SPECIAL COMMUNICATION

A pragmatic evaluation of trauma care: an evidence from the province of Punjab, Pakistan

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Abstract

Road Traffic Accident (RTA) injuries pose a public health challenge which significantly impacts the human capital development. The Punjab Economic Research Institute (PERI) conducted a study to assess the frequency, causes of trauma injuries, distribution and need and gap analysis of trauma centers in the province of Punjab. For gap/situational analysis, information was extracted through a structured questionnaire from randomly selected 8 District Head Quarters hospitals, 6 Teaching hospitals and 8 independent trauma centers. According to the data of Rescue 1122, 70% of RTA injuries involved the age group 11-40 years. In 295589(63.26%) of the RTA cases the vehicle involved was a motorbike. The major RTA injuries were leg fractures 71699 (16.44%) and head injuries 44738(10.26%). Over speeding 159977(44%) and careless driving 121545 (33.35%) were the major causes of RTAs. Noted was a shortage and mismatch between human resources and equipment in the trauma treatment facilities. Inequality was also found in distribution of trauma care units. Integrated and fully equipped trauma care system along with the establishment of trauma centers in places of high accidents' frequency is recommended. Strict implementation of road traffic safety laws is mandatory.

Keywords: Road Traffic Accidents, Public health, Trauma Centers, Human resource, Equipment.

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Introduction

Trauma care is one of the most important components of the health sector. A widespread inequality in the distribution of trauma care is found not only in developing but also in the developed countries.[1] Injuries due to road traffic accidents (RTAs) pose a public health challenge which significantly impacts the human capital development of every nation. The economic impact of injuries is also very high because most of the time young and healthy individuals are affected by RTAs. The economic burden of disabilities and deaths of productive persons due to road traffic accidents, leads to substantial economic losses for the victims, their families and to the community at large.[2] A study conducted in Karachi, Pakistan, determined that the average out-of-pocket health care costs due to road traffic injuries amounted to US$ 271 while the average work loss was US$ 67.1.[3] This indicates that a burden is placed on national economies also. The literature indicates that low income countries and poor people are more affected by such injuries.[4]

Pakistan being a developing country has not been safe from this health care and economic issue. According to the World Health Organization, in 2015[5] RTA deaths reached 30,310 or 2.69 percent of total deaths. The age adjusted death rate is 20.22 per 100,000 of population therefore with this death rate Pakistan's ranking in the Road Traffic Accidents Ratio Index in 2014 was 67th. The rescue 1122 data shows that in 2016 there was one death every 20 minutes in Punjab.

Punjab is the most populous province of the country with more than 50 percent of the population as per the latest census of 2017[6] Road traffic accidents have also been rising. Besides leaving thousands of people dead or handicapped, the lives of many families get affected due to the loss of many earning hands falling victim to these incidents. There are a number of determining factors for these accidents such as over-speeding, drunk driving, distracted driving, mobile use, unsafe road infrastructure, inadequate enforcement of traffic laws and unsafe vehicles.[7] Moreover, the inequality in the distribution of trauma care services is also a reason for large number of deaths and disabilities. All these issues make the roads perilous and become a reason for various types of road traffic accidents.

It is evident from the existing literature that delays in transportation of patients to hospitals, inaccessibility, lack of adequate equipment and supplies and a small number of trained doctors at hospitals in countries like Pakistan, contribute to the high death toll caused by trauma.[8] An effective response through well-established pre-hospital

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care in first few hours of injury may decline trauma mortality.[9] It is a recognized approach of trauma care that by providing first aid, initial life support and replacement of fluids, within first hour of the injury (which is called the golden hour in the literature) increases the probability of saving the life of accident victims. The most important factor of this strategy is to establish a network to provide initial treatment to the victim within the golden hour. By doing so, the chance of disability and death followed by road accident can be avoided to a greater extent.[10] As the burden of traumatic injuries in Punjab is high,[11] majority of trauma deaths in Punjab may be avoided by providing efficient pre-hospital trauma care facilities. Therefore, it is important to examine these shortcomings for formulating effective policies in order to minimize the loss of human capital.

Keeping these facts in view, the objective of the study is: a) to determine the incidence and major causes of RTAs in Punjab, b) to identify the gaps in current trauma care facilities, c) to identify distributional disparities in trauma care facilities d) to recommend policies based upon analysis.

Methodology

To meet the above-mentioned objectives, this study used Rescue 1122 and survey data. The incidence, causes of trauma injuries and distribution of trauma care facilities were assessed. For gap/situational analysis, information was extracted through a structured questionnaire from randomly selected trauma care facilities (Teaching Hospital, DHQ and Independent Trauma Centers). As adequate trauma care can be generally provided by Teaching hospitals, District Head Quarters Hospitals (DHQ) and Independent Trauma Centers, so sample was selected from these health care facilities only. As Basic Health Units (BHU), Rural Health Centers (RHC) and Tehsil Head Quarters hospitals (THQ) do not have adequate facilities to deal with acute traumatic injuries so they were excluded from the sample. The sample was proportionally divided in 3 regions (north, central and south) of the province. From north Punjab: DHQ Gujrat, DHQ Rawalpindi, Benazir Bhutto Shaheed Hospital Rawalpindi, Trauma Centre at Lalamusa and Trauma Centre at Kallar Kahar were randomly selected for the survey. From central Punjab: DHQ Kasur, DHQ Sheikhupura, DHQ Faisalabad, DHQ Lahore, Allied Hospital Faisalabad, Government Hospital Faisalabad, Trauma Centre at Phool Nagar, Trauma Centre at Hafiz Abad were randomly selected. From south Punjab: DHQ Multan, DHQ Layyah, DHQ Bhakkar, Nishtar Hospital Multan, Civil Hospital Bahawalpur, Trauma Centre, Ahmad Pur East Trauma Centre, Shujabad, Trauma Centre, Fatehpour Layyah, Trauma Centre and Jandiawala were randomly selected. Situational analysis was used to evaluate the existing facilities available in the units which provide trauma care services. Gini Coefficient/Lorenz Curve was used to categorize the disparities in the distribution of trauma care institutions with cumulative percentage of Road Traffic Accidents in all 36 districts.

Results

Situational Analysis of Vital Statistics of Accidents

The situational analysis of the data obtained from the Rescue 1122 department for the period January 2016 to July 2017 on the causes and frequency of traumatic injuries is presented. Road Traffic Accidents (RTAs) had the highest number of 364,360 (75 percent) of which 44738 (10%) were head injuries. This was followed by 71699 (17%) leg fractures and 21816 (5 %) multiple fractures. The other minor injuries reported around 285950 (65.5 %). While 5101(one percent) deaths also occurred due to Road Traffic Accidents.

In 2016, of the most affected victims, around 295589 (64%) were users of two-wheeled motor bikes, 54481 (12%) were three-wheeler rickshaws, 39900 (8%) were involved in car accidents, 12411(3%) trucks, 20342 (4%)

Table-1: Road Traffic Crashes Statistics Of 2016-2017.

Gender wise distribution of RTA	Male	341306 (79%)
	Female	89789 (21%)
Age wise distribution	Age 01-10	18830 (4.37%)
	Age 11-40	303301 (70.34%)
	Age 41-60	87644 (20.34%)
	Age >60	21320 (4.95%)
Vehicle wise distribution	Bike	295589 (63.26%)
	Car	39900 (8.54%)
	Truck	12411 (2.66)%
	Rickshaw	54481 (11.66%)
	Bus	4952 (1%)
	Van	20342 (4.36%)
	Other Vehicle	39631 (8.48%)
Injury wise distribution	Spinal Injury	6896 (1.58%)
	Head Injury	44738 (10.26%)
	Leg Fracture	71699 (16.44%)
	Multiple Fracture	21816 (5%)
	Minor	285950 (65.55%)
	Dead	5101 (1.17%)
Cause wise distribution	Over speed	159977 (43.91%)
	Carelessness	121545 (33.36%)
	Wrong Turn	29462 (8.09%)
	U Turn	21580 (5.92%)
	One Wheeling	220 (0.6%)
	Tyre Burst	3373 (0.93%)
	Others	28203 (7.74%)

vans, 4952(1%) bus and 39631 (8%) all other vehicles. The main reason reported for traffic accidents was over speeding according to the National Highway and Motorway Police; NH&MP, 2011 data. The most affected age group was 11-40 years with the frequency of 70 percent. The age group 41-60 years had 87644 (20%) share while age group 1-10 years 18830 (4.37%) and above 60 years having a 21320 (5%). Furthermore, as males are more likely to drive vehicles than females therefore, they are more accident-prone compared to females, as 341306 (79%) males and 89789 (21%) females were involved in road accidents in Punjab (Table-1).

Situational Analysis of Existing Structure of Trauma Care in Punjab

According to the second objective of the study, it was examined that Punjab is appallingly lacking in trauma care centers. There are only 20 trauma centers in the province, among which 12 are partially functional and 8 non-functional. During the survey it was found out that there is no level I specialized trauma care facility in Punjab. Another major hurdle in effective trauma care was observed to be the inaccessibility of the health care facility. The distance from trauma centers to other nearest public health facility dealing in higher level of trauma care was very long such as from Layyah the nearest public health facility was 118 Kilometers (KMs), from Gujrat 122 KMs and from Chakwal it was 125 KMs. Another constraint in dealing with the trauma patients, was the shortage of human resources. There were no neurosurgeons in any of the independent trauma centers. However, only 17 percent of the DHQ hospitals and 63 percent of the teaching hospitals had neurosurgeons. All of the trauma treating facilities lacked plastic surgeons. Only 5 (60%) of the independent trauma centres, 7(83%) of the DHQs and 5 (88%) of the teaching hospitals had orthopaedic surgeons. While 6(75%) of the independent trauma centres had general surgeons. There was also lack of specialized trauma team for acute surgical treatments and to deal with the emergencies. Independent trauma centres such as Phoolnagar, Bhakkar, Layyah, Bahawalpur and Shujaabad did not have any specialized trauma team. It is evident from the literature that the human resource is a very essential component for delivering efficient health services. It is the most effective input for improving the quality of healthcare services.[12] An effective human resource in the health care institution can make a significant difference between health organizations with good performance and health organizations that underperforms or are below average.[13]

The second essential tool for providing trauma care is the medical machinery and equipment.[14] According to the data collected, only 4(50%) of the trauma centres and 2(17%) of the DHQ hospitals had CT scanners. While 5(63%) of trauma centres and 5(63%) of the DHQ hospitals in Punjab had an operation theatre. It was also interesting to note that operation theatres of most of the trauma centers were non-functional. The consistent shortages led to the referral of the patients to other public health facilities. Moreover, the medical diagnostic test labs were not available in 5(63%) of the trauma centres while only 5(63%) had blood banks. Similarly, 7(87%) had no ventilator and 7(88%) had no ICU facility.

The earlier situational analysis of truamatic injuries showed that RTAs are the major cause of trauma injuries. Head

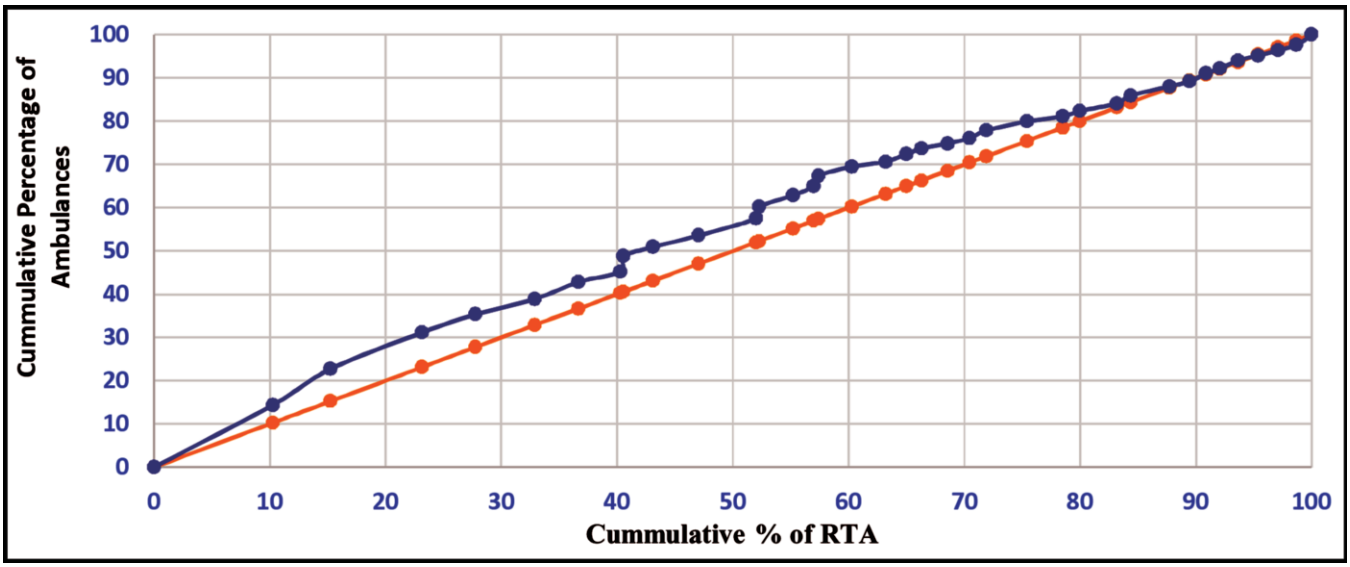

Figure-1: Lorenz curves of distribution ambulances.

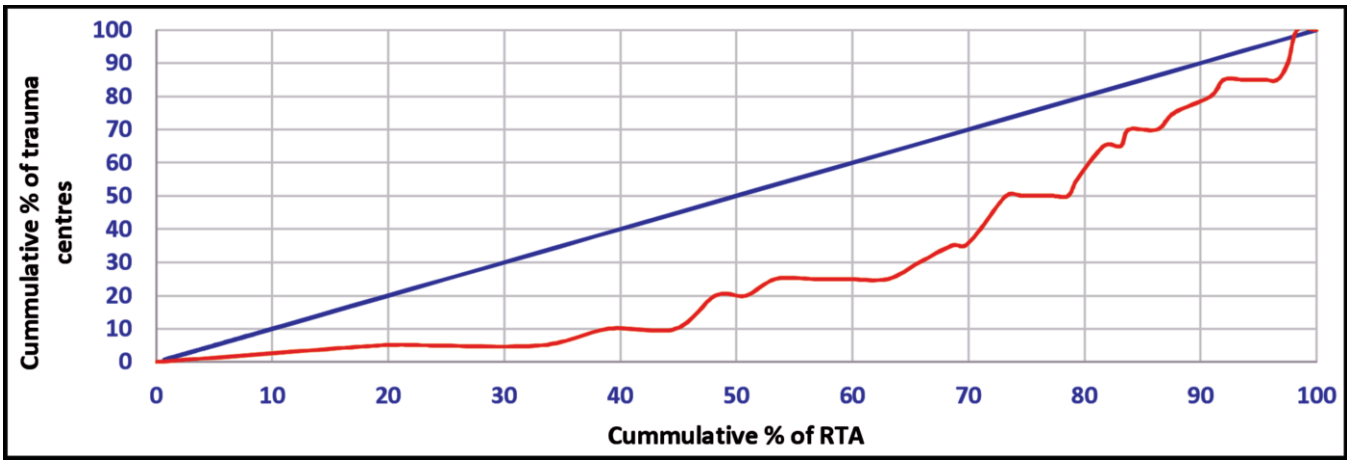

Figure-2: Lorenz curves of distribution of trauma care facilities.

injuries, being the most commonly encountered trauma require the relevent human resource and health facilities on an urgent basis to save lives. On the other hand the analysis also stresses upon an efficient traffic management to diminish these RTIs and RTAs. Moreover, the exisitng strucutre of trauma care in Punjab also shows lack of basic facilties to deal with the trauma emergencies. There was lack of important human resource, equipemnt and machinery and specialized trauma care facilties. Therefore, it is not only important to deal with the factors leading to traumatic injuries but it is also the need of the hour to fully equip the existing independent trauma centres.

Equity Analysis

For the third objective which was to examine inequality in distribution of trauma care facilities in Punjab, Gini coefficient[15] was used. Gini coefficient is generally used to quantify the inequality in the distribution of one variable over the distribution of another variable. The equality/inequality is measured by the distance from the Lorenz curve. The higher the distance from the diagonal line, the greater is rate of inequality while the shorter distance shows lower rate of inequality. The perfect equal distribution is shown by the 45-degree line. The overall distribution of trauma care facilities (equipped ambulances of 1122) showed that they are progressively distributed between districts of Punjab. It indicates that the districts with lower proportion of RTAs have more ambulance services (e.g., if the districts with less than 5% of total RTA have more than 5% of total ambulance), it is for this reason, the Lorenz curve lies above the 45° line (Figure-1). Significant variation in the distribution of trauma centres among different districts has been observed. The difference between the justice line and Lorenz curve specifies a lack of appropriate distribution of trauma centres among districts (Figure-2). The calculation of the Gini coefficients confirmed the results of Lorenz curves. Therefore, more trauma care centres should be available at places where a higher number of accidents take place.

Conclusion

Injuries due to road traffic accidents (RTAs) pose a public health challenge and greatly affect the human capital development of every nation. The economic impacts of injuries are also very high because mostly it is the young and healthy individuals affected. The situational analysis of this study revealed the frequency and leading causes of major trauma injuries to be RTAs, which mostly involved the most productive age group (11-40 years). This signifies a major loss of human capital. The situational analysis also highlighted the existing infrastructure of the trauma care in Punjab which lacks sufficient human resources as Neurosurgeons, Radiologists, Plastic Surgeons and Orthopedic Surgeons. A shortage of machinery and equipment was also observed. There was shortage of CT scanners, ICUs and ventilators. At some centers the operation theatres were non-functional. The absence of a specialized trauma emergency team for acute surgical and emergency treatment was also observed.

Another major issue which impedes the effective trauma care was the inaccessibility of a trauma health care facility. Fair and impartial distribution of the resources is one of the bases of success for any heath service delivery system. It was also found that distribution of trauma centers with the incidence of RTA among different districts of Punjab is unequal.

Policy Recommendations

On the basis of the above-mentioned analysis the

following policy recommendations are proposed:

◆ As the major cause of RTA is over speeding and careless driving, therefore relevant awareness campaigns and traffics rules need to be Implemented stringently.

◆ Health facilities are in dire need of specialized trauma care teams and missing medical equipment.

◆ To encourage specialists (Neurosurgeon, Orthopaedic surgeon and Anaesthetist) for working at trauma centres particularly in far-flung areas, the government should take initiatives to introduce some special packages (monetary and real) for such human resource.

◆ To remove the distributional inequalities, more trauma care institutions should be established at places (where most of the accidents take place) with technically sound administrative body.

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