Summer Internship Report

at IIHMR Delhi in collaboration with ISRO (RRSC North)

(May 01st to June 30th, 2025)

A Report

By

Dr. Tejas Kalhane

Mentor. Dr. Nishikant Bele

PGDM (Hospital and Health Management)

2024-2026



International Institute of Health Management Research, New Delhi

INTERNSHIP COMPLETION CERTIFICATE

Date: 20.03.26

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CERTIFICATE OF COMPLETION

This is to certify that **Dr. Tejas Kalhane (PG/24/043)** has successfully completed a **Summer Internship** of **two months duration** at the *International Institute of Health Management Research (IIHMR), Delhi*, joint research by IIHMR, Delhi and RRSC North from **5th May 2025 to 5th July 2025**.

During this period, he was engaged in a research study titled:

"To understand the effectiveness and usage of Remote Sensing (RS) & Geographic Information System (GIS) tools and techniques for evacuating and hospitalization of Road Traffic Accident victims in Delhi: An exploratory study."

He has demonstrated sincere effort, dedication, and a keen interest in research throughout the internship. His work has been found to be satisfactory and in line with the academic and professional standards of the institute.

We wish him all the best in his future endeavors.

Dr. Punit Yadav
Dean- Academics and Student Affairs

(Authorized Signatory)
International Institute of Health Management Research (IIHMR), Delhi

Certificate of Approval

Certificate of Approval

The Summer Internship Project of titled "**To understand the effectiveness and usage of Remote Sensing(RS) & Geographic information system(GIS) tools and techniques for evacuating and hospitalization of Road traffic accident victims in Delhi: An exploratory study**" at "**IIHMR DELHI in collaboration with ISRO(RRSC North)**" is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of Post Graduate Diploma in Health and Hospital Management for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed, or conclusion drawn therein but approve the report only for the purpose it is submitted.



Dr. Nishikant Bele

Professor and Controller of Examination

IIHMR, Delhi.

Plagarism Check Report

Dr. Tejas Kalhane ST re[prt

ORIGINALITY REPORT

4%	3%	2%	0%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	www.usbr.gov Internet Source	1%
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3	H. M., Naveena. "Comparative Study of Efficacy Between Platelet Rich Plasma (Prp) Versus Other Mode of Conservative Managementin the Treatment of Lateral Epicondylitis", Rajiv Gandhi University of Health Sciences (India), 2023 Publication	1%
4	www.mdpi.com Internet Source	1%
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6	Darma, Yusria. "A Time Series Analysis of Road Traffic Fatalities in Malaysia", University of Malaya (Malaysia), 2023 Publication	<1%

Exclude quotes	On	Exclude matches	Off
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FEEDBACK (ORGANISATION SUPERVISOR)

FEEDBACK FORM

(Organization Supervisor)

Name of the Student: Tejas Kalhane

Summer Internship Institution: IIHMR

Area of Summer Internship: Road Traffic Accident and Disaster Preparedness.

Attendance: 98%

Objectives met: Yes

Deliverables:
- Conducted a situational analysis of road traffic accident response mechanisms.
- Assisted in data collection and analysis related to emergency health services.

Strengths:
- Strong analytical & observational skills.
- Demonstrates keen interest in public health and emergency preparedness.
- Punctuality and self-motivated in completing task

Suggestions for Improvement:
- Encourage more active participation in field visit.

Signature of the Officer-in-Charge (Internship)

Date: 14 July 2025
Place: Delhi

FEEDBACK FORM(Mentor)

FEEDBACK FORM

(IIHMR MENTOR)

Name of the Student: Dr. Tejas Kalhans.

Summer Internship Institution: International Institute of Health Management Research.

Area of Summer Internship:

Secondary Research

Attendance:

100 %

Objectives met:

Yes.

Deliverables:

Report.

Strengths: Hard work, sincere.

Suggestions for Improvement: good communication skills.

Signature of the Officer-in-Charge (Internship)

Date: 13/02/26.
Place: Delhi

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OBSERVATIONAL LEARNING - GENERAL FINDINGS ON LEARNING:

Learnings obtained under the project

Research & GIS Department

- Practical exposure to **Remote Sensing and GIS tools** (e.g., QGIS, MapCruzin) for mapping accident hotspots and health facilities.

Medicolegal Data & Government Interface

- Developed an understanding of how official records from the Delhi Traffic Police and DCP Office are organized, retrieved, and analysed.
- Experienced the **bureaucratic processes** involved in seeking permission and accessing data, including formal communication protocols, follow-ups, and compliance with institutional hierarchies.

CONCLUSIVE LEARNING

Conclusive Learning:

- Developed strong proficiency in **GIS-based public health research** and analytical skills.
- Gained a comprehensive understanding of **inter-sectoral collaboration** between healthcare systems, road transportation authorities and Bureaucratic systems and procedures.

Limitations of Study

- **Data Limitations-** The accuracy and completeness of this data, particularly for accident locations and real-time traffic conditions, could be a limitation.
- **Scope of Study Area-** The findings might not be generalizable to all of Delhi or other urban environments with different road characteristics, traffic patterns, and healthcare infrastructure.
- **Difficulties in assessing ground data or actual data from police stations.**
- **"Platinum Minutes" Concept-** Achieving this in a real-world urban setting with potential traffic, varied healthcare facility accessibility, and ambulance availability can be challenging.
- **Definition of Healthcare Facilities-** The specific services offered by each, their capacity to handle trauma cases, and their emergency care capabilities might vary.

PROJECT REPORT

INTRODUCTION AND SIGNIFICANCE OF STUDY

Road traffic accidents (RTA) are the significant health crisis for the mortality and morbidity worldwide. Currently RTA's are ranked as 8th leading cause of death globally and projections indicates that it will be 5th leading cause of death by 2030. It has been observed that roughly 1.19 million people die each year from road traffic crashes. As per the data from WHO, it has been seen that between 20 and 50 million people suffer from non-fatal injuries. Due to road traffic injuries there has been considerable economic loss to individual, their families and to the country as well. Road traffic crashes carry a substantial economic burden and costing most countries around 3% of their Gross Domestic Product (GDP).

The research will be significant because it integrates Remote Sensing (RS) and Geographic Information System (GIS) to map the incident location and to access the nearest healthcare facility to avoid any unnecessary delays and improve emergency response strategies. The first hour after a traumatic injury is the most critical period to initiate treatment and increase chances of survival.

Our study will focus on Euclidean distance from RTA sites to healthcare facilities so that victims will be able to access medical attention within this life – saving window. It will also help in identifying real challenges like non-availability of ambulances in critical minutes, referral delays and mismatch between victim need and hospital capacity. By exploring their effectiveness in Delhi's context, this study pioneers the application of advanced geospatial tools to emergency healthcare delivery, potentially setting benchmarks for other urban centres globally. Delhi's rapid urbanization and infrastructure development create unique challenges for emergency response systems.

This study's findings will provide evidence-based insights for policymakers regarding hospital placement, ambulance station locations, traffic management strategies, and emergency service optimization. The spatial analysis capabilities of GIS can reveal patterns in accident distribution, helping authorities identify high-risk zones and implement targeted interventions. Emergency response systems often exhibit spatial and socioeconomic disparities, with underserved areas experiencing longer response times and reduced service quality. This study can identify such inequities in Delhi's emergency response coverage and suggest technology-driven solutions to ensure more equitable access to emergency medical services across different socioeconomic neighbourhoods. The study bridges geospatial technology, emergency medicine, urban planning, and public policy, demonstrating how interdisciplinary approaches can address complex urban challenges. The insights generated will be valuable for emergency management agencies, healthcare administrators, urban planners, and technology developers working on smart city initiatives.

RESEARCH TITLE

To understand the effectiveness and usage of RS & GIS tools and techniques for evacuating and hospitalization of Road traffic accident victims in Delhi: An exploratory study

RESEARCH OBJECTIVES

1. To understand the spatial pattern of RTA and suitable healthcare facilities in Delhi
2. To estimate the Euclidian distance for evacuating the RTA victims (as per platinum minutes concept)
3. To identify gaps and challenges in hospitalization of RTA victim from the incident site

METHODOLOGY

Study Design

- This is an exploratory study that uses Remote Sensing (RS) and Geographic Information Systems (GIS) tools to analyze the spatial dynamics of Road Traffic Accidents (RTAs) and their proximity to healthcare facilities in the study area.
- Exploratory: Since this area has not been thoroughly studied in terms of evacuation logistics using spatial tools, the aim is to explore patterns and gaps.
- RS & GIS Techniques: Mapping RTA locations along Najafgarh Road in Dwarka. Evaluating Euclidean distance and network-based shortest routes to the nearest healthcare facilities and identifying gaps in healthcare accessibility based on response time and infrastructure availability.
- The study integrates secondary data (accident locations, health infrastructure) and spatial analysis to assess how efficiently accident victims can be evacuated and hospitalized, especially within the "Platinum Minutes"—the first 10 critical minutes post-accident when survival chances are highest if proper medical help is provided.

Study Area

- The study focuses on the Dwarka region of South-West Delhi, specifically on Najafgarh Road.
- Najafgarh Road was selected based on the 2023 Delhi Road Crash Reports, which identify it as having several accident-prone hotspots or black spots.
- This road has a mix of high-speed stretches, urban congestion, and inadequate pedestrian management, making it vulnerable to accidents.
- The area has a mix of healthcare facilities.

Sampling Strategy

- Stratification of Healthcare Facilities – Hospitals are categorized into Primary, Secondary, and Tertiary Care Centers to ensure proportional representation and assess differences in accessibility and emergency response times.
- Stratification of Accident Locations – RTA sites along Najafgarh Road are classified into high-risk, moderate-risk, and low-risk zones, ensuring a comprehensive analysis of evacuation efficiency across different accident-prone areas.

MODE OF DATA COLLECTION

Data for the study was primarily sourced from the Delhi Crash Report 2023, a comprehensive annual document published by the Road Crash Research Cell under the Delhi Traffic Police Department. This report provided critical information such as the total number of road traffic accidents (RTAs), their geographic distribution across various zones in Delhi, accident hotspots, frequency of crashes, and the corresponding fatality and injury rates. These datasets served as the foundation for identifying high-risk zones-particularly along the Najafgarh Road corridor in the Dwarka region by analysing accident patterns over time. In addition to secondary data, qualitative and contextual insights were obtained through direct communication with the Station Officer at the Deputy Commissioner of Police (DCP) Office, Dwarka.

This interaction was instrumental in verifying accident-prone locations, understanding on-ground realities related to emergency response times, and clarifying discrepancies in publicly reported data. The Station Officer also provided supplementary details such as ambulance availability, inter-facility referral patterns, and local challenges in coordinating traffic management and trauma care services.

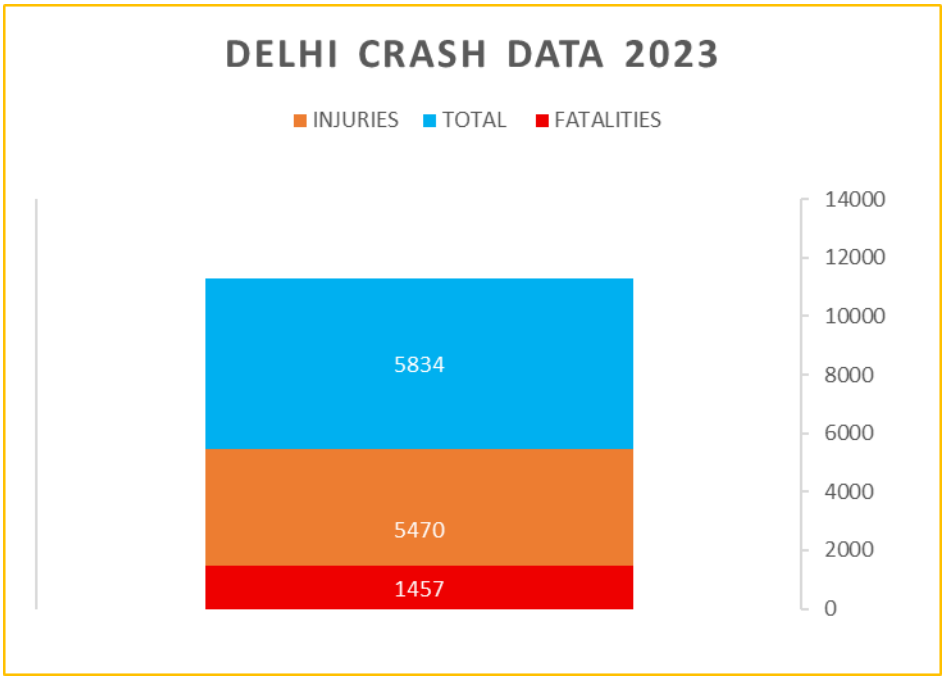
These first-hand insights helped in enriching the spatial analysis, validating accident locations, and identifying systemic gaps in evacuation and hospitalization processes. Together, these sources ensured a more accurate and contextually grounded understanding of the emergency response landscape in the study area. They also supported the application of geospatial tools (e.g., GIS mapping, Euclidean distance analysis) to analyse evacuation efficiency and health facility accessibility with a greater degree of precision.

Limitations of Study

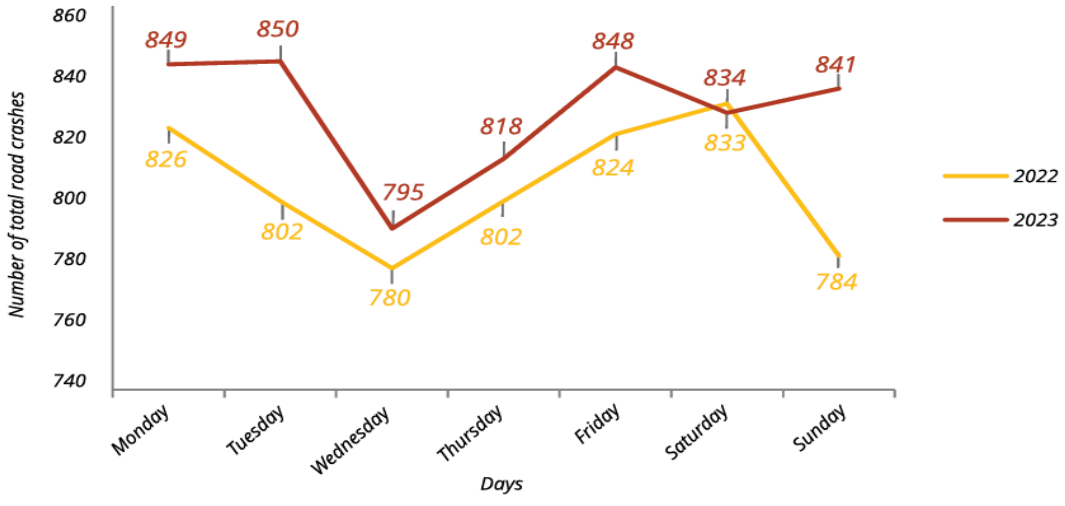
- **Data Limitations-** The accuracy and completeness of this data, particularly for accident locations and real-time traffic conditions, could be a limitation.
- **Scope of Study Area-** The findings might not be generalizable to all of Delhi or other urban environments with different road characteristics, traffic patterns, and healthcare infrastructure.
- **Difficulties in assessing ground data or actual data from police stations.**
- **"Platinum Minutes" Concept-** Achieving this in a real-world urban setting with potential traffic, varied healthcare facility accessibility, and ambulance availability can be challenging.
- **Definition of Healthcare Facilities-** The specific services offered by each, their capacity to handle trauma cases, and their emergency care capabilities might vary.

DATA ANALYSIS

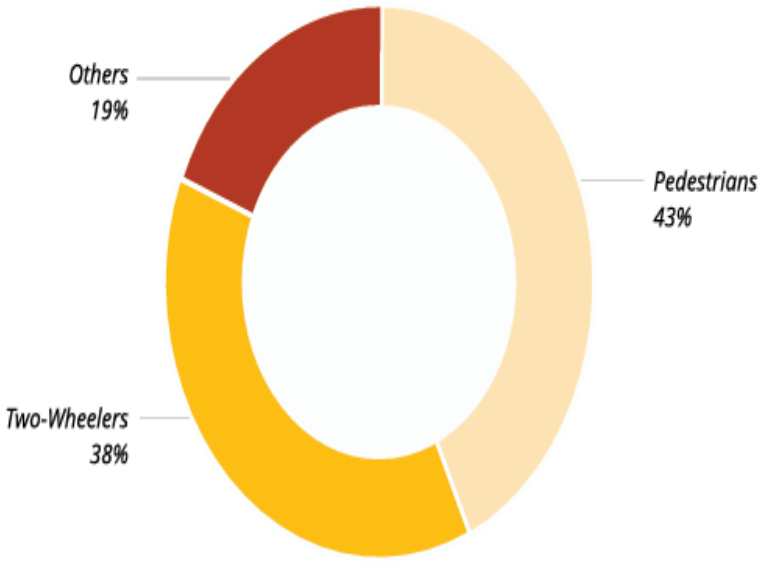
In the 2023, a total of 5834 road crashes were reported in Delhi, claiming 1457 lives and causing injuries to 5470 persons.

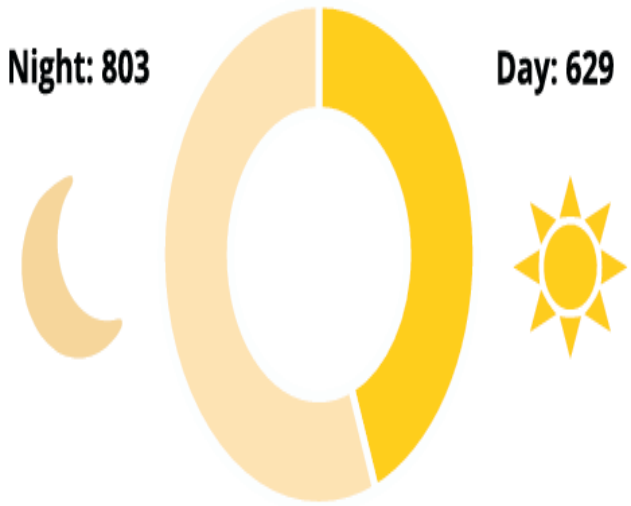


- **The number of total crashes has been the highest on Tuesday followed by Monday and Friday in the year 2023. Wednesday has witnessed the lowest crashes in the year 2022 as well as year 2023. The increase in crashes is maximum on Sunday, Tuesday and Monday.**

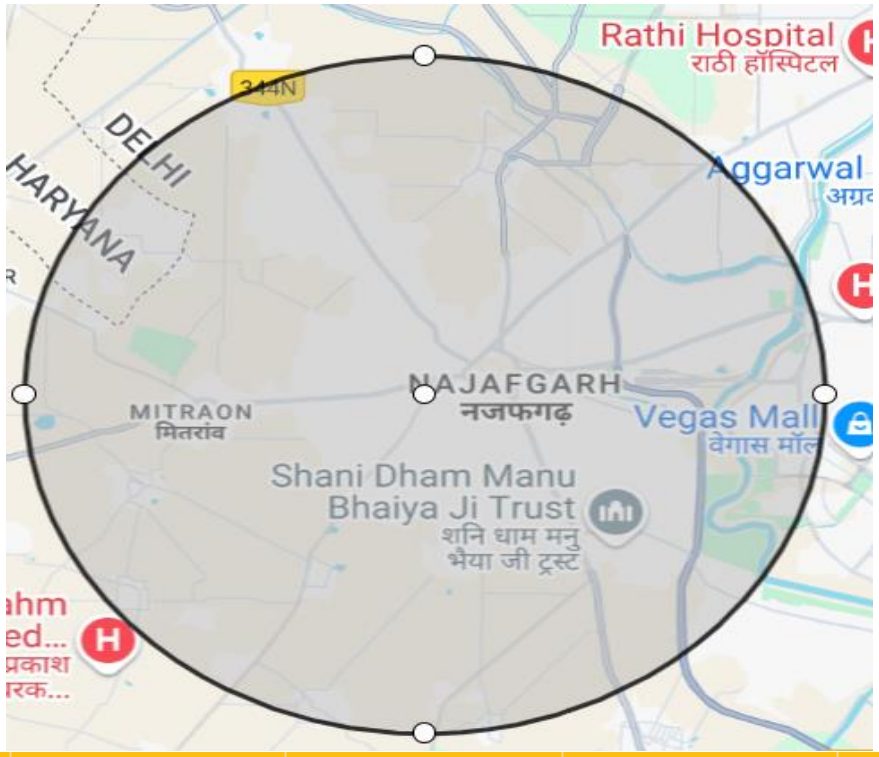


In 2023, share of pedestrians death in road crashes were 43% and motorised two-wheeler riders were the second most vulnerable victims account for 38% of total road crash deaths.





Crash classification as per day and night show that in 2023, 629 fatal crashes occurred during the day time whereas 803 occurred during the night time.



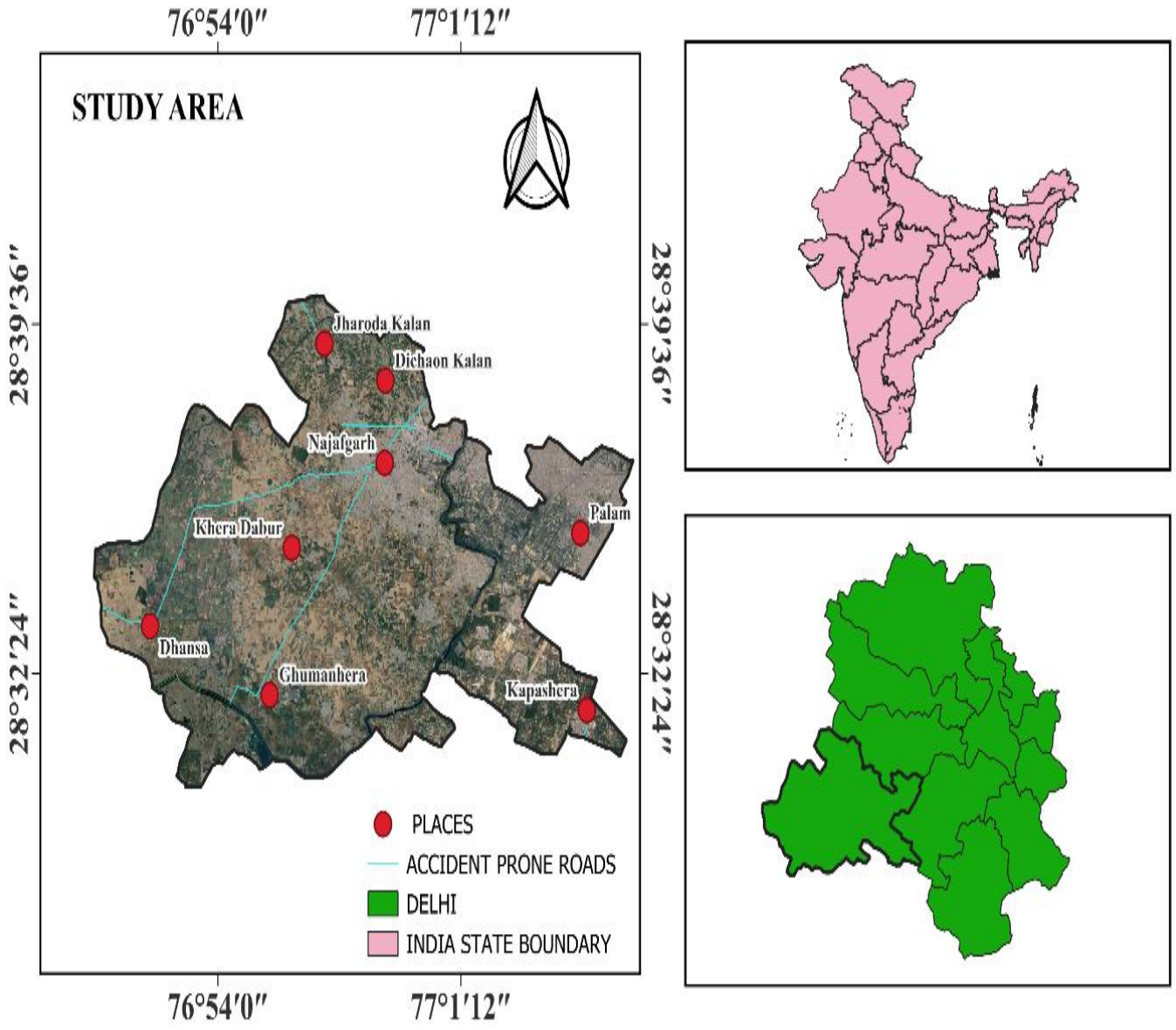
Traffic districts	Fatal Crashes	Simple Crashes	Non-injury Crashes	Total Crashes
Dwarka district	*91*	*394*	*6*	*491*
North district	*115*	*323*	*6*	*444*
North east district	*94*	*295*	*2*	*391*
East district	*79*	*243*	*9*	*331*
Central district	*49*	*198*	*4*	*251*
New Delhi district	*39*	*124*	*5*	*168*

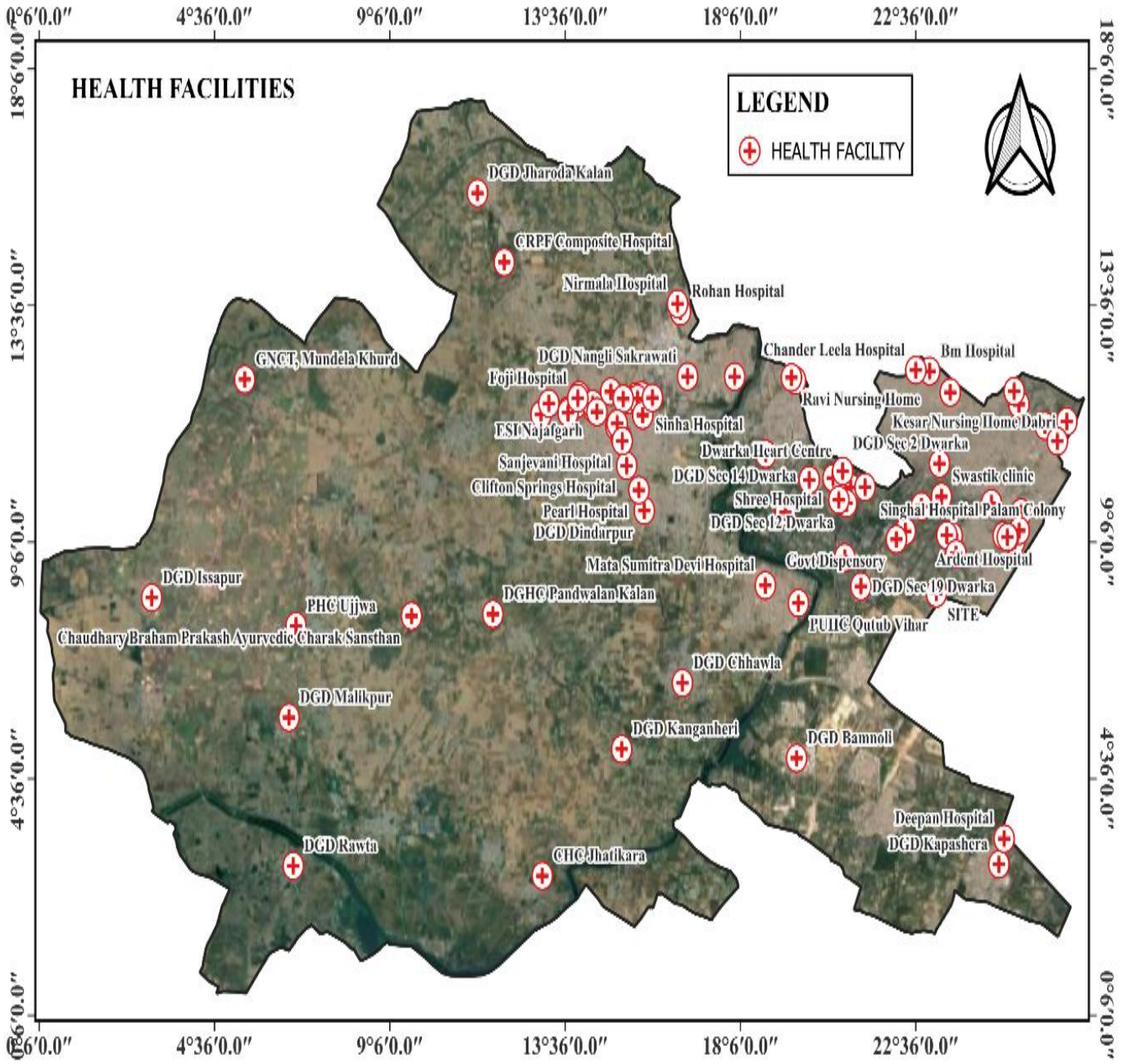
The Najafgarh road has reported highest number of crashes which are 79 in 2023. These crashes have resulted in deaths of 16 people. Further, road no. 201 has recorded 33 crashes and 7 fatalities.

S.no.	Road Name	Fatal Crashes	Total Crashes	Persons Killed
1.	Najafgarh Road	16	79	16
2.	Dansha Road	9	19	9
3.	201 No. Road	7	33	7
4.	Jharoda Road	2	12	3
5.	Chhawla Road	2	4	2
6.	Najafgarh Nangloi Road	1	5	1

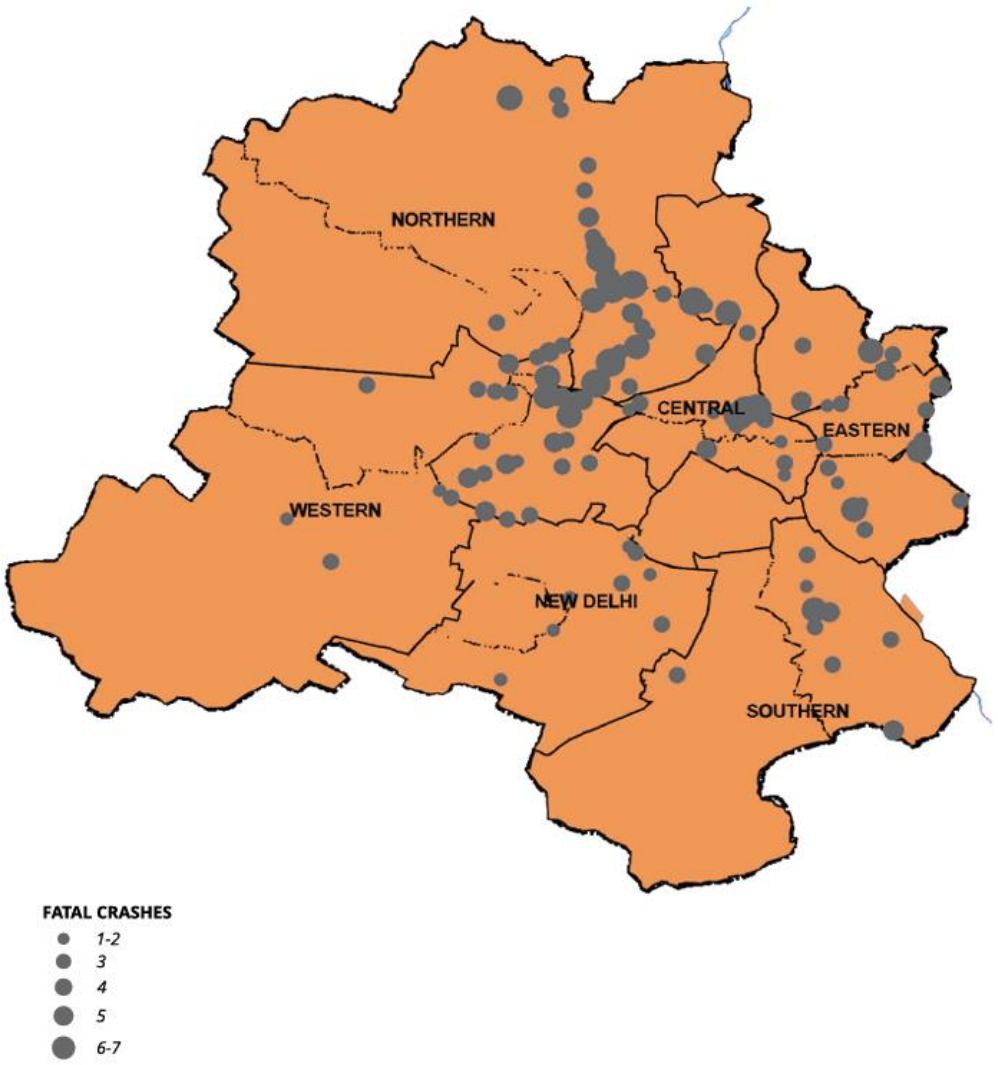
- **Identification of spatial trends in road crashes, revealing high-risk zones such as Najafgarh Road, which recorded the highest number of crashes (79) and fatalities (16) in Dwarka.**

RESULT


76°54'0"
77°1'12"
STUDY AREA
28°39'36"
28°32'24"
Jharoda Kalan
Dichaon Kalan
Najafgarh
Palam
Khera Dabur
Dhansa
Ghumanhera
Kapashera
PLACES
ACCIDENT PRONE ROADS
DELHI
INDIA STATE BOUNDARY



- **The research remains in progress and is yet to reach completion (for objective 2 & 3); consequently, the results have not been finalized or prepared at this stage. Further work is underway to ensure the study's comprehensive and conclusive outcomes.**



TOOLS AND SOFTWARE USED

- **Satellite map using QGIS 3.44.0**
- **India boundary, state boundary shapefiles, places, points using Mpacruzin.**
- **Map developer**

CONCLUSION

Road safety remains of paramount importance in India, demanding innovative research to address rising challenges. Despite its criticality, there is a notable lack of scientific literature exploring novel solutions, leaving significant gaps in understanding and intervention strategies. Furthermore, the publicly available data pertains only to 2023, underscoring the urgent need for updated information to guide evidence-based policies and ensure safer roads for all.

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