

# Need Assessment of Trauma Centres in Punjab



*The Punjab Economic Research Institute (PERI) is a statutory body attached to Planning and Development Board, Government of the Punjab, with a mandate to carry out socio-economic research on issues of provincial and national importance and to support planning and development work of Punjab Government.*

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## Foreword

According to WHO's Global Burden of Disease Project, Road Traffic Accidents (RTA) cause over 1.27 million deaths/year. Traffic injuries affect all age groups, but their impact is most striking among the young. Road Traffic Injuries are consistently one of the top three causes of death for the people aging between 5 to 44 years. While road traffic death rates in many high-income countries have stabilized or declined in the recent decades, data suggest that in most regions of the world the global epidemic of RTAs is still increasing. It is estimated that unless immediate actions are taken road deaths will be the fifth leading cause of death by 2030, leading to estimated 2.4 million deaths per year. In addition to mortality, Road traffic crashes injure or disable 20 million and 50 million people a year. Over 90% of the world's fatalities on the roads occur in low-income and middle-income countries, which have only 48% of the world's vehicles.

In Pakistan as well as in Punjab, there has been limited attempt to develop a trauma system that addresses the unique trauma situations especially occur in rural areas. Nor the planners in health sector have attempted to make any policy regarding trauma system. It is because of this reason, the needs of the majority of patients who are injured in RTI are not facilitating properly. Health sector has not taken any initiative for policy-making, financing, planning, and establishment of minimum standards for the performance of a trauma-care system. No reliable institutional arrangement exists to lead the development of such a system in any district of Punjab.

Although, some schemes are being released by Primary & Secondary Health-care (P&SH) as a reference tool to provide the Trauma Care Facility level but what needs to be understood here is that a Trauma Centre is not an infrastructure concept but a systems concept in which the appropriate infrastructure, equipment & human resources work to provide the necessary trauma care services to a patient. The aim of this study is to discuss the magnitude of the problem of road traffic accidents (RTAs) in Punjab and suggest the model of trauma care system as a solution to improve trauma outcomes. Furthermore, to develop and validate a model of definitive care within one provincial trauma system and identify the gaps in current trauma care system.

**Dr. Mumtaz Anwar**  
**Director**

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## Acronyms

A&E	Accidents & Emergency
ATLS	Advanced Trauma Life Support
BOS	Bureau of Statistics
CT	Computed tomography
DHQ	District Head Quarter
DART	Disaster and Rescue Team
FDGs	Focus Group Discussion
GDP	Gross Domestic Product
HISDU	Health Information System Development Unit
LHV	Lady Health Visitor
LHW	Lady Health Worker
MRI	Magnetic Resonance Imaging
P&SH	Primary & Secondary Healthcare
PIPS	Performance Improvement and Patient Safety
PM&DC	Pakistan Medical & Dental Association
RHC	Rural Health Centre
RTA	Road Traffic Accidents
RTI	Road Traffic Injuries
RTM	Road Traffic Mortality
SCDF	Singapore Civil Defence force
TCH	Tertiary Care Hospital
THQ	Tehsil Headquarter Hospital
TMD	Trauma Medical Director
TPM	Trauma Program Manager
WHO	World Health Organization





# *Executive Summary*



## 1. Background

1. The families suffer the incidence of traffic accidents in term of the cost of treatment as well as reduced/lost productivity (e.g. in wages) for those killed or disabled by their injuries. Furthermore, the injuries from the traffic accidents create many health problems and have been caused a million of deaths every year. Road traffic injuries claim more than 1.2 million lives each year and have a huge impact on health and development. They are the one of the leading cause of death among young people aged between 15 and 29 years, and cost governments approximately 3 percentage of GDP (WHO, 2015).
2. There is deficiency of documented data on trauma care facilities, the latest data on the trauma care facilities is essential to prioritize evidence-based safety strategies and prevention efforts. Reliable estimates on injury burden and pattern to cure the injuries are the basis of delivery of acute trauma care.

## 2. Introduction

3. A trauma system is a planned, comprehensive, and coordinated region- or countrywide injury response network that includes all facilities and sectors with the capability to care for the injured and is integrated with the local public health care system. This system involves components related to trauma prevention, prehospital care, hospital care, rehabilitation of the disabled, disaster medical planning, systems administration, trauma care education and training, trauma care evaluation and total quality improvement, and includes the participation of society (Mohammed Y. Al-Naami, 2010).
4. Expansion of roads network tend to increase the businesses and hence income and prosperity among people but this prosperity has also been observed to brought about the traffic injury epidemic worldwide. It has been reported that the current trend of increase in Road Traffic Accidents would be the 3rd leading cause of Disability Adjusted Life Years lost by 2020 (The Red Crescent).

## 3. International Practices for Trauma Care Services

5. In India, there are more than one hundred trauma centres almost all at national highways. In England, there are twenty-seven trauma centres located at different places. In Singapore, there is emergency response system, the Singapore Civil Defence Force (SCDF), comprising: Police, Fire, Ambulance, Disaster and Rescue Teams (DART) are co-located. Co-location of emergency response organizations is an economic and geographic necessity to ensure that valuable space is utilized well. In Hua Hin city of Thailand there are pub-

lic and private hospitals dealing with emergency cases. One may conclude that trauma centres at international level are running independently.

## 4. Methodology

6. Spearman rank-order correlation analysis has been used to find the possible association of traumatic exposures with the mean number of vehicles, the length of roads etc. All statistical analyses are carried out using the software package Stata version 13.
7. The Lorenz curve is also used to compare the distribution of a pre-and post-trauma health care services with that of the equal distribution of population, RTI & RTM in different districts. This equal distribution is represented by the 45-degree line, and the deviation of the Lorenz curve from the diagonal shows the intensity of inequality.
8. The sample of this study consists of 08 DHQs 06 teaching hospitals and 08 independent trauma centres, that were randomly selected from three regions (Southern, Central and Northern Punjab) of the province.

## 5. Incidence of Trauma Injuries in Punjab

9. The majority of RTI victims are male in their most productive year's e.g. 11-40. This age group is usually considered the economically energetic and any unexpected incidence of such type describes an economic lost not only to the family but the overall nation too. The high incidence of RTI in this age group imitates their high level of involvement in risky activities such as carelessness driving/riding, one-wheeling, over-speeding, and driving without wearing any protective gears (helmet etc.). The highest mode of accidents is motor bikes and major mode of serious injuries is head injuries followed by fractures of different kinds.
10. The results of correlation demonstrate that the correlation coefficients exhibited a very weak but positive association between RTIs & RTMs and the RTI & RTM rate is affected significantly by the number of vehicles, that is to say that there is a significant correlation between RTI. RTM & vehicle/100000 persons.

## 6. Utility Map of Trauma Centres in Punjab

11. There are 20 trauma centres in Punjab, among which 12 are functional and 8 are non-functional. While the A&E department which exists in teaching hospitals also provide access to all trauma patients 365 days a year, 24/7 days of the week, A&E department include staff such as paramedics, diagnostic

- radiographers, A&E nurses, A&E reception staff, healthcare assistants, surgeons and emergency medicine doctors.
12. By available of services, the existing District Head Quarter (DHQ) hospitals are the level III trauma centre (according to WHO guidelines) and are the only referral hospitals of traumatic injuries within district premises. The existing services of independent trauma centres can be classified as level IV trauma hospitals. There is no level 1 specialized state of the art trauma care facility in Punjab till date.
  13. Among facilities, the Trauma care is slightly unevenly distributed among districts. Lorenz curve lies at a distance from the diagonal/justice line. The difference between the justice line and Lorenz curve specifies a lack of appropriate distribution of trauma care facilities among districts. The calculation of the Gini coefficients confirmed the results of Lorenz curve. Realistically, more trauma care centre should be available at places where most of the accidents take place.

## 7. Gap Analysis and Shortcomings in Trauma Care

14. The biggest constrain in dealing with the trauma patients according to the quantitative and qualitative analysis is the shortage of human resource. There were no neurosurgeons in any of the trauma centres surveyed, while only 17 percent of the District Headquarter (DHQ) Hospitals and 63 percent of the teaching hospitals had them.
15. The management of trauma patients requires a multidisciplinary approach. After human resources, another resource which is essential for providing trauma care is the medical machinery and equipment. According to the data 50 percent of the trauma centres had CT scan machinery and only 17 percent of the DHQ hospital had this facility. These shortages led to referral of the patients to other public health facilities.
16. The data and observations highlight that another major issue that became a hurdle in effective trauma care was the inaccessibility of health care facility. The distance from trauma centre to the other nearest public health facilities dealing in trauma care was mostly very long such as from Layyah the nearest public health facility was 118 km, from Gujrat 122 km and from Chakwal it is 125 km.
17. Specialized trauma teams are essential for dealing with trauma emergencies. Independent trauma centres such as the Phoolnagar, Bhakar, Layyah, Bahawalpur and Shuja abad did not have any specialized trauma team.
18. The independent trauma centres in Punjab are facing budgetary constraints

and therefore, trauma care remains to suffer in their catchment areas. The public health care including trauma care services are publicly funded and free for public but continuously put-upon by the huge number of patients and the scarce resources. The capital investment and payment instruments for the trauma centres are not yet well established by the health sector.

19. 62.5 percent of the trauma centres were having operation theatre similarly 67 percent of the DHQ hospitals were having the facility of operation theatre. It was also interesting to note that all the trauma centres and DHQs were having operation theatre rooms but they were non-functional due to lack of human resource and necessary equipment and all the teaching hospitals were obviously having functional operation theatres. Medical diagnostic test lab was not being available in 60 percent of the trauma centres. While no diagnostic test lab in DHQ hospital Kasur. All the teaching hospitals were having medical diagnostic test lab. Blood bank facility in all teaching hospitals and DHQ hospitals but only 60 percent of the trauma centres having blood bank facility.

## 8. Conclusion & Recommendation

20. At present, establishing new trauma centres is not viable solution. There is acute shortage of human resource and equipment in existing trauma centres and in emergency departments, so at there is dire need to strengthen the existing trauma centres and emergency departments of DHQs. Furthermore, it may be more viable that the trauma centres should be established within the premises of DHQs to provide comprehensive rehabilitation services which the independent trauma care centre cannot provide.
21. Develop & update trauma protocols, Regular trauma team training session, strengthening the existing facilities by providing required equipment, HR etc., elimination of the upper and lower differentiation, stabilization of level 4 trauma nearby the main roads are some of the recommendation to make the trauma care system in Punjab more efficient.

CHAPTER

1

*Background and Introduction  
of Trauma Care Facilities*

# ورنمنٹ ٹراوما سنٹر لالہ موسیٰ



# 1.1

## Background

Road traffic accidents (RTAs) not just lead to loss of life but have both social and economic impact which can impede progress and development. The injuries resulting because of these accidents cause considerable economic losses to individuals, their families, and to nations as a whole. These losses arise from the cost of treatment as well as lost productivity for those killed or disabled by their injuries, and for family members who need to take time off work or school to care for the injured. Therefore, road traffic crashes cost most countries 3% of their Gross Domestic Product.<sup>1</sup>

According to the WHO Global Status report on road safety 2015 the world-wide deaths due to road traffic accidents have reached 1.25 million per year.<sup>2</sup> This report further highlights that the highest fatalities rates were reported in the developing and low-income countries. These low and middle income countries have only half of the world's vehicles but they account for 90 percent of the world's road traffic accidents related deaths.<sup>3</sup> Moreover a person living in the South East Asian countries has a higher chance of dying in a road traffic accident, 17 percent, as compared to a person living in the European countries where one has 9.3 percent chance of dying this way while for those in South African countries it is even higher at 26.6 percent.<sup>4</sup> These statistics show that the developing countries need to efficiently and effectively deal with this growing public issue if the economic and social losses are to be reduced.

As it has been already mentioned that the low and middle-income countries have a higher rate of deaths caused by road traffic accidents, Pakistan being a developing country has not been able to stay protected from this menace. According to the WHO data published in May 2014, RTA deaths in Pakistan reached 30,310 or 2.69% of total deaths.<sup>5</sup> The age adjusted death rate is 20.22 per 100,000 of population therefore with this death rate Pakistan is ranked 67th in the world in road accidents.

Punjab which is the most populous province of the country as per the latest census 2017, has also been suffering from the growing number of road traffic accidents. During the years 2014-17 there were 13,620 lives lost, 1.19 million people were injured and 996,032 road traffic crashes in 32 districts of the province.<sup>6</sup> Besides leaving thousands of people dead or handicapped, road traffic accidents affected the lives of many families as many bread earners fall victim to these lives taking incidents. The data showed that 79.38% of the total victims, i.e. 948,750 victims, were male of which 51% were between the ages of 21-40.<sup>7</sup> 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. All these issues make the roads perilous and become a reason for various types of road traffic incidents.

The existing literature has mentioned that the trauma is one of the leading causes of death across the world; it is made worse in developing countries because the victims are not able to get treatment on time due to inadequate access to pre-hospital trauma services and weak public health infrastructure. The delays in transportation of patients to hospitals and the lack of adequate equipment, supplies and doctors in hospitals in countries like Pakistan contribute to the high death toll caused by trauma (Jamali, 2008).

*Pakistan's ranking in the Road Traffic Accidents Ratio Index in 2014 was 67th. The rescue 1122 data, 2016 staggering one deaths in every 20 minutes.*

Pakistan's ranking in the Road Traffic Accidents Ratio Index in 2014 was 67th. The rescue 1122 data, 2016 staggering one deaths in every 20 minutes.

As the burden of traumatic injuries in Punjab is certainly high (see table 1), majority of trauma deaths in Punjab may be avoided by providing efficient pre-hospital trauma care facilities. There is no documented data on trauma care facilities, as per best of our knowledge, in Punjab which therefore becomes a hurdle in understanding the existing situation and devising associated policies. Up to date data on the trauma care facilities is essential to prioritize evidence-based safety strategies and prevention efforts. Reliable estimates on injury burden and pattern to cure the injuries are the biases of delivery of acute trauma care. Therefore, keeping in view these growing figures of road traffic accidents and their related injuries and deaths it is imperative to determine not just the causes of these accidents but also examine the existing available trauma care in the province of Punjab.

## 1.2

### Introduction of Trauma Care Facilities

*This section provides some brief overview of Trauma care facilities and details the necessity of a study of this nature.*

A trauma system is a planned, comprehensive, and coordinated region- or countrywide injury response network that includes all facilities and sectors with the capability to care for the injured and is integrated with the local public health care system. This system involves components related to trauma prevention, prehospital care, hospital care, rehabilitation of the disabled, disaster medical planning, systems administration, trauma care education and training, trauma

care evaluation and total quality improvement, and includes the participation of society (Mohammed Y. Al-Naami, 2010). Every country or region set their goals in accordance with their technical facilities, staff and resources availability. Ideally, a successful trauma system should involve the goals to decrease the incidence and severity of trauma, to ensure optimal, equitable, and accessible care for all persons sustaining trauma, to prevent unnecessary deaths and disabilities from trauma, to implement quality and performance improvements in trauma care throughout the system etc.

Well established pre-hospital care after first few hours of injury may decline trauma mortality. It is an acknowledged approach of Trauma Care that by providing first aid, initial life support and replacement of fluids, within first hour of the injury (the golden hour) can increase the chances to preserve the life of accident victim. 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 accidents are avoidable up to some extent. The strategic actions in such perspective required some medical facilities to treat such cases. The short term and long-term mortality and morbidity rates can also be declined by providing best trauma care facilities. There is an emerging trend of establishing trauma care centres in Punjab especially in the cities located on main roads out of the city but as per best of our knowledge, there is no focus on evaluating the existing pre-hospital trauma care. The results of this study would help to improve the knowledge about the structure and need of trauma care centres in Punjab.

## 1.3

### Levels of Trauma Care Centres

By availability of services, the existing District Head Quarter (DHQ) hospitals are the level III.

Trauma centre (according to WHO guidelines) and are the only referral hospitals of traumatic injuries within district premises. The existing services of independent trauma centres can be classified as level IV trauma hospitals. There is no level 1 specialized state of the art trauma care facility in Punjab till date.

As it has already been mentioned that the number of road traffic accidents in Punjab is increasing at an alarming rate therefore the purpose of the study is not only to determine the causes and types of such traumatic incidents but also to examine the existing available trauma care facilities in the province of Punjab.

**Level 1**

Level 1 facilities provide the highest level of trauma care for patients. These facilities have a full range of all types of specialists and equipment available 24 hours a day. These facilities also offer teaching and research-components.

**Level II**

Level II facilities provide the same services as Level I facility without the research component or a surgical residency program. Level II facilities may not have specialists on-hand 24/7, but they have them on call.

**LEVEL III**

Level III facilities do not have the full availability of specialists as Level I & Level II centres do, but they do have resources for emergency surgery and intensive care. In some cases, the facility might have to transfer patients.

**Level IV**

Level IV facilities provide initial evaluation, stabilization and diagnostic capabilities but will likely have to transfer the patient to a trauma care centre with a higher designation



Such analyses would help in understanding the trauma related mortalities and morbidities and therefore are essential for devising evidence-based prevention strategies and health policies.

## 1.4

### Objectives of the Study

The main objective of the study is to assess the need for the establishment of trauma centres in Punjab and mapping the existing trauma centres. However, the specific objectives of the study are to

- Identify the major types for Traumatic Injuries in Punjab.
- Determine the magnitude of RTA and RTM in Punjab.
- Figure out the major types of RTI in Punjab.
- Find the main causes of RTA.
- Mapping the existing Trauma Centres in Punjab
- Determine whether the existing trauma care facilities are distributed according to the needs of RTA cases.
- Identify the gaps in current trauma care facilities.
- Provide policy/suggestions based upon analysis regarding trauma care in Punjab.



CHAPTER

# 2

## *International Practices to Facilitate Trauma Patients*



## 2.0

### Practices of Trauma Care Facilities

Injury is an increasingly significant health problem throughout the world. As per World health organization report, every day, 16000 people die from injuries, and for every person who dies, several thousand more are injured, many of them with permanent sequelae. Injury accounts for 16% of the global burden of disease. The burden of death and disability from injury is especially notable in low- and middle-income countries. By far the greatest part of the total burden of injury, approximately 90%, occurs in such countries. Decreasing the burden of injuries is among the main challenges for public health in this century. For too long, trauma has been one of the leading health problems of the world. Trauma care represents a major challenge to the clinician, no matter what his or her background. The life- and limb-threatening injuries that are daily parts of trauma care present some of the most difficult decisions that any clinician can face. However, many lives can be saved through proper treatment and preventive measures. Given below is the information from some countries/cities regarding trauma handling.

## 2.1

### Trauma Care System in India

In India, accidental injury is one of the leading causes of mortality and morbidity. Road traffic crashes are one of the major causes of disability, morbidity and mortality in India, India has just one per cent of total vehicles in the world but accounts for six per cent of total road accidents. In India, 4, 50,898 road accidents caused 1, 41,526 deaths during 2014. As per, World road statistics 2010, by 2020 road accidents will be a major killer in India accounting for 546,000 deaths and 15,314,000 disability adjusted life years lost.

In response to this severe problem India started a pilot program by the name of *“Pilot Project for strengthening emergency facilities along the highways”* then afterwards this plan was extended with the name of *“Capacity building for developing Trauma Care Facilities in Govt. Hospitals on National Highways”* with a total outlay of Rs.732.75 crore with 100 % central funding provision for developing a network of 140 trauma care facilities in the Govt. Hospitals along the Golden Quadrilateral highway corridor covering 5,846 Kms connecting Delhi-Kolkata-Chennai-Mumbai-Delhi as well as North-South & East-West Corridors covering 7,716 Kms connecting Kashmir to Kanyakumari

and Silchar to Porbandar respectively. Under this program trauma care facilities in the Govt. Hospitals were identified and funds were released to 116 trauma care facilities. The scheme was further extended with total budget outlay of Rs 899.29 crore. Under this there was a proposal for development of another 85 new trauma care facilities.

Under this scheme, the designated hospitals were to be upgraded for providing trauma care facilities. It was envisaged that the network of trauma care facilities along the corridors will bring down the morbidity and mortality on account of accidental trauma on the roads in India by providing trauma care within the ambit of golden hour concept. The trauma care network is so designed that no trauma victim has to be transported for more than 50 Km to a designated hospital having trauma care facilities. For this purpose, an equipped basic life support ambulance is to be deployed by NHAI (Ministry of Road Transport and Highways) at a distance of 50 KMs on the designated National Highways.

The criterion for identification of State Govt. hospitals on the national highways was as follows:

- Connecting two capital cities.
- Connecting major cities other than capital city
- Connecting ports to capital city
- Connecting industrial townships with capital city

List of manpower and equipment to be recommended for Trauma care facilities to be established in States was formulated by the Technical Resource Group (TRG). Operational Guidelines were formulated. A Screening Committee for Trauma & Burn Program was formed to screen proposals of the scheme, prioritize the sites across States and monitor the physical and financial progress made in the development of Trauma Care Facilities and Burn Units. National Injury Surveillance, Trauma Registry and Capacity Building Centre are being established at Dr. RML Hospital. Software has been developed for the same. ATLS & BLS training is being conducted at Dr. RML Hospital for Doctors and Nurses posted in trauma care facilities. The pre-hospital trauma technician course initiated during 2007 has been revised by an Expert Group through an Agreement for performance of work (APW) with WHO. 300 copies of the revised Course Curriculum have been printed. Print material, audio-video spots and documentary film on Good Samaritan/ First Aid have been developed. The Committee has also finalized the technical specifications of the medical equipment component of the ambulances. 6-months course curriculum on Neuro-trauma is being developed for General Surgeons.

## 2.2

### Trauma managing in UK

Major trauma describes serious injuries that are life changing and could result in death or serious disability, including head injuries, severe wounds and multiple fractures. Major trauma centres are set up to provide specialized trauma care and rehabilitation. They are hubs that work closely with local trauma units. There are 27 major trauma centres in England, of those:

- 11 treats both adults and children
- 11 only treat adults
- 5 only treat children

Major trauma centres operate 24 hours a day, 7 days a week. They are staffed by consultant-led trauma teams that meet the patient on arrival at the hospital and have immediate access to the best diagnostic and treatment facilities, including blood transfusion, CT scans and emergency operating theatres.

#### 2.2.1 Pre-hospital care

Ambulance crews make an assessment at the scene using triage tools to ensure that those with major trauma are taken directly to a major trauma centre for urgent treatment. This may involve bypassing their local hospital, so patients can immediately receive specialist care with access to CT scans and innovative technology. If the distances are long, patients may have to be taken to their local trauma unit first for stabilization before they can transfer to the major trauma centre for definitive treatment. Pre-hospital care is crucial – it means the ambulance service and the helicopter emergency medical service work closely with the major trauma network to ensure the most urgent patients are sent to the most appropriate place.

#### 2.2.2 What Happens at the Trauma Centre?

Once patients arrive at the trauma centre, they will immediately undergo a full assessment by a consultant-led trauma team trained to deal with these types of injuries. Major trauma centres also treat children. The management of specific injuries and drug administration will differ for children, but the focused response from the children's trauma team will essentially be the same.

In life-threatening situations, the doctors and nurses from the trauma team will do what is required to save a person's life. If the patient is unable to give con-

sent because they are incapacitated, treatment will still be carried out. In these cases, the reasons why treatment was necessary will be fully explained once the patient has recovered. All relatives will be allowed to visit patients both at their bedside and in the ward.

### 2.2.3 Rehabilitation

Patients who have suffered a severe injury often need complex reconstructive surgery and care from many professionals, such as physiotherapists, occupational therapists, and speech and language therapists. Psychological support for patients and their families is also very important. Many patients need a personalized rehabilitation program to help them return to an active life, which can take many months. This care will start at the major trauma centre and then continue in the community or at a hospital closer to home. Some patients, such as those with paralysis, may need to go to a specialist rehabilitation unit. Many charities offer help and support to patients and families that have experienced trauma. For example, After Trauma and Day One provide access to support groups and resources.

## 2.3

### Trauma Treatment in Singapore

Singapore has an integrated emergency response system, the Singapore Civil Defense Force (SCDF), comprising Police, Fire, Ambulance and Disaster and Rescue Teams (DART). Co-location of emergency response organizations is an economic and geographic necessity to ensure that valuable space is utilized well. Paramedic services consist of a three-person crew comprising a driver, a medic first aider, and a paramedic. Paramedic education and training involves a two-year commitment to diploma level with components of theoretic and on-road phases. The training is somewhat aligned with the US EMT model and is reflective of the earlier training course (Diploma of Ambulance and Paramedic Studies) which was undertaken by Ambulance Victoria paramedics prior to the introduction of the pre-employment (Bachelor of Emergency Health Degree course) at Monash University. Ambulance vehicles consist of Mercedes-Benz Sprinters of a single stretcher variety but have the capacity to transport up to four patients (albeit with the paramedic managing all four-end route). Motorcycle response units are also a feature of the SCDF system, with police, fire and ambulance motorcycles available to combat response in the often-heavy traffic. Computer-aided dispatch is a feature of the service, and in-vehicle cameras record each response to a case. This is a risk control measure and has the side effect of providing an

ability to fine those drivers who fail to give way to the emergency vehicle. Basic pharmacology is utilized, including adrenaline, GTN and aspirin, however S8 drugs such as Morphine for analgesia are not included as part of the paramedic pharmacological regime. A Life pack monitor/defibrillator with inbuilt SPO2 capability provides 3-lead ECG capabilities, however arrhythmia management is limited to cardiac arrest defibrillation of VF and VT. According to paramedics and medic first-aiders at Singapore's Central City station, there is an increasing risk of assault on ambulance staff within their operational field, presenting the greatest hazard to paramedics in Singapore at this time. This is said to occur during treatment and is anecdotally related to altered behavior resulting from specific medical conditions, mental health issues, drugs and/or alcohol. This risk has also been identified as a growing concern among many other prehospital care services across the developed world.

## 2.4

### Trauma Dealing at Hua Hin (Thailand)

Hua Hin is a resort town on the coast of the gulf of Thailand. Its significance as a holiday destination for the Thai people is enhanced by the presence of a summer palace for His Majesty King Bhumibol Adulyadej, who has ruled Thailand for long time. There are several major hospitals servicing the coastal area; the San Paulo Hospital, the Hua Hin hospital, the Hua Hin International polyclinic, the Hua Hin Red Cross, the Petcharat Hospital, the Pranburi hospital and the Cha-am hospital. These offer a range of services including obstetrics, general and specialist surgical, neurology and haemodialysis. An increasingly popular form of tourism within Thailand is "medical tourism", a phrase coined to reflect foreigners travelling to the area for cosmetic surgery at significantly reduced prices compared to similar treatments in countries like Australia or the USA.

The San Paulo hospital has two ambulances, staffed by drivers. There is no prehospital care provided in the ambulances, only (rapid) transport. The ambulance is crewed by an attendant and a driver, however in discussions with staff it appeared that no significant clinical skill or training was required, coupled with very limited English language skills. The Petcharat hospital is included here, even though it is a private institution and is some 45 minutes' drive from Hua Hin, as it has the facilities to manage complex trauma including head injury. An ongoing concern within Hua Hin province is the prevalence of Dengue Fever - a hemorrhagic fever spread by mosquito, which by February 2008 had infected a rate of 3.64 per 100,000 people in the province, although community and government

measures are currently underway to combat the mosquito problem.

## 2.5

### Trauma Handling at Siem Reap (Cambodia)

The Kingdom of Cambodia has a tumultuous history, and is still recovering from the Pol Pot era, which resulted in the systematic extermination of approximately two million of its citizens between 1974 and 1979. Cambodia remains an essentially impoverished country where education is rudimentary, and health care is supported primarily by foreign NGOs. Siem Reap in Cambodia, most famous as the location of the temples of Angkor and home to the Khmer empire up until the 15th century, attracts almost one million visitors per year to the 150-square kilometer site. The town has a population of 798,000 and is serviced by a children's hospital (Angkor Hospital for Children), the Royal Angkor International Hospital, the Siem Reap Provincial Hospital and a number of private clinics. There is no ambulance service funded or supported by the government, and the primary services for emergency transport are those attached to hospitals and private clinics. These are rudimentary and offer basic transport to the hospital or clinic represented. Cambodians who do require medical assessment or treatment can endure up to seven-hour long rides by whatever transport they can muster, and then a further wait of up to six hours for medical assessment. The local hospitals advertise medical assessment for international visitors and the availability of a medical retrieval helicopter to evacuate those patients requiring specialist or intensive care services to primary care facilities in Bangkok, Thailand. However, these services are well out of the reach of ordinary Cambodians.

Due to the high cost of fuel and motor vehicles, motorcycles and scooters are a popular mode of private transport. Helmets are not compulsory, and the roads are of dubious quality, with significant ambiguity in terms of road rules and traffic management devices. As a result, road trauma represents a significant proportion of emergency health cases in the area, next to diseases such as malaria and dengue fever. Other significant risks include injuries sustained from visiting the temples, which often involve steep climbs in the surrounds of unstable structures.

## 2.6

### Discussion

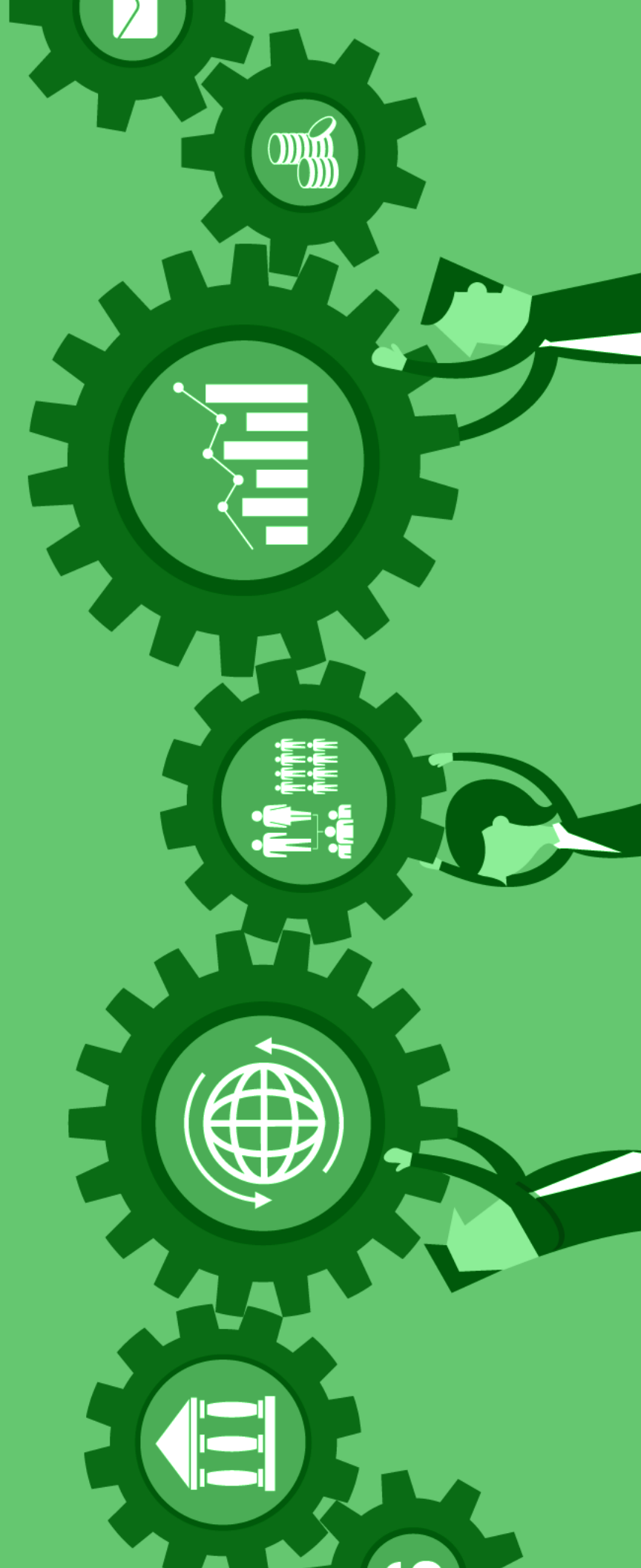
The above discussion reveals that there are different international practices dealing with the trauma. In India, there are more than one hundred trauma centres almost all at national highways. In England, there are twenty-seven trauma centres located at different places. In Singapore, there is emergency response system, the Singapore Civil Defence Force (SCDF), comprising Police, Fire, Ambulance and Disaster and Rescue Teams (DART). Co-location of emergency response organizations is an economic and geographic necessity to ensure that valuable space is utilized well. In Hua Hin city of Thailand there are public and private hospitals dealing with emergency cases. In Siem Reap city of Cambodia There is no ambulance service funded or supported by the government, and the primary services for emergency transport are those attached to hospitals and private clinics. Cambodians who do require medical assessment or treatment can endure up to seven-hour long rides by whatever transport they can muster, and then a further wait of up to six hours for medical assessment. For international visitors, there is availability of a medical retrieval helicopter to evacuate those patients requiring specialist or intensive care services to primary care facilities in Bangkok, Thailand. However, these services are well out of the reach of ordinary Cambodians. We can conclude that trauma centres at international level are running in dependently. However, the trauma centres within the premises of urban hospitals are also in practice in many countries.



CHAPTER

3

*Methodological  
Framework*



## 3.0

### Methodology

To meet the above-mentioned objectives, this study has adopted the combination of qualitative and quantitative methods and data in the form of a mixed methodology. Mixed methodology is extensively used by the health researchers as it strengthens the consistency and supplements the analysis and findings of any healthcare unit evaluation. By carefully selecting the mixed method design that best suits the objectives of this study it is aimed to find the causes of trauma injuries. Spearman rank correlation analysis has been used to analyse the possible association of traumatic exposures with the mean number of vehicles, length of roads etc. Spearman rank correlation coefficient is a statistical measure to show the strength of relationship between two variables. The value of spearman rank correlation lies between + 1 and -1. The value equal to or close to zero shows no correlation between variables while closer to + 1 shows strong positive correlation and closer to or equal to -1 shows strong negative correlation of the variables.

Furthermore, the Lorenz curve is also used to compare the distribution of a pre-and post-trauma health care services with that of the equal distribution of population, RTI & RTM in different districts. This equal distribution is represented by the 45-degree line, and the deviation of the Lorenz curve from the diagonal shows the intensity of inequality. All statistical analyses are carried out using the software package Stata version 13.

Gap analysis is used to find out the impediments in the provision of an efficient and effective trauma care system in Punjab by analysing the trauma care services in the hospitals and trauma centres covered during the study survey.

Qualitative assessment of Trauma Centres was carried out by conducting interviews and Focus Group Discussions (FGDs). The participants were the medical superintendent, senior doctors, trauma care specialist, medical staff, patients and attendants of Patients. The FDGs were carried out in all selected health facilities. The complete framework of methodology is given as follows:

## 3.1

### Assessment Approaches

Both quantitative as well as qualitative assessment approaches have been used in

the study. For quantitative assessment, data was collected on a structured questionnaire. For qualitative assessment, Focused Group Discussions (FGDs) were carried out.

## 3.2

### Study Area

The population of Punjab is about 111 million (Statistics, 2017), which is about 52 percent of the total population of Pakistan. The province has 36 districts, 88 cities, and 142 Tehsils and approximately 25916 mauzas/villages (BOS P. , 2016). Vehicle ownership is significantly higher in Punjab, Punjab has almost 14.5 million registered motorized vehicles. The total length of roads is 75920.41 km.

## 3.3

### Sample Frame

In order to have better understanding of the sampling frame there is need to understand the structure of Health Department Government of Punjab. Health department consists of: Primary, Secondary and Tertiary Healthcare units. Primary health care is the basic level of health care at community level and it consists of: Basic health units (BHU), Rural health Centres (RHC). BHU are established at union council level. Services provided at BHU are promotive, preventive, curative and referral. BHU provides first level referral to patients, BHU refers patients to higher level facilities as and when necessary. RHC's are established at circle level, The RHC provides promotive, preventive, curative, diagnostics and referral services along with inpatient services. RHC also provides medico-legal, basic surgical, dental and ambulance services. After the primary health care, the role of secondary health care starts. Secondary Health Care is an intermediate level of health care that is concerned with the provision of specific technical, therapeutic or diagnostic services. Specialist consultation procedures and hospital admissions fall into this category of care. Hospital at the first referral level serving a district or a tehsil are Tehsil Head Quarter hospitals (THQ) and District Head Quarter hospitals (DHQ). The THQ hospital provides promotive, preventive, curative, diagnostics, in patients, referral services and also specialist care. THQ hospitals are supposed to provide basic and comprehensive Emergency Obstetric and New Born Care. THQ hospital provides referral care to the patients including those referred by the Rural Health Centers, Basic Health Units. District Headquarter Hos-

pitals (DHQ's) at district level. The DHQ hospital provides promotive, preventive, curative, advance diagnostics, inpatient services, advance specialist and referral services. All DHQ hospitals are supposed to provide basic and comprehensive

TABLE

1

**Sampling Units**

North Punjab	Central Punjab	South Punjab
DHQ Gujrat	DHQ Kasur	DHQ Multan
DHQ Rawalpindi	DHQ Sheikhpura	Nishtar Hospital Multan
Benazir Bhutto Shaheed Hospital Rawalpindi	DHQ Faisalabad	Civil Hospital Bahawalpur
Lalamusa Trauma Centre	Government Hospital Faisalabad	DHQ Layyah
Kallar Kahar Trauma Centre	Allied Hospital Faisalabad	DHQ Bhakkar
	DHQ Lahore	Ahmad Pur East Trauma Centre
	Phool Nagar Trauma Centre	Shujabad Trauma Center
	Hafiz Abad Trauma Centre	Trauma Centre at Fatehe Pur Layyah
		Trauma Centre at Jandiawala

Emergency Obstetric and New Born Care. At the highest level, the tertiary health care facilities are available. Tertiary care is specialized consultative health care, usually for inpatients and on referral from a primary or secondary health professional. This consists of teaching hospitals.

The treatment of trauma injuries needs surgical services which require at least the services of three specialists' i.e. Neuro surgeon, orthopaedic surgeon and Anaesthetic. As these are hardly available up to THQ hospitals, so the relevant sampling units include DHQ's, Teaching Hospitals and Independent Trauma Centres. So, the sample was taken from DHQ's, Teaching Hospitals and Independent Trauma Centres. The sample of this study consists of 08 DHQs, 06 Teach-

ing Hospitals and 08 Independent Trauma Centres. For sampling purpose, we divided the Punjab into three regions: Upper Punjab, Central Punjab and Lower Punjab by keeping in view different socio-economic factors. Sample form each region was randomly selected. Details are given as follow:

## 3.4

### Study Protocols

The medical ethical approval and study protocol were obtained from Member Health, Planning & Development Department, Government of Punjab. Data is collected through a combination of direct facility inventory in the selected Teaching hospitals, DHQs and trauma centres, and detailed interviews with medical superintendents and key hospital management staff using authorised check lists. The check list/questionnaire was developed according to WHO guidelines for essential Trauma care. It assessed the composition and availability of equipment, machinery essential for trauma centre along with trauma team, along with their training and frequency of up gradation of knowledge and skills in trauma care. The check list for physical record is made using WHO guidelines for essential trauma care for the speciality hospitals. As Punjab is known as a middle-income province, so both desirable and essential things to make the trauma care health facility functional have been included in the questionnaire/checklist. Essential items are those that should be provided to all the injured at the level of health facility concerned in any country.

## 3.5

### Pre-Testing

After the check list/questionnaire development, it was pre-tested in two selected Trauma Centers, one from the DHQ Kasur and other Phool Nagar Independent Trauma center. The feedback of the pre-setting and enumerator experiences were discussed in detail with experts. The data collection tool, after suitable amendments was finalized.

## 3.6

### Permission to access the information/Records/ Data

Formal letters from the Chief Planning officers of health department were issued to the head of the institutions explaining them the objectives of data analysis and its utilizations. They were requested and convinced to provide the cooperation and access to relevant information/record/data. Furthermore, for secondary data of trauma injuries, a request letter was sent to rescue 1122 office who have a complete mechanism of recording the data. So, the secondary data for analysis was taken from respective office of Rescue 1122.

## 3.7

### Data Collection & Sources

Field data collection was done by the PERI researchers. There were many constraints and bottlenecks in data collection. Four researchers from PERI were selected for site visits to locations where there exist trauma care facilities. Each visit lasted for 3-4 hours. The visits were conducted between July to August 2017 to inspect facilities and equipment's condition. Nearly 2 visits of each place have been made, which included visits to outpatient department, causality, operation theatres, ICUs, blood bank, wards, radiography unit, store house and rehabilitation unit.

Furthermore, the secondary data for trauma injuries were collected from the respective department of Rescue 1122, which has a complete mechanism of recording the day to day data of all types of injuries.

## 3.8

### Data Analysis

Data entry software was prepared in MS Excel Program. Data entry was done by the PERI team Data was analyzed according to the thematic areas mentioned in the data collection tools.



CHAPTER

# 4

*Results and Discussion: Incidence  
and Causes of Traumatic Injuries  
in Punjab*



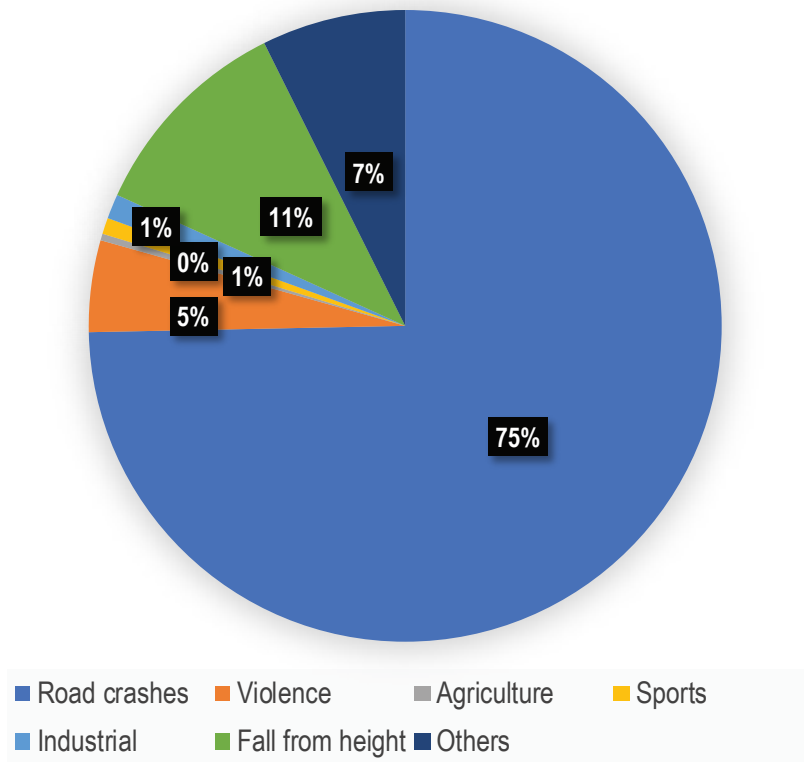
In order to meet the first objective of the secondary data has been used, which has been obtained from rescue 1122 and Punjab Bureau of Statistics.

# 4.1

## Major Types of Trauma Injuries

In order to ascertain the major types of injuries, Rescue 1122 data of the Punjab province has been used. Different types of injuries are depicted in the Figure 1 when we compare the different types of injuries we come to know that the largest share in injuries is of road traffic accidents (RTA) the share of Road Traffic Injuries (RTI) in overall injuries is around 75% which is very high percentage. After road traffic accidents the second major type of injuries is fall from height, which

**FIGURE 1** Types of Trauma Injuries



Source: Rescue 1122, 2016

is 11%. After fall from height the third major share of injuries is of violence victims which is around 5%. Injuries linked to RTI contribute to a large number of trauma admissions at hospitals which involves the use of financial & physical resources.

## 4.2

### Magnitude of RTI in Punjab

The data obtained from rescue 1122 is presented in Table given below, it shows district wise number of RTI and RTM in Punjab. RTI and RTM rates of 36 districts in Punjab have been calculated for the year 2016. The districts are ranked in descending order according to RTM score. Substantial differences can be observed across the districts of Punjab. The provincial average of RTM is 22 per 100,000 population which varies from lowest 3.25/100,000 population in Vehari district to 81.41/100,000 in Muzaffargarh district. Similar differences may be observed for RTIs, which fluctuated from 104.63 per 100,000 population in Attok district to 477 per 100,000 population in Lahore district.

## 4.3

### Major Types of RTI in Punjab

Assessment of trauma patients is very necessary for better understanding of the distribution of mechanisms of injuries that are the contributory factors of morbidity and mortality in trauma. Trauma injuries can be grouped into Minor injuries, Head injuries, Spinal Injuries, Multiple fractures etc., among the different type of injuries, Head Injuries are the serious cause of disabilities, trauma mortality, hospitalizations, and many other socio-economic losses. Among all trauma injuries occurred from January to December 2016, 10% are reported as head injuries, 17% leg fractures, 5% multiple fractures occurred. Among all injured persons, 1% of deaths occurred in 2016 while 67% reported cases were of minor injuries (see Figure 2). High mortality rate is reported midst those with multiple injuries, which can be credited to the lack of trauma care facilities at the nearest place of accident, and inadequate critical care.

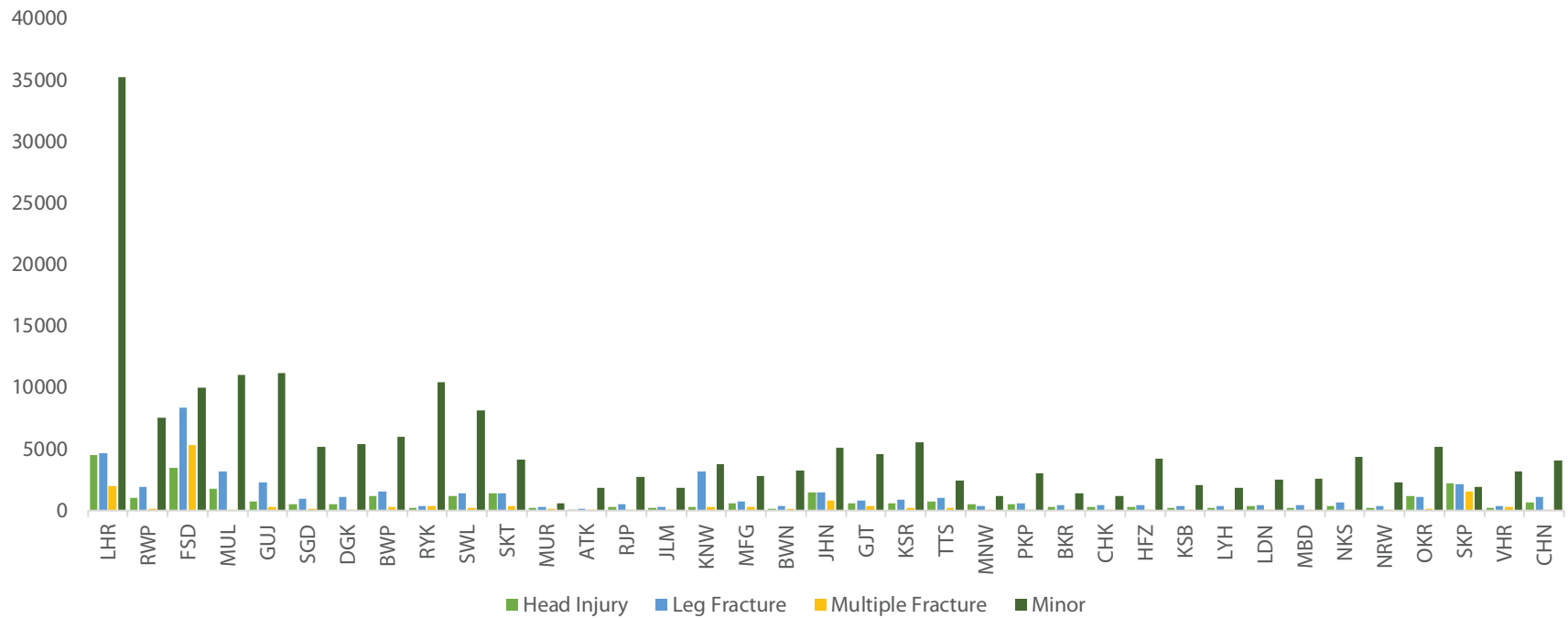
TABLE

2

**Population, RTIs, RTM, in Districts of Punjab, 2016**

District Name	Total Population	RTI/100,000	RTM/100000
Muzaffargarh	3980000	80.79	81.41
Sahiwal	2415000	337.35	41.28
Gujranwala	4828000	283.97	39.85
Faisalabad	7413000	315.66	38.26
Multan	4368000	318.36	31.98
Hafizabad	1106000	310.58	30.20
D.G Khan	2463000	244.90	29.35
Lahore	9644000	477.60	27.63
Rawalpindi	4730000	199.56	26.91
Sargodha	3417000	182.53	25.61
Khanewal	2805000	235.58	25.49
Bahawalpur	3549000	231.81	24.06
Jhelum	1218000	140.39	22.99
R.Y Khan	4647000	187.45	22.38
Chiniot	1239000	322.76	20.66
Sheikhupura	3148000	237.74	17.88
Pakpattan	1757000	170.97	17.53
Nankana Sahib	1311000	280.40	17.24
Lodhran	1645000	165.65	16.78
Toba Tek Singh	2117000	144.31	16.77
Khushab	1171000	182.84	16.40
Gujrat	2707000	192.13	16.14
Bhakkar	1471000	131.82	15.43
Okara	3017000	193.67	14.82
Mianwali	1417000	131.19	14.68
Mandibaha-ud-Din	1471000	181.44	14.28
Jhang	247000	2619.84	13.14
Sialkot	3700000	166.78	13.14
Narowal	1621000	154.60	12.71
Rajanpur	1648000	166.02	12.38
Kasur	3288000	164.69	11.77
Bahawalnagar	2781000	116.90	11.11
Layyah	1641000	130.04	9.14
Chakwal	1392000	118.53	6.32
Attock	1685000	104.63	4.51
Vehari	2919000	119.73	2.33
<b>Total</b>	<b>102199000</b>	<b>247.72</b>	<b>21.69</b>

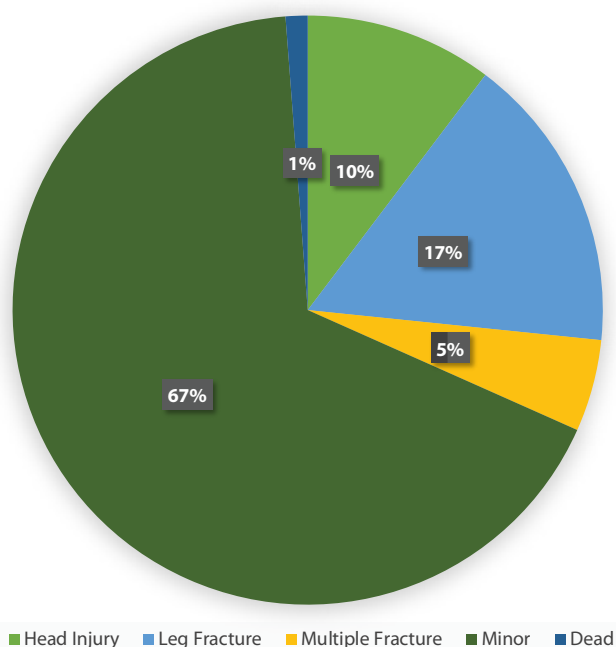
Source: Rescue 1122 emergency data

**FIGURE 2**
**Major Types of Injuries in Districts**


Source: Rescue 1122, 2016

FIGURE

3

**Major Types of Injuries in Percentage**

Source: Rescue 1122, 2016

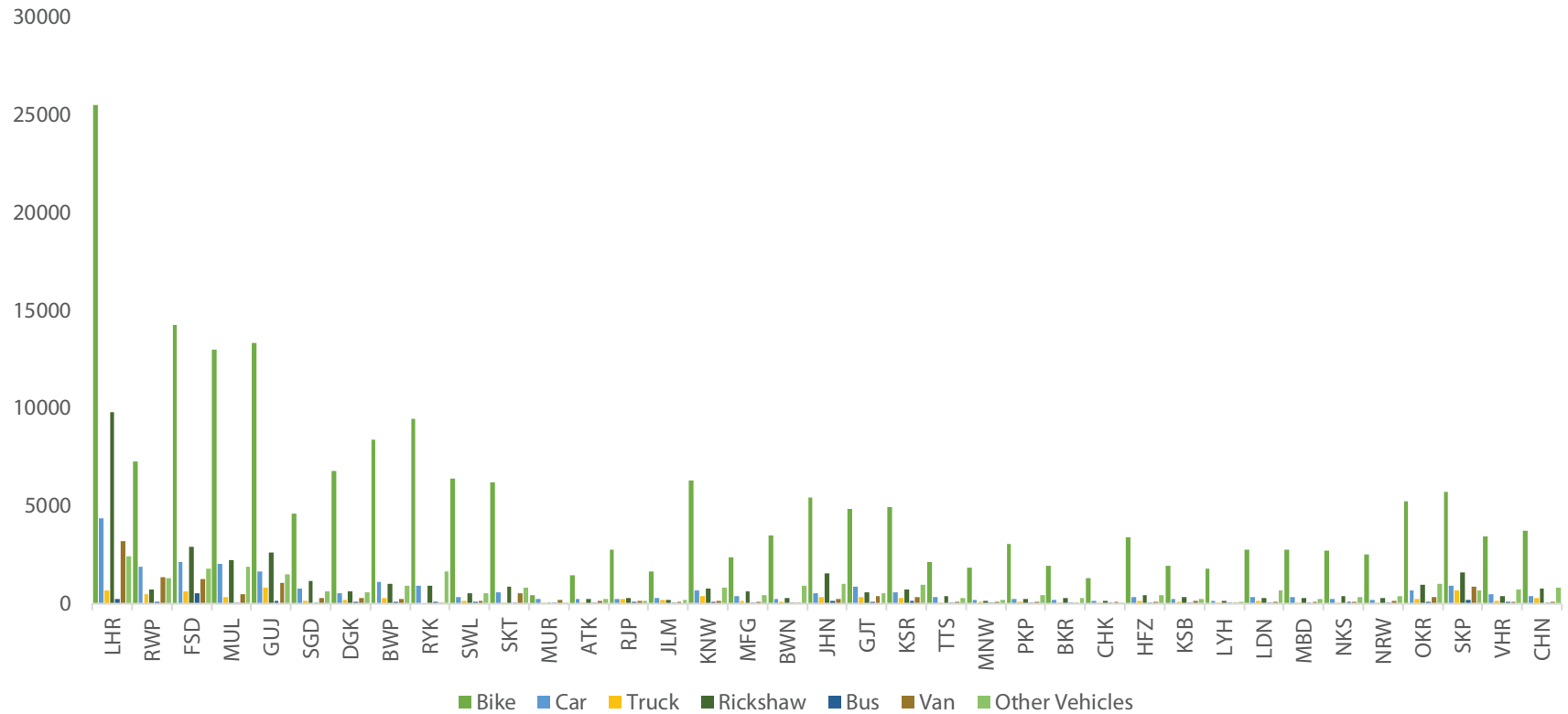
## 4.4

**Type of Motor Vehicles involved in RTA Collusions**

Among most affected by RTI in 2016, 64% were users of two-wheeled motor bikes. The most common conveyance in Punjab is motor cycle, and because the bike rider drives the bikes in a most unprotected way, so the major vehicle involved in causing injury is motorcycles. After motor bikes 12% vehicles involved in RTI were three-wheeler Rikshaw, the third most common vehicle involved in RTI is car which has 8% share in total RTI, 3% trucks, 4% vans, 1% bus and 8% all other vehicles. The lowest percentage of vehicles involved in RTI are buses (see fig). Several kinds of internal, external, and skeletal trauma injuries occur as a result of motor vehicle crash such as scratches, cuts, fractures, puncture wounds etc. There is a larger probability of getting multiple fractures on the body of the person involved in an RTI. Furthermore, the forms of injuries suffered by the in-

FIGURE

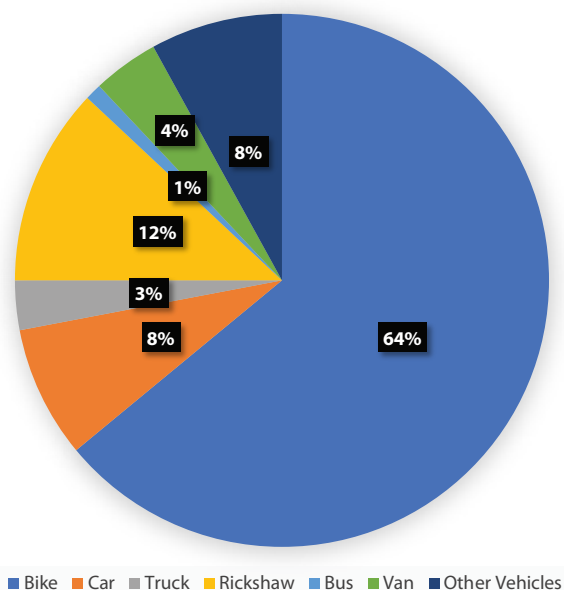
4

**Motor Vehicle Crash Ratio District Wise**

Source: Rescue 1122, 2016

FIGURE

5

**Motor Vehicle Crash Ratio %**

Source: Rescue 1122, 2016

dividuals involved in motor vehicle collusion also depends upon the structure of the vehicle, as the structures of the vehicle in which the victim's body fall out will have the greater chances to injure the person severely.

## 4.5

### Causes of RTA

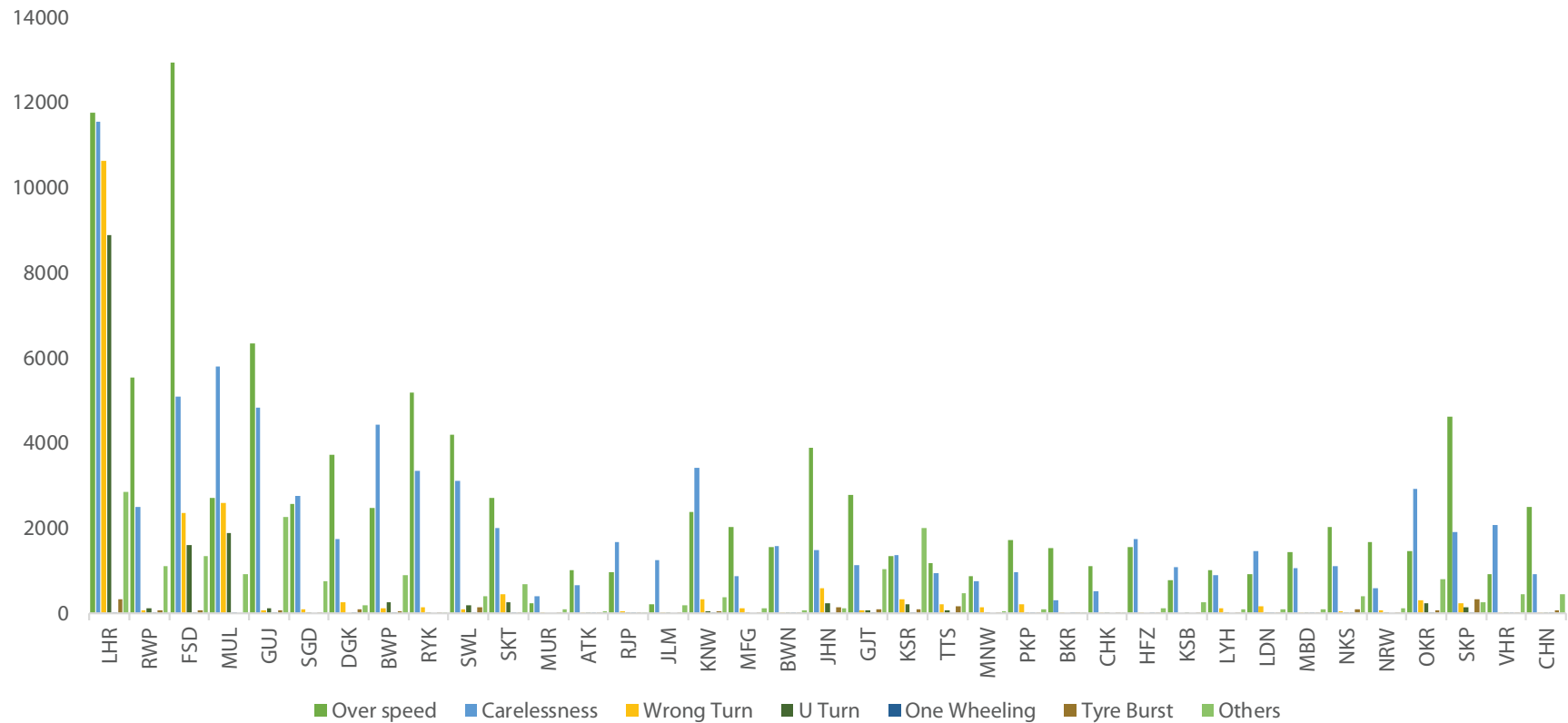
Some of the accidents are simple hit with little loss, but a lot of motor vehicle crash results in huge loss. About 23000 people in 2016 died in auto accidents. The ratio of mortality is much high in big cities such as Lahore, Rawalpindi, Faisalabad etc (Rescue 1122). Among RTI, over speeding is the major reason, around 43% of the road traffic accidents are due to over speeding. The second largest reason for road traffic accidents is carelessness in driving and it accounts for 34% of the road traffic accidents.

The third largest reason for RTA is wrong turn which contributes 8% in total RTA. The next reason for RTA is U-turn which contributes 6% in total RTA. Over-

FIGURE

6

## Main Causes of RTI &amp; RTM District Wise



Source: Rescue 1122, 2016

all Motor bike is the most significant determinant of RTA. Young bike riders' ride bikes without wearing helmets, resort to one-wheeling, often carry out dangerous stunts like lying flat, standing on motorbikes and driving with backs facing the handle. So, motor bike is the major cause of RTA (NH&MP, 2011).

## 4.6

### Population Characteristics of RTI Victims

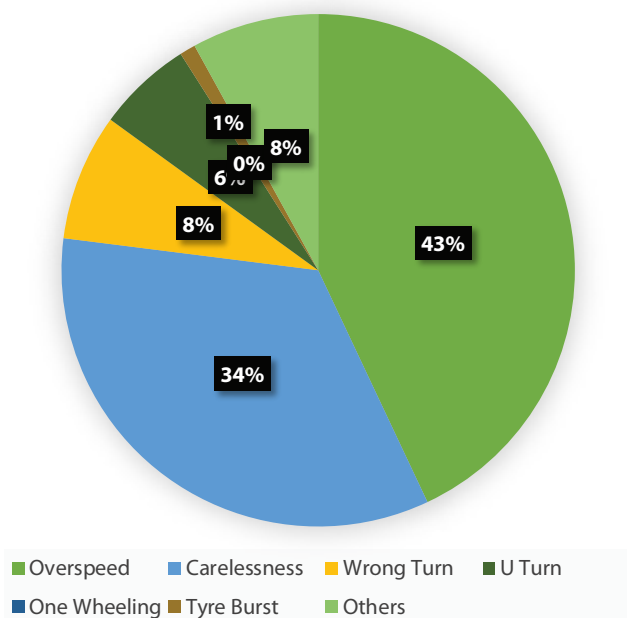
#### 4.6.1. Male/Female Ratio

In Pakistan Socially male are several times more likely to drive vehicles than females so they are more accident-prone than females, it is also seeming to be true in case of Punjab (see fig 8) The data recorded by Rescue 1122 for year 2016 indicates that, on average males are around 3.8 times more likely to suffer a road side accident than females. This ratio varies from district to district. The highest ratio is observed in Lahore, Rawalpindi, Murree, Rajanpur, Mianwali etc.

FIGURE

7

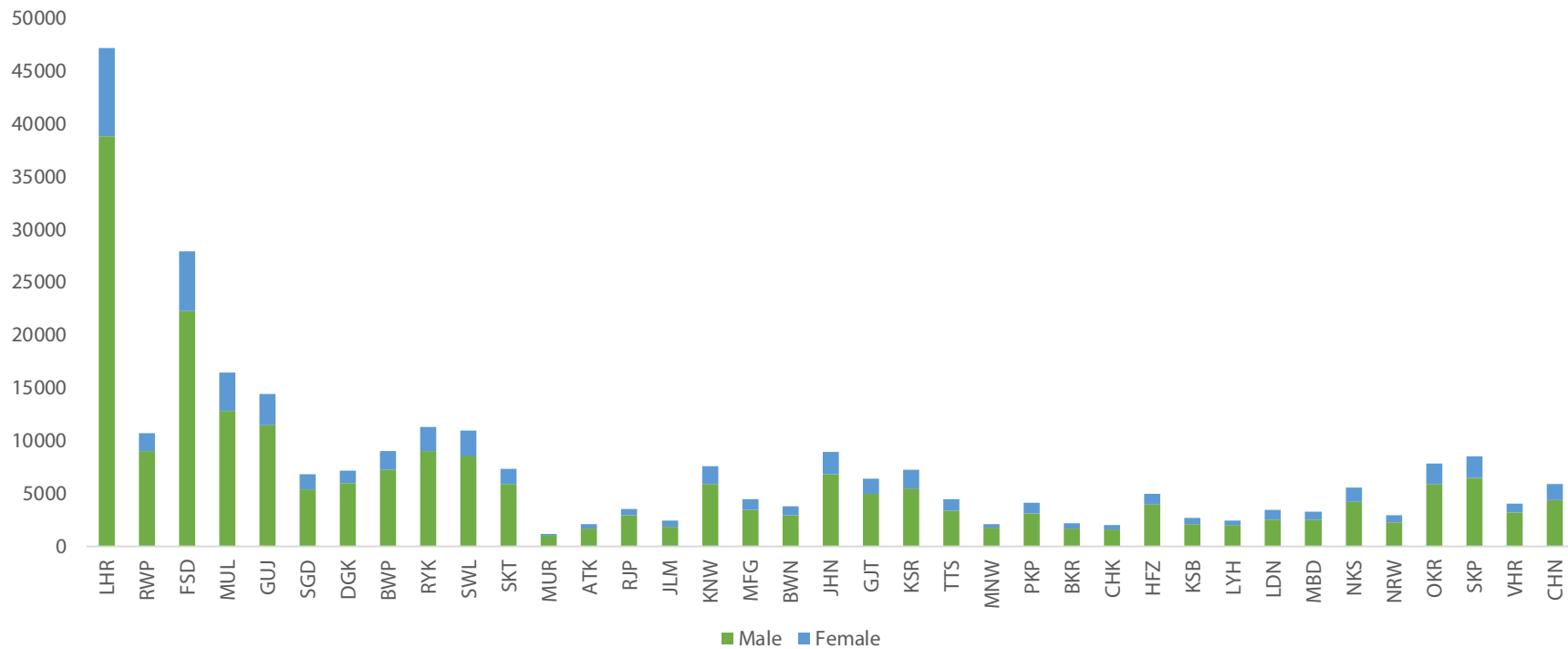
Main Causes of RTI &amp;RTM in %



Source: Rescue 1122, 2016

FIGURE

8

**Male/Female Ratio of Accidents District wise**

Source: Rescue 1122, 2016

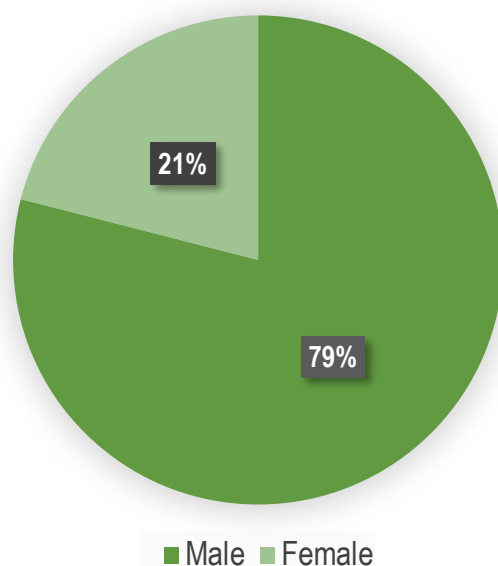
### 4.6.2. Age structure of RTI Patients

Age is a familiar factor in trauma patients and it is also observed that age is provocatively linked with the severity of an injury. Adult's ages 11-40 years are founded the fastest-growing part of the Punjab population. This age group is projected to constitute 53% of the total population (Bureau of Statistics, 2016) whereas the young trauma patients aging between 11-40 are 70% of total trauma patients according to the Rescue 1122 data for year 2016. The second largest trauma incidence arise for the age 41-60. group 41-60. In the above review, the majority of RTI victims are male in their most productive years e.g. 11-40. This age group is usually considered the economically energetic and any unexpected incidence of such type describes an economic lost not only to the family but the overall nation too. The high incidence of RTI in this age group imitates their high level of involvement in risky activities such as carelessness driving/riding, one-wheeling, over-speeding, and driving without wearing any protective gears (helmet etc.). The ground realities of RTI in economically productive age-group requires an urgent public policy response. Furthermore, motor bike riders are responsible for the majority of RTI accounting for 64% of crashes. The use of motor bike has become very popular in Punjab due to the fact that it is cheaper & easier means of transportation and people easily afford it.

FIGURE

9

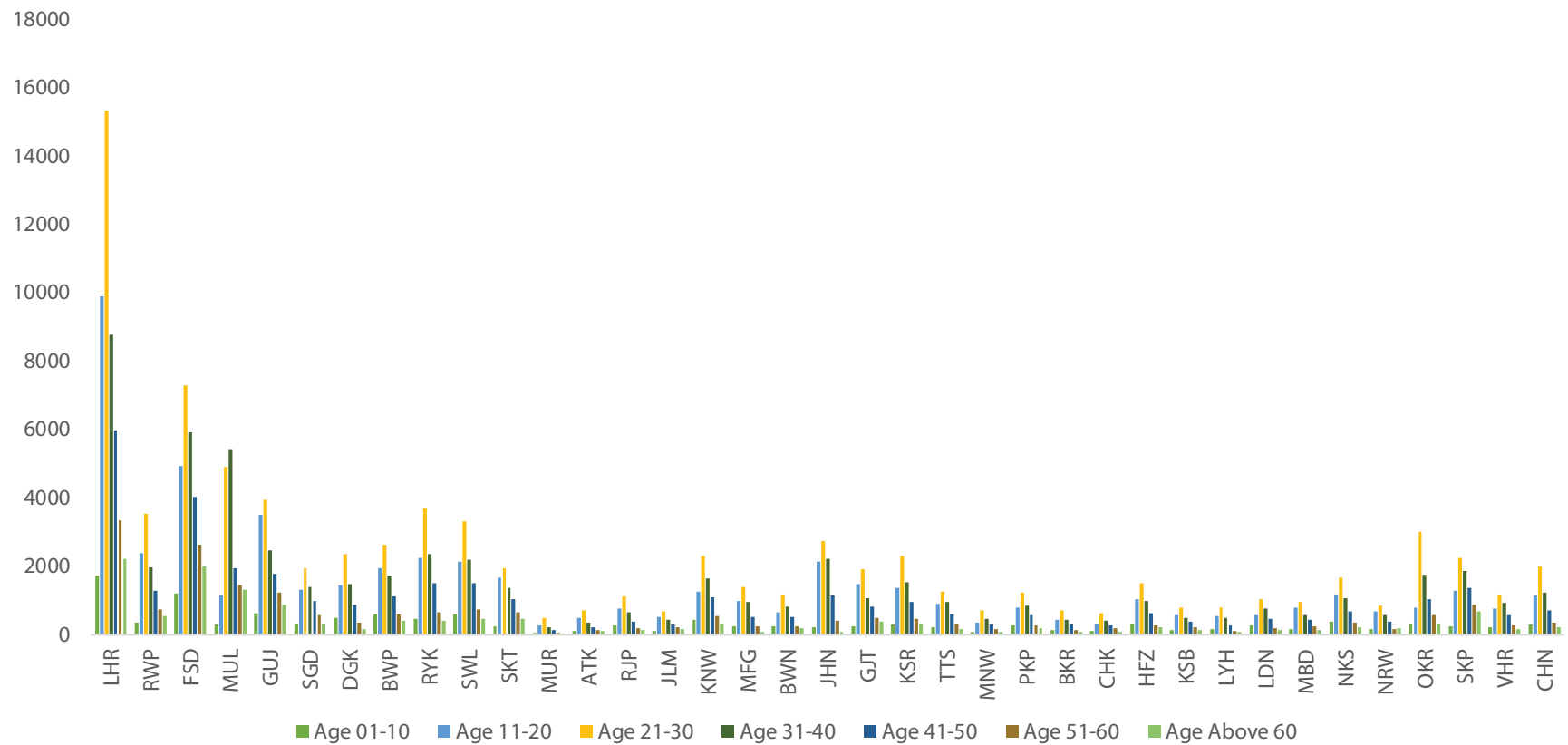
#### Male/Female Ratio of Accidents %



Source: Rescue 1122, 2016

# FIGURE 10

## Age Component in RTI District



Source: Rescue 1122, 2016

## 4.7

### Correlation Analysis of RTI, RTM and No of Vehicles

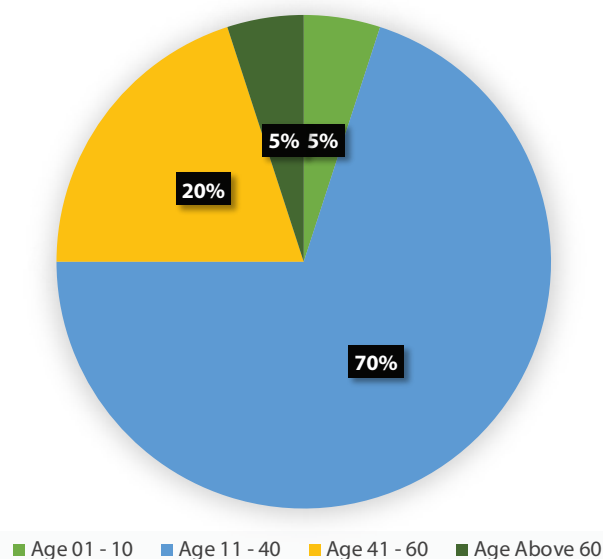
To find the possible association of traumatic exposures with the mean number of vehicles and to discover the association between the trauma centres and traumatic exposure spearman rank correlation is used in this section. Correlation analysis also has been done for investigating the relation between RTA/RTM and no of vehicles, RTM and no of ambulances (Indicator used for prehospital care).

The correlation analysis is depicted in graphical form as given below. The first graph indicates correlation between RTI and no of vehicles per 100000 population, it indicates positive correlation. Similarly, second graph also depicts positive correlation between RTM and no of vehicles. It is obvious that if there are more vehicles on the road there will be greater probability of RTI and more RTI will increase the probability of RTM. The last graph shows correlation between RTM and No of ambulances (Indicator of pre-hospital care). It shows very interesting correlation as the correlation between RTM and no of Ambulances is negative and it is according to general rule. If there is pre-hospital care available right after the RTI the costly life can be saved. That is why there is negative correlation between RTM and No of Ambulances.

FIGURE

11

**Age Component in RTI in %**

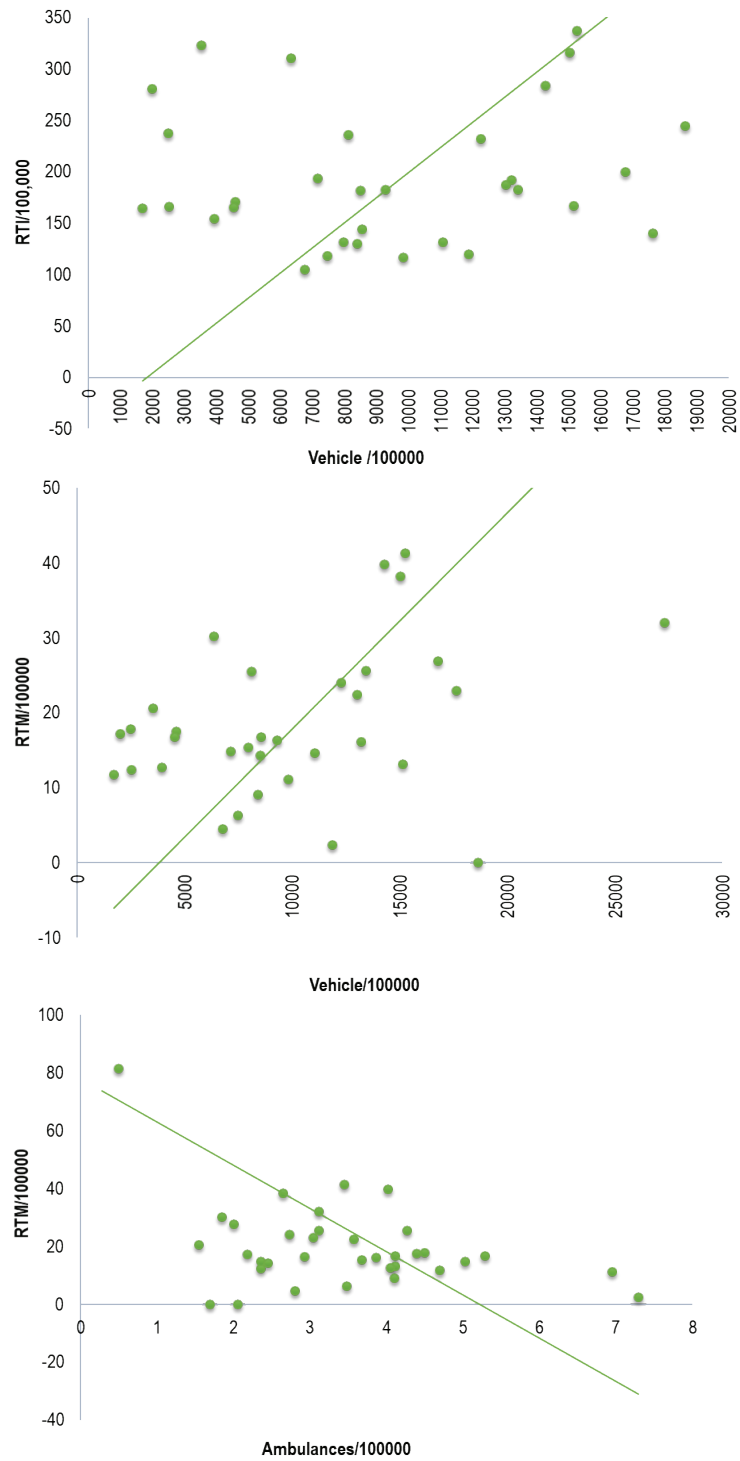


Source: Rescue 1122, 2016

FIGURE

12

## Scatter Diagram for Correlation Analysis



Source: Author's Calculations

### Trauma in Punjab-Fact file

- Road-traffic accidents are increasing on average 11% annually
- A trauma-related death occurs in Punjab in every 20 minutes
- The majority of fatal road-traffic accident victims are Bike 64% Car 8% Rickshaw 12% Van 4% Bus 1% Truck 3% Others 8%
- During 2016
  - nearly 22,767 lives were lost and
  - 245300 people were injured
  - 80% were men and 20% women, 70% of trauma victim fall in age group of 11-40 years, causing significant impact on productivity
  - More than 90% trauma victim fall in the income group of below 30,000
- The education level reported is illiterate 33.58% primary education 28.28% metric 25.28% intermediate 8.42% graduate 3.62% masters & above 0.82%
- A trauma victim rescued by Recue 1122 is reported 1.39 persons/ minute
- All trauma deaths are not road traffic injuries
  - Road Crashes 74.68%
  - Violence 4.69%
  - Fall from Height 10.85%
  - Industrial 1.26%
  - Agriculture 0.34%
  - Sports 0.83%
  - Others 7.35%



CHAPTER

# 5

## *Mapping of Trauma Care Facilities in Punjab*



## 5.1

### Map of Trauma Centres in Punjab

The trauma centres in Punjab are established with the vision to provide the obligatory equipment, dedicated resources, and a specially trained trauma team to care for severely injured patients. Although the trauma centres are especially designed for the treatment of injuries but they have also the capacity to handle all of the same types of illnesses that are seen in an emergency department. Currently, the trauma centres in Punjab provide multi-disciplinary, emergency services to patients who have traumatic injuries particularly and medical services to the patients who have medical emergency generally. The trauma centre health-care facility in different cities /districts of Punjab plays a major role to facilitate the injured persons. Although, there are many hospitals at different levels with all modern medical instruments and technology which deal with traumatic injuries such RHCs, THQs, DHQs & Teaching hospitals etc. In Figure 2, we consider only those trauma centres which are functional as speciality hospital for traumatic injuries. At a present Primary & Secondary Healthcare Sector having around 20 trauma care centres. Most of trauma centres are mainly existed in central part of the province. Some trauma centres are established within the premises of the DHQ Hospitals while some work as independent unit.

## 5.2

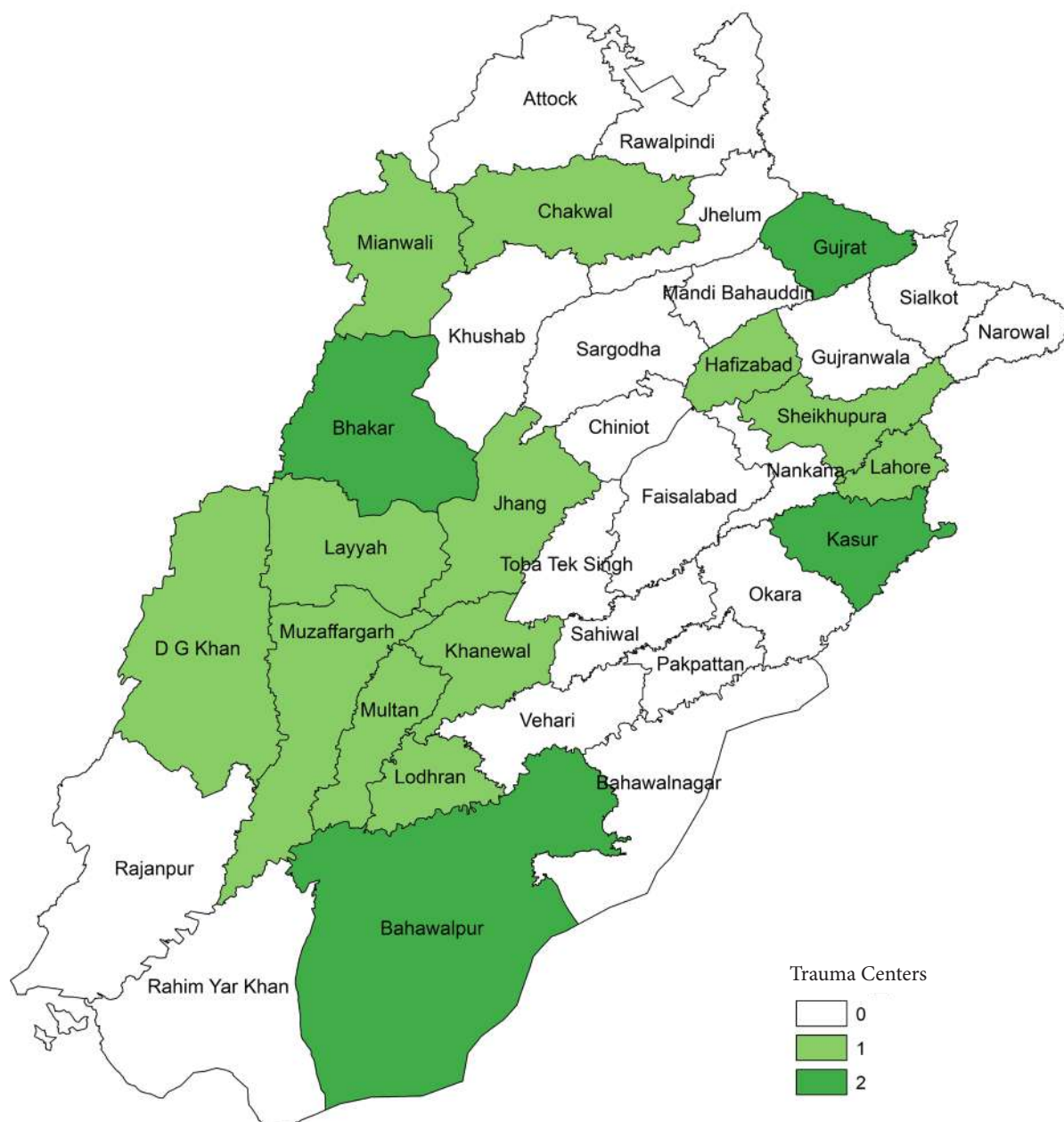
### Mapping of Functional and Non-Functional Trauma Facilities

Some of the trauma centres in different areas of Punjab are not functional due to various reasons, like lack of equipment or human resource. Timely availability of human resources to deal with trauma emergency services and critical care can prevent and reduce number of deaths. Similarly, financial constraints, hurdles in the supply of medicines, the X-ray facility and for the fuel of an ambulance and a generator etc., are some of the reasons in many trauma centres to make them properly functional. According to Health Information System Development Unit (HISDU), Primary & Secondary Health Care (P&SH) Department Punjab, currently, there are 20 trauma centres in Punjab, amongst which 12 are functional and 8 are non-functional as listed in below diagram.

FIGURE

13

## Mapping of Trauma Centres in Punjab

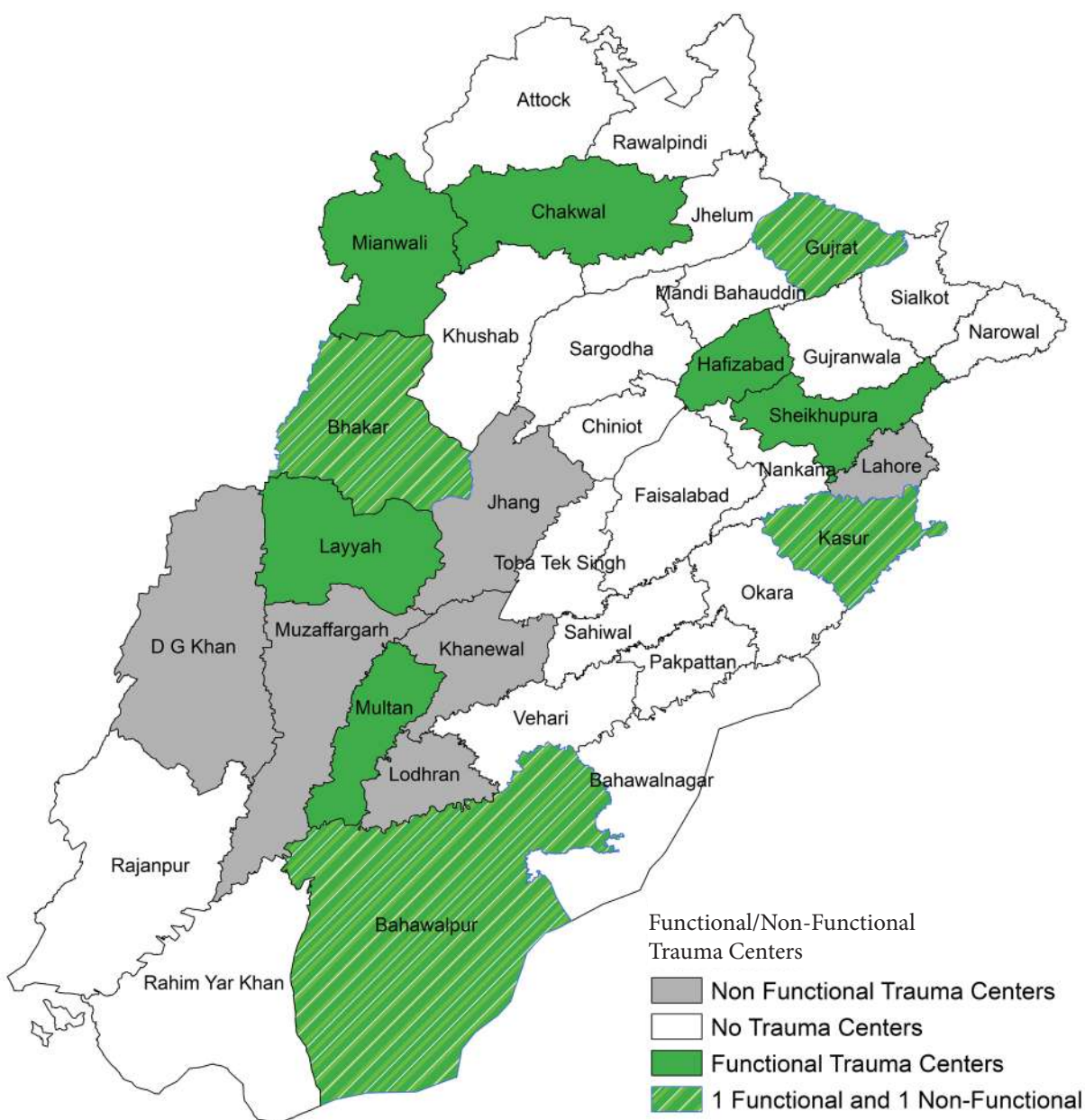


Source: HISDU, P&amp;SH Department.

FIGURE

14

## Mapping of Functional/Non-Functional Trauma Centres in Punjab



Source: HISDU, P&SH Department.

In Bahawalpur, Bhakkar & Kasur, there are two trauma centres in each district, one functional and one nonfictional

## 5.3

### Mapping of Accidents and Emergency Departments in Teaching Hospitals of Punjab

The Accident and Emergency (A&E) service delivery system provides a basis to the health care in a way that they give an immediate response to the uncertainty and volatility of ailment or accident. The A&E department has a number of structural and operational features which may suit the requirements of a potential patient e.g., the department provides a 24 hours service which is mostly free of charge and no proper organizational arrangements such as appointment systems for limiting accesses departments exist in A&E Departments of the hospitals (Calnan, 2009). In Punjab, the A&E department which exists in teaching hospitals provide access to all patients in 365 days a year, 24/7 days of the week, A&E department include staff such as paramedics, diagnostic radiographers, A&E nurses, A&E reception staff, healthcare assistants, surgeons and emergency medicine doctors. Medical staff are highly trained in all aspects of emergency medicine. However, adherence to a general routine, all type of patients is received here, there is no system of filtration of patients resulting a huge volume of patients with no serious emergency such as the patients with common ailment etc. visit here. The consequences of this is that some serious patients may not be given proper attention. The A&E department in Punjab are mapped as follows:

## 5.4

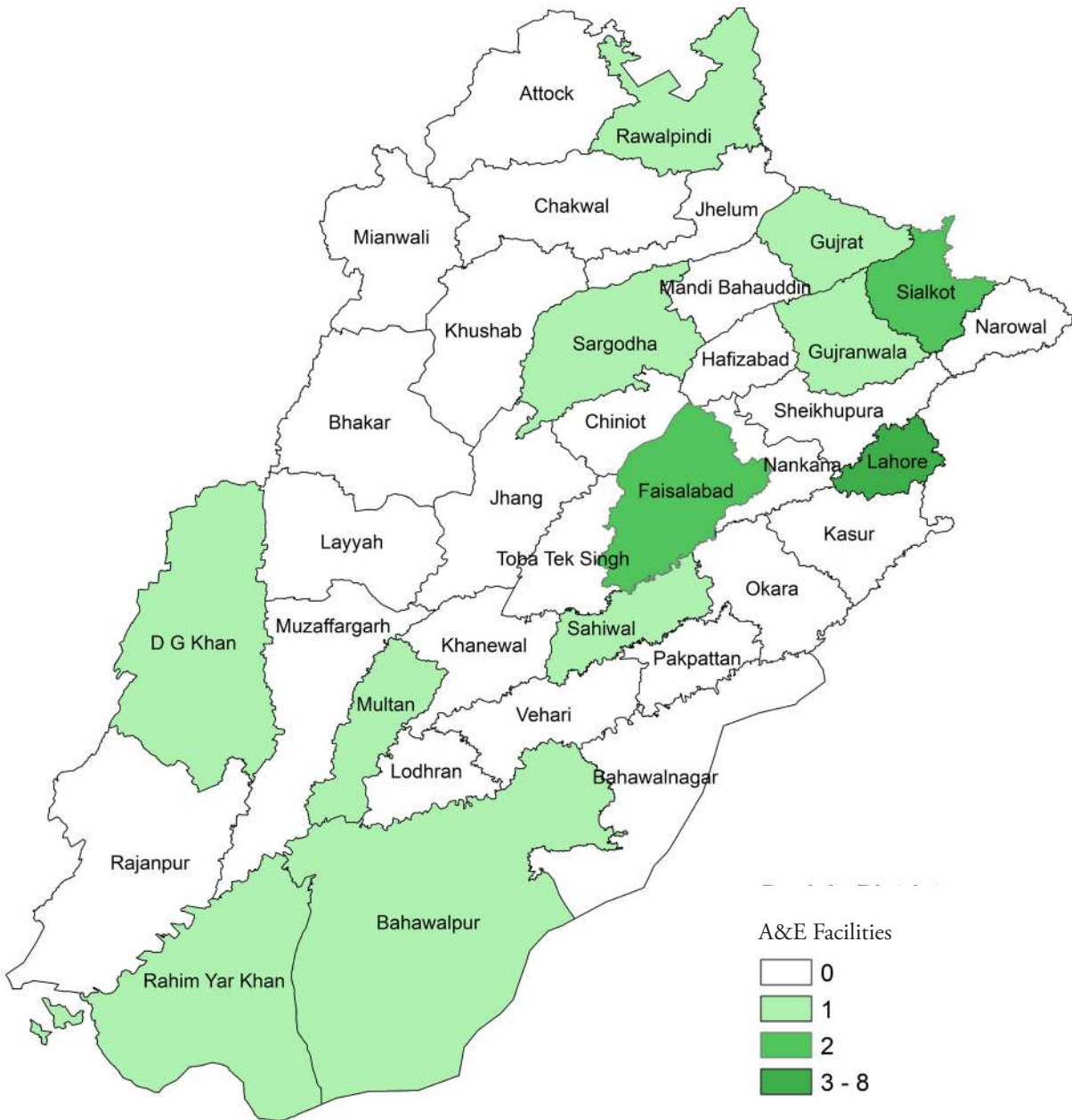
### Pre-Hospital Trauma Services Mapping

Pre-hospital trauma care service includes all rapid and safe transportation and investigation of the system, all quick responses and safety measures which are taken for the injured persons. Pre-hospital trauma care is the first aid treatment of the injured person at the scene and transport him/her to trauma care facility. Training is one of the most important component of successful prehospital trauma care. In Punjab, prehospital care is provided by Rescue 1122 owned by the Government of Punjab (GOP), Pakistan. Rescue 1122 delivers free of cost help in RTAs, General Emergencies and Disasters etc.

The ambulances of the rescue 1122 reached at the scene within a golden hour for successful management of the injured patient from the time of accident to the receipt of definitive care at the hospital. Rescue service is functional in all districts of Punjab (see Fig 6). The total number of ambulances in each district

is given in following Figure. Besides public-sector pre-hospital services, there are number of ambulances operated under Private sector and NGOs as well.

**FIGURE 15** Mapping of A&E Facilities in Punjab



Source: Specialized Healthcare Department

## 5.5

### Analysis of Distribution of Trauma Care Facilities in Punjab

Researchers, organizers, and policymakers in the health sector are usually concerned to the equal distribution of health resources; they are also concerned about the quality of services. Fair and impartial distribution of the resources is one of the bases of success of any health service delivery system (Motevalli Zadeh, 2006). To examine the distribution of trauma care facilities, Gini coefficient is used in this analysis. Gini coefficient is generally used to quantify the inequality in the distribution of income; however, it can be used to quantify the inequality in the distribution of one variable over the distribution of another variable. The comparison of the distribution of variable of interest that embodies equality is shown by Lorenz curve (Fig 6). The perfect equal distribution is shown by the 45-degree line. The equality/inequality is measured by distance of the Lorenz curve lies from this line, the higher the distance from diagonal line shows high rate of inequality while the shorter distance shows lower rate of inequality. In Fig 16, the cumulative share of the population is shown on the X axis while the cumulative share of the variable of interest is shown on Y axis. The Lorenz curve of RTA (16a) shows that the number of road accidents is unevenly occurred as compare to population percentages in different districts which indicate that the districts with more population percentage met with low percentage of accidents. Significant variation in the distribution of trauma centres among different district has been observed. The overall distribution of pre-hospital/ level 4 trauma

TABLE 3

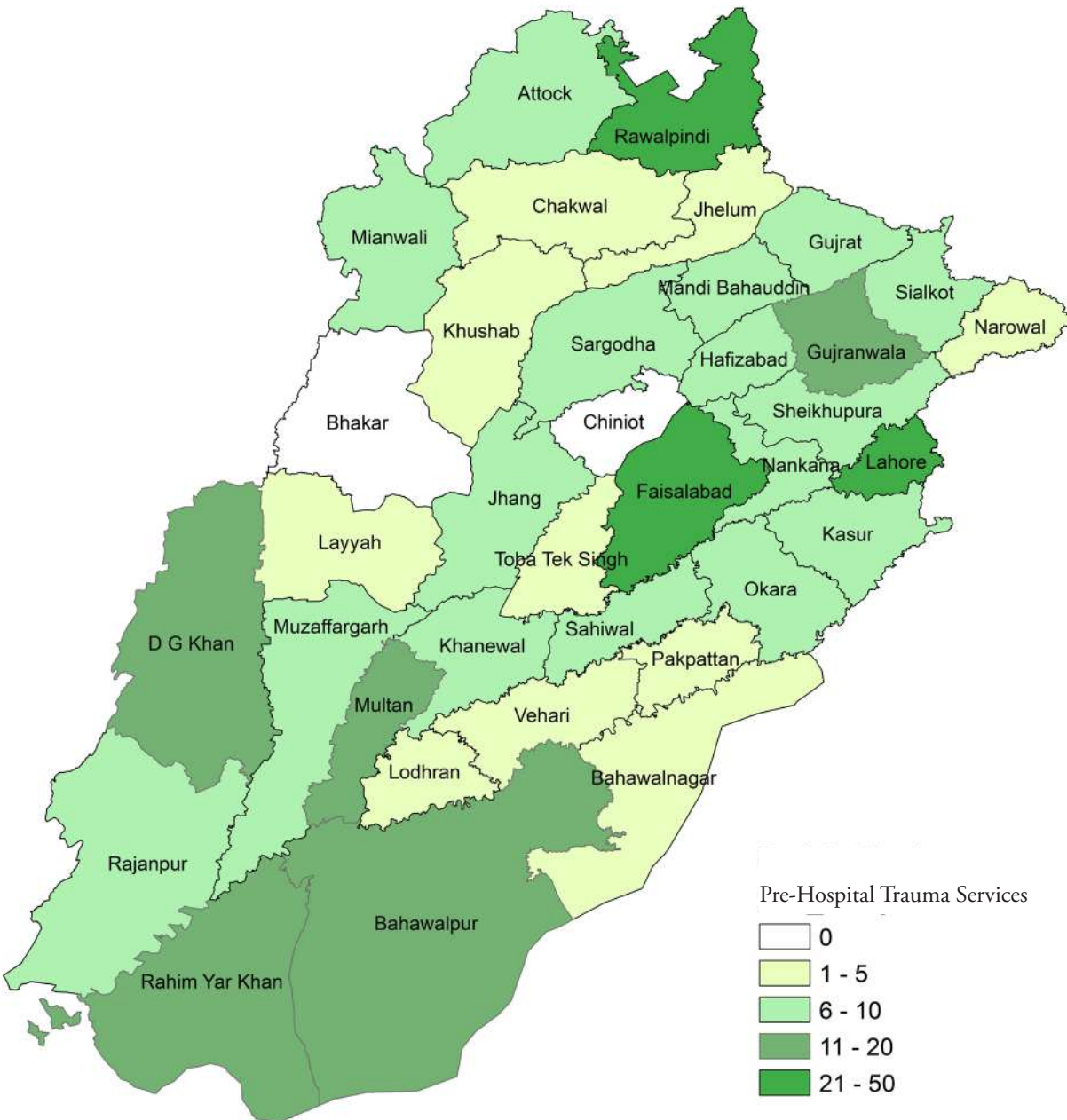
**GINI Coefficients For Pre-Hospital Trauma Care Facilities, Trauma Care Facilities, RTA, RTM and Dispatched Ambulances**

Variable	Gini Coefficient
Ambulance	0.129
RTA	0.113
RTM	0.106
Trauma Centers	0.263

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 population have more ambulance services than their population share (e.g., if the districts with less than 5% of total population have more than 5% of total ambulance), it is for this reason, the Lorenz curve lies above the 45°

line. The same is the case observed in RTM (see 16c).

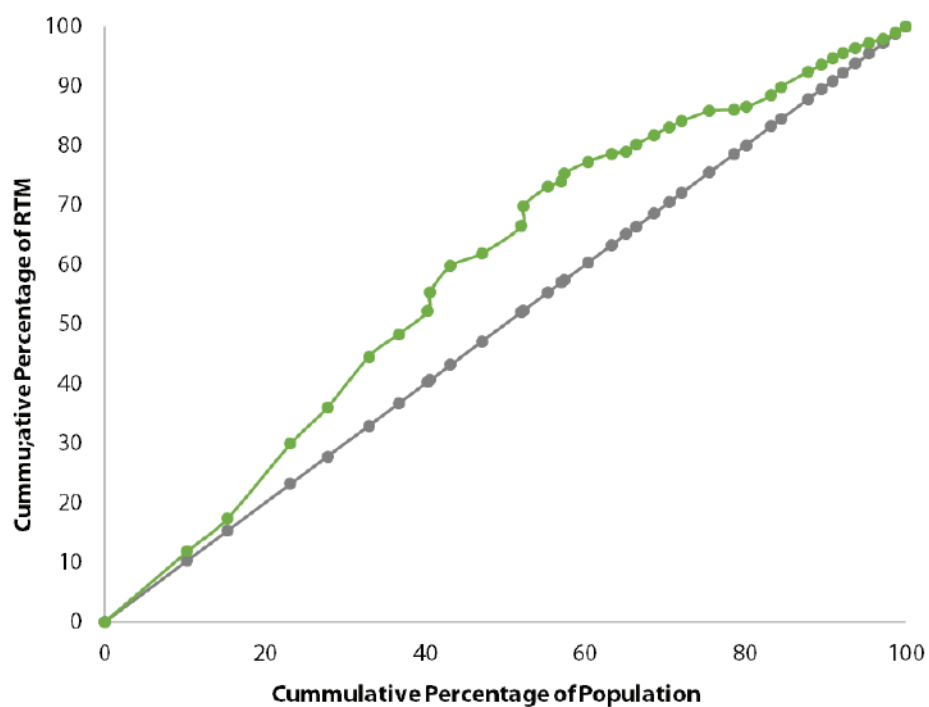
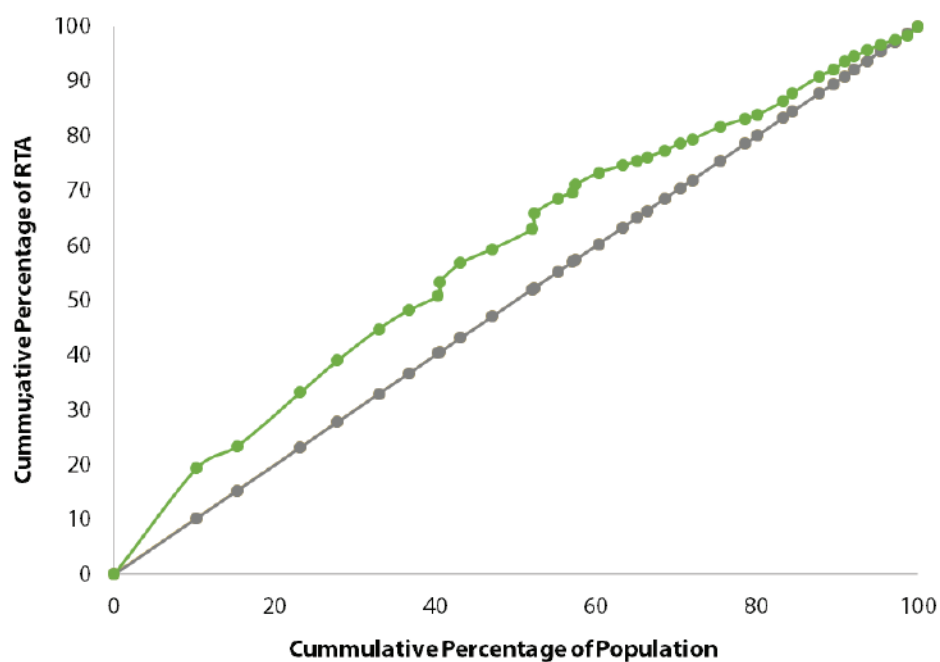
**FIGURE 16** Mapping of Pre-Hospital Trauma Services in Punjab

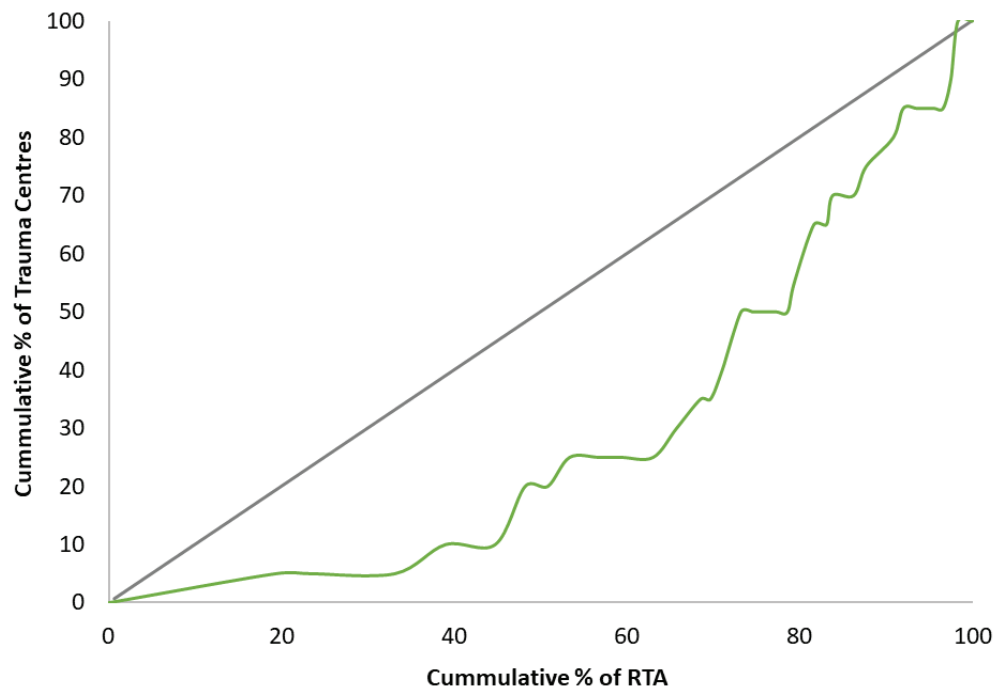
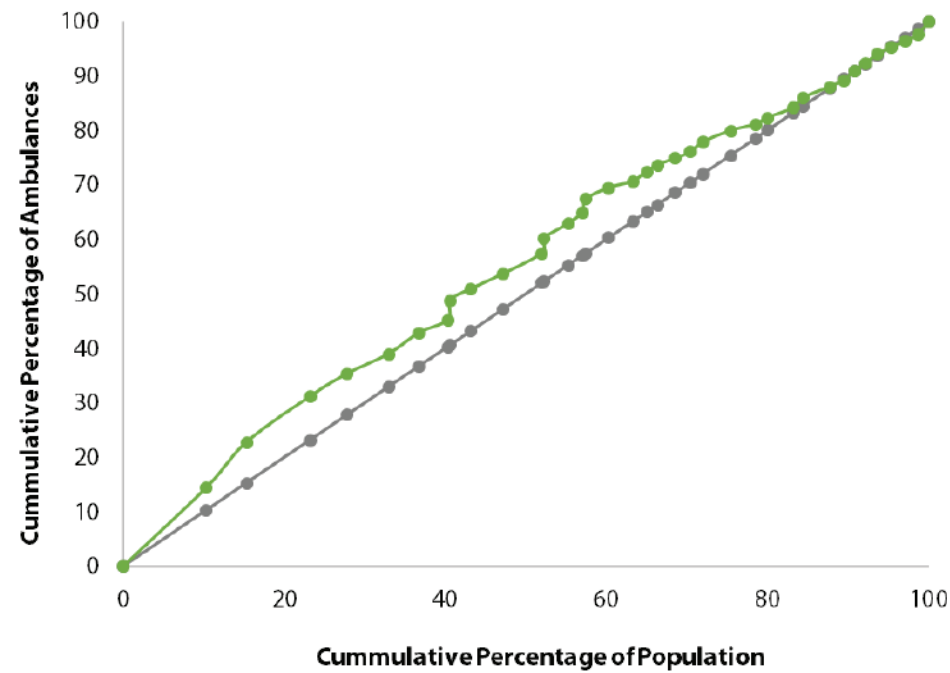


Source: Rescue 1122

Among facilities, the Trauma care centres are slightly unevenly distributed among districts. Lorenz curve lies away from the diagonal/justice line. The dif-

FIGURE

**17****Lorenz Curves of Distribution of, RTA, Ambulance, RTM and Trauma Centres Among Different Districts of Punjab**



ference between the justice line and Lorenz curve specifies a lack of appropriate distribution of trauma centres among districts. The calculation of the Gini coefficients confirmed the results of Lorenz curves (see Table 2). Realistically, more

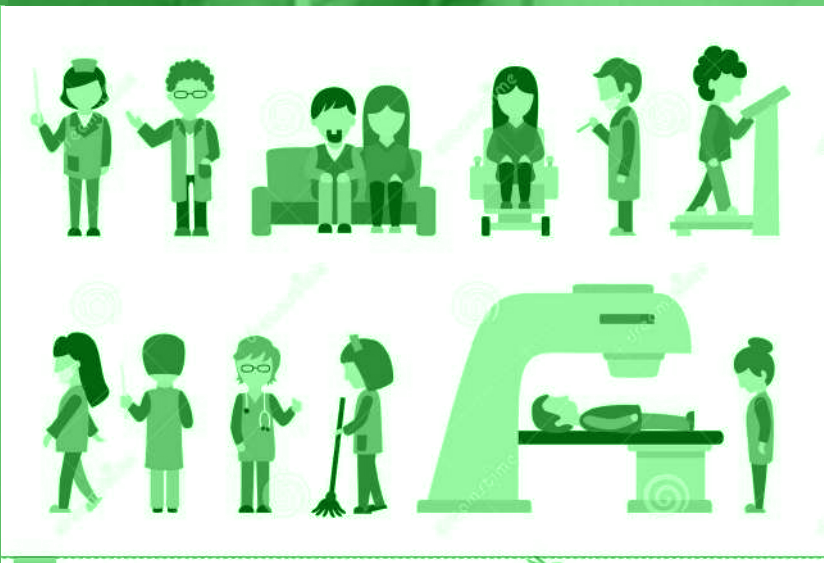
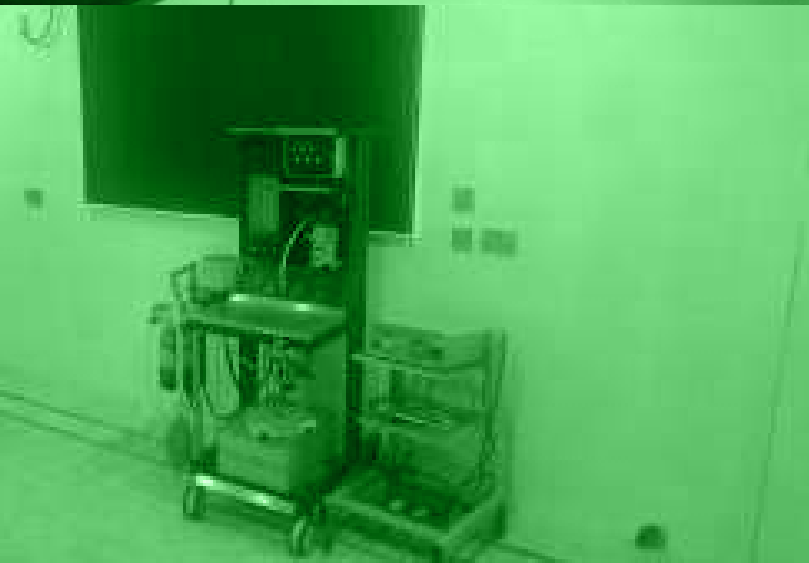
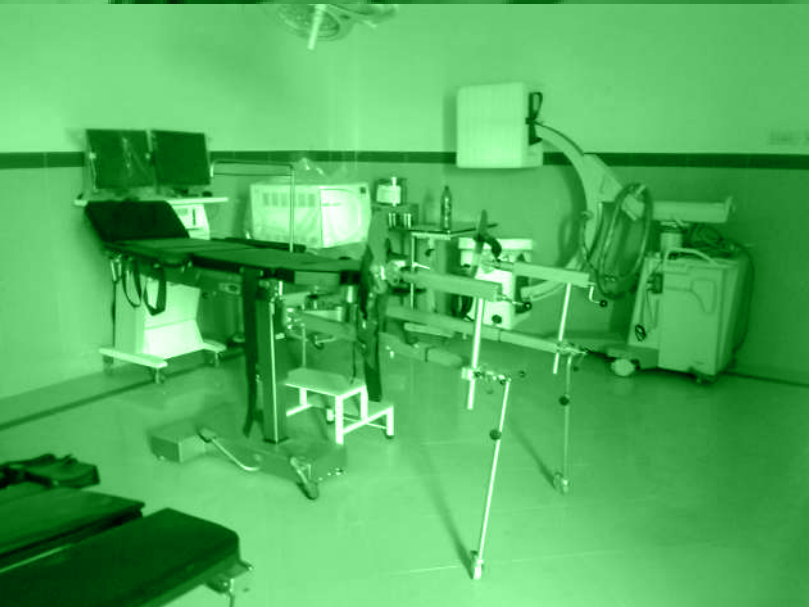
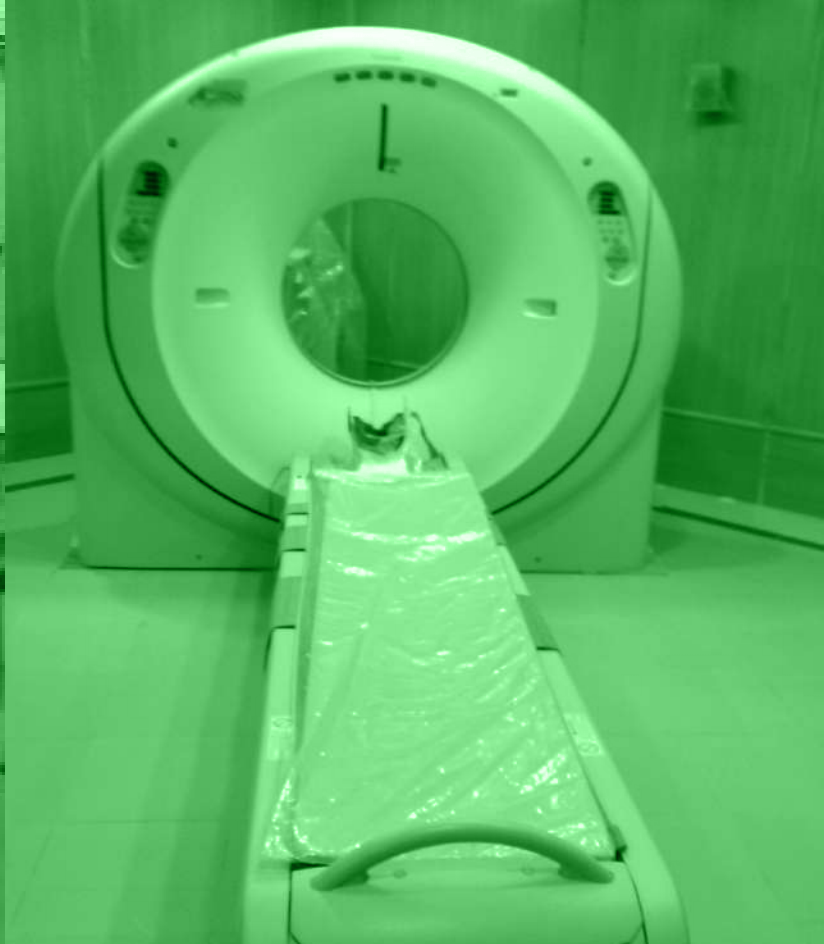
trauma care centre should be available at places where most of the accidents take place.

The Gini Coefficients shows the degree of inequality in distribution. The highest inequality is observed in distribution of trauma care facilities.

CHAPTER

# 6

## *Gap Analysis of Trauma Care Services in Punjab*



## 6.1

### Quantitative Analysis

This section will look at the impediments in the provision of an efficient and effective trauma care system in Punjab by analysing the trauma care services in the hospitals and trauma centres covered during the study survey.

#### 6.1.1. Scarcity of Human Resource:

Trauma care requires immediate availability of board-certified emergency physicians, general surgeons, anaesthesiologists, neurosurgeons, and orthopaedic surgeons (American College of Surgeons 2014). Other board-certified specialists should also be available, within a short time, to all patients who require their expertise. But during the survey and data collection it was observed that a major hurdle that was faced by the patients and hospital administration was the shortage of medical staff for the delivery of trauma care and services. Human resource has essential to run health care institutions in an effective way and to deliver efficient service delivery and to achieve patient satisfaction. It is evident from the literature that the human resource management is the most effective input on developing the quality of healthcare service (Yu, 2007; Michael, 2009; Patrick, 2011) and found that the incentives and providing motivation to work and follow the system of bonuses by competencies improve the performance of individuals working in hospitals (McKinnies, 2011). An effective human resource in the health care institution can make a significant difference between health organization with good performance and health organization underperforms or below average (Edgar and Geare, 2005). In the coming lines, we will through a light on the availability of human resource in the Trauma Centres, DHQs, and in Teaching Hospitals.

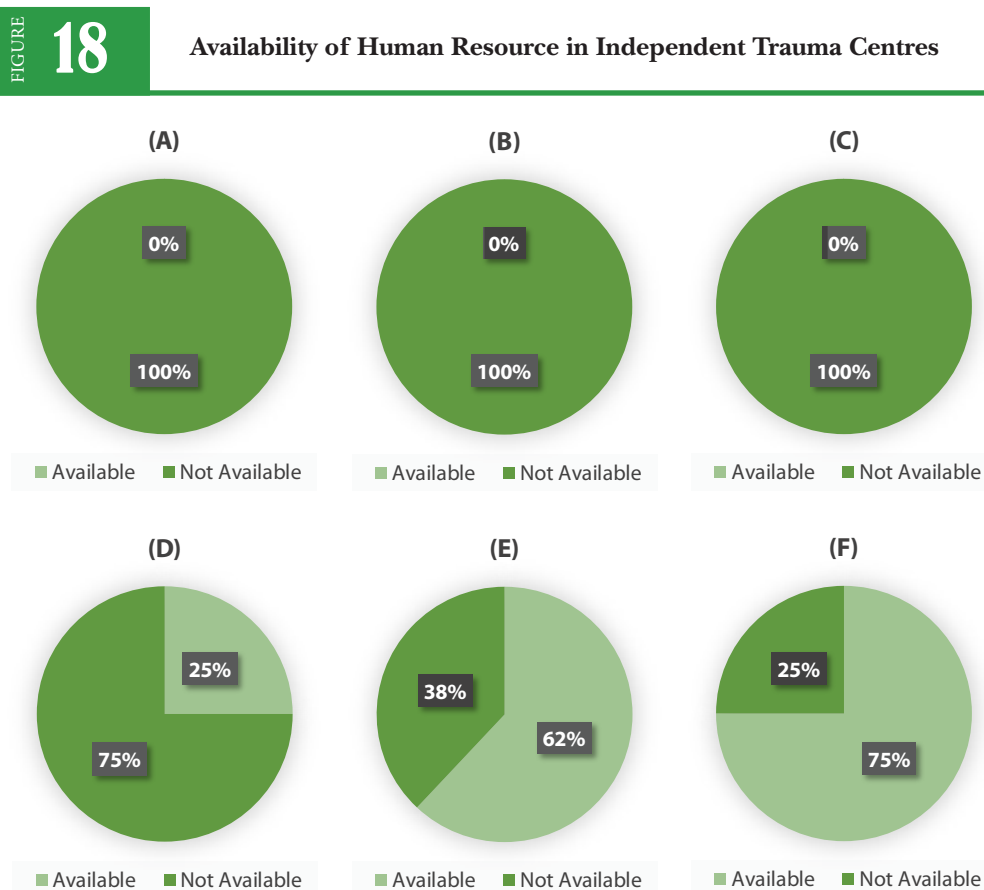
##### 6.1.1.1. Neurosurgeon

In most of the road traffic accidents the head injury is classified as one of the most frequent and lethal cause of trauma deaths. The role of Neurosurgeon has an immense importance in order to deal with the head injuries including spinal cord injuries. It plays utmost essential and critical role in explaining the mechanism of a traumatic brain injury, clinical examination results, insignificance of diagnostic testing results (which, despite actual TBI are often negative) and examining the legitimacy and credibility of the treating neuropsychologist. According to the data presented in the 18 (A), 19 (A) and 20 (A): there was immense shortage of neurosurgeons in the Trauma Centres, DHQs and in Teaching Hospitals. In 5 out of 8 Trauma Centres, there were sanctioned positions of neu-

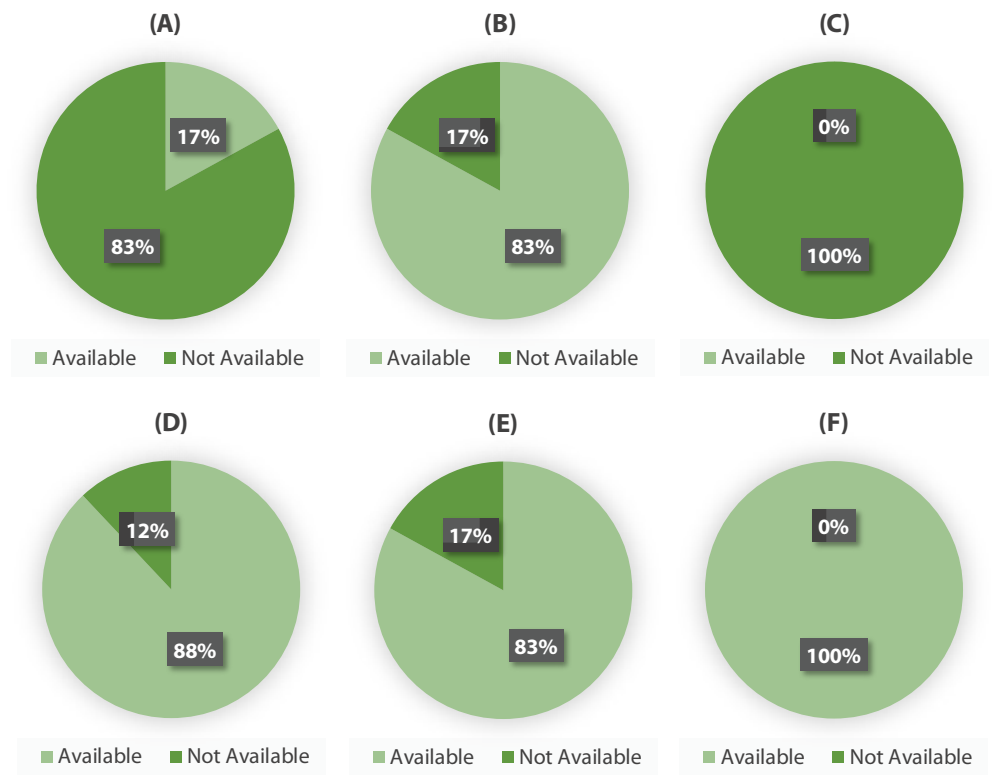
rosurgeons but there was no neurosurgeons and all the positions were falling vacant. There was no Trauma Centre having neurosurgeon. In case of DHQs the neurosurgeon was available only in District Bhakkar. As far as the Teaching Hospitals were concerned; it was found that 2 out of 8 Teaching Hospitals were having neurosurgeons.

### 6.1.1.2. The Radiologist

The radiologist is a medical expert / doctor who is responsible in diagnosing, treating injuries through the use of medical techniques related with imaging such as x-rays, magnetic resonance imaging (MRI), computed tomography (CT), nuclear medicine, positron emission tomography (PET), fusion imaging, and ultrasound. In traumatic emergencies, the radiologist has a unique and critical role to treat the patient in the light of imaging techniques. In our analysis, there was similar situation of radiologist as it was for neurosurgeon. There was no single Trauma Centre where radiologist was available. Figure 18 (B), 19 (B) and 20 (B)



**FIGURE 19** Availability of Human Resource in DHQ Hospitals



shows the existence of radiologist in the trauma centres and A & E Departments of DHQ and Teaching Hospitals:

### 6.1.1.3. Plastic Surgeon

Plastic surgeon also plays an important part to deal with the accidental or traumatic damages. It tries to correct functional abnormalities caused by burns; traumatic injuries, such as facial bone fractures and breaks; congenital abnormalities, such as cleft palates or cleft lips; developmental abnormalities; infection and disease. It was interesting to note that there was no position sanctioned for plastic surgeon in the Independent Trauma Centres. While only in DHQ Sheikhupura, one position for plastic surgeon was sanctioned but this was vacant. In case of Teaching Hospitals; Allied Hospital Faisalabad was having two vacant positions for plastic surgeon, while there was one vacant position in DHQ Gujrat. [See Figures 18 (C), 19 (C) and 20 (C).]

#### 6.1.1.4. Anaesthetist

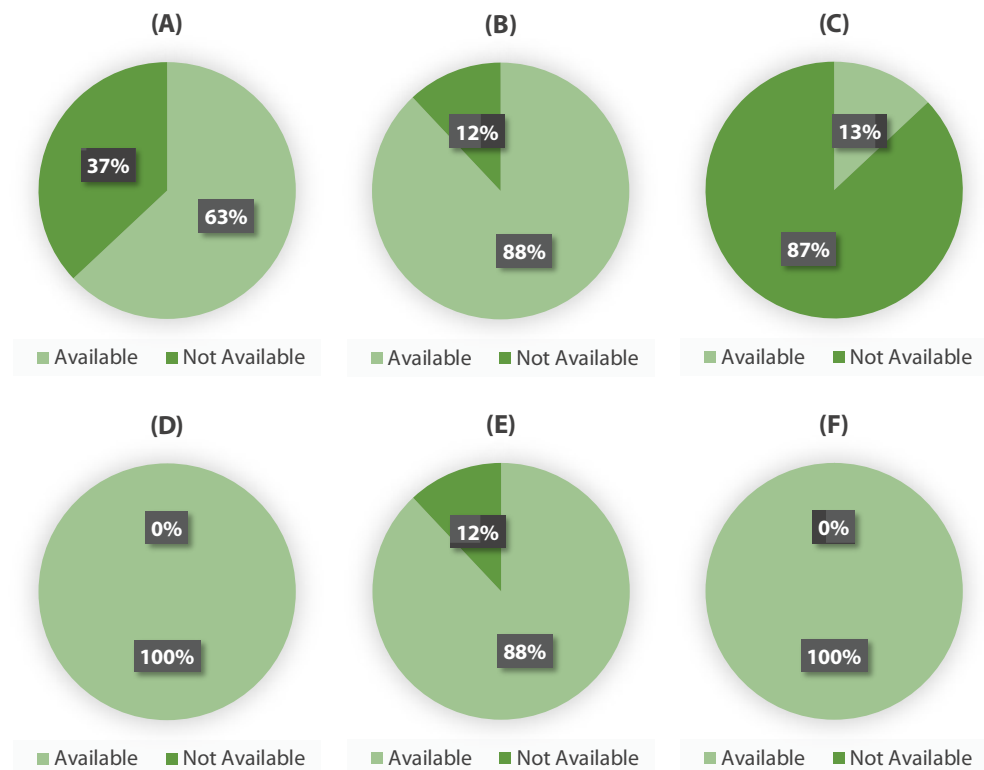
Anaesthetists form the largest single hospital medical specialty and their skills are used in all aspects of patient care. It performs the role of preoperative preparation, resuscitation and stabilization, in relieving of post-operative pain and transportation of acutely injured patients of surgical patients. Anaesthetist were found in 25 percent of the Trauma Centres followed by 88 percent in DHQ Hospitals and 100 percent in Teaching Hospitals. [See Figures 18 (D), 19 (D) and 20 (D).]

#### 6.1.1.5. Orthopaedic Surgeon

Orthopaedic surgeon is one of the most essential part and is the prime requirement of any Trauma Centre to run. Orthopaedic surgeons work with the musculoskeletal system, which includes bones, joints, muscles, tendons and ligaments. They perform surgery to address trauma, tumours, injuries, infections and other conditions requiring surgical interventions. According to the survey data it was found that 62 percent of the Trauma Centres having orthopaedic surgeon, while in DHQ Hospitals and Teaching Hospitals it was 83 percent and 88 percent re-

FIGURE  
**20**

**Availability of Human Resource in Teaching Hospitals**



## Availability of HR



spectively: [See Figures 18 (E), 19 (E) and 20 (E).]

#### 6.1.1.6. General Surgeon

General surgery is a surgical specialty that focuses on abdominal contents including oesophagus, stomach, small bowel, colon, liver, pancreas, gallbladder and bile ducts, and often the thyroid gland (depending on local reference patterns). General surgeon was available in most of the Trauma Centres, 75 percent of the Trauma Centres were having General Surgeons while all the DHQ Hospitals and Teaching Hospitals were having General Surgeons. [See Figures 18 (F), 19 (F) and 20 (F).]: Availability of Human Resource in Independent Trauma Centres.

According to the data collected there were no neurosurgeons in any of the trauma centres surveyed, while only 17 percent of the District Headquarter (DHQ) Hospitals and 63 percent of the Teaching Hospitals were having Neurosurgeons.

TABLE

4

**Human Resources, Referral Cases and Distance from Referral Place**

Particular Unit	Types of Surgeries	Referral Case Type	Reason for Referring	Distance from Referral Place (K.M)
<b>Trauma Centre</b>				
Hafizabad	Major & Minor	Head Injury	Lack of Human Resource	111
Layyah	Minor Surgeries	All Major Injuries	Lack of Human Resource	118
Bhakkar	Minor Surgeries	All Major Injuries	Lack of Human Resource & Lack of Equipment	185
Shujabad	Minor Surgeries	All Major Injuries	Lack of Human Resource & Equipment	41
BHP	Minor Surgeries	All Major Injuries	Lack of Human Resource & Equipment	54.2
Lalamusa	Major & Minor	Head Injury	Lack of Equipment	122
Kasur	Minor Surgeries	All Major Injuries	Lack of Human Resource & Equipment	58.6
Kallar Kahar	Minor Surgeries	All Major Injuries	Lack of Human Resource	125
<b>DHQ Hospitals</b>				
SKP	Major / Minor Injuries	Head Injury	Lack of Human Resource	49.2
Faisalabad	Major / Minor Injuries	Chest Injury	Lack of Human Resource & Equipment	5
Bhakkar	Major / Minor Injuries	Abdomen	Lack of Human Resource & Equipment	183.8
Layyah	Major / Minor Injuries	Head Injury	Lack of Human Resource & Equipment	116.8
Multan	Major / Minor Injuries	All Severe Injuries	Lack of Human Resource & Equipment	5
Kasur	Major / Minor Injuries	All Severe injuries	Lack of Human Resource & Equipment	40.7
<b>Teaching Hospitals</b>				
GM Abad FSD	Minor Injuries	All Severe Injuries Referred	Lack of Human Resource & Equipment	10
Benazir Bhutto Hospital RWP	Major / Minor Injuries	Head Injury	Lack of Human Resource	08
Allied Hospital FSD	Major / Minor Injuries	No need to Refer		
Mian Munshi Hospital LHR	No Surgical Services	All Surgical Referred	Lack of Human Resource & Equipment	04
DHQ RWP	Major / Minor Injuries	Multiple Patients	Lack of Human Resource	05
Aziz Bhatti Hospital Gujrat	Major / Minor Injuries	Head and Abdomen	Lack of Human Resource & Equipment	150.1
Nishtar Hospital MTN	Major / Minor Injuries	No need to Refer		
Civil Hospital BHP	Major / Minor Injuries	Head Injury	Lack of Human Resource & Equipment	100

Source: Authors own calculation based on survey results

Similarly, there were no Radiologists in any of the Independent Trauma Centres but 83 percent of the DHQs and 88 percent of the Teaching Hospitals have Radiologists. Another important medical practitioner for Trauma care is Anaesthe-

tist. According to the survey data only 25 percent of the Independent Trauma Centres have Anaesthetist.

The unavailability of these specialists put the lives of the trauma patients at risk and becomes a hurdle in providing a much-needed trauma care. During the focused group discussion also, this dearth of human resource was brought forward in every hospital and trauma centre. The Medical Superintendents at these public hospitals when highlighting this acute problem suggested that trauma care and hospital cannot work until and unless there are sufficient number of medical staff and specialist doctors to deal with the ever-increasing number of trauma patients.

The following table also shows how shortage of human resource was the leading reason in most of the trauma related referral. All major injuries in Bhakkar, Layyah, Bahawalpur, Multan, Chakwal and Kasur Trauma Centres were referred to other hospitals because of lack of the required doctors and medical staff.

In the same way DHQ hospitals such as Sheikhpura, Faisalabad, Multan and Kasur also had to transfer the patients with major injuries to the other hospitals due to unavailability of human resource.

Therefore, both the quantitative and qualitative data imply that there is a scarcity of specialist doctors such as Neurosurgeons, Anaesthetists, Orthopaedic surgeon and General surgeons for the trauma care. If the trauma patients are to be provided adequate care then the public health facilities need to ensure that the all these specialist doctors and essential medical staff is available at trauma care facility.

#### 6.1.1.7. Unavailability of Medical Machinery and Equipment

The management of trauma patients requires a multidisciplinary approach. After human resources, another resource which is essential for providing trauma care is the medical machinery and equipment. Trauma care is dependent on different types of medical machinery such as X-ray machines, C.T scan etc. and various equipment's such as Ambo Bag, cervical collar, breathing equipment etc. The following table 5 shows the percentages of public health care facilities such as Trauma Centres, DHQs and Teaching Hospitals which had the medical machinery and equipment.

Close proximity of the medical equipment and machinery such as CT scanner to the patient in the emergency department is of huge importance. The above table shows that 50 percent of the Trauma Centres had CT scan machinery and only 17 percent of the DHQ hospital had this facility. Therefore, in case of unavailability of the required medical machinery and equipment the patients then

**TABLE 5****Availability of Medical Equipment and Machinery (%)**

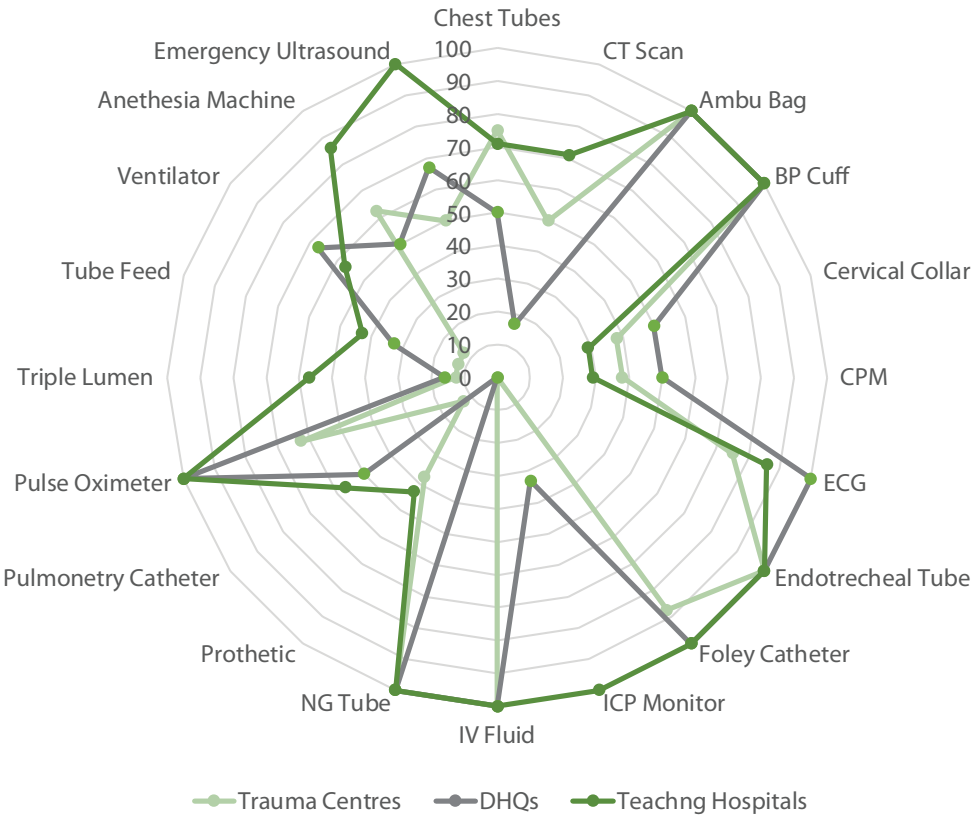
Items	Trauma Centres	DHQs	Teaching Hospitals
Chest Tubes	75	50	71
CT Scan	50	17	71
Ambo Bag	100	100	100
BP Cuff	100	100	100
Cervical Collar	38	50	29
CPM	38	50	29
ECG	75	100	86
Endotracheal Tube	100	100	100
Foley Catheter	87.5	100	100
ICP Monitor	0	33	100
IV Fluid	100	100	100
NG Tube	100	100	100
Prosthetic	37.5	0	43
Pulmometry Catheter	12.5	50	57
Pulse Oximeter	62.5	100	100
Triple Lumen	12.5	16	57
Tube Feed	12.5	33	43
Ventilator	12.5	67	57
Anaesthesia Machine	62.5	50	86
Emergency Ultrasound	50	67	100

Source: Authors own calculation based on survey results

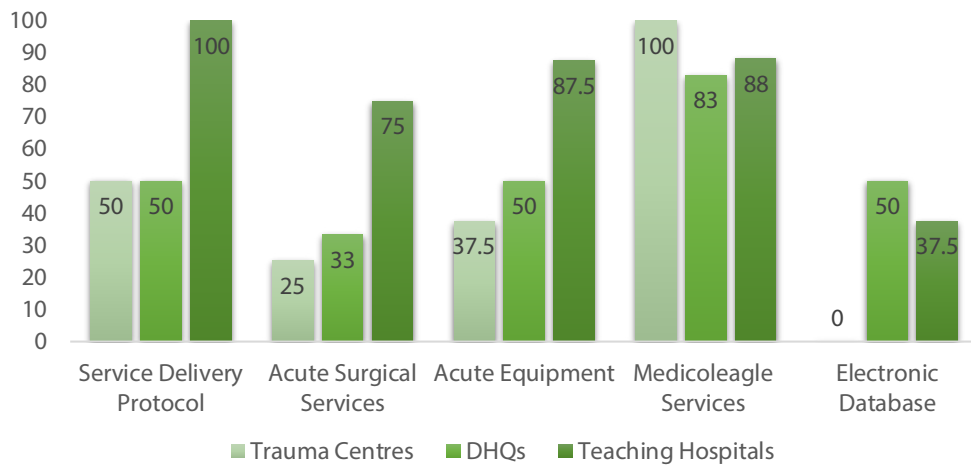
had to be referred to other public hospitals which had the facility. The Figure 21 below further summarizes the availability of the equipment and machinery among the Trauma Centres, DHQ and Teaching Hospitals.

12.5 percent of the Trauma Centres having ICU facility, while 50 percent of the surveyed DHQ and 87.5 percent of the Teaching Hospitals were having it. It is important to note that 75 percent of the Trauma Centres have ICU infrastructure but were not functional because of the lack of human resource and specific equipment. 50 percent of the DHQ hospitals have ICU facility. Interestingly there was one Teaching Hospital namely Ghulam Muhammad Abad Teaching Hospital, Faisalabad which was not having ICU facility and they were not treating any severe injured patient. 62.5 percent of the Trauma Centres were having Operation Theatre and 67 percent of the DHQ hospitals were having the facility of operation theatre. It was also interesting to note that all the Independent

**FIGURE 22** Equipment Availability in Trauma, DHQ & Teaching Hospitals



**FIGURE 23** Allied Medical Facilities (Percentages)



Source: Authors own calculation based on survey results.

Trauma Centres and DHQs were having Operation Theatre rooms but they were non-functional due to lack of human resource and necessary equipment and all the Teaching Hospitals were obviously having functional Operation Theatres. Medical diagnostic test lab was not being available in 60 percent of the Independent Trauma Centres. While there was no diagnostic test lab in DHQ hospitals Kasur. All the Teaching Hospitals were having medical diagnostic test lab. Blood bank facility was available in all Teaching Hospitals and DHQ hospitals but only 60 percent of the Independent Trauma Centres were having blood bank facility.

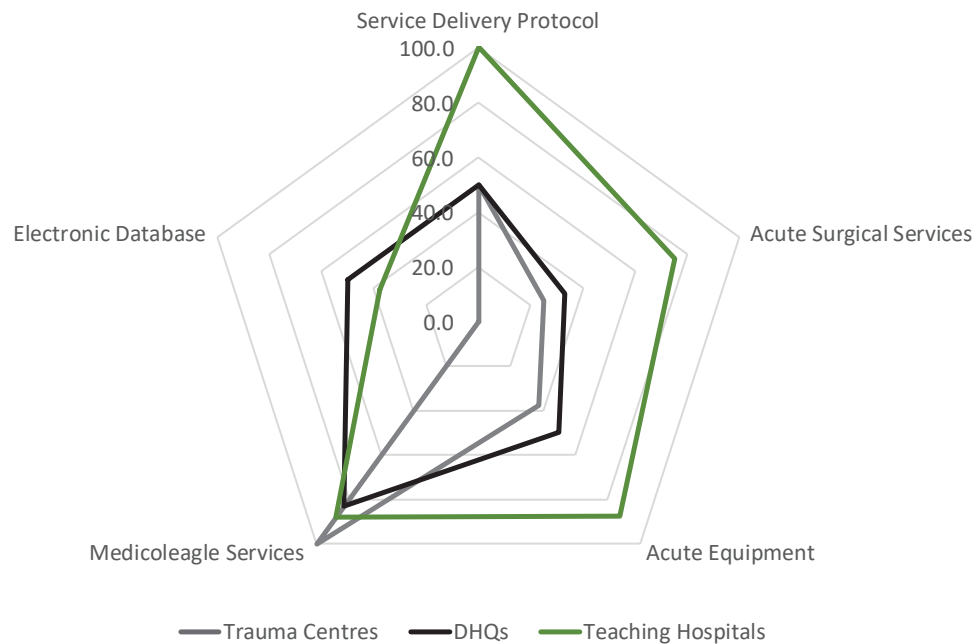
Adequate equipment is necessary for proper functioning of Trauma Centre and A & E departments. According to the information collected on the available equipment; it was found that only 37.5 percent of the Independent Trauma Centres having adequate equipment and only one DHQ in Bhakkar was having adequate equipment for the trauma emergency. In Teaching Hospitals; the availability of equipment is better than DHQs and Trauma Centres with the percentage of 87.5 percent.

According to the survey data only 25 percent of the Trauma Centres were having acute surgical services. While 75 percent of the DHQs were giving acute surgical services. All Teaching Hospitals were providing acute surgical services except GM Abad Hospital Faisalabad and Mian Munshi Hospital Lahore.

FIGURE

24

### Emergency Service Delivery at Different Level



Source: Authors own calculation based on survey results.

The database management of patients is not only important for the administrative point of view but electronic database is very important for policy making regarding trauma care; it was found that it was not maintained electronically at majority of sites and in A&E departments separate record for traumatic injuries was hardly maintained, it was mixed up with general patients. Almost all the Trauma Centres, DHQs and Teaching Hospitals were providing the medicolegal services for specific accidents due to gunshot or any type of violence.

As an international practice, Service Delivery Protocols were followed by the all the Teaching Hospitals, which they have in written form. 50 percent of DHQs and Trauma Centres were having Service Delivery Protocols in written to deal with the Trauma Patients.

#### **6.1.1.8. Inaccessibility of Health Care Facilities:**

The survey data and observations highlighted that another major issue that became a hurdle in effective Trauma Care was the inaccessibility of health care facility. Due to lack of specialist doctors, medical equipment and machinery the patients had to be transferred to other public health facilities. But these public health facilities were very far.

The following table 6 provides the details of the distances covered by the referred trauma patients to reach other public hospital and avail the required trauma care. In all the trauma centres, the patients were referred to higher level hospitals because they fail to provide them surgical services in case of patient suffering from head, abdomen, chest injuries and other organ disruptors.

From the above table 6 it can be seen that all the patients with major injuries at the Independent Trauma Centres have to be referred to the other public health facilities. The patients with severe injuries and requiring surgical treatment have to travel long to other public health facilities.

In the same way, patients with major injuries referred by the DHQ hospitals to the other nearest hospital also had to travel long distances such as from Kasur DHQ hospital the other nearest public hospital was 40.7 km and from Bhakkar DHQ it was 183.8 km. This shows that the patients had to travel long distances to get the required Trauma care. These long distances and travelling time can both be very dangerous for the Trauma Patients who are already battling for their lives. Therefore, inaccessibility of the required trauma care and health facilities hampers the provision of trauma care necessary for saving the lives.

#### **6.1.1.9.Total Trauma Patients Visits**

The table given below represents the number of patients visited each of the Trau-

TABLE  
**6****Referral Case Type and Distance from Referral Place**

Particular Unit	Referral Case Type	Distance from Referral Place (K.M)
<b>Trauma Centre</b>		
Hafizabad	Head Injury	111
Layyah	All Major Injuries	118
Bhakkar	All Major Injuries	185
Shuja Abad	All Major Injuries	41
Ahmad Pur East	All Major Injuries	54.2
Lalamusa	Head Injury	122
Kasur	All Major Injuries	58.6
Kallar Kahar	All Major Injuries	125
<b>DHQ Hospitals</b>		
Sheikhupura	Head Injury	49.2
Faisalabad	Chest Injury	5
Bhakkar	Abdomen	183.8
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Multan	All Severe Injuries	
Kasur	All Severe injuries	40.7
<b>Teaching Hospitals</b>		
GM Abad FSD	All Severe Injuries Referred	10
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Mian Munshi Hospital LHR	All Surgical Referred	04
DHQ RWP	Multiple Patients	05
Aziz Bhatti Hospital Gujrat	Head and Abdomen	150.1
Nishter Hospital MTN	No need to Refer	
Civil Hospital BHP	Head Injury	100

Source: Authors own calculation

ma Centre in the year 2016. It is worth mentioning that these numbers represent overall number of patients visited, in which majority of the patients were related to general ailments like flue, fever etc. particularly at Trauma Centre: Hafiz Abad, Phool Nagar, Lala Musa. The second column of the table provides the number of patients that have been referred to other health facilities due to lack of human resource or equipment. It is clear that neither of the Trauma Centre was able to provide the needed health care at the premises and it was referring patients to other health facilities. The last column provides the number of patients that

TABLE

7

**Independent Trauma Centres Total Trauma Cases**

Name of Health Facility	Patient Received 2016	Referred 2016	Deaths 2016
Trauma Centre at Hafizabad	10536	1054	57
Trauma Centre at Fatehpur (Layyah)	6881	204	43
Trauma Centre at Jandanwala (Bhakkar)	7614	196	17
Trauma Centre at Lala Musa (Gujrat)	17983	Data not available	Data not available
Trauma Centre at Phool Nagar (Kasur)	3595	195	12
Trauma Centre at Kalar Kahaar (Chakwal)	1893	118	17
Trauma Centre at Ahmad Pur East (Bahawalpur)	155352*	1138*	288*

Source: Data has been directly obtained by the respective Trauma Centres.

\*Represents number of overall patients visited THQ, as no separate data was available for trauma patients.

expired at each of the Trauma Centre.

The Table given below shows: the number of patients visited, the number of patients referred and number of patients expired at emergency department of each of the District Head Quarter (DHQ) Hospital in the years 2014, 2015 and 2016. It may be kept in mind that these numbers are not only related to trauma injuries but this also includes the other patients as well like heart disease, blood pressure, kidney patients and other patients. It may be observed from the numbers that there is increasing trend over time in almost all the DHQ, s in all

TABLE

8

**DHQ Hospitals Patients Visits**

Name of Facility	Patient Received in 2014	Patient Received in 2015	Patient Received in 2016	Referred 2014	Referred 2015	Referred 2016	Deaths in 2014	Deaths in 2015	Deaths in 2016
DHQ Sheikhpura	16865	21410	25519	870	1030	1245	122	142	160
DHQ Faisalabad	17086	16997	16148	372	410	480	157	178	130
DHQ Bhakkar	58310	67708	87238	693	982	1040	1214	1226	1380
DHQ Layyah	1864	2788	2963	179	211	152	9	14	17
DHQ Kasur	18144	17976	19452						

Source: Data has been directly obtained by the respective DHQ Hospital

three domains i.e. number of patients received, number of patients referred and number of patients expired. It indicates that on one side preventive measures are not working and on the other hand increase in number referred patients indicates that during this period there was unavailability of either human resource or equipment.

The table given below shows the number of patients visited, the number of patients referred (Except at Allied Hospital Faisal Abad) and number of patients expired at emergency department of each of the Teaching Hospitals in the years 2014, 2015 and 2016. It may be kept in mind that these numbers are not only related to trauma injuries but this also includes the other patients as well like heart disease, blood pressure, kidney patients and other patients. The numbers represent mixed trends as in some of the Teaching Hospitals it was increasing over time like at Bahawalpur Civil Hospital, Aziz Bhatti Shaheed Hospital, and Government General Hospital G.M Abad Faisalabad, while in rest of the Hospitals it decreased in 2015 and again increased in 2016. The most astonishing thing was that there was only one Teaching Hospital Namely Allied Hospital Faisalabad which was giving full-fledged trauma care to all of the patients and none of the patient was referred elsewhere. All of the remaining Teaching Hospitals under study were referring the patients to other Hospitals. Teaching Hospitals are the highest level of health facilities and they are referring the patients which indicates that there is lack of either Human Resource or Equipment.

TABLE

9

### Teaching Hospitals Patients Visits

Hospital Name	Patient Received in 2014	Patient Received in 2015	Patient Received in 2016	Referred 2014	Referred 2015	Referred 2016	Deaths in 2014	Deaths in 2015	Deaths in 2016
Government General Hospital G.M Abad Faisalabad	15997	16030	21494	799	803	1009	55	58	47
Allied Hospital Sargodha Road Faisalabad	212792	124994	135087	0	0	0	3597	3282	2904
Aziz Bhatti Shaheed Hospital, Gujrat	32670	34204	37605	1108	985	1015	245	204	207
Mian Munshi Hospital Lahore	13155	12280	15653						
Bahawalpur civil Hospital	175139	202912	204960	150	96	275	21	18	31
DHQ Teaching Hospital Raja Bazar Rawalpindi	154587	195107	163919	14567	13776	11987	67	88	111

Source: Data has been directly obtained by the respective Teaching Hospital

#### 6.1.1.10 Lack of Specialized Trauma Team

Disruption of great vessels, body cavities and organs such as heart, brain and lungs are the major cause of immediate deaths in trauma related injuries. To

prevent this is it important to have health care facilities and services which would deal with such injuries so that deaths can be prevented.

The recognition of these patterns led to the development of the Advanced Trauma Life Support (ATLS) approach by the American College of Surgeons. ATLS is the basis of trauma care and it is developed on a standardized protocol for patient evaluation. This protocol ensures that the most immediate life-threatening conditions are actively identified and addressed in the order of their risk potential. Therefore according to these protocols and American College of Surgeons' elements of a trauma care a specialized trauma team should have the following: "(1) hospital organization; (2) medical staff support; (3) the trauma medical director (TMD); (4) the trauma resuscitation team; (5) the trauma service; (6) the trauma program manager (TPM); (7) the trauma registrar; (8) the performance improvement support personnel; and (9) the multidisciplinary trauma peer review committee of the performance improvement and patient safety (PIPS) program." (American College of Surgeons 2014)

Availability of all these elements results in formation of a specialized trauma team. However, during the survey, it was observed that except two Teaching Hospitals (Faisalabad Allied Teaching Hospital and Nishtar Teaching Hospital Multan) none of the other hospitals and Trauma Centres had a specialized trauma team. Independent Trauma Centres such as the Phoolnagar, Bhakar, Layyah, Bahawalpur and Shuja abad did not have any specialized trauma team. Even in Faisalabad GM Abad Teaching Hospital and Mian Munshi Teaching Hospital there was no specialized trauma team and similarly DHQ Multan and Kasur did not have specialized trauma teams. Due to these reasons, the patients had to be referred and transferred to other hospitals, causing great deal of inconvenience.

Therefore, it is essential for each hospital that treat major trauma cases to have a trauma response team or a specialized trauma team which can deal with the injured patients. The initial management of the trauma patient can be extremely challenging and requires a co-ordinated team approach to deliver timely and correct treatment to these patients.

#### **6.1.1.11 Lack of Electronic Database**

The information systems about trauma care services in most places are manual and undeveloped. There is no central trauma registration, referral system and record in any hospital. Although, Independent Trauma centres have some reliable data on trauma admissions, but no data was available on the clinical outcome of the trauma patients. This lack of electronic database may have an impact on the structure of establishing an effective public policy on trauma care.

## 6.2

### Qualitative Analysis

Qualitative assessment of Trauma Centers was carried out by conducting interviews and Focus Group Discussions (FGDs). The participants included medical superintendent, senior doctors, trauma care specialist, medical staff and their attendants, patients and attendants of Patients. The participants were explored under different dimensions to get feedback about working of Trauma Centers. FGD sessions were carried out at each of the health facility. 5-8 participants were assembled and provided with a comfortable environment for expression of their views. The objectives of these FGDs were to get an insight into issues of Trauma centers to get the views of the clients and stakeholder for future policy guidelines. Region wise main findings of FGD are given as

#### 6.2.1. North Punjab

Focused Group Discussion (FGD) was conducted in each of the trauma care facility survey in upper Punjab that includes DHQ Gujrat, DHQ Rawalpindi, Benazir Bhutto Shaheed Hospital Rawalpindi, Lalamusa Trauma Centre, Kallar Kahar Trauma Centre. There were 5 to 8 participants at each of the trauma care facility. The participants were probed regarding different aspects of trauma care and overall findings are given as. When the participants were probed whether the Trauma Centres should be established within the premises of existing hospitals or these should be established on main highways and whether these should be independent or these should be linked with existing hospitals. There were diverse opinions, some of the participants suggested that constructing trauma centres along the highways would not be feasible and successful option because the trauma is not limited to roads it can take place anywhere, like burns, psychological trauma, violence injuries, fall from height etc. therefore it may be better to build them in the premises of existing hospitals. Some of the participants were of the view that Trauma Centres should be built on main highways because major part of trauma is happening on the roads. When the participants were probed whether these should be independent or these should be linked to existing hospitals, there were different opinions. Some participants were of the view that these should be linked to existing hospitals due to the reason that they have to rely on the hospitals for a number of services and health care such as neurosurgery, blood bank, medical equipment and staff. Therefore, isolating the trauma centres from these facilities would mean creating hurdles in their efficient working and putting the lives of the people at risk, because if in case a patient comes to the trauma centre who requires health care which is not available there but



Stat of the Art, well equipped trauma centre in DHQ Gujrat build by NGO, but non-functional due to some HR constraints.

can be provided at the higher facilities then this would mean that the patient's life is being put in jeopardy. Therefore, until and unless the trauma centres are provided each and every health services and facility which can be required for treating and operating on the trauma patients, it would not be appropriate to make them independent. Currently there is shortage of human resource even teaching Hospitals are unable to fill the posts of the specialists, how Trauma centres can be equipped with required human resource.

The point of view of some participants was that they should be built independently so that the workload on the existing health facilities may be reduced. In their opinion, the trauma centres should be provided specialized trauma teams and doctors to deal with the patients so that they are not referred to other hospitals. Moreover, they were of the view that the bed strength in trauma centres should also be high so that the patients can be admitted there for continued care. Moreover, air ambulances should also be given to the trauma centres so that patients are quickly taken to the medical facilities and important human lives are saved. There was another point of view that a separate department may be established by combining the 1122 service and trauma centres and budget should be given directly to this department. There was another point of view that whatever you do basics human resource and equipment must be provided. Specialists such as general surgeon, neurosurgeons, orthopaedic surgeon and anaesthetists are the crucial in dealing with trauma injuries and without these medical staff the trauma centres anywhere cannot function properly. So, before any other step is taken it is necessary to ensure that all the trauma centres have the required medical staff. Some equipment is the basic necessity for trauma care like CT scan machine and Proper X-ray machine. One participant said that in some of the trauma centres this basic equipment are not available then what is the objective of trauma centres, it is not trauma centre rather in such case it may be better to call it **"Drama centre"**.

The participants were asked how the shortage of human resource can be



Stat of the Art Trauma Centre with latest equipment in Kalakahar, Chakwal built at the cost Rs260.7 million in 2015, but still semi functional for trauma patients due to lack of HR.



Trauma centre Lalamusa is the only one centre in Punjab which has comparatively enough human resource and building but due to shortage of Digital X-Ray machine & CT Scan, some services were unavailable.

overcome. The participants said that most of the posts are advertised on contract basis with prevailing pay structure; no one is willing to join trauma centres with that salary package. Therefore, it is dire need to fill these posts on regular basis with some additional fringe benefits. The focused group also suggested that the need of the time is to retain the doctors in Pakistan therefore they should be given market-based salaries and other incentives such as benefits for family and children like free education etc. They also highlighted that the government should assess the total demand of doctors in the country and make health and education policies accordingly so that the more doctors can enter the health sector and serve here.

### 6.2.2. Central Punjab

Focused Group Discussion (FGD) was conducted in each of the trauma care facility survey in upper Punjab that includes DHQ Kasur, DHQ Sheikhpura, DHQ



Trauma Centre in DHQ Sheikhupura was Overfilled by the trauma patients but faces the constraints of HR & Budgeting

Faisalabad, Government Hospital Faisalabad, Allied Hospital Faisalabad, DHQ Lahore, Phool Nagar Trauma Centre and Hafiz Abad Trauma Centre. There were 5 to 8 participants at each of the trauma care facility. The participants were probed regarding different aspects of trauma care and overall findings are given as. When the participants were probed whether the Trauma Centres should be established within the premises of existing hospitals or these should be established on main highways and whether these should be independent or these should be linked with existing hospitals.

The participants were probed regarding different aspects of trauma care and overall findings are given as. When the participants were probed whether the Trauma Centres should be established within the premises of existing hospitals or these should be established on main highways and whether these should be independent or these should be linked with existing hospitals. There were different opinions, some of the participants suggested that constructing trauma centres along the highways would not be a good option it may be better to build them in the premises of existing hospitals

When the participants were probed whether these should be independent or these should be linked to existing hospitals, there were different opinions. Some participants were of the view that Trauma centres should be independent because there are number of problems associated with the interlinkage of Trauma Centres with existing hospitals. One participant said that duties of different specialists like neurosurgeon, orthopaedic surgeon, plastic surgeon, and anaesthetist are assigned at Trauma Centres for one month and two days a week for twelve hours each day, because they have to handle the operations at the Hospitals as well, at the prescribed days and time. He further highlighted the issue that when a patient is transferred from Trauma Centre to ward of the hospital after operation, there is no one to take the ownership of the patient due to the reason that the patient has been operated by some other doctor at Trauma Centre and the doctors at ward do not accept these patients as they claim that they have no idea about the nature of their trauma and condition. So, Trauma Centres should



Stat of the art building of Trauma centre Phoolnagar but due to inappropriate location, lack of HR, Equipment, Machinery & Budgeting, only few trauma patients visits daily.



Trauma centre in DHQ Mian Munshi (Teaching Hospital) is under construction since 2012 but not completed yet due to lack of funds.



Well equipped, Stat of the art building of trauma centre in Hafizabad but reported a lack of HR.

be independent it will increase the efficiency and he further suggested that tertiary health care institutes should deal only referred cases from: trauma centres, primary and secondary. Routine patients should be treated in primary and sec-

ondary health care institutes. In this way, efficient utilization can be ensured at main facility (tertiary health care institute). He suggested that at main Highways only first aid centres may be established which may be more suitable option. Another reason was put forward for Independent Trauma Centres that needs of trauma centre and DHQ are entirely different. What is needed by trauma centre is not purchased by DHQ.

Some participants were of the view that Trauma Centres should be linked to hospitals and should not be independent as there are number of complications involved with the trauma patients and it is not possible to provide all specialist in the trauma centre as there is already shortage of specialist doctors in the market. Furthermore, there is need of recovery services to the injured patients which can be provided in a better manner in hospital premises. The participants were probed about the budgetary needs of the trauma care facilities. Some participants were of the view that independent trauma centres are facing budgetary problems furthermore the needs of the Trauma Centres are entirely different from hospitals, what is needed by Trauma Centres is not purchased by hospitals.

### 6.2.3. South Punjab

Focused Group Discussion (FGD) was conducted in each of the trauma care facility survey in upper Punjab that includes DHQ Multan, Nishtar Hospital Multan, Civil Hospital Bahawalpur, Shujabad Trauma Center, Ahmad Pur East Trauma Centre, DHQ Layyah, DHQ Bhakkar, Trauma Centre at Fatehe Pur Layyah and Trauma Centre at Jandiawala. There were 5 to 8 participants at each of the trauma care facility. The participants were probed regarding different aspects of trauma care and overall findings are given as. When the participants were probed whether the Trauma Centres should be established within the premises of existing hospitals or these should be established on main highways and whether these should be independent or these should be linked with existing hospitals.

When the participants were probed whether these should be independent or these should be linked to existing hospitals, there were different opinions. One point of view was that Trauma centres may be established both at DHQ and National Highways. The teaching hospitals, DHQ's and THQ's that are near to national highways, trauma centres may be established with in the premises of these institutions. The national highways where there are no such institutions in those areas trauma centres may be established at National highways and these should be at the junctions of main highways. One participant further added that besides the treatment of trauma injuries, there is dire need to figure it out why trauma is so large. Preventive measures may be adopted and, in this regard, he suggested that roads traffic must be one way. Some suggested that these should be established with in the premises of Hospitals due to the reason that injured



Local pre-hospital service used by people of Shuja Abad, Picture Capture by PERI Surveyor staff outside the Trauma centre Shuja Abad.



Trauma centre Ahmadpur east where no acute surgical services for trauma patients are available, due to lack of HR.



PERI Staff visited the Trauma Centre DHQ Hospital Bhakkar

patients may have multiple problems like besides the need of orthopaedic and neuro surgeons if eye is injured there will be a need of eye specialist, similarly there may be a need of number of specialists, the services of these specialists may be acquired from the attached Hospital, which may not be available in each and every trauma centres, as there is already shortage of these specialists in Hospital. Emergency and outdoor patients must be separated. Diploma in neuro surgery may be opted for the staff working at trauma centres. Accommodation and in centre system should be launched.

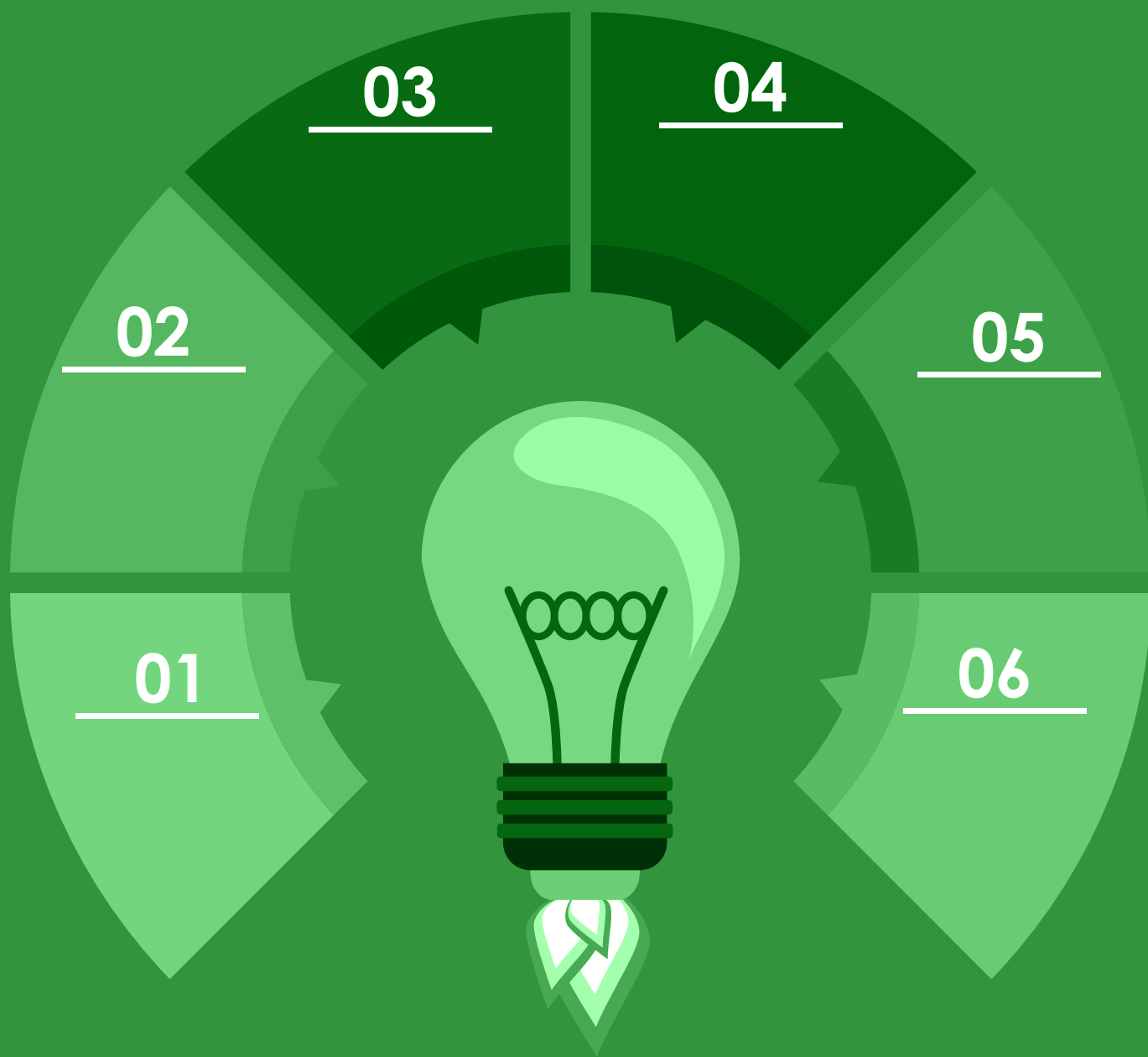
The participants were also probed regarding the shortage of human resource. The participants were of the view that, in order to overcome the shortage of specialists in the country, Government must stop the brain drain from the country by giving incentives; furthermore, doctors serving in public sector hospitals must not be allowed to work in private sector because it reduces their efficiency at public hospital. Highly talented Poor students must be given medical education free of cost and they must be bound to work in the country after completing their education. There must be no barriers in the way of acquiring specialization. More doctors must be trained for dealing the trauma injuries. In the less developed areas the specialists are very reluctant to work as there are number of issue related to schooling and other facilities for their children and there are constraints on their own career growth. In order to attract highly qualified staff in far-flung there is need to address these problems as well. The participants were also probed regarding the budgetary needs, the participants were of the view that there should not be uniform policy of funding to all health facilities like for all THQs, all DHQs, While financing, needs of each hospital should be kept in mind. Some THQ hospital has work load at par with DHQ hospital however budget is given as par with THQ.



CHAPTER

7

*Conclusion and  
Recommendations*



# 7.1

## Conclusions

The report contains an in-depth analysis of the existing trauma care facilities in Punjab and the mode and mechanism of trauma injuries.

From the data collected for this study a number of conclusions can be reached. According to the data there are varying population characteristics of the trauma patients. The data recorded by Rescue 1122 for year 2016 in Punjab indicates that, on average males are 3.82 times more likely to suffer a road side accident than females. It has been found that 70 percent of the trauma patients are aged between 11-40 years. Moreover, the data reveals that among all trauma injuries occurring from January to December 2016, 10 percent were head injuries, 17 percent were leg injuries and 5 percent were multiple fractures and 67 percent were minor injuries. Another significant finding of this study is that the vehicles which are a major cause of RTI are the motor bikes, as they accounted for 64 percent of the accidents.

The results of correlation demonstrate that the correlation coefficients exhibited a positive association between the RTIs & RTMs and number of vehicle/100000 persons. Among major reasons of RTA were over speeding, carelessness while driving and wrong turn.

The other major objective of the study was to map the trauma care facilities across Pakistan. It has been determined that there are 20 trauma centres in Punjab, among which 12 are functional and 8 are non-functional. While the A&E department which exists in teaching hospitals also provide health care to all trauma patients 365 days a year.

In Punjab, pre-hospital care is provided by Rescue 1122 ambulance service. It delivers free of cost help in RTAs, General Emergencies and Disasters etc. The service is functional in all districts of Punjab. The rescue 1122 service has the facilities of pre-hospital and hospital care and therefore provides the medical care to reduce mortality and morbidity which may result from life-threatening airway, breathing, and circulatory injuries. Moreover, the overall distribution of pre-hospital / level 4 trauma care facilities (equipped ambulances of 1122) showed that they are progressively distributed between districts of Punjab.

Human resource is the most essential component for the functioning of the trauma care facilities. But this study found that the shortage of the required human resource was a major hurdle in the efficient working of the trauma care across Punjab and it was the leading cause of trauma patient referrals among the hospitals, especially in the northern and southern districts of Punjab. It was

found that general surgeon was available in 75 percent of the trauma centres while all the DHQ hospitals and teaching hospitals had general surgeons. According to the data collected there was no neurosurgeon in any of the trauma centres surveyed, while only 17 percent of the District Headquarter (DHQ) Hospitals and 63 percent of the teaching hospitals had neurosurgeons. Similarly, there was shortage of radiologists in independent trauma centres. According to the survey data only 25 percent of the trauma centres had anaesthetist.

After human resource the necessary medical equipment and in-house infrastructure are the most essential element of trauma care. But during the study survey it was found that majority of the trauma facilities lacked vital medical equipment. All the trauma centres and DHQs had operation theatre rooms but they were non-functional due to lack of human resource and necessary equipment. Similarly, medical diagnostic test laboratory was not available in 60 percent of the trauma centres. Only 60 percent of the trauma centres had blood bank facility. It was also found that 50 percent of the trauma centres had CT scan machinery and only 17 percent of the DHQ hospital had this facility but most of them were underutilized due to the unavailability of the concerned technical person. Moreover, only 12.5 percent of the trauma centres had ICU facility, while it was available 50 percent of the DHQs and 87.5 percent of the teaching hospitals.

It is important to note that 75 percent of the trauma centres had ICU in their premises but astonishingly none of them were functional because of lack of equipment. For the registration of trauma patients; the electronic database is also an essential part to deal with but it was found that trauma centres had no facility of electronic database for trauma patients. There was hardly separate record of trauma patients maintained in DHQ and Teaching Hospitals.

Financial constraints were also observed in the way of efficient functioning of trauma centres. The centres suffered from inadequate allocation of resources. The independent trauma centres in Punjab are especially reported to be under funded by the government and therefore, trauma care remains to suffer in their catchment areas. The delays were observed for the approval of required funds from the government, so in order to supplement the budget minimal laboratory test fees are collected from the patient.

## 7.2

### Recommendations

1. As the major causes of RTI are over speeding, carelessness in driving and

wrong turn, so there is a need to implement the traffic rules in letter and spirit, furthermore there is a need to create awareness among the general public regarding road safety. For this purpose, an organized awareness campaign may be launched in such a manner that awareness is reached to each and every road user.

2. In more than 64 percent of trauma injuries, motorbikes are involved. The shape and structure of motor bikes make them more susceptible to accidents, therefore it is dire need to change the shape of these motor vehicles. For this purpose, manufacturers of motor bikes may be asked to change the shape of the motor bikes and introduce new designs which are safer.
3. Major injuries due to the RTA are head and leg injuries and multiple fractures therefore the initial trauma care should have Neuro surgeon, Orthopaedic surgeon and Anaesthetist to deal with these injuries so that the further mortalities and morbidities can be prevented and the necessary trauma care can be provided.
4. CT scan and digital X-ray machines are very basic requirement of any trauma centres however they are not available in majority of trauma centres, so it should be provided on priority basis and relevant specialists may also be provided.
5. According to the survey observations the health facilities are in dire need of specialized trauma care teams. However, in trauma care services, formal education and speciality training are neither available nor mandatory for personnel involved. So, PM&DC can take initiatives to introduce special courses of trauma care services. The health sector should also arrange the regular sessions of the capacity building of trauma care service providers.
6. The government should take initiatives to introduce some special package for the specialists (Neuro surgeon, Orthopaedic surgeon and Anaesthetist) to encourage them for working at trauma centres particularly at far-flung areas. This package may consist of: monetary benefit, residential facility at trauma centre, a certificate of acknowledgment for their service at trauma centre and this certificate must be given due weightage in the promotion and other entitlements. The general surgeons and medical doctors can also be trained to provide special services through regular courses.
7. From the facts and figures gathered during survey, observation made and FGD conducted, it may be concluded that at present establishing new trauma centres is not viable solution. There is mismatch between human resource and equipment it may be better matched. Furthermore, there is acute shortage of human resource and equipment in majority of existing trauma centres and in emergency departments, so at present there is dire

- need to strengthen the existing trauma centres and emergency departments of DHQs.
8. There is need to segregate the trauma patient's data at A&E departments of DHQs and Teaching Hospitals, because if policies are to be made then data regarding trauma injuries, deaths related to trauma and morbidity due to trauma would give a clear picture of the needs and requirements for building a purposeful trauma care. Such a data would highlight the demand for other resources such as specialist doctors, medical equipment, and medicines etc. which are necessary for providing the relevant care and therefore more concrete steps in the right direction can be taken.
  9. It was observed that patients had to be transferred to higher level hospitals which are far away from the first aid trauma care centres, so there is a need to establish a regionalized network of trauma care, so that patients may get treatment at nearest possible place.
  10. Gross discrepancies have been observed among regions such as lower and upper settings. Lower Punjab is considered to be more disaster affected, a significant difference has been found in trauma care services, the only referral hospital in lower Punjab is Nishter hospital. So, level 2 and level 3 traumas need to be established in these areas.

## End Notes

<sup>1</sup> <http://www.who.int/mediacentre/factsheets/fs358/en/>

<sup>2</sup> [http://www.who.int/violence\\_injury\\_prevention/road\\_safety\\_status/2015/en/](http://www.who.int/violence_injury_prevention/road_safety_status/2015/en/)

<sup>3</sup> [http://www.who.int/violence\\_injury\\_prevention/road\\_safety\\_status/2015/magnitude\\_A4\\_web.pdf?ua=1](http://www.who.int/violence_injury_prevention/road_safety_status/2015/magnitude_A4_web.pdf?ua=1)

<sup>4</sup> Ibid

<sup>5</sup> <http://www.worldlifeexpectancy.com/pakistan-road-traffic-accidents>

<sup>6</sup> <https://tribune.com.pk/story/1562378/1-punjab-road-accidents-claim-3620-lives-six-years/>

<sup>7</sup> Ibid

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*PERI Staff during data collection at DHQ Faisalabad*



*PERI Staff during data collection at DHQ Faisalabad  
at Allied Hospital Faisalabad.*



*Trauma Care at Ahmad Pur East Trauma Centre*




*PERI Staff during data collection at Ahmad Pur East Trauma Centre*






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