no or fewer crashes, which could be possible via safer drivers using safer vehicles on safer roads. This paper reviewed and investigates possible initiatives that could improve the road safety in south Asian developing countries. Road fatality data from eighteen countries with different economic conditions were used in this study. A review of current safety levels and comparison of road safety initiatives in developing, and transition countries in Asia together with developed countries shows that south Asian developing countries should take immediate actions to prevent ever-increasing road deaths.

Successful scenarios from developed countries show that there are a number of approaches available to plan for the road safety improvements. Among them two well established approaches are known as top-down and bottom-up. Finding appropriate fatality reduction strategies is not a simple task and they were not directly transferable between countries; moreover implementation needs trained professionals, strong political pressure from the government, financial support and similar inputs. For example, Nepal introduced a fatality reduction target in 2001 to reduce the accident by 6.9 percent each year, but controversially it increased 68% between year 2002 and 2003, and 12% between 2003 and 2004, thus, setting a target alone will necessarily not solve the problem.

Especially, in south Asian developing countries, any move should be politically motivated (e.g., a political champion should be identified who can promote road safety as an important public priority) as well as decision makers should be given adequate training. Like Hauer (2005b) stated: the road safety related workforce is in need of fact-based training, too. Such training should include not only civil engineers, police officers, and driving instructors; but also include town planners, architects, municipal engineers, transportation planners, and all those who advise politicians, officials on planning boards, and perhaps other stakeholders and road users.

Recommendation

Road crashes kill many people, but are not given adequate priority in many south Asian developing countries, which require intensive efforts for effective and sustainable prevention. In south Asia, the future will be more challenging than at present, because economic development and rapid motorization are likely to occur in these countries over the next two decades.

It was revealed that transferring strategies that have succeeded in one country will not necessarily succeed in another. Thus, in order to develop their individual strategies, careful steps should be taken in the form of training performers and transferring knowledge, and securing financial support for implementation. As an example, a vibrant lead office of road safety could be identified to oversee the road safety matters within a country, and clearly defined responsibilities for this office should also be spelled out. More importantly, the officers in this office should be appointed in a transference manner. This office should document the road safety problem using effective ways, and outcomes should be made available for interested members of the general public, parliament, NGOs, and other stakeholders. Moreover road safety researchers need to consider the failures and mistakes in the past by paying attentions to the historical development of the individual county. As for example, especially in this region, it is important to look at societal factors. No matter how technically well-founded interventions may be, no action can be implemented without political will and commitment. When allocating funds, the highest priority should be given to road safety initiatives. In the meantime an international participation to improve the road safety should be invited.

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