

Cause of injury investigation and black spot identification: Experience from AIIMS Trauma Center

Santosh Mahindrakar, Amulya Rattan,
Abhinav Kumar, Kapil Dev Soni, Amit Gupta,
Sushma Sagar, Subodh Kumar

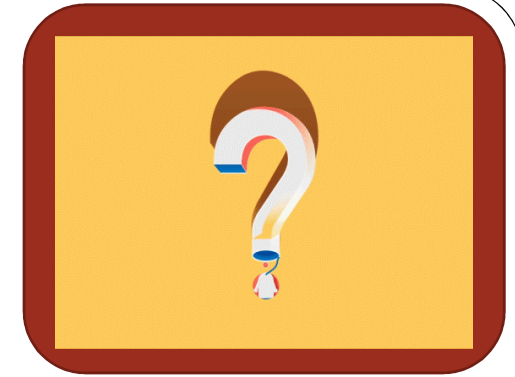


Entrance, JPN Apex Trauma Centre, AIIMS, New Delhi

Review of literature

- Trauma registry.
- Analysis of fatal injury.
- Pre hospital care.
- Trauma care facility at the rural area.
- In hospital mortality
- Rehabilitation

Gaps



- How many hospitals can provide appropriate trauma care?
- Application of ICD 10 (chapter XX, V00-Y99) with GIS?
- What is the quality of life after the accident?
- Hot spot of RTA according to the severity of injury?
- Do we have hot spots of RTA as per the pre-hospital and hospital triage criteria?
- Areas from where patient reach appropriate trauma care centre in 30 minutes.

Experience from AIIMS Trauma Center

- Trauma Surveillance Registry – Trauma Nurse Coordinator
- ICD - 10 coding : External Causes (Chapter 20)
- Maintenance of the quality data
- Biannual publications

Initiatives

- **Trauma surveillance system : Since 2009**
- **TITCO : 2013-2015**
- **AITSC: 2014- till date**
- **National Task Force: An intervention study on comprehensive emergency care and trauma registry for road traffic injuries in India – ICMR: 2017-2019**
- **Series of training courses: ATLS, ATCN, AUTLS, ACLS, BLS**
- **Training : BSF, CRPF, and Police**

External causes of morbidity V00-Y99 >

Note

- This chapter permits the classification of environmental events and circumstances as the cause of injury, and other adverse effects. Where a code from this section is applicable, it is intended that it shall be used secondary to a code from another chapter of the Classification indicating the nature of the condition. Most often, the condition will be classifiable to Chapter 19, Injury, poisoning and certain other consequences of external causes ([S00-T88](#)). Other conditions that may be stated to be due to external causes are classified in Chapters I to XVIII. For these conditions, codes from Chapter 20 should be used to provide additional information as to the cause of the condition.

Codes

- [V00-V09](#) Pedestrian injured in transport accident
- [V10-V19](#) Pedal cycle rider injured in transport accident
- [V20-V29](#) Motorcycle rider injured in transport accident
- [V30-V39](#) Occupant of three-wheeled motor vehicle injured in transport accident
- [V40-V49](#) Car occupant injured in transport accident
- [V50-V59](#) Occupant of pick-up truck or van injured in transport accident
- [V60-V69](#) Occupant of heavy transport vehicle injured in transport accident
- [V70-V79](#) Bus occupant injured in transport accident
- [V80-V89](#) Other land transport accidents
- [V90-V94](#) Water transport accidents
- [V95-V97](#) Air and space transport accidents
- [V98-V99](#) Other and unspecified transport accidents
- [W00-W19](#) Slipping, tripping, stumbling and falls
- [W20-W49](#) Exposure to inanimate mechanical forces
- [W50-W64](#) Exposure to animate mechanical forces
- [W65-W74](#) Accidental non-transport drowning and submersion
- [W85-W99](#) Exposure to electric current, radiation and extreme ambient air temperature and pressure
- [X00-X08](#) Exposure to smoke, fire and flames
- [X10-X19](#) Contact with heat and hot substances
- [X30-X39](#) Exposure to forces of nature

santoshmahindrakar84@gmail.com

TNC: _____

ICD/C.O.I _____

**JAI PRAKASH NARAYAN APEX TRAUMA CENTRE, AIIMS
TRAUMA REGISTRY FORM - 2015**

Initial Triage: R / Y / G
 Re-Triage: 1: R / Y / G
 2: R / Y / G
 3: R / Y / G

MLC/NMLC
 TC No. _____

Patient's Name: _____ Age: _____ Gender: Male / Female / Others
 Father's/Husband's Name: _____
 Address: _____
 City: _____ State: _____ Contact Number: _____
 Brought By: Family/Relatives Known Person By-Stander Police CATS Other Ambulance Self Others
 Mechanism of Injury: Blunt SSC DSC HVP LVP Mixed Burns
 Pre Hospital Notification: Yes No ; ETA: _____ Alert Semi-Conscious Un-Conscious Bleeding Not Bleeding
 Date of Injury: _____ Time of Injury: _____ Date of Arrival: _____ Time of Arrival: _____ Date of Admission: _____ Time of Admission: _____

ROAD TRAFFIC CRASH | **UNINTENTIONAL/ACCIDENT** | **SUICIDE/SELF HARM** | **RAIL TRACK INJURY** | **ASSAULT**

ROAD TRAFFIC CRASH

PATIENT'S VEHICLE	OTHER VEHICLE	PATIENT WAS	TYPE OF COLLISION
<input type="checkbox"/> Pedal Cycle <input type="checkbox"/> M3W <input type="checkbox"/> Pick-Up-Truck/Van <input type="checkbox"/> Spl. Agri. Vehicle <input type="checkbox"/> Spl. Ind. Vehicle <input type="checkbox"/> Spl. Const. Vehicle <input type="checkbox"/> Animal/A. Drawn Vehicle <input type="checkbox"/> Unknown <input type="checkbox"/> Others _____	<input type="checkbox"/> M2W <input type="checkbox"/> Car <input type="checkbox"/> HTV <input type="checkbox"/> Bus <input type="checkbox"/> Pedal Cycle <input type="checkbox"/> M3W <input type="checkbox"/> Pick-Up-Truck/Van <input type="checkbox"/> Spl. Agri. Vehicle <input type="checkbox"/> Spl. Ind. Vehicle <input type="checkbox"/> Spl. Const. Vehicle <input type="checkbox"/> Animal/A. Drawn Vehicle <input type="checkbox"/> Railway Train <input type="checkbox"/> Unknown <input type="checkbox"/> Others _____	<input type="checkbox"/> Driver <input type="checkbox"/> Passenger <input type="checkbox"/> Pillion <input type="checkbox"/> Pedestrian <input type="checkbox"/> Unknown <input type="checkbox"/> Other <input type="checkbox"/> Restrains: <input type="checkbox"/> Helmet:	<input type="checkbox"/> Hit Pedestrian <input type="checkbox"/> Head on Collision <input type="checkbox"/> Hit from back <input type="checkbox"/> Skid <input type="checkbox"/> Hit from side <input type="checkbox"/> Nose to tail Collision <input type="checkbox"/> Hit and run <input type="checkbox"/> Hit fixed object <input type="checkbox"/> Hit animal <input type="checkbox"/> Over turn <input type="checkbox"/> Fall From Moving Vehicle <input type="checkbox"/> Other (specify): -

UNINTENTIONAL/ACCIDENT	SUICIDE/ SELF HARM	RAIL TRACK INJURY
Specific Cause : <input type="checkbox"/> Sharp Object <input type="checkbox"/> Fire Arm <input type="checkbox"/> Machine Injury <input type="checkbox"/> Fall From Bed <input type="checkbox"/> Struck in between <input type="checkbox"/> Other Animal Bite <input type="checkbox"/> Fall from height Feet <input type="checkbox"/> Others (Specify) _____	<input type="checkbox"/> Blunt Object <input type="checkbox"/> Dog Bite <input type="checkbox"/> Fall Stairs <input type="checkbox"/> Fall From Chair <input type="checkbox"/> Insect Bite <input type="checkbox"/> Burn <input type="checkbox"/> Poisoning Hanging <input type="checkbox"/> Fall of Heavy Obj. <input type="checkbox"/> Fall (Level) <input type="checkbox"/> Fall From Furniture <input type="checkbox"/> Near Drowning <input type="checkbox"/> Unknown	Specific Cause: <input type="checkbox"/> Sharp Object <input type="checkbox"/> Blunt Object <input type="checkbox"/> Fire Arm <input type="checkbox"/> Jumped form Height <input type="checkbox"/> Burn <input type="checkbox"/> Unknown <input type="checkbox"/> Others (specify) _____
		Patient Was: <input type="checkbox"/> Passenger <input type="checkbox"/> Pedestrian / Trespasser <input type="checkbox"/> Track Worker Place: <input type="checkbox"/> Platform (Station) <input type="checkbox"/> Out of Station

ASSAULT/VIOLENCE

CAUSE OF INJURY	TYPE OF VIOLENCE	PERPETRATOR-VICTIM RELATIONSHIP
<input type="checkbox"/> Sharp Object <input type="checkbox"/> Blunt Object <input type="checkbox"/> Fire Arm <input type="checkbox"/> Explosion <input type="checkbox"/> Push/Kick <input type="checkbox"/> Human Bite <input type="checkbox"/> Unknown <input type="checkbox"/> Others (specify) _____	<input type="checkbox"/> Strangulation <input type="checkbox"/> Poisoning <input type="checkbox"/> Fire Burns <input type="checkbox"/> Other Burns <input type="checkbox"/> Lathi/Danda <input type="checkbox"/> Vitriolage <input type="checkbox"/> Iron Rod <input type="checkbox"/> Interpersonal <input type="checkbox"/> War <input type="checkbox"/> Civil Violence <input type="checkbox"/> Unknown <input type="checkbox"/> Robbery <input type="checkbox"/> Others _____	<input type="checkbox"/> Rape/Sexual <input type="checkbox"/> Child Abuse <input type="checkbox"/> Terrorist Attack <input type="checkbox"/> Snatching <input type="checkbox"/> Road Rage <input type="checkbox"/> Spouse <input type="checkbox"/> Partner <input type="checkbox"/> Parent <input type="checkbox"/> Sibling <input type="checkbox"/> Acquaintance <input type="checkbox"/> Others: _____
NUMBER OF PERPETRATORS 1 2 3 4 >4 Unknown		Sex of Perpetrator <input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/> Others

santoshmahindrakar84@gmail.com

3/14/2018

PLACE OF INJURY	ACTIVITY AT TIME OF INJURY																									
<input type="checkbox"/> Private House/Residential <input type="checkbox"/> Govt. Premises (Residential) <input type="checkbox"/> Govt. Premises (Office) <input type="checkbox"/> Private (office)/Commercial <input type="checkbox"/> Informal Settlements/Slums <input type="checkbox"/> Road Street/Highway <input type="checkbox"/> Public Transport Area <input type="checkbox"/> Recreational Area <input type="checkbox"/> Others	<input type="checkbox"/> Industry <input type="checkbox"/> Construction Site <input type="checkbox"/> School/Edu.Instt. <input type="checkbox"/> Hospital/ PHC <input type="checkbox"/> Farm/Agricultural <input type="checkbox"/> Open Land <input type="checkbox"/> Prison/Custody <input type="checkbox"/> Sports/Atheletic <input type="checkbox"/> Unknown <input type="checkbox"/> Traveling <input type="checkbox"/> Sleeping/Eating/Resting <input type="checkbox"/> Education <input type="checkbox"/> Leisure <input type="checkbox"/> Others <input type="checkbox"/> Sports/Athletics <input type="checkbox"/> Working for someone <input type="checkbox"/> At home <input type="checkbox"/> Unknown <input type="checkbox"/> Domestic Work																									
<input type="checkbox"/> ALCOHOL TAKEN / SMELL OF ALCOHOL IS PRESENT <input type="checkbox"/> DURGS TAKEN																										
PRE HOSPITAL DETAILS (1) MODE OF TRANSPORT: <input type="checkbox"/> Govt. Ambulance <input type="checkbox"/> Private Ambulance <input type="checkbox"/> PCR Van <input type="checkbox"/> Public Transport <input type="checkbox"/> Private Vehicle <input type="checkbox"/> Auto Rickshaw <input type="checkbox"/> Rented 4 wheeler <input type="checkbox"/> Others																										
(2) FIRST AID WAS GIVEN: <input type="checkbox"/> Yes <input type="checkbox"/> No IF YES. (A) WHERE: <input type="checkbox"/> Onsite <input type="checkbox"/> Near-by Govt. Hospital/Clinic <input type="checkbox"/> Pvt. Hospital/Clinic <input type="checkbox"/> Ambulance <input type="checkbox"/> Others (B) By Whom: <input type="checkbox"/> Doctor <input type="checkbox"/> CATS Personnel <input type="checkbox"/> Police <input type="checkbox"/> Nurse/Paramedic <input type="checkbox"/> Others																										
TYPE OF FIRST AID GIVEN: <input type="checkbox"/> CX Spine Immobilized <input type="checkbox"/> Basic Splinting <input type="checkbox"/> Injection T.T <input type="checkbox"/> Dressing																										
<input type="checkbox"/> Oxygen by Mask/N. Prongs <input type="checkbox"/> I.V Fluids started <input type="checkbox"/> Diagnostic Procedure <input type="checkbox"/> U. Catheter																										
<input type="checkbox"/> Airway Procedure Performed <input type="checkbox"/> Pressure Bandaging <input type="checkbox"/> Definitive Procedure <input type="checkbox"/> N.G Tube																										
<input type="checkbox"/> Spine Board Used <input type="checkbox"/> Analgesic <input type="checkbox"/> Suturing <input type="checkbox"/> ICD Tube																										
PRE-HOSPITAL VITAL SIGNS: <input type="checkbox"/> Yes <input type="checkbox"/> No Airway: Patent/Compromised/Threatened; O ₂ _____ Lit/Min Breathing: RR: _____; SPO ₂ : _____ %; Circulation: HR: _____; B.P. (Sys): _____ Disability: E _____, V _____, M _____ = _____/15																										
PATIENT REFERRED BY- <input type="checkbox"/> By GP <input type="checkbox"/> Pvt. Hospital <input type="checkbox"/> Govt. Hospital <input type="checkbox"/> PHC <input type="checkbox"/> Directly <input type="checkbox"/> Others If Yes: Name of the Hospital : _____ Phone No.: _____ District: _____ State: _____ Whether Informed Trauma Centre before transferring Patient <input type="checkbox"/> Yes <input type="checkbox"/> No Was the Patient on Life Support																										
<table style="width:100%; border: none;"> <tr> <td style="width:30%;">(1) Intubated</td> <td style="width:10%;"><input type="checkbox"/></td> <td style="width:10%;">Yes</td> <td style="width:10%;"><input type="checkbox"/></td> <td style="width:10%;">No</td> </tr> <tr> <td>(2) Ventilated</td> <td><input type="checkbox"/></td> <td>Yes</td> <td><input type="checkbox"/></td> <td>No</td> </tr> <tr> <td>(3) I.V Fluids</td> <td><input type="checkbox"/></td> <td>Yes</td> <td><input type="checkbox"/></td> <td>No</td> </tr> <tr> <td>(4) Monitoring</td> <td><input type="checkbox"/></td> <td>Yes</td> <td><input type="checkbox"/></td> <td>No</td> </tr> <tr> <td>(5) Infusion of drugs</td> <td><input type="checkbox"/></td> <td>Yes</td> <td><input type="checkbox"/></td> <td>No</td> </tr> </table>		(1) Intubated	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	(2) Ventilated	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	(3) I.V Fluids	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	(4) Monitoring	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	(5) Infusion of drugs	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
(1) Intubated	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No																						
(2) Ventilated	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No																						
(3) I.V Fluids	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No																						
(4) Monitoring	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No																						
(5) Infusion of drugs	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No																						
Reason for Transfer: <input type="checkbox"/> Doctors request <input type="checkbox"/> Cannot Manage (Technical Reason) <input type="checkbox"/> Financial Reason <input type="checkbox"/> Patient/relative request: <input type="checkbox"/> DOPR-F <input type="checkbox"/> DOPR-T <input type="checkbox"/> LAMA-F <input type="checkbox"/> LAMA-T <input type="checkbox"/> Not Stated / Inadequately Described																										
ED Disposition: <input type="checkbox"/> Brought Dead <input type="checkbox"/> ED Death <input type="checkbox"/> Admitted <input type="checkbox"/> Discharge <input type="checkbox"/> Transfer Out to any Govt. Hospital <input type="checkbox"/> Transfer- Out to AIIMS <input type="checkbox"/> LAMA <input type="checkbox"/> Abscond																										
E.D. Disposition Date : _____ E.D. Disposition Time : _____																										
ADMISSION FROM: <input type="checkbox"/> Emergency Department <input type="checkbox"/> OPD/Direct																										
ASSOCIATED CO-MORBID CONDITIONS: <input type="checkbox"/> HTN <input type="checkbox"/> DM <input type="checkbox"/> CVA <input type="checkbox"/> CAD <input type="checkbox"/> T.B. <input type="checkbox"/> MALIGNANCY <input type="checkbox"/> BLEEDING DISORDER <input type="checkbox"/> OTHER _____																										

TITCO INTAKE FORM

Inclusion criteria: Potentially life-threatening injury, defined as all patients 1) admitted with history of any of the below specified injury mechanisms, or 2) with history of any of the below specified injury mechanisms who die between arrival and admission, or 3) admitted with potentially life-threatening injury as assessed by treating physician, or 4) kept for observation in yellow area with history of any of the below specified injury mechanisms

Exclusion criteria: 1) Isolated limb injury. 2) Dead on arrival

1. Hospital: Patient file #: Ward:

2. Patient study ID:

3. Directly observed?

4. Inclusion criteria used

DEMOGRAPHIC DATA

5. Age 6. Sex 7. Patient transferred from other hospital?

8. Date of injury 9. Time of injury

10. Date of arrival 11. Time of arrival

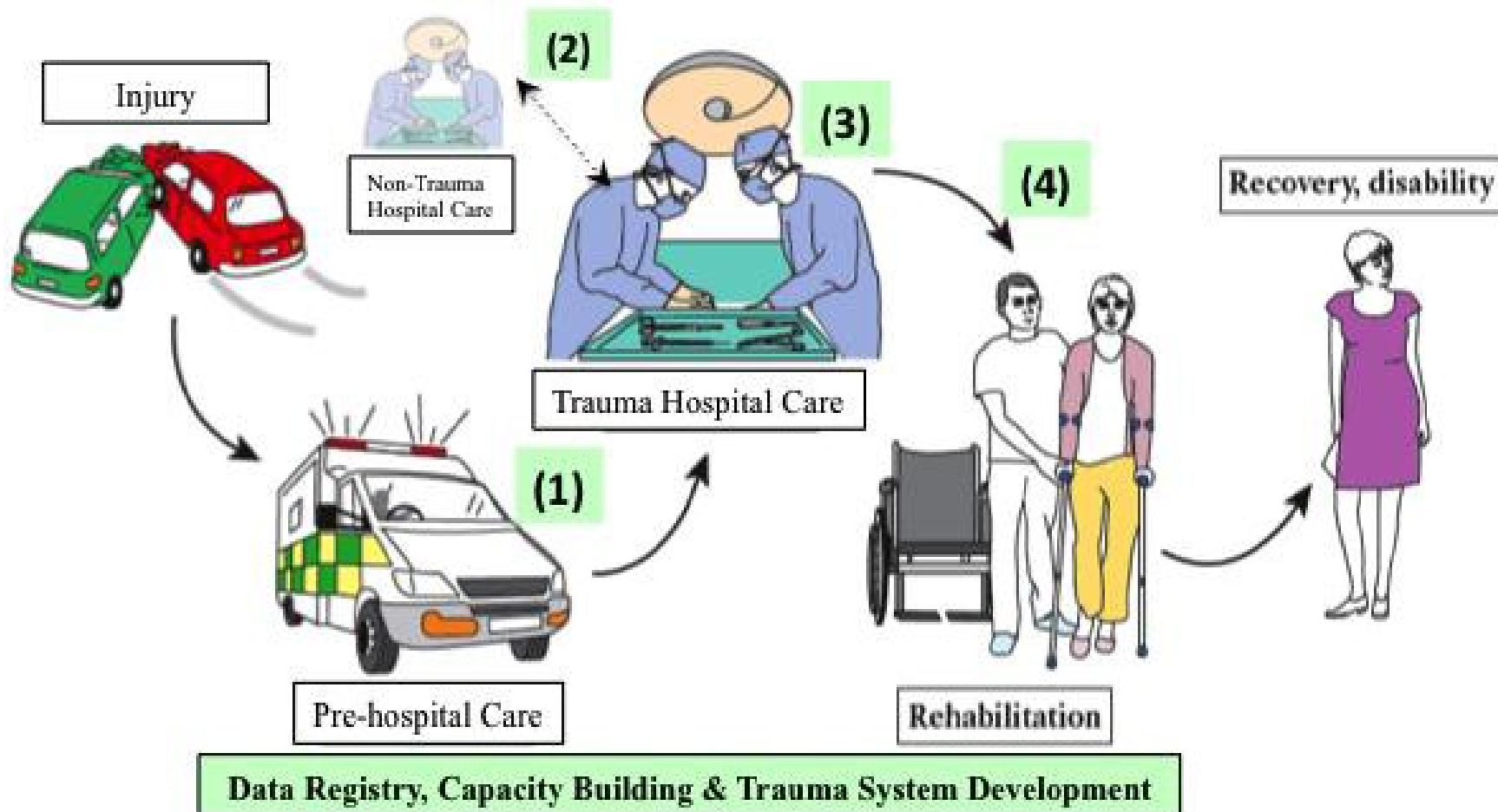
12. Date of admission 13. Time of admission

14. Mechanism of injury 15. Mode of transportation to hospital

16. Type of injury 17. Arrived walking without support from another person?

FIRST SET OF VITALS, WITHIN 24 HOURS FROM ARRIVAL

AITSC - The Proposed Solution



Data Registry, Capacity Building & Trauma Systems Development

1. Hospital ID:	<input type="checkbox"/> 1. JPNATC <input type="checkbox"/> 2. MSRMC <input type="checkbox"/> 3. KGMC <input type="checkbox"/> 4. JMMCR <input type="checkbox"/> 5. PSMC
2. Health Care ID:	
3. Registry ID:	
4. Name of Data Collector:	

5. Pre Hospital Notification (PHN) Received: Yes No

6. Date of PHN: _____ **7. Time of PHN:** _____

8. SBP: _____ **9. HR:** _____ **10. RR:** _____

11. Consciousness: Unconscious : Yes No Semi Conscious : Yes No Alert: Yes No

Injury Event Data:

12. Date of Injury: _____ **13. Time of Injury:** _____

14. Place of Injury:	i. Urban		ii. Rural	
	<input type="checkbox"/> 1. Arterial (high Capacity Urban Road)	<input type="checkbox"/> 1. State Highway	<input type="checkbox"/> 2. National Highway	<input type="checkbox"/> 2. National Highway
	<input type="checkbox"/> 2. Street	<input type="checkbox"/> 3. Other	<input type="checkbox"/> 3. Other	<input type="checkbox"/> 3. Other
	<input type="checkbox"/> 3. Other	<input type="checkbox"/> 4. Unknown	<input type="checkbox"/> 4. Unknown	<input type="checkbox"/> 4. Unknown
	<input type="checkbox"/> 4. Unknown	<input type="checkbox"/> 5. Not Recorded	<input type="checkbox"/> 5. Not Recorded	<input type="checkbox"/> 5. Not Recorded

15. Dominant Type: Blunt Penetrating Mixed

16. Primary Vehicle:

<input type="checkbox"/> 1. Pedal-Cycle	<input type="checkbox"/> 8. Spl. Industrial Vehicle
<input type="checkbox"/> 2. Motorized-2-Wheeler	<input type="checkbox"/> 9. Spl. Construction Vehicle
<input type="checkbox"/> 3. Motorized-3-Wheeler	<input type="checkbox"/> 10. Animal/A. Drawn Vehicle
<input type="checkbox"/> 4. Car	<input type="checkbox"/> 11. Unknown
<input type="checkbox"/> 5. Pick-up-Truck/Van	<input type="checkbox"/> 12. Not Applicable
<input type="checkbox"/> 6. HTV (heavy Transport Vehicle)	<input type="checkbox"/> 13. Other
<input type="checkbox"/> 7. Bus	<input type="checkbox"/> 14. Not Recorded

17. Patient Role:

<input type="checkbox"/> 1. Driver (of any vehicle)	<input type="checkbox"/> 5. Pedestrian
<input type="checkbox"/> 2. Front Seat Passenger	<input type="checkbox"/> 6. Pillion Rider
<input type="checkbox"/> 3. Rear Seat Passenger	<input type="checkbox"/> 7. Not Recorded
<input type="checkbox"/> 4. Other Passenger (bus/pick-up)	<input type="checkbox"/> 8. Other
	<input type="checkbox"/> 9. Unknown

18. Type of Collision:

<input type="checkbox"/> 1. Hit Pedestrian	<input type="checkbox"/> 8. Hit Fixed Object
<input type="checkbox"/> 2. Head on Collision	<input type="checkbox"/> 9. Hit Animal
<input type="checkbox"/> 3. Hit from back	<input type="checkbox"/> 10. Overturn
<input type="checkbox"/> 4. Skid	<input type="checkbox"/> 11. Fall from Moving Vehicle
<input type="checkbox"/> 5. Hit From Side	<input type="checkbox"/> 12. Trapped between 2 Vehicle
<input type="checkbox"/> 6. Nose to tail Collision	<input type="checkbox"/> 13. Other (Specify)
<input type="checkbox"/> 7. Hit and Run	<input type="checkbox"/> 14. Not Recorded
	<input type="checkbox"/> 15. Unknown

19. Helmet/Restraint : Yes No Not Applicable Not Recorded

20. Other Associated Risk Factors:

1. Alcohol 2. Texting 3. Music 4. Over Speeding 5. Talking on Phone
 6. Others _____ 7. Not Recorded
 8. Not Applicable

21. Mode of Arrival:

- | | | | |
|--------------------------|------------------------------------|--------------------------|-----------------------------|
| <input type="checkbox"/> | 1. Walking | <input type="checkbox"/> | 8. Highway Petrol Ambulance |
| <input type="checkbox"/> | 2. Pedal-Cycle | <input type="checkbox"/> | 9. Other Govt. Ambulance |
| <input type="checkbox"/> | 3. Motorized -2-Wheeler | <input type="checkbox"/> | 10. Private Ambulance |
| <input type="checkbox"/> | 4. Motorized -3-Wheeler | <input type="checkbox"/> | 11. Police Vehicle |
| <input type="checkbox"/> | 5. Taxi (Rented -4- Wheeler) | <input type="checkbox"/> | 12. Unknown |
| <input type="checkbox"/> | 6. Private Car | <input type="checkbox"/> | 13. Other |
| <input type="checkbox"/> | 7. NAS Ambulance/108/NHM Ambulance | <input type="checkbox"/> | 14. Not Recorded |

22. Primary Care Given:

1. Pre-hospital Care Providers (Ambulance)
 2. Private Clinic/Hospital
 3. Govt. Hospital/Medical College
 4. Bystander/Brought By
 5. Not Recorded
 6. Not Applicable

23. Referring Hospital:

1. Private Clinic
 2. Private Hospital
 3. PHC
 4. CHC
 5. District Hospital
 6. Medical College University
 7. Not Recorded
 8. Not Applicable

Demographics Data

24. Age :		25. Gender:	<input type="checkbox"/> 1. Male	<input type="checkbox"/> 2. Female	<input type="checkbox"/> 3. Transgender
26. Place of Residence	Line 1:				
	Line2 :	Pin Code :			

Hospital Data:

27. ED Arrival Date:		28. ED Arrival Time :	
29. ED Disposal	<input type="checkbox"/> 1. Discharge <input type="checkbox"/> 2. Died <input type="checkbox"/> 3. LAMA <input type="checkbox"/> 4. DAMA <input type="checkbox"/> 5. Transferred out to other Hospital <input type="checkbox"/> 6. Absconded <input type="checkbox"/> 7. OT <input type="checkbox"/> 8. ICU <input type="checkbox"/> 9. Ward		
30. ED Disposition Date:		31. ED Disposition Time:	
32. Hospital Admission Date:		33. Hospital Admission Time	

First set of Vitals in ED (On Arrival)

34. Date of Vital Signs Recorded:		35. Time of Vital Signs Recorded	
36. SBP:		37. HR:	
38. RR:		39. SPO2:	
40. GCS Eye:		41 GCS Verbal :	
42. GCS Motor :		43. Total GCS:	

44. ED Investigation (FAST): Yes No

1. Done	Date :	
	Time:	
<input type="checkbox"/> 2. Not Done <input type="checkbox"/> 3. Done but Not Recorded <input type="checkbox"/> 5. Not Required		

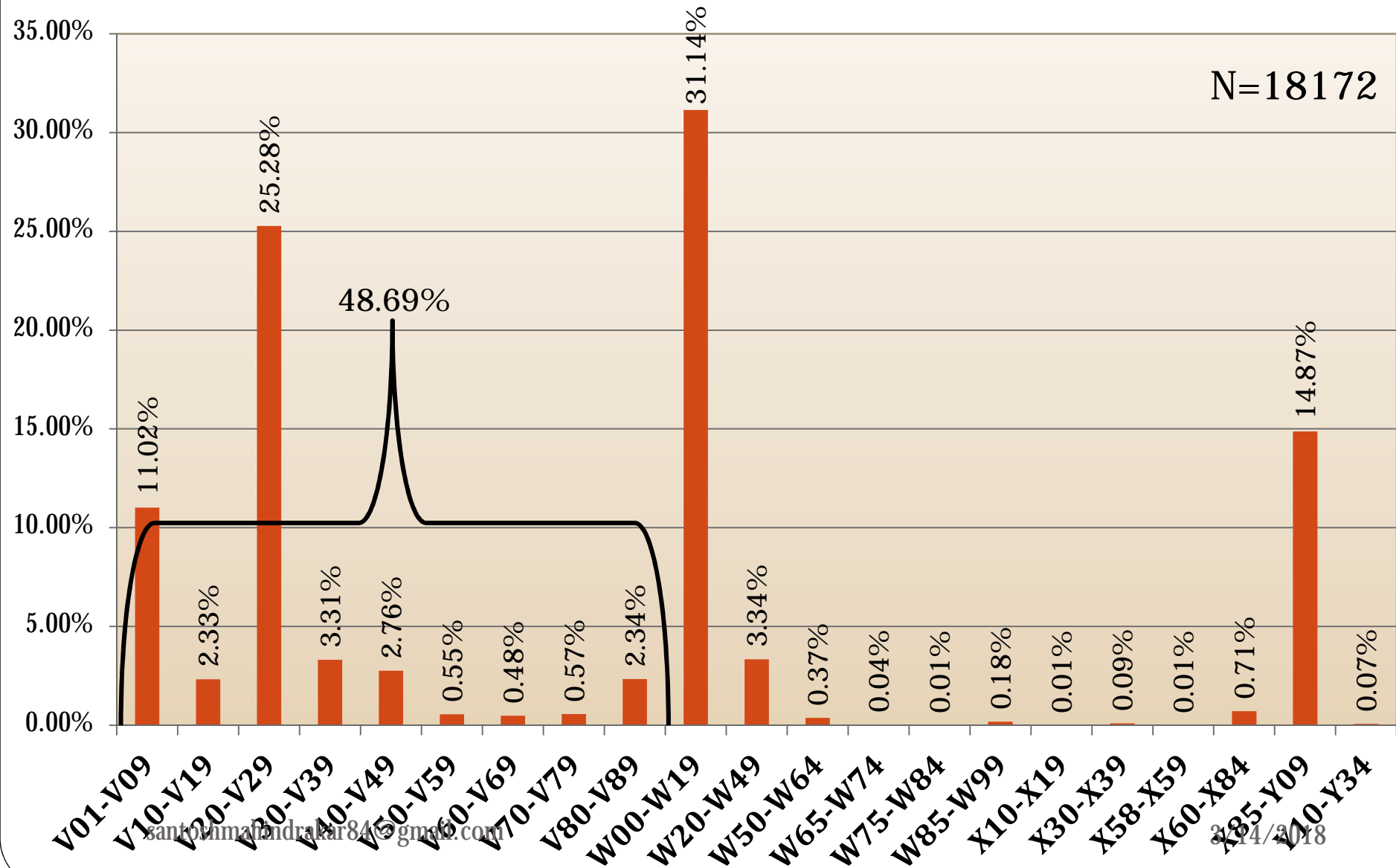
45. x-Ray:

45.1 Chest:	
1. Done	Date :
	Time:
<input type="checkbox"/> 2. Not Done <input type="checkbox"/> 3. Done but Not Recorded <input type="checkbox"/> 4. Not Available <input type="checkbox"/> 5. Not Required	

santoshmahindrakar84@gmail.com

3/14/2018

Coding as per the chapter XX of External Cause of Mortality & Morbidity



Under pipeline

- Patterns of RTA and its geo-spatial distribution using Geo Information System (GIS) among the patients arrived in Emergency Department.

Methodology

Systems approach

Mixed method:-

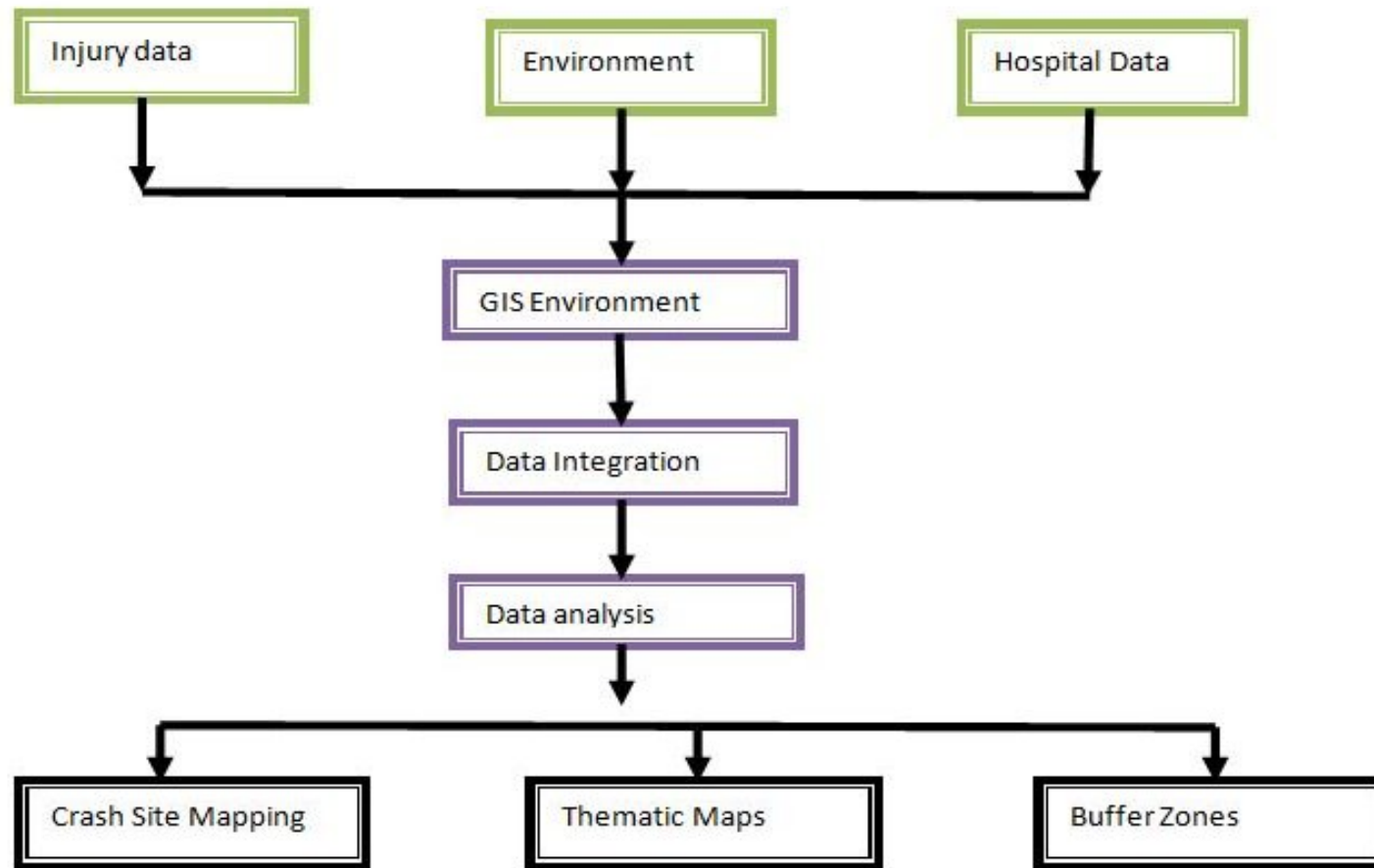
- **Quantitative methods** - to assess, prevalence of Exposure to risk factors, patterns of RTA and injury events, environment and hospital data.
- **Qualitative methods** - to assess the thick data on the environmental causes and individual opinion on the accident.
- **Research design:** We will be adopting the prospective survey designs to assess the multiple causes and its distribution using the GIS.
- **Research design:** Prospective survey designs

Data source and tools

Sources of data	Type of data	Tools
Patient and bystanders	Injury event, environment and behavioral data will be collected	Semi structured Interview
Hospital records	Initial vital signs, care and outcome will be collected	Structured questionnaire
Accidental zones condition	Their observations and opinion on the accidental zones	Semi structured Interview and
<ul style="list-style-type: none"> - Traffic police - Passengers - Others 		Observational checklist
ZIP codes	Place of injury data will coded as per the ZIP code or latitude	GIS systems to map the combination of the three sets of defined data.
Toposheet map (Survey of India)	Area maps and that would cover the road network present in the region	

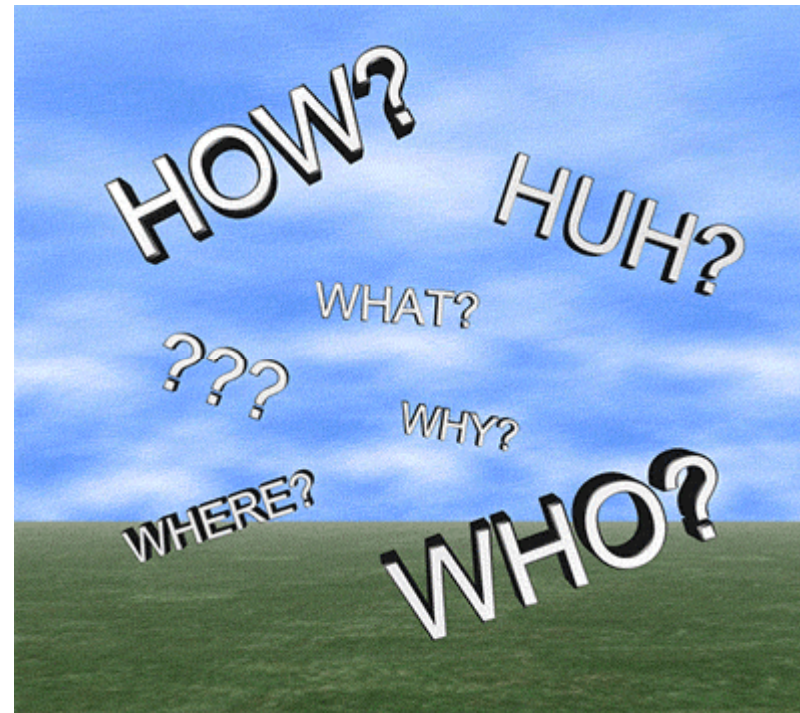
Study Design

Figure 2: Diagram representing the study design



A way forward

- **Collaboration among the hospital, technology and social sector**
- **New tertiary trauma care centre Vs pre-hospital care/strengthening referral centers.**
- **Rehabilitation**



Reference

1. Agrawal, A., Galwankar, S., Kapil, V., Coronado, V., Basavaraju, S., McGuire, L., ... Dwivedi, S. (2012). Epidemiology and clinical characteristics of traumatic brain injuries in a rural setting in Maharashtra, India. 2007-2009. *International Journal of Critical Illness and Injury Science*, 2(3), 167. <http://doi.org/10.4103/2229-5151.100915>
2. American College of Surgeons (Ed.). (2012). *Advanced trauma life support: ATLS ; student course manual (9. ed)*. Chicago, Ill: American College of Surgeons.
3. Bagaria, V., & Bagaria, S. (2007). A geographic information system to study trauma epidemiology in India. *Journal of Trauma Management & Outcomes*, 1(1), 3. <http://doi.org/10.1186/1752-2897-1-3>
4. Bell, N., & Schuurman, N. (2010). GIS and Injury Prevention and Control: History, Challenges, and Opportunities. *International Journal of Environmental Research and Public Health*, 7(3), 1002–1017. <http://doi.org/10.3390/ijerph7031002>
5. Bhalla, K., Ezzati, M., Mahal, A., Salomon, J., & Reich, M. (2007). A Risk-Based Method for Modeling Traffic Fatalities. *Risk Analysis*, 27(1), 125–136. <http://doi.org/10.1111/j.1539-6924.2006.00864.x>
6. Boulos, M. N. K. (2004). Towards evidence-based, GIS-driven national spatial health information infrastructure and surveillance services in the United Kingdom. *International Journal of Health Geographics*, 3(1), 1. <http://doi.org/10.1186/1476-072X-3-1>
7. Cromley, E. K. (2003). GIS and Disease. *Annual Review of Public Health*, 24(1), 7–24. <http://doi.org/10.1146/annurev.publhealth.24.012902.141019>
8. Curtis, J., Schuch, L., Curtis, A., Hudson, C., & Wuensch, H. (2015). 0002 Integrative geospatial technologies for child injury prevention: spatial analysis of hospital injury data and spatial video surveys of pedestrian and bicycle behaviours in the city of akron and summit county, Ohio. *Injury Prevention*, 21(Suppl 1), A23.1–A23. <http://doi.org/10.1136/injuryprev-2015-041602.57>
9. Cusimano, M. D., Chipman, M., Glazier, R. H., Rinner, C., & Marshall, S. P. (2007). Geomatics in injury prevention: the science, the potential and the limitations. *Injury Prevention*, 13(1), 51–56. <http://doi.org/10.1136/ip.2006.012468>
10. Edelman, L. S. (2007). Using Geographic Information Systems in Injury Research. *Journal of Nursing Scholarship*, 39(4), 306–311. <http://doi.org/10.1111/j.1547-5069.2007.00185.x>
11. Fradelos, E., Papathanasiou, I., Mitsi, D., Tsaras, K., Kleisiaris, C., & Kourkouta, L. (2014). Health Based Geographic Information Systems (GIS) and their Applications. *Acta Informatica Medica*, 22(6), 402. <http://doi.org/10.5455/aim.2014.22.402-405>
12. Gosavi, S. V., & Deshmukh, P. R. (2014). Epidemiology of injuries in rural Wardha, central India. *Medical Journal, Armed Forces India*, 70(4), 380–382. <http://doi.org/10.1016/j.mjafi.2014.02.003>

13. Gundogdu, I. B. (2010). Applying linear analysis methods to GIS-supported procedures for preventing traffic accidents: Case study of Konya. *Safety Science*, 48(6), 763–769. <http://doi.org/10.1016/j.ssci.2010.02.016>
14. Kaplan, S., & Giacomo Prato, C. (2015). A Spatial Analysis of Land Use and Network Effects on Frequency and Severity of Cyclist–Motorist Crashes in the Copenhagen Region. *Traffic Injury Prevention*, 16(7), 724–731. <http://doi.org/10.1080/15389588.2014.1003818>
15. Kumaresan, V., Vasudevan, V., & Nambisan, S. (n.d.). Development of a GIS-based Traffic Safety Analysis System (pp. 1–12). Presented at the In Annual ESRI International User Conference, San Diego, California.
16. Lawrence, B. M., Stevenson, M. R., Oxley, J. A., & Logan, D. B. (2015). Geospatial analysis of cyclist injury trends: an investigation in Melbourne, Australia. *Traffic Injury Prevention*, 16(5), 513–518. <http://doi.org/10.1080/15389588.2014.973947>
17. Lawson, F. L., Schuurman, N., Oliver, L., & Nathens, A. B. (2013). Evaluating potential spatial access to trauma center care by severely injured patients. *Health & Place*, 19, 131–137. <http://doi.org/10.1016/j.healthplace.2012.10.011>
18. Mooney, S. J., DiMaggio, C. J., Lovasi, G. S., Neckerman, K. M., Bader, M. D. M., Teitler, J. O., ... Rundle, A. G. (2016). Use of Google Street View to Assess Environmental Contributions to Pedestrian Injury. *American Journal of Public Health*, 106(3), 462–469. <http://doi.org/10.2105/AJPH.2015.302978>
19. Noordin, S., Wright, J. G., & Howard, A. W. (2008). Global relevance of literature on trauma. *Clinical Orthopaedics and Related Research*, 466(10), 2422–2427. <http://doi.org/10.1007/s11999-008-0397-y>
20. Odero, W., Garner, P., & Zwi, A. (1997). Road traffic injuries in developing countries: a comprehensive review of epidemiological studies. *Tropical Medicine & International Health*, 2(5), 445–460. <http://doi.org/10.1111/j.1365-3156.1997.tb00167.x>
21. Peden, M. M., & World Health Organization (Eds.). (2004). *World report on road traffic injury prevention*. Geneva: World Health Organization.
22. Ranapurwala, S. I., Mello, E. R., & Ramirez, M. R. (2016). A GIS-based matched case-control study of road characteristics in farm vehicle crashes. *Epidemiology (Cambridge, Mass.)*. <http://doi.org/10.1097/EDE.0000000000000542>

23. Reddy, Nb., Reddy, Nn., Reddy, Cs., Hanumantha, & Madithati, P. (2014). An epidemiological study on pattern of thoraco-abdominal injuries sustained in fatal road traffic accidents of Bangalore: Autopsy-based study. *Journal of Emergencies, Trauma, and Shock*, 7(2), 116. <http://doi.org/10.4103/0974-2700.130882>
24. Ruikar, M. (2013). National statistics of road traffic accidents in India. *Journal of Orthopedics, Traumatology and Rehabilitation*, 6(1), 1. <http://doi.org/10.4103/0975-7341.118718>
25. Schuch, L., Curtis, J. W., Curtis, A., Hudson, C., Wuensch, H., Sampsell, M., ... Davis, A. J. (2016). Breaking Out of Surveillance Silos: Integrative Geospatial Data Collection for Child Injury Risk and Active School Transport. *Journal of Urban Health: Bulletin of the New York Academy of Medicine*, 93(1), 36–52. <http://doi.org/10.1007/s11524-015-0006-9>
26. Singh, R., Singh, H., Gupta, S., & Kumar, Y. (2014). Pattern, severity and circumstances of injuries sustained in road traffic accidents: A tertiary care hospital-based study. *Indian Journal of Community Medicine*, 39(1), 30. <http://doi.org/10.4103/0970-0218.126353>
27. Smith, D. P., Gould, M. I., & Higgs, G. (2003). (Re)surveying the uses of Geographical Information Systems in Health Authorities 1991-2001. *Area*, 35(1), 74–83. <http://doi.org/10.1111/1475-4762.00112>
28. Tansley, G., Schuurman, N., Amram, O., & Yanchar, N. (2015). Spatial Access to Emergency Services in Low- and Middle-Income Countries: A GIS-Based Analysis. *PloS One*, 10(11), e0141113. <http://doi.org/10.1371/journal.pone.0141113>
29. Violanti, J. M., & Marshall, J. R. (1996). Cellular phones and traffic accidents: An epidemiological approach. *Accident Analysis & Prevention*, 28(2), 265–270. [http://doi.org/10.1016/0001-4575\(95\)00070-4](http://doi.org/10.1016/0001-4575(95)00070-4)
30. Warden, C., Sahni, R., & Newgard, C. (2010). Geographic Cluster Analysis of Injury Severity and Hospital Resource Use in a Regional Trauma System. *Prehospital Emergency Care*, 14(2), 137–144. <http://doi.org/10.3109/10903120903538682>
31. World Health Organization. (2015). *Global status report on road safety 2015: supporting a decade of action*. Geneva, Switzerland: WHO