

IN JUST THE LAST 5 YEARS OVER 850 PERSONS KILLED OVER 16,820 PERSONS INJURED OR DISABLED OVER EUR 430 MILLION LOST TO ECONOMY

> URGENT ACTION IS REQUIRED TO REDUCE SUCH LOSSES !

THE COST OF ROAD TRAFFIC ACCIDENTS IN THE REPUBLIC OF SRPSKA



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The Cost of Road Traffic Accidents in the Republic of Srpska

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ABBREVIATIONS

- BAM Bosnia and Herzegovina Convertible Mark (Exchange rate is fixed to EUR in rate 1 EUR = 1.95583 BAM)
- RTA Road traffic accident

EXECUTIVE SUMMARY

Road safety is a problem worldwide and many countries are now attempting to reduce the numbers killed and injured on their roads. The first step in taking action in that direction is to examine real and potential losses which occur as a result of traffic crashes.

The socioeconomic losses resulting from road accidents in the Republic of Srpska have been calculated using the Gross output or Human Capital Method – a well-recognized methodology used in many countries. This estimates the cost of administration, medical treatment of victims, property damage and the lost productivity of those killed and injured and includes an allowance for pain, grief, and suffering. The most important results from these calculations are shown below.

Type of Casualty Costs BAM 520,950 $(EUR \ 266.358)^2$ Death Serious injury BAM 20,776 (EUR 10,623)

Table ES 1: Losses incurred for each traffic casualty¹ by severity

Table ES 2: Losses incurred for each Traffic accident by severity³

0 00	
Type of Accident	Costs
Fatal Accident	BAM 620,618 (EUR 317,317)
Serious injury Accident	BAM 66,683 (EUR 34,094)
Slight injury Accident	BAM 6,221 (EUR 3,181)
Property damage only Accident	BAM 3,258 (EUR 1,666)

BAM

693

(EUR

354)

Tabla	ES 3.	Estimated Ann	ual lossas t	o the Re	nublic of	Srnskal	Fronomy	hasad	on 2010	λ^4
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Item	Amount (millions)
Annual GDP	BAM 8,308.1
Calculated annual losses	BAM 171.87 (EUR 87.87)
As a %-age of annual losses	2.07 % of GDP in 2010

It should be noted that these calculated values above for economic losses are an absolute minimum. If "willingness to pay" approach had been used to make the estimates, the values would have been two or three times higher. However "willingness to pay" approach requires extensive attitudinal surveys and is very expensive and complicated to undertake. Because of this many countries just use (as we have done for the Republic of Srpska) the Human Capital Approach in the knowledge that this is an absolute minimum value and that if interventions can be justified on these figures they would be even more justified under any other costing methods.

Now that estimates are available, relevant agencies in the Republic of Srpska can do cost benefit analyses to justify road safety interventions. Expenditure on road safety should be regarded in future as an "Investment" and not as a "cost" since every casualty or traffic accident prevented will result in savings to the Republic of Srpska economy as well as benefits to people who might otherwise be killed or injured.

Research into the losses to the Republic of Srpska's economy resulting from road accidents has been undertaken by the Economics Institute JSC, Banja Luka in cooperation with Swedish consultants -SweRoad.

Slight injury

³ The costs per accident include the costs of the several casualties that may occur in an accident plus the additional accident related costs of property damage, administrative costs etc. associated with each severity of accident ⁴ Estimated annual losses include an allowance for the estimated under reporting of casualties in the Republic of Srpska. International

¹ Values presented here included a small allowance to reflect the admin costs plus property damage costs incurred in the accident that the victim was involved in. These values per casualty can be used in cost benefit analysis of proposed safety interventions which may deliver savings of casualties. ² 1 EUR = 1.95583 BAM

research and experience indicates that for every one death there are around 12-15 serious injuries and around 70 slight injuries.

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1 INTRODUCTION

1.1 General

Among transportation accidents, road accidents generally received less public attention. Road accidents tend to be less dramatic because they contribute casualties in ones and twos, compared to, for example, air transport accidents, which occur much less frequently but usually result in more deaths. Consequently, the large-scale economic and social impact of road accidents may not be fully appreciated. Where estimates are available, accident costs are found to be very considerable. However, information regarding the costs of road accidents is important if governments are to accord equitable priority in resource allocation for accident prevention programs. In many European countries, detailed cost evaluations of road accidents are made periodically. The accident costs are primarily used for the purposes of strategic planning and performing cost-benefit analyses of major projects. The often cited reason for nonuse of accident costs for ranking remedial safety interventions is that insufficient data are available to allow a proper assessment. Yet, ironically, the very absence of such an assessment results in the magnitude of economic losses not being fully appreciated by decision makers. As a consequence, resources have not been allocated for improvements of road safety, and huge annual economic losses continue to drain national resources.

1.2 Motivation

The desire to reduce road traffic injuries or fatalities is usually humanitarian in nature. For this reason, an argument could be made for not waiting until an accident occurs or a fatality is registered before taking some preventive measures. However, highway authorities are commonly unwilling to be persuaded by such an argument and adopt a reactive approach to solving road safety-related problems. The usual reasons for adopting this approach are that safety measures can be costly, and, where competing needs for funding exist, devoting resources to safety related expenditures can be less readily justifiable. Even within the highway and transportation sector, where funding is available, allocating these funds for road building and development projects is often easier than allocating funds for schemes to enhance safety on roads, especially since building and development projects can result in immediate congestion reduction and are therefore politically attractive. Another strong motivation to improve road safety is financial. In line with this, by considering the massive financial resources that are consumed because of accidents, accident prevention measures can be justified as investments. This has been the approach adopted in many developed and developing countries where the economic value of preventing accidents can be considerable.

Following this approach, any safety improvement scheme to be adopted on highways can then be evaluated on the basis of cost-benefit analyses. Systematic procedures to select the best or most costeffective schemes can then be put in place. While this may appear to be straightforward, many obstacles can make this goal rather difficult to attain in practice. A closer look shows that before a quantitative analysis can be applied to evaluate a specific road safety improvement scheme, valuations must be derived. Support data on costs are seldom available because they are either not systematically captured or are poorly recorded. The effort to establish accurate cost figures can be such a significant task that few agencies are willing to invest time and resources to pursue this exercise. It appears then that an important initial step needed to convince national authorities to accord road safety a higher ranking at the national resource planning level is to demonstrate the huge losses incurred annually to the Republic of Srpska's economy as a result of road accidents. In the longer term, resources need to be devoted to building a suitable database for cost estimation. Fortunately, for this purpose, the level of accuracy in estimating these initial cost figures need not be too precise. In other words, what is needed for a start is to estimate the approximate scale of the cost of accidents, rather than obtaining a precise cost. Such less precise estimates can be used to get some idea of the magnitude of the losses, which will suffice until more precise estimates are available. This is the focus of this report.

1.3 Objective and Scope of Study

The objective of this study is to prepare an initial approximation of the costs of different types of road accidents and to use that to estimate the scale of annual economic losses being borne by the Republic of Srpska as a result of road accidents. For the purpose of this report, the year of study is 2010, from which accident data and cost figures are to be computed.

1.4 Outline of Report

The report is divided into five chapters. Chapter 2 identifies the commonly available methods of traffic accident costing and outlines the different approaches involved. Chapter 3 presents the cost components, together with a computation of the estimates in the Republic of Srpska's context. Chapter 4 extends the cost computations to the national level. Chapter 5 summarizes the findings. Appendixes supplement and support the findings presented in the report.

2 METHODOLOGY

3.1 Introduction

The valuation of accidents is controversial because life is too important to be valued simply in monetary terms. When given the choice of trading their lives for a sum of money or incurring added expenses to acquire safety devices or some inconvenience to ensure an acceptable level of personal safety on roads, most people would choose to spend money or be inconvenienced. The cost of accidents may consist of two components, often regarded as the coldblooded material cost and the warm-blooded willingness-to-pay component. Material costs may include damage to property, charges related to administration, fees for medical services, charges for hospitalization, and loss of productive work. The problem with determining accident costs is obtaining accurate relevant data for computation. The desire and the resulting willingness to pay the economic cost of reducing the risk are likely to be much higher than the material cost resulting from accidents. That explains why most developed countries adopt an ex ante method of estimation. However, considerable difficulties are involved in estimating the willingness-to-pay component. Estimating the cost of traffic accidents involves two important steps: (i) identifying the cost components and (ii) placing a monetary value on each of these components. The direct costs include medical and rehabilitation expenses incurred by the injured and replacement and repair costs due to property damage and other expenses (e.g., transportation costs). However, in economic assessments and insurance claims, costs arising from loss of earnings by those affected as well as compensation for pain and suffering are often included. Indirect costs are also associated with maintaining emergency and other essential services. Furthermore, there may be other social costs, including those related to congestion and delays arising from accidents or even the perpetuation or increase of poverty among low-income families whose top wage earners are killed or permanently disabled.

3.2 Available Methods

Placing a value on each of the cost component may not be straightforward, as this depends on not only the availability of data but also the manner in which the estimates are derived. The costs can be estimated in several ways. There are six methods for evaluating the cost of fatal accidents.

These are

- 1. the gross output method,
- 2. net output method,
- 3. life insurance method,
- 4. court award method,
- 5. implicit public sector valuation method, and
- 6. willingness-to-pay method.

The gross output or human capital method is based on the assessment of economic consequences, usually supplemented by a notional sum, to reflect the pain, grief, and suffering of victims and their family members. In contrast, the net output method deducts the future consumption of individuals killed in accidents, reflecting a more conservative economic cost to society. The life insurance method measures the valuation of risk associated with road usage and is determined by the life insurance premiums drivers are willing to pay. The court award method is based on the actual compensation settlements awarded, which may be influenced by the degree of negligence found. In the implicit public sector valuation method, a set of implicit values are used to value human lives. The willingness-to-pay method estimates the amount of money people affected would pay to avoid an accident. Considerable overlaps are found in the different methods, but the derived values are also substantially different.

Based on the objective of reducing accidents, articulated in the form of either a call to maximize national output or social welfare, two methods (i.e., the willingness-to-pay method or the gross output method) are most appropriate. The approaches adopted in the two methods are different. The first is to adopt an ex ante approach, which attempts to estimate the true costs by considering what a person would do to avoid being involved in an accident. The second is the ex post approach, which estimates the true costs based on historical data of costs incurred following accidents.

Willingness-to-Pay Method. The ex-ante⁵ approach involves some assessment of risk and the willingness of individuals to commit resources to reduce this risk to an acceptable level. This trade-off between risk and economic resources, measured in terms of the marginal rate of substitution of wealth for risk of death or injury, gives rise to the concept of willingness to pay in accident cost analysis. Willingness to pay to avoid a lost statistical life is affected by the context effects, which are the perceived seriousness of an accident and the scale effects (i.e., the number of casualties the accident will involve). That being the case, the willingness-to-pay approach appears to be more concerned with reducing the risk for the entire population than saving a specific life. Under this approach, the cost components or the willingness-to-pay values are assessed for three parties: (i) the individual road user facing the risk of accident; (ii) the family, relatives, and friends of the individual exposed to the risk; and (iii) the rest of society affected by the risk exposure. The willingness-to-pay approach is conceptually appealing but has practical problems when being applied to developing countries, because of incomplete or inaccurate data.

In determining the values, three types of information are needed: accident or casualty risk, risk elasticity, and valuation (economic). First, accident or casualty risk is assessed by considering individual transport modes, vehicle types, and road user categories. This is done by stratifying accidents or casualties into several categories of injury severity. Second, risk elasticity is assessed, and this describes the changes in risk in relation to other road users and is often measured in terms of probability per million vehicle-kilometers of travel. Obtaining the elasticity values for different casualty types and vehicle types is necessary but extremely difficult. This being the case, the value of statistical life is determined by combining the willingness-to-pay values with other cost components, such as gross production losses and health costs, administration costs, and property damage, as well the as the subjective pure human value.

Human Capital Method (Gross Output Method). In contrast to the willingness-to-pay method is the ex post⁶ approach, also known as the gross output or human capital method. The main component in this approach is the discounted present value of a victim's future income forgone due to premature death. Added to the present value are market costs, such as medical costs, administration costs, and property damage costs, and nonmarket output. This approach has disadvantages as it focuses only on the output effects and does not account for the value and enjoyment of life forgone. This approach grossly underestimates the true costs of accidents and will produce significantly lower values than any ex ante estimate. As a partial correction for this shortcoming, a life component involving pain, grief, and suffering is often added. Although this increases the value derived, it still results in a valuation that is generally much lower than values derived from the willingness-to-pay method. Although a few of the more developed countries have moved toward willingness-to-pay approaches, the human capital method is very common in many countries where extensive surveys to obtain perceived risks of different groups of individuals are difficult or impossible to conduct.

One appealing aspect of using the human capital method is that the cost estimates derived are conservative. Furthermore, where accident databases may not be well integrated, so that cost estimates cannot be made with a high degree of precision, the human capital method will suffice. In comparing the ex-ante and ex post approaches, the latter is more reliable and internally consistent and has a strong theoretical foundation. Indeed, various methods of costing are built on very diverse premises and thus result in vastly different cost figures. The choice of method depends on the purpose

⁵ Latin word meaning Before the event

⁶ Latin word meaning *After the event*

of the costing exercise. The willingness-to-pay method is considered the better approach for conventional cost-benefit analyses and the most efficient way of allocating scarce financial resources. However, where relevant data to produce reliable willingness-to-pay estimates may be lacking, it is recommended the gross output method. In this study, to estimate the cost of road accidents in the Republic of Srpska, the more conservative gross output method was adopted. This method is outlined in a research report (Babtie Ross & Silcock and Transport Research Laboratory, 2003).

3.3 Gross Output Method

The basis of the gross output method is the concept of a statistical life whose value is considered to be the output that an individual can produce over the period of his or her productive life. Based on this argument, the cost of an accident will then be the loss of output or the output forgone by the economy as a result of an accident. In general, the productivity of any casualty is assumed to be equal to the average in the economy. The overall cost to the national economy is then the accumulated lost output obtained. This approach views each person as a unique and valuable economic entity. The main strength is that this approach provides an objective means of arriving at an estimate. Data values are generally measurable, and the method is also useful in providing an estimate of the cost to society of a casualty over and above the private cost. However, the methodology ignores the value of leisure and only considers work performed. As a result, it places no value on the emotional content of life. Supplementing the estimates with a component of subjective costs, including pain, grief, and suffering, is possible. The conservative approach is recommended, because this ensures an indisputable minimum value obtained for road accident costs in a country. The argument is that if the investment can be justified on the basis of such a minimum value, it will certainly be justified on the basis of any other value.

The cost components in the gross output method can be divided into two categories: those involving current resources that are consumed or diverted because of accidents and those resulting from loss of future output. In the latter, the loss of output may be due to absence from work resulting from medical leave or reduction of potential productive output arising from long-term or permanent disabilities and deaths. The former includes costs associated with medical services and rehabilitation treatment; reported damage to property; and administrative, professional, and emergency services. For this study, the analysis was made for 2010, and all data and considerations are consistent for that year. As tracing the cost incurred in every accident record is impossible, the cost assessment is done on an aggregated scale, typically according to the classification of accident severity. In this report accidents are classified into four severity categories: fatal, serious injury, slight injury, and property damage only. These categories are examined in Box 1. To ascertain the correct cost values, the cost components are evaluated in two groups: casualty-related (in which the unit cost is for each accident). Costs due to lost output and medical expenses, as well as pain, grief, and suffering, are associated with each casualty involved in the accident, while property damage and administration costs are more likely to be accident-related.

Box 1: Definitions of Crashes and definition of Casualties

A **fatal crash** is one in which one or more persons are killed as a result of the accident, provided death occurs within 30 days.

A serious injury crash is one in which there are no deaths, but one or more persons are seriously injured.

A **slight injury crash** is one in which there are no deaths or serious injuries, but a person is slightly injured. This will be an injury of a minor character such as a cut, sprain or bruise.

A **damage only** crash is one in which no one is injured, but damage to vehicles and or property is sustained.

A fatal casualty in a road accident is one in which the victim dies within 30 days of the crash.

A serious injury casualty is defined as either one for which a person is detained in hospital as an 'in patient' for at least 1 night, or if any one of the following injuries are sustained whether or not he or she is detained in hospital: fractures, concussion, internal injuries, crushing, severe cuts and lacerations, or severe general shock requiring medical treatment. In the UK this category includes deaths occurring after 30 days.

A slightly injured casualty is when someone receives some medical attention (small cuts and bruises) but is not detained in hospital over night.

Once the unit cost for different categories of accidents is determined, the total national accident cost can be computed, based on the known number of classified accident counts. Since this computation makes use only of reported accident counts, it is usual also to consider, though difficult to account for, cases of unreported accidents. This will require the degree of underreporting to be established.

3 COST COMPONENTS

3.1 Introduction

The human capital method involves determining five cost components: property damage, administration costs, costs of medical treatment, output lost and human costs. For most purposes, computing these from aggregate values obtained from summarized reports is sufficient.

3.2 Damage to Property

Damage to property can be obtained from insurance companies based on property damage claims for motor vehicle accidents. Property damage costs can vary considerably, depending on the degree of wreckage sustained. Obtaining estimates based on accidents stratified according to severity may therefore be necessary. To further improve the aggregate measure, specific surveys may be conducted among fleet operators or motor vehicle workshops for different categories of vehicles, although these surveys may not include nonvehicle damage. Another problem is the disparity between the definitions of accident severity. For most purposes, accident severity is measured in terms of injuries sustained, but for property damage, severity is based on the degree of wreckage. While there may be some correlation between injury sustained and wreckage caused, the relationship is not always proportional. For example, in a pedestrian accident, the vehicle may have little or no vehicle damage but the injury sustained can be extremely serious.

The Republic of Srpska's Estimates. Almost all accidents result in some damage to the vehicles involved, and, in some cases, damage to public infrastructure, such as lampposts, guardrails, traffic signs, and road surface. The associated costs will include repairs and replacement of vehicle parts and infrastructure elements. Costs associated with property damage may also include car rental charges during the period the damaged vehicles are out of service. The estimate of property damage can be ascertained through insurance records. However, practical difficulties exist in obtaining comprehensive figures. First, not all properties are insurable and hence may not be reflected in insurance claims. Second, numerous unreported accidents occur, for which no insurance claims were made. These claims usually involve small amounts. Third, the amount of damage to property can vary considerably from one accident to another, and this may not be correlated well with the degree of injury sustained in an accident. Therefore, assigning different property damage costs for the different severity classes of accidents is difficult. Using data from insurance companies in the Republic of Srpska (Appendix 5) as well as statistics data from the Agency for insurance companies in the Republic of Srpska, the total compensation for property damage from traffic accidents amounted to BAM 44,15 million. This works out to an average claim of property damage for a fatal accident is BAM 7,115, while that of serious and slight injury accidents are respectively BAM 5,521 and BAM 3,433. Where no injuries are involved, the average damage cost is BAM 2,671.

3.3 Administrative Costs

The presence of traffic accidents in the system necessitates the devotion of resources for accident prevention and safety promotion, as well as following up on accident cases. This incurs administrative costs consumed by a number of entities, including traffic police, emergency response services, and insurance and legal service providers. In most cases, these entities do not only handle road accidents, and the expenditures may not be grouped neatly enough to allow a correct evaluation of the administrative cost of managing road safety objectives. For example, besides attending to road accidents, traffic police officers also perform traffic control duties that may also involve ensuring safe traffic movements. In some instances, administrative costs associated with activities linked directly or indirectly to accident occurrences may be well defined. An example of this is the accident investigation unit of the traffic police, which maintains its own accounts. In any accident, the associated administrative costs are likely to depend on severity. In a more serious accident, vehicles

may remain on the road longer, and more police officers may be deployed for traffic control. The process of investigation, claim, and follow up will also be longer and more complicated, potentially with drawn out legal proceedings. All these imply a higher administrative cost. Assigning different cost values for various categories of accidents is therefore necessary. Apportioning costs in this way can be difficult, unless detailed records are maintained (e.g., hours spent on duty for each case). Obtaining precise values is difficult, but perhaps such efforts may not be necessary, since the contribution of administrative costs to overall accident costs is generally low. As argued before, this cost is likely to be underestimated, so again the final computed accident cost is a conservative one. In apportioning the distribution of administrative costs to the different classes of accidents, the ratios assumed by the Economics Institute Banja Luka and the Transport Research Laboratory are used.

The Republic of Srpska's Estimates. Using available statistics from Department of Traffic Police of the Republic of Srpska, Automobile Association of the Republic of Srpska, Emergency services, Agency for insurance companies in the Republic of Srpska and similar statistics, as well as our estimations based on mentioned and similar data sources, estimated cost of administration associated with traffic crashes is amounted to BAM 13,01 million in 2010 (Appendix 6). The annual administrative costs are apportioned to the different categories of accidents, according to the assumed cost distribution for fatal, serious injury, slight injury, and damage only accidents of 12, 5, 2 and 1 respectively. The administrative cost of a fatal accident is BAM 7,051, while that of a serious injury accident is BAM 2,938. In an accident involving slight injuries, the administrative cost is BAM 1,175. A damage only accident incurs an administrative cost of BAM 588.

3.4 Medical Costs

Medical costs resulting from accidents cover a large number of items associated with the medical attention disbursed. First, victims may be given first aid and treatment and incur costs associated with ambulance service. In the more serious cases, victims require hospital treatment and emergency services and may require further nonhospital and outpatient treatment. Where a victim is hospitalized, the costs will increase, due to hospital occupancy charges and the need for inpatient medical care, surgeon and specialist services, nurse and sometimes follow-up care, and outpatient services. There may also be costs associated with the use of aids and appliances to facilitate patient movement and rehabilitation. When an accident victim dies instantly at the accident scene or shortly after the accident, the medical cost is usually lower. However, those that die after admission to a hospital will incur costs associated with emergency and intensive care services, including special room charges and medication.

The Republic of Srpska's Estimates. Medical costs vary widely, depending on the nature and severity of injuries, which are translated into duration of hospitalization and rehabilitation. Different classes of hospitals and wards offering services to accident victims also exist. Some hospitals handle specific cases. For the purpose of the analysis, the Clinical Center of Banja Luka and Eastern Sarajevo Clinic Center, being the largest public hospital and handling all types of primary accident treatment, and Hospital of Physical Medicine and Rehabilitation dr Miroslav Zotović Banja Luka, was approached to provide information on the direct cost of medical services offered for road traffic accident (RTA) victims. As no official data on the cost of treating RTA patients are recorded, a survey of RTA patients seen in February and March 2012 was undertaken by Economics Institute Banja Luka. In this, various costs were itemized according to the three classes of victims treated. For fatal cases, the number of days in the hospital before death and the associated costs for performed operations; medical checkups; and specialized treatment, were noted, as well as funeral costs. In the case of seriously injured victims, information gathered included the itemized costs incurred at the Emergency services, the number of days of hospitalization, the number of medical checkups and specialized treatments needed, rehabilitation and prosthetic, and the estimated charges. Other information related to outpatient treatment, including number of follow-up appointments within the year. For slightly injured victims, the itemized costs at the Emergency services, the number of followup appointments, and the associated charges were recorded. Based on the consolidated computations (Appendix 7), medical costs per fatality amounted to BAM 3,001, while medical costs per seriously injured casualty and slightly injured casualty were BAM 5,584 and BAM 189, respectively.

3.5 Lost Output

Lost output relates to the potential loss to the national economy because of productive time lost from an accident. Time for productive activities is lost because of delays at the accident scene and when drivers must send vehicles to workshops. Where casualties are a factor, time is lost when casualties receive medical attention in hospitals or outpatient centers. In more serious cases, time losses occur when casualties undergo follow-up treatment and/or rehabilitation and possibly attend court proceedings. For cases involving long term or permanent disabilities or fatalities, substantial losses of productive years can occur. This last component constitutes the greatest contribution to accident costs. Delays at an accident scene affect other road users more than the parties involved in the accident. In general, estimating congestion costs is difficult, since congestion effects depend on traffic flow on an affected road and may be influenced by location and time of day. The costs computed based on the period of congestion and the extent to which this affected other road users may not be readily available. Consequently, when estimating lost output, congestion effects are at times excluded.

The time casualties spend consulting with doctors, staying in hospitals, and remaining on medical leave can be obtained from patients' records. While identifying the source of this information is easy, extracting the information may not be as simple, largely because the databases are generally designed for medical reference rather than safety studies. Also, in cases involving serious injuries, records on the extended loss of productive days may not be as well documented. To complete the calculation of lost output, the value of productive time must be considered. This can be done by considering the average national wage to avoid putting higher or lower value on an individual based on his personal earnings. Average for country allows all victims to be treated equally. In many instances, productive loss not only affects the casualty but also the voluntary caregivers, who may be relatives of the casualty. This loss is seldom captured, since the total amount of time lost and the wage rate cannot be easily ascertained. This problem is particularly acute when the victims are children, since they suffer no productive loss but may impose economic losses on their caregivers. Accounting for this can be difficult.

In the case of a fatality, the lost productivity is the number of years of productive work forgone due to premature death. The extent of productive life lost depends on the age of the casualty, the potential retirement age, and the wage rate. The age distribution of accident casualties is generally well captured in the traffic police database. The potential retirement age may vary but is sufficient to assume a single common and acceptable retirement age. The wage rate needed to compute the lost output from premature death plays an important part in the overall cost assessment. From the individual standpoint, the annual wage rate is dependent on the age of the victim and also grows dynamically with time. Taken over the population, the annual wage rate varies across professions and age. While adopting a distribution of annual wages is possible, adopting a single annual wage rate is generally acceptable, and this is usually taken from the average national annual wage rate. An alternative to using the annual wage rate is to use the value of per capita gross domestic product. The wage rate and gross domestic product value are key economic indicators and are readily available. The estimate of lost output usually takes into account the expected increase in wage values accomplished (e.g., by applying a growth factor based on the anticipated percent of gross domestic product growth). The future lost output is then expressed in present values by applying a discount rate. Naturally, the choice of the gross domestic product growth rate and the discount rate will significantly affect the final computed value of lost output.

The Republic of Srpska's Estimates. In computing the economic rate of productivity for fatalities, no weight is given to the different types of individuals involved, except for the consideration of their age. An average value is assumed (i.e., all victims are assumed as average workers capable of an economic production measured by the average wage rate). This simple formulation obviates the oftenraised problem of associating the economic value of life and injury with attributes such as sex, profession, and wealth. However, it does not deal with the objection of reducing life and its quality to just an economic value; an issue that if dealt with will make economic evaluation impossible. From the age distribution of fatal accident victims in 2010 (Table 1) the weighted average age (reflecting the number in each age category) of persons killed in road crashes is 40.5 years.

Age Distribution of Extalities	Distribution of Fatalities in % for year 2010
07 - 14	2.07
14-18	3.45
18 - 21	6.90
21 - 30	20.69
30 - 40	13.10
40 - 50	18.62
50-60	17.24
> 60	17.93

Table 1: Age Distribution of Fatal Casualties

< = less than, > = greater than

Source: Ministry of Interior of the Republic of Srpska

Year	Nominal Average Gross						
	Wage Rates in BAM						
2001	444						
2002	528						
2003	576						
2004	643						
2005	707						
2006	793						
2007	875						
2008	1,132						
2009	1,204						
2010	1,199						

Table 2: Average Wage Rates

Source: Republika Srpska, Institute of Statistics

The average loss of productive years is computed based on a retirement age of 65. The age of 65 is chosen because at this age a significant number of individuals are still economically active and employable. It is for expecting that the year limit for retirement would be increased to 66 or 67 age of retirement in coming period for the Republic of Srpska. The average number of years forgone by fatal casualties is 24.50 years. Wage rates in the Republic of Srpska increased significantly in recent years because of the economic growth (Table 2). Given the uncertainty and economic crisis, projecting growth in wages is difficult. A conservative estimate would be to assume that the discount rate is similar to the growth in the wage rate. Using the average gross wage rate of BAM 1,199 per month, the lost output for an average fatal casualty was found to be BAM 368,573 at 2010 prices (Appendix 8). Based on the lost output due to estimated medical leave and the period of incapacity due to injuries sustained, as well as the average gross wage rate in national economy, the average lost output for a seriously injured victim is BAM 3,365, while that of a slightly injured victim is BAM 302.

3.6 Human Costs

The ex-post method of accident costing makes use of data relating to accidents that have occurred. This method is often criticized for its consistent underestimation of the true costs of accidents, because it fails to capture the intangible desire to enjoy life and avoid risk. To correct this, the human capital method incorporates a component of human costs. This is often termed pain, grief, and suffering. Victims and their family members suffer from psychological deterioration following accidents. The computation of cost-benefit analysis in many countries usually includes a social cost component. And, for accidents, a notional value of pain, grief, and suffering is often included, to reflect an aversion to death shared by societies and individuals. The cost associated with pain, grief, and suffering is, by virtue of its character, rather subjective. This includes the physical and mental suffering of victims and their relatives and friends. Trauma and damage to the quality of life can be included. Research undertaken to estimate this cost has involved correlating this cost component to resource costs, which can be objectively measured.

While many attempts have been made to quantify and valuate the pain, grief, and suffering experienced by affected parties, there appears to be no single rigorous method that is well accepted. A higher value of human costs implies a greater willingness of society to prevent an accident from occurring. As the method of valuation is a rather subjective one, the assigned quantum will be more likely to be based on a political decision than an economic analysis. The values also vary considerably from one country to another, even among developed nations. Given this property that the value is subject to political influence, the valuation method has also been considered to serve the objective of poverty reduction. Thus, it has been applied in less-developed countries to account for the inability of the poor or more vulnerable to cope with the aftermath of accidents. Babtie Ross & Silcock and Transport Research Laboratory (2003) listed a number of case studies to illustrate the drastic financial consequences for the poor who are involved in road accidents. Box 2 examines why the poor are more likely to be involved in accidents. Given the lack of a rigorous method of objective assessment, the difficulty in placing an appropriate value on pain, grief, and suffering is overcome by making use of benchmark values established elsewhere. The values adopted by the Transport Research Laboratory appear to be quite widely accepted and reflect the percentage of human costs to overall accident cost for an injury accident. The values are as follows: (i) 28% of total costs for a fatal accident, (ii) 50% of total costs for a serious injury accident, and (iii) 8% of total costs for a slight injury accident.

Box 2: Road Accidents and impact on the poor

In developed countries, the poor are known to be at greater risk to crashes. For example, the United Kingdom Road Safety Strategy acknowledges how children in the lowest economic stratum are five to six times more likely to be killed or seriously injured than those in the highest stratum. It has been long suspected the same applies to developing countries, as the poor will have limited, if any, transport mode choice, and they will be less able to protect or distance themselves from the exposure to traffic. Both their homes and work place are assumed to be physically closer to the threat of crashes.

International research has shown that families of those killed or permanently disabled often suffer financially and many have to go into debt to survive, Road accidents therefore perpetuate and in some cases increase poverty in low and medium income countries

Sources: Babtie Ross & Silcock and Transport Research Laboratory (2003).

The Republic of Srpska's Estimates. Currently, there is no serious research done in the Republic of Srpska to establish a reliable estimate of pain, grief, and suffering associated with road accidents. To circumvent this lack of information, the correlation estimates adopted in Babtie Ross & Silcock and Transport Research Laboratory (2003) are assumed. In this, the cost of pain and suffering for each fatality is assumed to equate to 28% of the resource cost associated with a death from a traffic accident. In the case of a seriously injured victim, the pain and suffering is equivalent to 50% of the corresponding resource cost of a person with a serious injury, while for a slightly injured casualty, this is assumed to be 8% of the associated resource cost.

Item	Fatal	Serious Injury	Slight Injury	Property damage only				
Per Casualty								
Lost output	368,573	3,365	302	-				
Medical Costs	3,001	5,584	189	-				
Human Costs	149,376	11,827	202	-				
Total per Casualty	520,950	20,776	693	-				
Per Accident								
Administrative costs	7,051	2,938	1,175	588				
Property Damage	7,115	5,521	3,443	2,671				
Total per Accident	14,166	8,460	4,609	3,258				

Table 3: Summary of Costs per Casualty and per Accident (BAM)

- = no data available

Source: Traffic Police of the Republic of Srpska, Clinical Center of Banja Luka, Eastern Sarajevo Clinical Center, Hospital of Physical Medicine and Rehabilitation dr Miroslav Zotović Banja Luka, Banja Luka Emergency service, Eastern Sarajevo Emergency service, Doboj Emergency service, Gradiška Emergency service, Agency for insurance companies in the Republic of Srpska, insurance companies in the Republic of Srpska, Automobile Association of the Republic of Srpska and Public Company Republic of Srpska Roads

Based on these computations, the costs attributed to pain, grief, and suffering is BAM 149,376 for each fatality, BAM 11,827 for each seriously injured victim, and BAM 202 for each slightly injured casualty.

3.7 Aggregate Cost

The individual cost components in each accident and casualty category are summarized in Table 3. If the crude estimates of pain, grief, and suffering are included in the computation, the human costs total about BAM 520,950 for a fatal casualty, BAM 20,776 for a seriously injured casualty, and BAM 693 for a slightly injured casualty. Even where the pain, grief, and suffering are to be excluded, the cost of a fatality will be BAM 372,000.

Computed based on accident occurrence, the total non-injury costs will be about BAM 14,166 for a fatal accident and BAM 8,460 per accident involving serious injuries. If accidents involve slight or no injuries, noninjury costs will be BAM 4,609 and BAM 3,258, respectively.

Casualties Accident Category	Fatal	Serious Injuries	Slight Injuries
Fatal Accident	1.13	0.81	1.22
Serious Injury accident	-	2.77	1.03
Slight Injury accident	-	-	2.33

 Table 4: Casualty Rates per Accident According to Economics Institute Data (2010)

Most accidents involve multiple casualties. Because of this, the casualty rates per accident must be established when computing the cost on a per accident basis. Table 4 gives the 2010 casualty rates for each class of accident based on estimated number of casualties and crashes. Taking into account multiple casualties in an injury accident, the average cost was BAM 620,618 per fatal accident, BAM 66,683 per serious injury accident, BAM 6,221 per slight injury accident and BAM 3,258 per damage only accident.

4 NATIONAL ROAD ACCIDENT COSTS

4.1 Introduction

Once the costs of individual accidents by severity and casualty are established, determining the total national cost of accidents by aggregating all individual accident costs is possible. While this may appear straightforward, several difficulties relate to the accuracy and quality of accident data.

4.2 Quality of Data

Insurance data constitute one of the richest sources of data for the evaluation of costs of accidents. However, limitations exist in the use of such data. Normally, insurance companies assess costs based on several categories (i.e., actual loss of earnings due to injury, direct medical and rehabilitation costs incurred or imminent, actual compensation for pain and suffering, direct losses due to damage to property, and any other direct costs that arise). Many of these costs can give direct insights into the economic costs of accidents. The approach in assessing the loss of earning is however different from that of the human capital method. Loss of income in the insurance database is based on the wage rates of the affected individuals, whereas in the human capital method, an aggregate value is employed (e.g., the national average wage rate or per capita gross national product). Problems are also associated with an ill-defined time frame. While gross outputs require a well-defined time period of usually 1 year, say 2011, and consequently give a spot-time measurement, insurance claims necessarily span over a period that depends on the complexity of the claims. Therefore, using insurance data on a fixed calendar year is biased, since total claims are likely to increase over time. Problems can also result from unclear case definitions. In the Republic of Srpska, the Agency for insurance companies merely collates information on claims but does not follow up on details. Moreover, insurers may submit records of claims in different ways. For example, a claim may be based on a particular casualty or may be insured by an insurer but regarded as an accident case involving several people insured by another insurer. Such discrepancies may result in a distorted average claim value. Deductibles or excess has a very strong effect on the number of reported accidents. Therefore, many small claims are unlikely to be captured, and there is no empirical study to determine the scale of such accidents.

Our small survey research (Appendix 5) reveals that claims are not filed for about 50% of all recorded accidents, mainly damage only. Given the absence of these accidents in the computation, the true cost of accidents thus computed will likely be underestimated. In cases involving minor injuries, the involved parties may also seek medical treatment without reporting accidents to the police. The greater the injury severity, the greater the likelihood of an accident being documented, either by hospitals or the traffic police. Besides the problem of underreporting, incorrect recording is a problem. Maintaining a reliable database is almost always difficult. Coding and data entry mistakes will always be present, especially for those data items that are less crucial, such as if a casualty was a passenger in the front or rear of a vehicle. Data quality depends on the design structure of the database as well as the training and ability of those responsible for data entry. Some amount of quality control is assured for those data items that are considered important for follow-up actions. That being the case, hospital staff members may pay more attention to entering injury details than to entering the details related to what actually caused an accident, while insurance agencies may be more careful recording data related to what happened before an accident occurred.

Data might also be missing, either because these were not recorded at the accident scene or because some information can only be known at a later stage (e.g., the severity of the injury). Consequently, entries can be incorrect, incomplete, or missing. In the extreme, incorrect recording involves ignoring some recorded cases because they are irrelevant to the function of a particular organization. For example, few organizations will be interested in capturing data purely for recording purposes. In line with this, a minor injury may be captured in the medical record database but may not be attributed as a road traffic accident. The degree of underreporting will affect the computation of the national accident costs. As the amount of underreporting is unlikely to be properly accounted for, the cost values will then be underestimated. To ascertain the quality of the traffic accident data and estimate the level of underreporting associated with injury accidents, a survey was conducted to compare the medical records with the data records maintained by the traffic police. The results appear in Appendix 4, and the survey is further examined in Appendix 7 and Appendix 8.

4.3 Computation of National Costs

Using the unit cost values of the individual components shown in Table 3 and the number of accidents that have occurred, the overall national accident costs can be computed. In 2010, 123 fatal accidents occurred, and these resulted in 139 fatalities. In addition, 582 accidents involving serious injuries and 3,860 accidents involving slight injuries occurred. Over 10,000 damage only accidents are estimated. As shown in Table 5, the total cost of traffic accidents occurring in 2010 was BAM 171.87 million, of which over 15% were attributable to damage only accidents, and almost 44% were attributable to fatal accidents.

For this report proportion of persons killed, seriously injured and slightly injured as a result of traffic crashes is 1:12:70 respectively (Appendix 4).

Accident Type	Number of Accidents	Average costs	Overall Costs (BAM)
Fatal	123	620,618	76,240,257
Serious Injury	582	66,683	38,575,921
Slight Injury	3,860 ⁷	6,221	23,065,548
Property damage only	10,038 ⁸	3,258	32,708,660
Total	14,603	696,780	171,865,277

Table 5: Economics Institute Estimation of National Cost of Accidents

Figure 1: Total Costs per Type of Accident in 2010



Based on a 2010 gross domestic product value of BAM 8,308.1 million, the cost of accidents was almost 2,07% of the gross domestic product.

⁷ Based on research done by Economics Institute JSC Banja Luka. Underreporting is estimated to 50% of all

traffic accidents which are equally distributed to accidents with slight injured and damage only (Appendix 5). ⁸ Based on research done by Economics Institute JSC Banja Luka (Appendix 5).

5 CONCLUSION

In comparison with other countries in the region, and especially in comparison with developed countries, the Republic of Srpska has a relatively inefficient and unsafe road network. The accident rates, especially in terms of fatal cases, are unacceptably high by international standards. This report has shown that the costs of accidents in the Republic of Srpska are high, even when using a very conservative estimation method. These values would be two or three time higher if willingness to pay method had been used in preparing the estimates.

In 2010, the annual costs of accidents amounted to BAM 171,87 million, (approximately EUR 88 million) representing nearly 2.07% of the annual Gross Domestic Product (GDP) in that year – these are recurring losses and no country – especially one which is trying to improve its economy – can afford to lose year after year. If the same order of losses is assumed over recent years, it is estimated that Republic of Srpska has lost over BAM 844 million (EUR 431 million) over the last 5 years (2007-2011) – funds that could have been invested to improve education, health and other urgent needs in the Republic of Srpska.

Given these very high recurring annual losses, relevant authorities should invest more in road safety research, to better understand the causes of road accidents, and in road safety programs, to improve the road safety environment so that we can have safer roads, safer vehicles and safer road users. Funds for those investments could be obtained in several different ways and a few alternative sources are outlined in Appendix 9.

Apart from funds for road safety, it is essential and important to have political, social and institutional willingness to tackle the road safety problem. Expenditure in road safety needs to be seen as an investment and not as a cost

Government of Republic of Srpska needs to invest in road safety interventions and activities and to strengthen the key agencies who have responsibilities in or have the ability to help reduce this terrible carnage on the Republic of Srpska Roads which is inhibiting the social and economic development of RS and its citizens.

APPENDIX 1: The Republic of Srpska - General and Transport Overview

The Republic of Srpska was proclaimed on 09th of January 1992 as a political entity verified by Dayton Peace Agreement and the signing in Paris on 14th of December 1995. The Republic of Srpska is one of two main political entities of Bosnia and Herzegovina. It is a parliamentary republic with a limited international personality. The National Assembly and the Republic of Srpska Government are based in Banja Luka, although Sarajevo remains the official capital.

Table A1.01: General and Transport Statistics of the Republic of Srpska (2010)					
Population and Area					
Land Area ¹ 24,85	8 square kilometers				
Population (estimated)	1,433,038				
Economic Indicators					
Gross Domestic Product	BAM ² 8,308.1M				
Gross Domestic Product Per Capita	BAM 5,798				
Road Network					
Highways	1,764 kilometers				
Regional	2,105 kilometers				
Local ³	10,035 kilometers				
Total Road Length	13,904 kilometers				
Vehicle Population					
Registered Cars	235,814				
Registered Motorcycles	2,050				
Registered Other Vehicles	60,500				
Total Registered Vehicles	298,364				
Automobile Driver's Licenses	482,461				
¹ Temporary data on the surface area of the Republic of Srpska which includes the portion of Brcko Distri	ct				
² Annual average exchange rate EUR/BAM = 1,9558 (Source: Central Bank of Bosnia and Herzegovina)					
³ Including uncategorized roads					

Table A1.02 shows general road traffic crashes and victims statistics of the Republic of Srpska as reported by traffic police during a period of 10 years. As it can be seen rate of deaths per 100,000 people and deaths per 10,000 registered vehicles are quite high and those ratios are almost constant through years (except for the last two years).

		once repor	teu Rouu					e Republic			
Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Description											
Total No. of Crashes	10,513	10,202	10,755	10,396	10,066	10,933	10,590	10,076	9,732	9,378	102,641
Fatal Crashes	171	178	154	146	168	176	159	155	123	150	1,580
Seriously Injured Crashes	716	666	580	539	546	649	679	603	579	577	6,134
Slightly Injured Crashes	1,496	1,463	1,524	1,363	1,425	1,709	1,723	1,620	1,424	1,526	15,273
Damage Only	8,132	7,895	8,497	8,348	7,927	8,399	8,029	7,698	7,606	7,125	79,656
Casualties ⁹											
Deaths	186	202	173	164	208	192	180	180	139	163	1,787
Seriously Injured	933	875	762	674	702	826	869	781	691	702	7,815
Slightly Injured	2,330	2,340	2,300	2,146	2,275	2,734	2,770	2,656	2,276	2,517	24,344
Deaths/100,000 People	12.79	13.91	11.93	11.34	14.41	13.34	12.52	12.54	9.7	11.37	///
Deaths/10,000 Vehicles	8.17	8.87	7.60	6.88	8.25	7.17	6.50	6.55	4.66	5.32	
Estimated losses (KM millions) Based on 2 07% CDP	87	94	106	119	135	152	176	170	172	174	///

Table A1.02: Police reported Road Traffic Crashes and Victims Statistics of the Republic of Srpska

⁹ These are police reported deaths and injuries which does not include under reporting



APPENDIX 2: The Republic of Srpska - Road Network

APPENDIX 3: Police Reported Road Crashes and Other Statistics

Table A3.01: Reported Road Crashes Resulting in Injury or Death								
Crash Severity	2009	2010	2011					
Fatal	155	123	150					
Serious Injury	603	582	582					
Slight Injury	1,620	1,426	1,521					
Total 2,378 2,131 2,253								
Source: Ministry of Interior of the Republic	of Srpska							

Table A3.02: Crash Rate per 10,000 Vehicles (Reported Crashes)			
Crashes Severity 2010			
Fatal	4.12		
Serious Injury	19.51		
Slight Injury	47.79		

Table A3.03: Reported Road Casualties as a Result of Traffic Crashes							
Type of Casualty 2009 2010 2011							
Death	180	139	163				
Seriously Injured	781	692	705				
Slightly Injured	2,656	2,287	2,516				
Total	3,617	3,118	3,384				
Source: Ministry of Interior of the Republic of Srpska							

Table A3.04: Casualty Rate per 100,000 People (Reported Casualties)			
Type of Casualty	2010		
Death	9.7		
Seriously Injured	48.3		
Slightly Injured	159.6		

Table A3.05: Number of Reported Deaths by Road User Groups							
Road User Group 2009 2010 2011							
Drivers	66	47	58				
Front passengers	25	17	19				
Passengers	24	13	20				
Motorcyclists	7	9	19				
Bicyclists	7	10	13				
Pedestrians	42	36	27				
Others	9	7	7				
Total	180	139	163				

Source: Ministry of Interior of the Republic of Srpska

Table A3.06: Number of Reported Seriously Injured by Road User Groups

Road User Group	2009	2010	2011
Drivers	272	263	249
Front passengers	140	93	110
Passengers	130	95	110
Motorcyclists	54	48	60
Bicyclists	35	31	39
Pedestrians	139	151	126
Others	11	11	11
Total	781	692	705
Source: Ministry of Interior of the Republic	of Srnska		

Source: I	Ministry of	Interior	of the	Republic	of Srpska
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Table A3.07: Number of Reported Slightly Injured by Road User Groups

Road User Group	2009	2010	2011	
Drivers	1,057	954	1,010	
Front passengers	525	463	523	
Passengers	576	448	474	
Motorcyclists	96	61	119	
Bicyclists	100	77	107	
Pedestrians	281	273	263	
Others	21	11	20	
Total	2,656	2,287	2,516	
Source: Ministry of Interior of the Republic of Stroka				

Table A3.08: Overall Reported Road Crashes						
Accident Consequences 2009 2010 2011						
Casualties	2,378	2,131	2,253			
Damage only	7,698	7,604	7,125			
Total 10,076 9,735 9,378						
Source: Ministry of Interior of the Penublic of Srnska						

Source: Ministry of Interior of the Republic of Srpska

Table A3.09: Number of Vehicles Involved in Reported Road Crashes							
2009 2010 2011							
Road Accidents	10,076	9,735	9,378				
Number of Vehicles	18,195	17,617	16,965				

Source: Ministry of Interior of the Republic of Srpska

Table A3.11: Causes of Reported Road Crashes							
Causes 2009 2010 2011							
Speeding	25.0%	27.0%	28.0%				
Alcohol and Drugs	5.5%	5.3%	12.0%				
Number of Road Accidents10,0769,7359,378							
Source: Ministry of Interior of the Republic of Srpska							

Type of vehicle damaged	Fatal	Serious Injury	Slight Injury	Damage only
Motorcar	0.98	1.08	1.23	1.59
Delivery Vehicle	0.14	0.15	0.12	0.21
Passenger Bus	0.02	0.03	0.02	0.03
Motorcycle	0.07	0.10	0.05	0.00
Moped	0.02	0.03	0.04	0.00
Bicycle	0.08	0.07	0.05	0.00
Agriculture Vehicles	0.06	0.02	0.02	0.01
Animal drawn	-	0.01	0.00	0.00
Other	0.12	0.09	0.05	0.07
Total average number	1.50	1.57	1.59	1.92
Source: Ministry of Interior of the Republic of Srpska				

APPENDIX 4: Economics Institute Sample Survey Results

Table A4.01: Economics Institute Estimated Road Crashes Resulting in Injury or Death			
Crash Severity	2010		
Fatal	123		
Serious Injury	582		
Slight Injury	3,860		
Total	4,565		

Figure A4.01.01: Road Accidents with Fatal, Serious and Slight Injuries Comparing Official Statistic and Economics Institute Estimates



Table A4.02: Economics Institute Estimates Road Crash Rate per 10,000 Vehicles

Crash Severity	2010
Fatal	4.12
Serious Injury	19.51
Slight Injury	129.37

Table A4.03: Economics Institute Estimates Road Accident Casualties			
Type of Casualty	2010		
Deaths	139		
Persons Seriously Injured	1,711		
Persons Slightly Injured	9,730		
Total	11,580		





The sample size upon which the survey was completed counts more than 800 injured patients in 2010 in Clinical Center of Banja Luka. All of them pass through medical check and the most severe among them were transported to different clinics (about 232 patients were sent to Shock room, Traumatology clinic, Neurosurgery clinic or Torocalsurgery clinic). Those patients were the most severely injured and some of them died (10 of them died in less than 30 days after traffic accident). After that we verified all of 10 people who died in hospital in less than 30 days after traffic accident (their names and surnames) in official police recordings. There were no differences between our survey research and police recording. Our conclusion is that official police recording of persons killed as a result of traffic accidents in year 2010 is correct and it is 139.

Based on the same medical research survey we calculated number of seriously injured as a result of traffic accidents in 2010. In geographical area which is covered by Clinic Center Banja Luka, there were about 800 seriously injured as a result of traffic accidents. Also, about 20% of total number of seriously injured was medically treated in some another hospital. About 960 seriously injured patients were in geographical area with about 5,257 traffic accidents (official police data) during 2010. That is about 56% of total number of traffic accidents in whole Republic. Following proportion we found that there are about 1,711 seriously injured persons as a result of traffic accidents.

The number of slightly injured persons as a result of traffic accidents cannot be calculated exactly. Medical data from Emergency services are not reliably to accurately compute number of slightly injured. We followed internationally accepted proportion: 70 slightly injured to one killed in traffic accidents.

For this report proportion of persons killed, seriously injured and slightly injured is 1:12:70 respectively.

Table A4.04: Economics Institute Estimates Casualty Rate per 100,000 People			
Type of Casualty	2010		
Deaths	9.70		
Persons Seriously Injured	119.40		
Persons Slightly Injured	678.98		

Table A4.05: Overall Economics Institute Estimates Road Crashes				
Road Accident Severity	2010			
Injury accidents	4,565			
Damage only accidents	10,038			
Total accidents	14,603			

APPENDIX 5: Damage to Property

Property damage cost estimated in this study is composed of two cost components: the cost of vehicle damage and the cost of public roadside property damages. The cost of vehicle damage was computed using data obtained from six insurance companies in the Republic of Srpska, which makes about 56% of total market share in insurance industry in the Republic of Srpska for the year 2010, and aggregated data from the Agency for insurance companies in the Republic of Srpska which was available. The cost of public roadside property damages was based on estimation from Public Company Republic of Srpska Roads. Detailed calculation of property damage costs for each category is given below.

Table A5.01: Costs of damage to property				
Description	Amount			
Cost of vehicles damage	43,301,664 BAM			
Cost of public roadside property damage	850,000 BAM			
Total damage costs	44,151,664 BAM			

While the damage is somewhat correlated with injury severity, the available data from insurance companies from the Republic of Srpska enable computing property damage by severity category. This distribution was based on sample size of about 817 cases from insurance companies: Nešković osiguranje Bijeljina, Dunav osiguranje Banja Luka, Brčko gas osiguranje Brčko, Osiguranje Aura Banja Luka, Mikrofin osiguranje Banja Luka and Jahorina osiguranje Pale. Research was done during February and March 2012.

Also, survey research conducted in five cities in the Republic of Srpska (Banja Luka, Laktaši, Prnjavor, Doboj and Teslić) during February and March 2012 among different participants in car industry (taxi drivers, auto dealers, spare part shops, tinsmiths and auto mechanics, vehicle sprayers). There were done about 25 interviews. The survey showed that there are a lot of unreported traffic crashes. The proportion of underreporting is different in small and big cities. Generally, where the city is bigger the percent of underreporting is smaller (about 30% compared with all reported traffic crashes) and vice versa (in small cities that proportion is about 70% compared with all reported traffic crashes). Material damage in that kind of traffic crashes is in average of BAM 300 per damaged vehicle. For this research assumed underreporting of number of traffic crashes is 50% of total reported traffic crashes.

To calculate average damage to property per type of crash the research conducted at insurance companies was used, as well as survey research regarding underreporting of number and costs of crashes (as explained above). For costs of reported crashes (reported to insurance companies) we applied to official traffic police numbers of crashes per type of crashes. For underreported number of crashes with slightly injured persons we used average reported material damage for crashes with material damage only. For underreported number of crashes with material damage only we used estimated average costs per damaged vehicle in amount of BAM 300 (explained above). Average number of vehicles involved in traffic crashes was given in Table A3.12. Details of calculations are given in following tables (A5.02 – 07).

Table A5.02: Reported average damage to vehicle per vehicle per type of crash					
FatalSeriousSlightDamageInjuryInjuryInjuryonly					
Average damage costs in BAM	3,362	3,248	2,804	1,727	

Data source in Table A5.02 are mentioned six insurance companies in the Republic of Srpska. That data represent average material damage per one vehicle per type of traffic crashes.

Table A5.03: Reported damage to vehicles per reported number of crashes per type of crash					
Type of Crashes	Number of reported crashes	Average number of vehicles participating in traffic crashes	Number of vehicles participating in each type of crash	Total reported material damage per type of crash in BAM	
Fatal	123	1.50	184	618,618	
Serious Injury	582	1.57	913	2,965,679	
Slight Injury	1,426	1.59	2,267	6,356,212	
Material damage only	7,604	1.92	14,632	25,273,202	
Total	9,735	///	17,996	35,213,712	

In Table A5.03 we calculated total material damage to all vehicles which were involved in reported traffic crashes in the Republic of Srpska in year 2010.

Underreported material damage to vehicles involved in unreported traffic crashes is given in table A5.04 below.

Table A5.04: Underreported average damage to vehicles per reported number of crashes per type of crash						
Type of Crashes	Number of unreported crashes	Average number of vehicles participating in traffic crashes	Number of vehicles participating in each type of crash	Estimated average material damage per vehicle in BAM	Total reported material damage per type of crash in BAM	
Fatal	-	1.50	-	-	-	
Serious Injury	-	1.57	-	-	-	
Slight Injury	2,434	1.59	3,869	1,727	6,682,752	
Material damage only	2,434	1.92	4,684	300	1,405,200	
Total	4,868	///	8,553	///	8,087,952	

In Table A5.04 we calculated total material damage to all vehicles which were involved in unreported traffic crashes in the Republic of Srpska in year 2010.

The distribution of road infrastructure property damage by crash severity category was as follows:

Table A5.05: Average road infrastructure damage per type of crash				
	Fatal	Serious Injury	Slight Injury	Damage only
Average damage costs in BAM	256,498	247,818	213,908	131,776

According to estimates from Public Company Republic of Srpska Roads, the cost of public roadside property damages in 2010 was BAM 850,000 in total. This amount is distributed to all four types of traffic crashes in the same proportion as is distribution of reported average damage to vehicle per vehicle per type of crash (Table A5.02).

The next table shows total property damage (vehicle damage and public roadside property damage) per type of traffic crashes.

Table A5.06: Total damage to property per type of crash				
FatalSeriousSlightDamaInjuryInjuryInjuryonly				
Total damage costs in BAM	875,116	3,213,498	13,252,872	26,810,178

The distribution of total property damage by severity category to all traffic crashes was as follows:

Table A5.07: Average damage to property per type of crash				
	Fatal	Serious Injury	Slight Injury	Damage only
Average damage costs in BAM	7,115	5,521	3,433	2,671

In the Republic of Srpska there is a lot of old vehicles so average material damage is relatively small compared with countries with high GDP per capita. Regarding the age of vehicles, 11.4% of total number of vehicles in the Republic of Srpska in year 2010 is in the category of age to 5 years, 36.8% in the category of 6-15 years, while 51.8% of registered vehicles older than 15 years.

APPENDIX 6: Administrative Costs

In any road traffic crash, administrative costs mostly include those associated with the administration of police services, court proceedings, insurance, rescue team and medical services, and others. Distribution of all administrative costs to the most important participants in the Republic of Srpska in 2010 was as follow:

Table A6.01: Administrative costs per institutions			
Description	Amount		
Traffic police of the Republic of Srpska	1,800,000 BAM		
Court and prosecution (including lawyers)	9,354,227 BAM		
Insurance companies	1,418,942 BAM		
Automobile Association of the Republic of Srpska and private companies and handy crafts with similar business	422,378 BAM		
Emergency services	15,605 BAM		
Other	1,000 BAM		
Total administrative costs	13,012,152 BAM		

A Court and prosecution administrative cost refers mainly to different kinds of autopsy, expert testimonies (medical, mechanic-technical, traffic-technical, alcohol in blood, technical soundness of vehicles etc.), court fees, witnesses testimonies, costs of enforcement of courts sanctions, lawyers etc. Automobile Association of the Republic of Srpska transport about half of all damaged vehicles in traffic crashes in the Republic of Srpska. The rest is transported by private companies and handy crafts. An administrative cost of Emergency service is manly fuel and depreciation of vehicles cost. Other administrative costs could be attributed to firefighters, Public Company Republic of Srpska Roads, Agency for insurance companies in the Republic of Srpska etc. The annual administrative costs are apportioned to the different categories of accidents as follow:

Table A6.02: Administrative costs per type of accident					
FatalSeriousSlightDateInjuryInjury0					
Total administrative costs in BAM	867,320	1,709,960	4,536,390	5,898,482	
Administrative costs per one crash per type of accident in BAM	7,051	2,938	1,175	588	
Proportion	12	5	2	1	

In apportioning the distribution of administrative costs to the different classes of accidents, the assumed ratios are done by professional judgment of the author and international experience of the SweRoad specialists and the guidance documents of the UK Transport Research Laboratory.

APPENDIX 7: Medical Costs

Medical costs were calculated based on data obtained from medical institutions in the Republic of Srpska which are responsible for primary and secondary care of the injured. These are the following institutions: Banja Luka Emergency service, Eastern Sarajevo Emergency service, Doboj Emergency service, Gradiška Emergency service, Clinical Center of Banja Luka, Eastern Sarajevo Clinical Center and Hospital of Physical Medicine and Rehabilitation dr Miroslav Zotović Banja Luka.

The sample size upon which the survey was completed included more than 800 injured patients in 2010 in Clinical Center of Banja Luka. All of them pass through medical check and the most severe among them were transported to different clinics (about 232 patients were sent to Shock room, Traumatology clinic, Neurosurgery clinic or Torocalsurgery clinic). Those patients were the most severely injured and some of them died (10 of them died in less than 30 days after traffic accident). For all of them we have very detailed medical costs specification. Another 568 patients were also severely injured but they were not in life-threatening medical condition. Besides that we collected data from Eastern Sarajevo Clinical Center, Banja Luka Emergency service, Eastern Sarajevo Emergency service, Doboj Emergency service and Gradiška Emergency service. Sample size of survey in Doboj Emergency service was about 86, in Gradiška Emergency service about 119 patients, in Banja Luka Emergency service about 136 patients (two months, January and July), in Eastern Sarajevo Emergency service about 22 patients. Also, we collected data regarding average cost approximation per seriously and slightly injured from Eastern Sarajevo Clinical Center. Medical costs calculation and approximation of average medical costs per death, severely and slightly injured, as well as average number of days spent in hospitals and average costs of emergency services, was based on the sample survey.

Detailed calculation of medical costs for the victims as a result of the accident for each category is given below.

Table A7.01: Medical costs of persons killed in traffic crashes				
Description	Amount			
Average hospital costs per fatal casualties	6,590 BAM			
Estimated number of patients who died during hospitalization	19			
Total cost of medical treatment of patients who died in the hospital	125,204 BAM			
Costs of emergency service	13,900 BAM			
Other costs	278,000 BAM			
Total medical costs of persons killed in traffic crashes	417,104 BAM			

"Other costs" means the funeral expenses and other similar charges.

Table A7.02: Medical costs of seriously injured persons in traffic crashes

Description	Amount
Costs of emergency service	136,880 BAM
Costs of primary medical treatment of seriously injured persons	2,287,969 BAM
Rehabilitation costs	5,992,109 BAM
Costs of home treatment	342,200 BAM
Other costs	795,615 BAM
Total medical costs of seriously injured persons	9,554,773 BAM

"Other costs" means the cost of subsequent medical control, costs of prosthetic devices, third persons care and other similar charges.

Table A7.03: Medical costs of slightly injured persons in traffic crashes			
Description	Amount		
Costs of emergency service	82,500 BAM		
Costs of primary medical treatment of slightly injured persons	57,200 BAM		
Costs of home treatment	729,750 BAM		
Other costs	973,000 BAM		
Total medical costs of slightly injured persons	1,842,450 BAM		

"Other costs" means the cost of subsequent medical control, third persons care and other similar charges.

APPENDIX 8: Lost Output

Lost output was calculated based on data obtained from Traffic Police of the Republic of Srpska, Bureau of Employment of the Republic of Srpska, the Republic of Srpska Institute of Statistics and medical institutions in the Republic of Srpska which are charged for primary and secondary care of the injured. These medical institutions are the following: Hospital of Physical Medicine and Rehabilitation dr Miroslav Zotović Banja Luka, Clinical Center of Banja Luka and Eastern Sarajevo Clinical Center. The sample size upon which the survey was completed counts about 800 injured patients (Appendix 7). We used estimates of costs of rehabilitation per severely and slightly injured persons given by Hospital of Physical Medicine and Rehabilitation dr Miroslav Zotović Banja Luka and Eastern Sarajevo Clinical Center. Detailed calculation of lost output for the killed and injured as a result of the accident for each category is given below.

Table A8.01: Lost output of persons killed in traffic crashes				
Description	Amount			
Average number of years lost as a result of fatal outcome of crashes	24,50			
Average monthly gross salary in the Republic of Srpska in 2010	1,199 BAM			
Total lost output of family members	88.886 BAM			
Total lost output of persons killed in traffic crashes	49,094,414 BAM			

Average number of years lost as a result of fatal outcome of crashes was calculated as it is shown in Table A8.02.

Table A8.02: Average number of years lost as a result of fatal outcome of crashes					
Age Distribution of Fatalities (1)	Number of Fatalities (2)	Number of lost working years (3)	Number of lost working months (4) = (2)x(3)x12	Lost output in BAM (5)	Average lost working years (6) = (2)x(3)
< 07	-	-	-	-	-
07 - 14	3	47	1,692	2,028,708	141
14 - 18	5	47	2,820	3,381,180	235
18 - 21	10	45	5,400	6,474,600	450
21 - 30	29	40	13,920	16,690,080	1,160
30 - 40	18	30	6,480	7,769,520	540
40 - 50	26	20	6,240	7,481,760	520
50 - 60	24	10	2,880	3,453,120	240
> 60	24	5	1,440	1,726,560	120
Total	139	244	40,872	49,005,528	3,406

The computation is based on a retirement age of 65 as it is defined by law in the Republic of Srpska. For children who died as a result of traffic crashes in age less than 18 we computed lost working years from 18 till 65 years of life. Number of lost working months was computed multiplying number of fatalities with number of lost working years and with number of months in year. Lost output in BAM was calculated multiplying number of lost working months with average monthly salary in the Republic of Srpska for year 2010 (Table 2). Average number of years lost as a result of fatal outcome of crashes was calculated dividing total of column 6 (average lost working years) with total number of fatalities.

Computation of lost output of seriously injured persons as a result of traffic crashes is shown in Tables A8.03 and A8.04.

Table A8.03: Lost output of seriously injured persons in traffic crashes				
Description	Amount			
Average number of months lost as a result of serious injured	1,74			
Average monthly gross salary in the Republic of Srpska in 2010	1,199 BAM			
Total lost output whiles looking for a new job	1,230,893 BAM			
Total lost output of carers	478,681 BAM			
Total lost output of family members	239,340 BAM			
Total lost output of persons seriously injured in traffic crashes	5,517,139 BAM			

Average number of months lost as a result of traffic crashes with seriously injured persons was calculated as it is shown in Table A8.04.

Table A8.04: Average number of months lost as a result of crashes withseriously injured persons			
Age Distribution of Fatalities (1)	Number of injured (2)	Number of lost working months (3) = (2)x2	Lost output in BAM (4)
< 07	32	-	-
07 - 14	87	-	-
14 - 18	104	-	-
18 – 21	141	282	338,118
21 - 30	326	652	781,748
30 - 40	302	604	724,196
40 - 50	247	494	592,306
50 - 60	247	494	592,306
> 60	225	450	539,550
Total	1,711	2,976	3,568,224

Children till 18 years of life do not have working capacity. Seriously injured persons spent approximately two months as a result of sick leave, rehabilitation and medical controls (column 3). Average number of months lost as a result of serious injured is a result of dividing total of column 3 with total of column 2 and it represents average (taking in account children without working capacity) number of months of lost output. Lost output in BAM was calculated multiplying number of lost working months with average monthly salary in the Republic of Srpska for year 2010 (Table 2).

Computation of lost output of slightly injured persons as a result of traffic crashes is shown in Tables A8.05 and A8.06.

Table A8.05: Lost output of slightly injured persons in traffic crashes			
Description	Amount		
Average number of days lost as a result of slightly injured	6,04		
Average monthly gross salary in the Republic of Srpska in 2010	1,199 BAM		
Total lost output of family members	467,040 BAM		
Total lost output of persons slightly injured in traffic crashes	2,814,282 BAM		

Table A8.04: Average number of days lost as a result of crashes with slightlyinjured persons			
Age Distribution of Fatalities (1)	Number of injured (2)	Number of lost working days (3) = (2)x7	Lost output in BAM (4)
< 07	272	-	-
07 - 14	447	-	-
14 - 18	621	-	-
18 - 21	1,093	7,651	305,785
21 - 30	2,493	17,451	697,458
30 - 40	1,668	11,676	466,651
40 - 50	1,293	9,051	361,738
50 - 60	1,013	7,091	283,404
> 60	830	5,810	232,206
Total	9,730	58,730	2,347,242

Average number of days lost as a result of traffic crashes with slightly injured persons was calculated as it is shown in Table A8.06.

Children till 18 years of life do not have working capacity. Slightly injured persons spent approximately seven days as a result of sick leave, rehabilitation and medical controls (column 3). Average number of days lost as a result of slightly injured is a result of dividing total of column 3 with total of column 2 and it represents average (taking in account children without working capacity) number of days of lost output. Lost output in BAM was calculated multiplying number of lost working days with average monthly salary in the Republic of Srpska for year 2010 (Table 2) and dividing with 30 (average number of days in month).

Costs of lost output as a result of travel time delays, of those delayed by traffic crashes, in the Republic of Srpska in 2010 was estimated to 2,500,000 BAM and it is divided in proportion to all three types of crashes. In this moment there is no way to calculate exact figure which would represent real costs of mentioned lost output. This approximation was done in consultation with the SweRoad specialists and was based on the guidelines from Transport Research Laboratory based on international experience. Lost output of persons killed in traffic crashes is the biggest cost component in total lost output with 85% of total lost output amount. For seriously and slightly injured these percentages are 10% and 5% respectively. 2,500,000 BAM of costs of lost output as a result of travel time delays, of those delayed by traffic crashes is divided to all three types of casualties (fatality, seriously and slightly injured) in mentioned proportion, 85%, 10% and 5% respectively.

Average lost output ratios for each severity of casualties in total was as follow:

Table A8.07: Average lost output ratios for each severity of casualty			
	Fatal	Seriously injured	Slightly injured
Average lost output ratios per casualty	1,221	110	1

APPENDIX 9: Alternative funding of road safety activities

The problem of safety in traffic is associated with both financial and non-financial factors. Financial factors included fund raising for improvement of traffic safety and appropriate deployment of resources so that the impacts of investments can be maximized. Non-financial factors could include serious willingness to start solving this problem, as well as official guidelines on who, what, when and how to achieve the desired results.

Funds for financing road safety improvements can be collected from several sources. The choice of one or more sources, or any combination of the multiple sources in one model, will depend on the decision makers. A brief financial analysis is presented of seven most potential and most appropriate methods which could be used in the Republic of Srpska, for rasing funding for road safety improvement. These also indicate the potential funding that could be raised from such sources. These methods and sources of funding are:

Earmarked Income - Potential government revenues assigned directly to road safety without going through Treasury. Examples of revenues which could be used for improvement of road safety are: traffic fines, customs taxes on imported vehicles, certificates of imported cars (homologation or type testing), parking fines, driver's medical examination etc. Particularly interesting revenues are traffic fines and certificates of imported used cars since they are directly related to road safety. Total funds collected through traffic fines should be put into a Road Safety Fund and some of that income used for better equipment for traffic police. That would make police more active which would result in more money collected and less traffic crashes. The principle behind this way of collecting funds is that bad drivers should pay more for road safety. In 2010, slightly less than 11 million BAM was collected through traffic fines and in 2011 that amount was even bigger. Also in 2011 about 45 thousand vehicles were submitted for type testing/homologation. If the price of homologation/type testing was increased by 10 BAM per vehicle it could bring an additional income to a road safety fund of about 450,000 BAM.

Policy on safety budget based on annual losses – This method emphasizes annual losses as a result of traffic crashes. A portion of such losses is spent on road safety as an investment to reduce such losses. That amount could be a fixed percent of annual GDP based on annual losses incurred¹⁰. The source of funding should be the national budget or any other appropriate source. This method is very simple to apply. In Republic of Srpska annual losses are now over lit 2% of total GDP It is widely accepted that the benefit cost ratio in road safety work is at least 10:1 i.e. there will be a "saving" of at least 10 EUR for every 1 EUR spent on road safety interventions to Road safety offers very high return in investment and government should think seriously about investing in road safety so that the significant savings can be available for investment in better health, education and other urgent needs of the Republic of Srpska.

Road Funds – Higher levies should be put on road user charges such as fuel excise duties, vehicle licenses, driving tests, yearly inspection of technical soundness of vehicles etc. The principle behind this is way of fund raising is to put more levies on those who are the most involved in the transport sector and who will benefit from improved road safety and driving comfort. This method can provide significant funds. It is reliable and grows over time so allows forward planning. In the Republic of Srpska in 2010 there were 298,364 road vehicles and trailers registered. If price of vehicle licenses were increased by just 10 BAM for road safety that would result in 3 million BAM being collected for that purpose. During 2010 in Republic of Srpska about 927 million BAM of vehicle fuels was sold. If

¹⁰ In Japan for example their annual losses were 1.2 % of GDP and they made a policy decision to spend one half of this every year (0.06 % of GDP) to improve road safety. Over a 10 year period they reduced deaths and injuries by 50% through a very successful road safety improvement programme.

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the price of fuel were increased by 1% per liter that would result in about 9 million BAM in road safety fund. In 2010 in the Republic of Srpska there were 19,836 driver test applicants (persons who took driver exams). If the price of driving tests were increased by 10 BAM per one applicant that would result in about 198,000 BAM in road safety fund. Also, if the price of yearly inspection of technical soundness of vehicles were increased by 10 BAM that would result in about 3 million BAM collected for road safety purposes.

Insurance Levies – This advocates a small levy on compulsory 3rd party insurance to fund road safety. This method enables growing guaranteed income for road safety funding. Insurance companies should see it as part of their "loss reduction". In 2010 in Republic of Srpska all insurance companies collected about 93 million BAM in premiums for liability insurance for motor vehicles. Increase in price of premiums by 8% for allocation to road safety would result in about 7.44 million BAM into the road safety fund. Insurance companies are already supposed to allocate 1% of premiums collected for prevention and safety purposes. That comes to about 930,000 BAM per year but such funds are not being spent in road safety improvement but instead are being used internally by the insurance companies to meet their own operational needs. These funds should be handed over to a road safety fund.

Public Company Republic of the Srpska Roads – This Company should be very interested in improvement in roads safety in the Republic of Srpska. It should be possible to allocate a portion of the Company's total income to road safety. If 5% of the Company's total income was allocated this would be absolute terms an amount of 3.9 million BAM and well below international recommendations for such allocations.¹¹

Multilateral Development Banks and Bilateral Donors – In the absence of enough funding from domestic sources loans and grants could be used from development banks and aid agencies. Most of the Multilateral Development Banks and Bilateral Donors now are very committed to providing more funds for road safety. There are a lot of opportunities to get safety funding so if there is a need and possibility to use them, it should be used. Road safety is an investment giving higher economic returns than almost anything else that government borrows money from such sources to invest in such as roads, agriculture etc. Borrowing to invest in road safety gives very high rates of return on investment for the Republic of Srpska.

General Sponsorship – This form of alternative funding enables private companies to provide funding for specific activities of interest to them. This method can never be the main way of fund raising but is a useful supplement to other methods. In this way it is possible to target areas which are not covered by other funding. Such funding tends to be collected in small amounts.

In the table A 9.1 possible sources are given which could be used to finance road safety improvement in future.

¹¹ Internationally the 7 multilateral development banks (including World Bank) and the UN Decade are suggesting that countries should allocate 10% of their infrastructure budgets for road safety improvements on existing road networks. Hence the suggested 5^% allocation in the Republic of Srpska is very modest compared to what is being suggested internationally

Table A9.01: Alternative funding sources for road safety activities			
No.	Alternative funding sources	Funds possible to collecting	Money collected for road safety in 2010
1	Earmarked Income		
	- traffic fines	11 million BAM	No money collected
	- homologation	450 thousand BAM	No money collected
2	Policy on safety budget based on annual losses	9 million BAM	No money collected
3	Road Funds		
	- yearly vehicle license	3 million BAM	No money collected
	- fuel excise duties	9 million BAM	No money collected
	- driver exams	198 thousand BAM	No money collected
	 yearly inspection of technical soundness of vehicles 	3 million BAM	No money collected
4	Insurance Levies	7.44 million BAM	No money collected ¹²
5	Public Company Republic of Srpska Roads	3.9 million BAM	No money collected
6	Multilateral Development Banks and Bilateral Donors	approximation	No money collected
7	General Sponsorship	small amounts	No money collected
	Total potential fund	46,988,000 BAM	No money collected

Combination of more than one of the above sources would be the most appropriate forward. In that way fluctuations would be eliminated in fund raising and in addition, the funding burden would be spread across a number of contributors. Road safety budget should ideally be at least BAM 20 million in year 2013 and during the coming years it should be expanded as needed. In that way would be possible to invest enough money to decrease the numbers of deaths and injuries and thereby the total losses to the Republic of Srpska economy.

For the first four alternative funding sources, there would be a need to change regulating legislation. Traffic fines now go to the Republic budget and this would need to be changed so they could be directed to road safety via a road safety fund. Price of homologation could be increased and the difference in money collected in that way could also be put into the road safety fund. This too could only be done by changing regulating legislation.

A paragraph should be included in the Republic's national budget for year 2013 which would specify and regulate funding sources for road safety. Those Funds would be solely used creating a road safety Fund and such funds would be spent only to increase road safety. Funds paid into such a road safety fund by government should be at least BAM 4-5 million per year.

Fuel excise duties also go directly to the national budget. A small portion of that that money should perhaps go to the road safety fund because parties who use fuel are also those who will benefit from safer and more comfortable driving conditions. If it is not possible with present fuel price regulation (distribution of excise duty) then the relevant regulations should be changed to allow a fuel price increase of only 1%. Money collected in that way could be allocated for use solely for improving road safety.

¹² Insurance companies are supposed to devote 1% of premiums to preventive activities in safety. In 2010, this should have been BAM 930,000 but in practice they do not spend the full amount each year and even the amounts they spend are spent mostly internally on their own needs. Despite the legal requirement to do so, Insurance companies spend little or no money on road safety.

Prices of annual vehicle license, annual inspection of technical soundness of vehicles, driver exams etc. are quite low in comparison to the potential losses which are caused by traffic crashes (more that 2% of GDP per year). Funds for road safety could be raised by increasing prices for such services. Funds collected in that way could also be spent on traffic accidents prevention.

Insurance levies as a source, already exists in theory as Insurance companies are supposed to apply 1% of premiums collected on prevention and safety activities but in practice they have consistently failed to comply with their legal obligations. In the last 5 years they should have spent BAM 4.8 million on such activity but in fact spent only BAM 3.5 million, retaining the difference BAM1.32 million within their companies. Even the funds (BAM 3.5 million) supposedly spent on prevention and safety activities was mostly spent on their own internal needs or training of staff. Little or no money was spent on road safety despite their legal obligations to do so. There is need for stronger regulation which would force insurance companies to invest that money in road safety In addition consideration should be given to increasing insurance levies (in accordance with World Bank recommendations) to a round a maximum 8% of total insurance premiums received. For such an increase the Republic of Srpska would have to review and modify its legislation.

Much of the road infrastructure needs additional safety elements to be added to make it safer for road users. There are many instances of unsafe practices, identified black spots and inadequate safety provision for road users that leaves them unnecessarily exposed to increased risk of deaths and injury. Ministry of Transport and Communication of the Republic of Srpska have to regulate financial management of Public Company Republic of Srpska Roads and oversee the Company's acts MoTC can require Public Company Republic of Srpska Roads to set aside an annual allocation of 5% of total revenue to improve road safety of their existing road network and to avoid building or operating unsafe roads in future. Such funds can be applied to improve the unsafe parts of the existing networks and to train local professionals to avoid such problems on future roads.

During the research and writing of this Report the Authors have had problems, especially during data collection. In the Republic of Srpska data sources are not very well structured and organized. This is especially the case with data from medical sector and insurance companies. Data bases are not connected between different data sources and in some cases, especially medical sector, there are no adequate hardware and software solutions in place. Insurance companies do not report adequate data to the Regulatory Agency for insurance companies in the Republic of Srpska which could be used for easy computation of cost of crashes (For example material damage is not separated from other types of damage in vehicle insurance). All of that complicates researching and reporting regarding costs of crashes in the Republic of Srpska. It also complicates and makes it difficult to manage the entire traffic safety system in the Republic of Srpska.

REFERENCES

Agency for insurance companies in the Republic of Srpska. 2011. *REPORT on the situation in the insurance sector of the Republic of Srpska for the period from 01.01.2010. to 31.12.2010.* Available: http://www.azors.rs.ba/azors/izvjestaji.html

Asian Development Bank – Association of Southeast Asian Nations. 2002. Regional Road Safety Program, Accident Costing Raport AC 8: Singapore

Asian Development Bank – Association of Southeast Asian Nations. 2003. *Regional Road Safety Program, Accident Costing Raport AC 9: Thailand*

Babtie Ross Silcock and Transportation Research Laboratory. 2003. Guidelines for Estimating the Cost of Road Crashes in Developing Countries, Final Report, Department for International Development R7780

Fakultet za saobraćaj i komunikacije Sarajevo. 2011. Federation of BiH Road Strategy, Action Plans and Mitigation Measures in high-risks, The Cost of Road Traffic Accidents in FBiH

INTERNATIONAL TRANSPORT FORUM. 2011. Accident cost, speed and vehicle mass externalities, and insurance. Discussion Paper No. 2011-26

National Assembly of the Republic of Srpska. 2011. *Law About Pension and Disability Insurance in the Republic of Srpska*. Available: <u>http://www.narodnaskupstinars.net/cyrl/?page=133</u>

National Assembly of the Republic of Srpska. 2011. *LAW ON THE ROAD TRAFFIC SAFETY in the Republic of Srpska*. Available: <u>http://www.narodnaskupstinars.net/cyrl/?page=133</u>

Republika Srpska Institute of Statistics. 2009. *STATISTICS OF WAGES, EMPLOYMENT AND UNEMPLOYMENT, STATISTICAL BULLETIN*. Available: <u>http://www.rzs.rs.ba/English.htm</u>

Republika Srpska Institute of Statistic. 2011. *STATISTICAL YEARBOOK OF REPUBLIKA SRPSKA*. Available: <u>http://www.rzs.rs.ba/English.htm</u>

Republika Srpska Institute of Statistic. 2011. *TRANSPORT AND COMMUNICATIONS*. Available: <u>http://www.rzs.rs.ba/English.htm</u>

Republika Srpska Institute of Statistic. 2011. WAGES, EMPLOYMENT AND UNEMPLOYMENT. Available: <u>http://www.rzs.rs.ba/English.htm</u>