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National Road Crash Injuries – An Estimation and Comparison with Previous National Studies

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ABSTRACT

Every year, approximately 1.24 million fatalities and 20 to 50 million non-fatal injuries occur worldwide due to road traffic collisions. This poses a serious social and economic challenge to all countries around the world. Effective road safety measures can only be introduced if the extent of the problem is thoroughly explored. Pakistan faces a similar problem and in spite of a rapidly growing population and sharp increase in vehicle fleet size, no real efforts have been made to obtain estimates of the number of injuries resulting from road traffic crashes every year. This study presents a survey to estimate the annual road crash injuries for Pakistan using data provided by Reputed world Organizations, including WHO (World Health Organization), IRF (International Road Federation), WB (World Bank), using two different measures of relative road safety. Annual road crash injuries for Pakistan were estimated using annual crash injuries data from seventy-four countries having vital registration systems. Results of this study were compared with past national studies on road crash injuries estimation which showed vast discrepancies due to use of insufficient or highly under-reported data or the use of flawed methods by those studies.

1. Introduction

Recently, Road Traffic Crashes (RTC) has increased substantially, thus posing a great challenge. Approximately 1.24 million people die yearly on roads and 20 to 50 million suffer non-fatal injuries as a result of RTC [1]. These consequences of RTC have proven to be an enormous public health challenge not to mention the impact on social disintegration of the concerned society by death or mutilation. Road Crash Injuries (RCI) and Road Crash Fatalities (RCF) are estimated to witness an increase as much as 65% in the coming 20 years, therefore, the outstanding necessity to implement creative initiatives for the amelioration of the safety of roads around the globe casting special concern over low and middle-income countries. Hospitals in many low and middle-income countries are encumbered by traffic-related injuries in between the range of 30% and 86% of all trauma admissions. Moreover, economically the cost of RCI is expected at roughly 1%, 1.5% and 2% of gross national product (GNP) in low, middle and high-income countries respectively [2]. It is foreseen that if the present situation is not addressed and precautions not implemented immediately, especially in low and middle-income countries, RCI will hold the fifth-leading cause of death by the year 2030, this fifth-leading cause of death already is held by RCI for youngsters aged between 15-29 years [1]. Pakistan is a developing country of South Asian region having the sixth largest population in the entire world (180.71 million as of 2012) [3]. RCI and RTC caused a significant influence on the country's economic conditions, round about RS 100 billion annually is spent to counteract the malignant effects of RCI and RTC [4]. In Pakistan, RCI holds the second-leading cause of disability, the fifth cause of overall healthy life-year losses and the eleventh cause of premature fatality [5]. Pakistan is facing a major issue of data reporting and recording systems. Estimates in regard to RCI have not shown constancy according to the previous studies, the deviations were generally wide as averred by NTRC, in 1999 roughly 1.4 million RTC took place in Pakistan [6]. Hyder et al. conducted a study at national level and concluded that only 37 individuals per 10,000 registered vehicles get injured annually [7]. Study conducted by Ghaffar et al. established that around 1,500 road crash injuries per 100,000 populations occur per annum [8]. Similarly Fatmi et al. established that approximately 1,700 individuals per 100,000 populations experience injuries caused by RTC in Pakistan annually [9]. It is estimated that two million crashes took place in Pakistan in 2006 and 0.418 million were of the sever description [10]. Nevertheless, recent data intimated that

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these figures could be four to ten times greater than claimed officially [11]. The RCI, mentioned in the WHO report "Global Status Report on Road Safety-2009", are 12,990 for the year 2007 [1], the variation is clearly protruding, more than which can be ignored or neglected. Nevertheless 12,990 RCI is a figure that does not call for concern since it belongs to the sixth world largest populated country. The road safety situation in Pakistan indicates that there is no approved transport policy in Pakistan. A significant drop in RCI in the country is possible if road traffic safety expenditure is increased. The RCI displays an increasing trend due to low traffic safety awareness, negligence in implementation of traffic rules, overloading, bad road conditions, low standards of vehicle maintenance, road safety law violations and increasing urbanization and motorization.

Still, before implementing any safety strategies or techniques, a thorough investigation must be carried out to find the causes behind this figure. None of the researches in past considered all the possible contributing factors to RCI. Some considered only few factors and some predicted the RCI nationwide or citywide. Razzak and Luby used capture and re-capture method to estimate road traffic injuries and fatalities for only Karachi city [12]. Farooq et al. used standard surveillance methods to study road traffic injuries for Rawalpindi city [13]. Similarly Bhatti et al. also studied road traffic injuries using cross sectional (survey) data from Rawalpindi city only [14]. Also Bhatti et al. studied discrepancies in data on road traffic injuries collected from police, hospital emergency services and Edhi ambulance services for Karachi city [15].A study conducted in Karachi city used surveillance system and found that at best, only 2-3% of road crash injuries are mirrored in the police records [16]. A study in Karachi city used three years data (2007-2009) form an ongoing surveillance system revealed that clothing-related motorcycle injuries also contribute to road crash injuries. The study concluded that 0.9% of road crash injuries are the cases of clothing-related motorcycle injuries of which 73.9% are females [17]. The annual incidence of road crash injuries is 184.3 per 100,000 populations and mortality is 5.7 per 100,000 populations in Karachi city [18]. A study used nine months data (July 2013 – March 2014) on motorcycle related injuries in Lahore city found that 66% clothing related pillion riders' injuries contribute to these road crash injuries out of which 10.3% were of severe nature owing to not wearing helmets [19]. Results from a retrospective registry-based study conducted in Lahore city concluded that the number of reported RTCs increased 3.8 times during 2005–2010. Motorcyclists contribute to 45% of RTCs out of which 40% are due to over-speeding [20].

Injuries due to road traffic crashes can be mitigated with suitable counter measures. Reliable estimation of annual road crash injuries is a basic step in understanding the extent of the problem and focusing on remedial efforts in the right direction. However, the main issue is availability of quality data. The literature that was considered for comparison and estimation of RCI values in this research was acquired from two national as well as international sources. National Highway and Motorway Police (NH&MP) is responsible for the gathering of data through their police stations, for road traffic crashes. The data acquired from police may be useful but may not be consistent and is sometimes completely unreliable. Similarly data obtained from hospital records may have recording issues. Whereas many international organizations such as World Bank, WHO and Asian Development Bank publish data that can be valuable and helpful with regards to road crash injuries studies. There is no systematic procedure for road crash data recording, reporting and storing in the country. Useful RCI data that is both accurate and regularly published or renewed is not yet available.

To overcome road safety problems in Pakistan, there is a need to play our role at the national level in inhibiting and reversing the current trends of RCI. Reliable estimation of annual RCI is an important step towards achieving a clear understanding of the nature of the problem. This paper aims to investigate the reliability of the data reporting and recording system in Pakistan. Average Rate method was used to estimate the RCI for Pakistan for the year 2016 based on the data of countries having vital registration record. The results of this study were compared with previous national studies and thus the conclusion was reached that previous national studies predicted a figure for national road crash injuries that seemed unrealistic whereas in reality, road crash injuries based on both population and registered vehicles for the year 2016 came out quite reasonable.

2. Research Methodology

This study used data from WHOs Global Status Report on Road Safety-2009 [1]. The WHO gathered data on road safety through a standardized survey conducted in 178 countries across the globe in 2007. The WHO data were collected through the assistance of a number of different sectors and stakeholders in each country, coordinated by a "National Data Coordinator" at country level. RCI rate is evaluated on the basis of "exposure". The normalized measures of relative road safety across the world are injuries per hundred thousand populations (IPHTP), injuries per thousand registered vehicles (IPTRV) and injuries per vehicle-miles travelled. These measures have proven to be good surrogates to an individual's potential risk of crash. In this study, IPHTP and IPTRV are comparatively analyzed and illustrated as follows:

$$\text{IPHTP}=\left(\frac{\text{I}}{\text{P}}\right)*100{,}000$$

$$\text{IPTRV}=\left(\frac{I}{RV}\right)*1000$$

IPHTP is the number of injuries per hundred thousand populations; P is the total population of a country; I is total number of injuries in a country; IPTRV is the number of injuries per thousand registered vehicles and RV is the total number of registered vehicles in a country.

Annual road crash injuries for Pakistan were estimated using annual crash injuries data from seventy-four countries having vital registration systems. The simple average of road crash injuries of the 74 countries having reliable vital registration systems and average annual road crash injuries of Pakistan are then estimated using population and registered vehicles as response variable in the following manner.

2.1 Average Injuries based on Population

The average annual injuries of Pakistan based on population, for the year 2016 are as follows:

Average IPHTP = 339.772 (74 countries with vital registration record)

Pakistan population in 2016
(World Population Review) = 192,826,501

$$\text{Injuries of Pakistan (2016)} = \frac{339.772}{100{,}000} \times 192{,}826{,}501$$

Estimated Injuries = 655,171

2.2 Average Injuries based on Registered Vehicles

The average annual injuries of Pakistan based on registered vehicles for the year 2016 are as follows:

Average IPTRV = 10.21 (74 countries with vital registration records)

Registered vehicles of Pakistan in 2016
(Estimated from WHO 2009 & 2013) = 14,215,408

$$\text{Injuries of Pakistan (2016)} = \frac{10.21}{1000} \times 14{,}215{,}408$$

Estimated Injuries = 155,140

Based on the injuries per hundred thousand populations, a total of 655,171 annual crash injuries have been estimated for Pakistan for the year 2016. These road crash injury estimates can be used by the National Highway Authority and Ministry of Communication as input for formulation of multipronged road safety improvement policies for Pakistan.

3. Comparison with Previous National Studies

Various researchers adopted different approaches to estimate the annual RCI for Pakistan. The number of RCI estimated by past studies have significant discrepancies, which points to the fact that either the data upon which these estimates are based was either insufficient or highly under-reported, or the methods adopted by researchers was flawed.

Hyder et al. [5] estimated the RCI using 40 years (1956-1996) registry-based data obtained from the Federal Police Research Bureau. The authors calculated 37 RCI per 10,000 registered vehicles that yielded a total of only 52,597 RCI, which seems unrealistic. Ghaffar et al. [8] estimated 2,892,398 injuries using data from the National Injury Survey of Pakistan (NISP). The NISP collected three months data from household surveys by interviewing residents from all four provinces of Pakistan including both urban and rural areas, except for a few tribal areas. The RCI estimated in that study were 15 RCI per 1000 population. The result of that study also appears unrealistic because the figure seems unusually high. Fatmi et al. [9] used National Health Survey of Pakistan (NHSP 1990-1994) data in which different households were interviewed. The authors estimated 17 RCI per 1000 population that yielded a total of 3,278,051 RCI. The estimated RCI was quite high which also seems unrealistic. The present study estimated RCI for Pakistan for the year 2016. RCI calculated in this study are worked out using the average rate method and they are given in terms of population and registered vehicles. Table 1 shows a comparison of RCI estimated by past studies with the present study.

Table 1: Comparison of estimated injuries

Study	Data source / Time	Data details	Estimated injuries (2016)
Hyder et al.(2000)	FPRB 1996 (Federal Police Research Bureau)	Police Reported Data Survey clarified on 14.3% crashes recorded by police	52,597
Ghaffar et al.(2004)	NISP 1997 (National Injury Survey of Pakistan)	Survey Based DataHousehold Interview Sample of 30,000 Individuals	28,92,398
Fatmi et al.(2007)	NHSP 1990-1994 (National Health Survey of Pakistan)	Survey Based DataHousehold Interview Sample of 18,315 Individuals	32,78,051
Present study(2016)	WHO 2009 (World Health Organization)	Aggregate Data of 74 Countries	6,55,171

4. Conclusions

Reliable estimation of annual road crash injuries and fatalities of a country are vital elements needed for road safety improvement and mortality management systems. The literature reviewed reveals that there is a significant lack of serious research efforts in estimating annual road crash injuries for Pakistan. Most of the national studies in the past used very limited amount of data for estimating road crash injuries and some used descriptive statistics. Past national studies also discussed and revealed under-reporting of road crash injury data by most sources. Review of international road crash injury studies revealed that an extensive effort has been made at the international level to estimate road crash injuries. This research effort making use of a WHO data set estimated the annual road crash injuries for Pakistan.

Based on the injuries per hundred thousand populations, a total of 655,171 injuries were estimated, whereas in case of injuries per thousand registered vehicles, a total of 155,140 annual road crash injuries were estimated for Pakistan for the year 2016. These outcomes seem fair and coincide with the results and predictions obtained from national studies of other countries worldwide having proper registration systems.

Road crash fatalities and injuries have emerged as a moral challenge for societies around the world. Reliable information on total traffic injuries and identification of factors responsible for high traffic crash injury rates is therefore an important issue and the first step towards initiating remedial measures. A broad and comprehensive accident data reporting and recording system is recommended for Pakistan. Also, the country needs a dedicated research center where new methods are adopted to conduct road safety research and counter measures are developed that can help to reduce the road crash injuries in the country.

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