

Delhi

ROAD SAFETY



DATA TO ACTION

REPORT BY



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Acknowledgements —

Delhi is one of the 28 cities globally participating in the Bloomberg Philanthropies Initiative for Global Road Safety (BIGRS). The Government of National Capital Territory (NCT) of Delhi partnered with BIGRS in 2020, and with the Indian Institute of Technology (IIT) Delhi in 2021, to support government stakeholders in implementing evidence-based road safety interventions to reduce road crash injuries and deaths. One of the key objectives of BIGRS is to strengthen road safety data, available with city authorities in order to improve data-led intervention planning, monitoring, and evaluation.

This report was made possible with the support of the Transport Department, Delhi Traffic Police (DTP), and BIGRS. Data encoding, analysis and report writing was done collectively by the Transportation Research and Injury Prevention (TRIP) Centre at IIT Delhi, Vital Strategies and the BIGRS embedded staff with inputs from BIGRS partners.

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PREFACE

Transport Department



According to the Ministry of Road Transport and Highways (MoRTH), Delhi was ranked 20th in terms of road injury crashes among all states and union territories (UTs) and ranked first among all UTs. There are strong social, health and economic reasons to reduce the burden of road crash injuries primarily due to the casualties affecting mostly economically active persons and having a ripple effect on their dependents, causing suffering and poverty.

The Road Safety Lead Agency (RSLA) of the Transport Department, working with experts from TRIP Centre, IIT Delhi and BIGRS have made this report possible. It gives us an insight into not just the current situation of road safety in Delhi but also a trend analysis for the past three years. This report gives an in-depth understanding and perspective on the risks associated with vulnerable road user groups such as pedestrians, motorcyclists, cyclists and auto-rickshaw occupants.

The report also highlights the initiatives that the Government of NCT of Delhi has undertaken to mitigate the risks associated with road crashes and gives an insight into the impact of those initiatives through comprehensive data analysis.

I am certain that this report will help all government stakeholders, global experts and researchers to utilise these findings and promote implementation of innovative road safety interventions. It is well known that data driven interventions help make well informed decisions.

With this report, the Transport Department hopes to promote and initiate more data-driven interventions that the NCT of Delhi can use to design safer streets for all road users.

The Transport Department of Government of NCT of Delhi is committed towards leading by example and working with global road safety experts and various government agencies in cohesion to build a city, where no lives are lost on road.

A handwritten signature in dark ink, appearing to read 'Ashish Kundra', written over a horizontal line.

Mr. Ashish Kundra (IAS)
Principal Secretary cum Transport Commissioner
Government of NCT of Delhi

PREFACE

TRIP Centre, IIT Delhi



The Delhi Traffic Police collects road crash data and an annual report is published. The Delhi Transport Commissioner's initiative of promoting comprehensive road safety strategy to ensure road safety is commendable and builds on the data collected by the traffic police. The TRIP Centre, IIT Delhi is pleased to work with the Road Safety Lead Agency of the Transport Department of Government of NCT of Delhi to prepare a comprehensive analysis of the road crash data.

This is an important step towards achieving the global target of reducing road crash death by 50% by the year 2030. Road crash deaths have been reducing in NCT of Delhi since 2012, however, it continues to be high for the capital. On an average, three persons are killed every day in road crashes in Delhi. This report presents analyses of the crash data involving at least one fatality in 2019, 2020 and 2021.

The report provides useful insights for each district of NCT of Delhi and can become a useful input for the DRSCs for promoting specific safety interventions and targeting specific road sections to reduce risk to vulnerable road users. As the quality of crash data improves, we expect better and more effective interventions in the future to achieve the annual targets set by the government.

We hope that this report is useful in promoting evidence based safety measures in the coming years in Delhi. We look forward to continuing this collaboration with the Delhi Transport Department and supporting them to promote evidence based road safety measures.

Dr. Geetam Tiwari
Professor and Head
Transportation Research and Injury Prevention Centre
Indian Institute of Technology Delhi

PREFACE

Vital Strategies



We congratulate the Transport Department of the National Capital Territory of Delhi, led by Mr. Ashish Kundra, for his leadership and continuing efforts to prioritise saving lives on the streets of Delhi. This three-year report is a testament to Delhi's road safety progress and commitment to transforming the city into a safer and more inclusive place.

In this new Decade of Action for Road Safety, data and evidence-based road safety interventions are heightened priorities. Data enables us to effectively implement a Safe Systems Approach to road safety and to achieve our road fatality reduction targets. This report examines the last three years and sets the direction for road safety efforts in the immediate future. This report also aims to guide government stakeholders in understanding what has worked and to replicate those successes.

Integral to this report is continuous and effective collaboration as well as sharing and openness of data. Effective implementation of the national Integrated Road Accident Database (iRAD) system for road traffic crash data, including full engagement of the police and the health sector, will be key to providing clearer and more detailed analyses in the future. We look forward to continuing to work with government partners to improve the collection, management, and use of data, in our shared commitment to save the lives of citizens of Delhi on the roads.



Mirick Paala
Senior Technical Advisor-Asia
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Vital Strategies

LIST OF Abbreviations

AIIMS	All India Institute of Medical Sciences	NHAI	National Highways Authority of India
BIGRS	Bloomberg Philanthropies Initiative for Global Road Safety	NIC	National Informatics Centre
CRRI	Central Road Research Institute	NSP	Netaji Subhash Place
CSIR	Council of Scientific and Industrial Research	PCR	Police Control Room
CSO	Civil Society Organisation	QGIS	Quantum Geographic Information System
DHS	Demographic Health Surveys	RSLA	Road Safety Lead Agency
DND	Delhi Noida Delhi	SKV	Sarvodaya Kanya Vidyalaya
DM	District Magistrate	SOP	Standard Operating Procedure
DRSC	District Road Safety Committee	TRIP	Transportation Research and Injury Prevention
DSL	Delhi Street Lab	UTTIPEC	Unified Traffic and Transportation Infrastructure (Planning & Engineering) Centre
DTC	Delhi Transport Corporation	UT	Union Territory
DTP	Delhi Traffic Police	WDoR	World Day of Remembrance
FIR	First Information Report	WHO	World Health Organisation
FOB	Foot Over Bridge	WRI	World Resources Institute
GBSS	Government Boys Secondary School		
GBSSS	Government Boys Senior Secondary School		
GDCI	Global Designing Cities Initiative		
GGSSS	Government Girls Senior Secondary School		
GIS	Geographic Information System		
GSSS	Government Senior Secondary School		
GT	Grand Trunk		
HV	Heavy Vehicle		
IACP	International Association of Chiefs of Police		
IIT	Indian Institute of Technology		
IPC	Indian Penal Code		
iRAD	Integrated Road Accident Database		
ISBT	Inter State Bus Terminal		
JH-IIRU	Johns Hopkins International Injury Research Unit		
KM	Kilometre		
LMV	Light Motor Vehicle		
MCD	Municipal Corporation of Delhi		
MoRTH	Ministry of Road Transport and Highways		
MPD	Master Plan for Delhi		
MTW	Motorised Two-Wheeler		
NCR	National Capital Region		
NCT	National Capital Territory		
NGO	Non-Governmental Organisation		
NH	National Highway		



Executive Summary

According to the World Health Organization (WHO), India already accounts for 22% of the fatal crashes in the world each year.¹ Road traffic crashes cost India between three to five percent of its GDP.² Apart from being the national capital, Delhi is one of the most populated cities in India. This report highlights that almost three persons are killed in road crashes each day on the streets of the NCT of Delhi.

This Delhi Road Safety Report, “Data to Action,” analyses road crash data over a three-year period for Delhi, and provides key recommendations to reduce road crashes. This report builds on the previous annual reports published by the Delhi Police, as well as the RSLA. The report covers three main areas: 1) road crash data and crash spots, 2) road safety risk factors, and 3) recommendations for road safety interventions.

The Government of NCT of Delhi, in 2017, established a Road Safety Lead Agency at the UT level to steer road safety activities and further decentralise road safety management through the DRSCs. The report highlights this approach and further emphasises the need to use quality data to implement evidence-based strategies by the DRSCs. The report discusses road safety in the context of the National Capital Region (NCR)'s rapid motorisation and the expansion of its high-speed road network. It emphasises how Delhi's highly heterogeneous traffic mix, its increasing population, and the rapidly increasing use of Motorised Two Wheelers (MTWs) shape Delhi's road safety situation.

The report provides data analysis and visualisation on various road safety metrics such as deaths caused by road user types, age, gender, among others. Further, this study also visualises data on road user types causing crashes, in addition to location-based data. Apart from identifying high risk locations, heat maps have also been developed to identify areas with the highest number of fatal crashes and fatalities at the Union Territory and at the district levels.

Road safety risk factors such as speeding, drink-driving, correct helmet and seat-belt use were also assessed. The investigation and analysis of these indicators enable a deeper understanding of the risks on the road network and their direct relationship with fatalities and serious injuries.

Since the formation of the RSLA, the Transport Department has made efforts to undertake road safety initiatives in coordination with diverse road safety experts. This report highlights the ongoing programs and interventions, the active engagement of the Transport Department with various stakeholders, and the outputs and results from these activities.

This report also enumerates various media interventions, along with government-led initiatives such as the bus lane initiative. Also covered in this report are key initiatives by the Government of the NCT of Delhi such as the 30-km network of bicycle lanes. Government initiatives such as strengthening enforcement teams on the ground, data surveillance through the iRAD platform, and road safety capacity building, are also discussed.

Ultimately, the report emphasises the power of data and how data can be transformed to meaningful and effective action in road safety. This report empowers Delhi and cities across India to take up evidence-based interventions and to make roads safer for everyone.

¹ Global status report on road safety 2018. Geneva: World Health Organization; 2018. Licence: CC BYNC-SA 3.0 IGO. <https://www.who.int/publications/item/9789241565684> *Note: 299091/1350000

² Traffic Crash Injuries and Disabilities: The Burden on Indian Society. Washington, D.C.: World Bank Group. 13 February 2021. <http://documents.worldbank.org/curated/en/761181612392067411/Traffic-Crash-Injuries-and-Disabilities-The-Burden-on-Indian-Society>

Introduction

Delhi at a glance

Delhi, officially called the NCT of Delhi, is a city, a UT, and the capital of India. Delhi is situated along the river Yamuna and shares borders with the states of Haryana and Uttar Pradesh. The NCT of Delhi covers an area of 1,484 square kilometres.

With a population of 20,341,192 people, Delhi is the second-most populated city in the country after Mumbai.³ It is further estimated that by 2028, the NCT of Delhi, is projected to become one of the most populous cities on the planet.⁴ The NCT of Delhi is contiguous with its neighbouring cities of Faridabad, Gurgaon, Ghaziabad and Noida, and together with these cities is called NCR which is home to a population of over 58 million people.⁵



Figure 1.1 -. Map of NCT of Delhi with 11 administrative districts

³ Delhi Police (2022). Delhi Road Crash Report 2021 <https://traffic.delhipolice.gov.in/sites/default/files/uploads/2021/Delhi-Crash-Report-Final-2021.pdf> <https://www.un.org/en/desa/around-25-billion-more-people-will-be-living-cities-2050-projects-new-un-report>

⁴ <https://www.un.org/en/desa/around-25-billion-more-people-will-be-living-cities-2050-projects-new-un-report>

⁵ Annual Report & Annual Accounts 2019-20. (2020). National Capital Region Planning Board. <http://ncrpb.nic.in/>

According to the WHO,⁶ road crash fatalities in India account for 22% of the global death toll each year. In 2017, the Global Burden of Disease estimated that pedestrians accounted for 35% of all road deaths in India, motorcyclists accounted for another 30%, and cyclists for 7%.⁷ Most often, it is the young working-age population that is predominantly affected. Road users between the ages of 18 and 45 comprise 69% of all road crash fatalities.⁸ As a result, road crash injuries are a burden to India's economy and have a tangible impact on overall poverty and development.

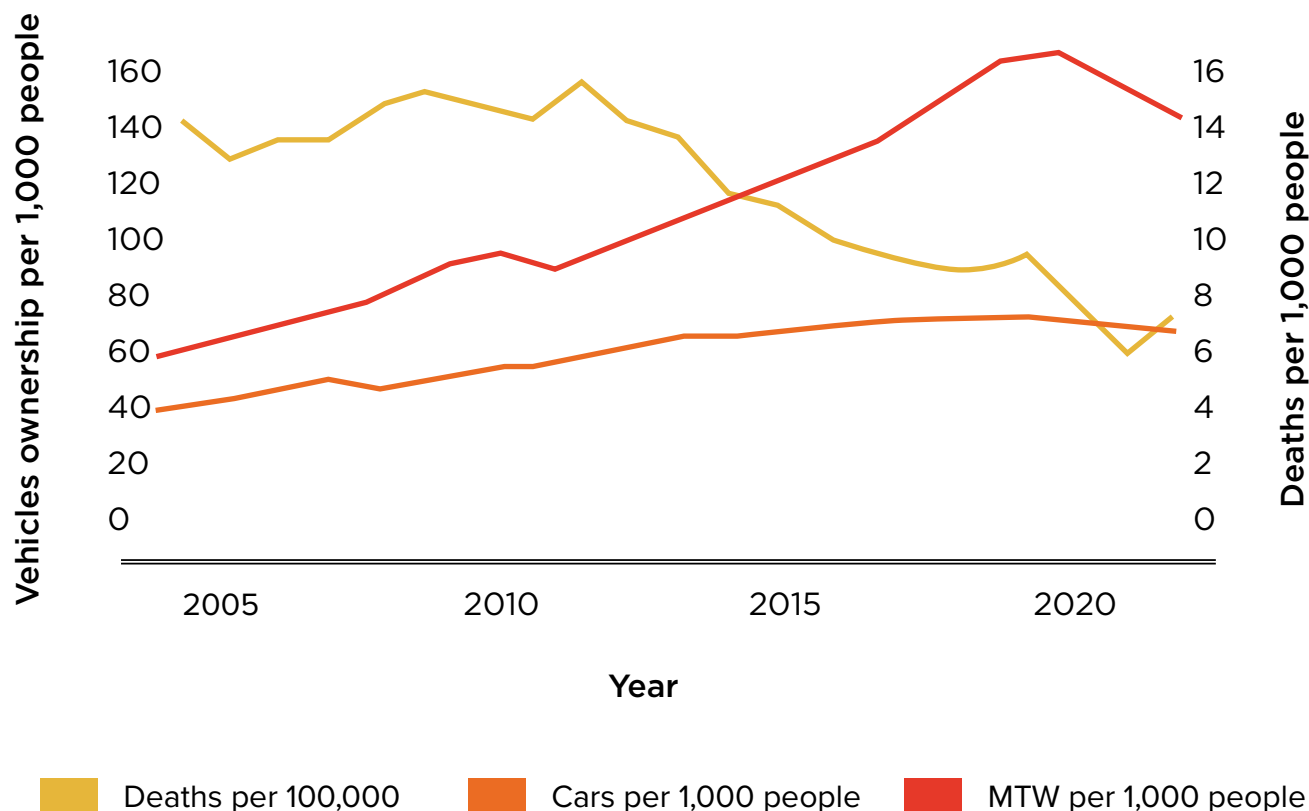


Figure 1.2 - 20 Year Time Trend of Road Crash Death Rate and Vehicle Ownership in Delhi

Specifically in Delhi, in 2021, at least 1,242 people were killed in road crashes. That translates to at least three persons killed in road crashes on Delhi's streets every day. Similar to the situation at the national-level, most of those affected are pedestrians and motorcycles. Adding to this issue is the rapid increase of the use of MTWs. As seen in Figure 1.2, Delhi has seen a rapid increase in MTW ownership and a gradual increase in car ownership. The crash data in this report also reflects the rising contribution of motorcyclists and pillion riders in overall crash deaths in the last three years.

Based on population-representative household surveys in 2019-21, more than half (53%) of all households owned at least one MTW, one in every five (19%) owned a car, and 27% owned at least one bicycle. In 2011, MTWs were only owned by 39% of households, reflecting a drastic increase.

⁶ WHO (World Health Organisation). 2018. Global Status Report on Road Safety 2018. https://www.who.int/violence_injury_prevention/road_safety_status/2018/en/

⁷ Dandona, Rakhi, G. Anil Kumar, Gopalkrishna Gururaj, Spencer James, Joy K. Chakma, J. S. Thakur, Amar Srivastava et al. "Mortality due to road injuries in the states of India: the Global Burden of Disease Study 1990–2017." *The Lancet Public Health* 5, no. 2 (2020): e86-e98.

⁸ The World Bank and MoRTH (2020), Delivering Road Safety in India, Leadership Priorities and Initiatives to 2030

⁹ International Institute for Population Sciences (IIPS) and ICF. 2021. National Family Health Survey (NFHS-5) 2019-21

¹⁰ Goel, Rahul, and Sarath K. Guttikunda. "Evolution of on-road vehicle exhaust emissions in Delhi." *Atmospheric Environment* 105 (2015): 78-90.

In 2021,¹¹ more than two million passengers rode buses in Delhi and another 900,000 rode the metro every day. Several new metro routes are proposed and under construction, and the government is planning to invest more in public transport with an intent to increase passenger traffic and improve mobility. Delhi is well-connected with the neighbouring regions and regional nodes through its road, bus, and metro rail network. Until 2018, large volumes of long-distance freight vehicles would enter into the city as many of the national highways approach Delhi in a radial manner. Much of this volume has now been diverted out of the city as a peripheral expressway has been built that encircles the city, which is used by long-distance trucks to completely bypass the urban core.

The transportation challenges in Delhi have become multifold given the rapid motorisation and the growing high speed road network. Delhi's mobility challenges are similar to other Indian cities due to a highly heterogeneous traffic mix and an increasing population paired with a rapidly increasing use of MTWs.

Delhi Road Safety Lead Agency

To confront issues in road safety, the Supreme Court of India directed all the states and UTs to create full-time separate entities such as the RSLA under the state or UT Transport Department. The Delhi RSLA was established in 2017. The agency is headed by a Special Commissioner - Road Safety and is comprised of staff from the Transport Department, the Delhi Traffic Police, the Public Works Department (PWD), the education department, and emergency medical services stakeholders. The functions of the lead agency are:

1. To work as a secretariat for the state road safety council, arrange meetings of the Council, issue its minutes, and monitor the implementation of the decisions of the Council by the concerned departments;
2. To coordinate with the concerned departments to ensure implementation of the directions issued from time-to-time by the Supreme Court Committee and furnish compliance reports in a time bound manner;
3. To ensure implementation of the directions given by the central government from time to time;
4. To notify annual targets for reduction of road crashes and fatalities as fixed by the State/ UT and draw up an annual action plan to achieve the targets and monitor its implementation;
5. To collate on a regular basis data on road crashes and analyse the data to identify areas /road stretches and categories of road crash victims who should be focused upon; and
6. To manage the road safety fund and ensure that the fund is effectively utilised.

The Delhi RSLA has partnered and worked with various international and national NGOs, and academia to implement best practices on road safety in the NCT of Delhi. In August 2020, the Delhi government signed a participatory agreement to enter as one of the global cities participating in BIGRS. BIGRS is a multi-year government led initiative with the aim of saving lives from preventable road crashes. BIGRS partners provide technical guidance and assistance to the Transport Department.

The Transport Department of the NCT of Delhi also signed a Memorandum of Understanding (MoU) with the TRIP Centre, IIT-Delhi in October 2021. The purpose of this MoU is to undertake collaborative projects, training, knowledge transfer, and data sharing in the area of road safety.

¹¹ <https://www.statista.com/statistics/1240001/india-average-daily-ridership-of-public-transport-in-delhi>

District Road Safety Committees

In June 2022 a State Road Safety Council meeting was held in Delhi, and the RSLA reconstituted the DRSCs and empowered them to lead the implementation of road safety interventions at the district level. As seen in Figure 1.3, the District Magistrate (DMs) will be the chairman of DRSC and the respective engineers from the PWD will be the member-secretary. Officials from police, health, transport and education departments, NHAI, MoRTH, municipal bodies, and local NGOs will make up the membership of the DRSCs.

The DRSCs are mainly responsible for expediting, coordinating, and supporting road safety activities, including:

1. Periodic review of crashes in the district and provide regular inputs to the state road safety council on major crash prone areas, black spots and additionally in areas of engineering, education, enforcement and emergency.
2. Develop a district road safety plan.
3. Implement and monitor the decisions of state road safety policy and targets set under it.
4. Act as the nodal body for placing, requirement, and disbursal of road safety funds.
5. Regular track and update state road safety council on details of road crashes in a district including: vehicle details, cause of crash, spot investigation details, details of offender and victim, type of injury and First Information Reports (FIRs) registered if any.
6. Publish road crash data on monthly basis on public domain (district website and the MoRTH portal).
7. Ensure adequate availability of different ambulance types with optimal positioning of ambulances to improve response time.
8. Prepare an emergency medical plan and forensic crash investigation under section 135A in the Motor Vehicles Act, 1988 for mass fatality crashes.
9. Ensure linkages between hospitals and ambulances through setting up a prior notification system.

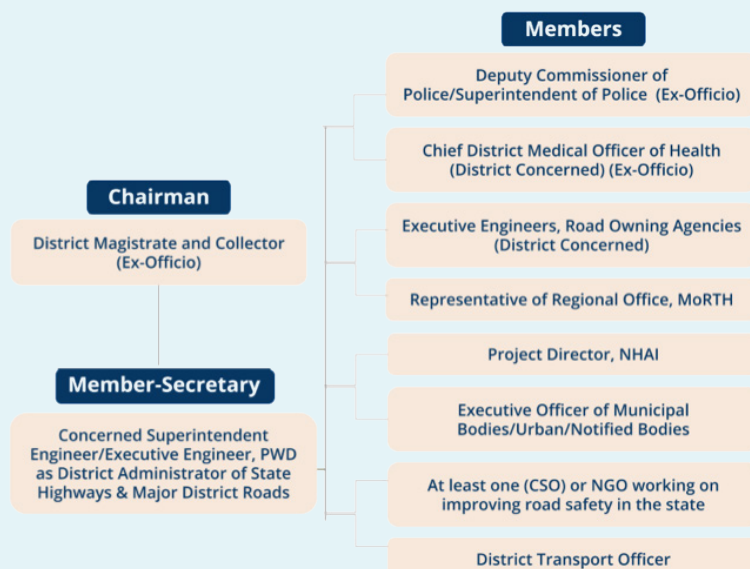


Figure 1.3 - Structure of the DRSC

Purpose of this report

Reliable and accurate road crash data enable governments to effectively address the challenges to road safety. Comprehensive analysis of data allows the government to identify vulnerable road users, hazardous locations, time period of highest risk, and various reasons for traffic crashes. The data highlight the magnitude of the road safety problem especially vis-a-vis other societal issues. It exposes the social and economic cost and benefit of road safety interventions. Data enables the government to identify problems, design evidence-based measures, and ultimately, to implement a Safe Systems Approach to road safety.

The 2020 and 2021 Delhi Road Crash Fatalities Reports are a step towards enhancing road safety surveillance data to respond to road crashes with urgency. These reports highlighted the road crash situation in Delhi in 2020 and 2021. In Delhi, the Transport Department, the Delhi Police and the Health Department work together on the surveillance system to utilise the available crash data. The three departments play a vital role in understanding why the crashes occur, how to respond to them, and how to prevent them in order to save lives.

This 'Data to Action' report builds on the previous annual reports and mainly focuses on transforming the data into actual measures. There are three main sections: the first part is a discussion of road crash data and crash spots, the second a presentation of road safety risk factors, and the third, recommendations on road safety interventions. It is for government stakeholders, private organisations, and the public who will all need to work together in road safety.

Furthermore, for the first time, RSLA will be identifying crash spots using MoRTH's recommended blackspot definition which is "a stretch of national highway of about 500 metres in length in which either five road crashes (in all three years put together involving fatalities/grievous injuries) took place during the last three calendar 5 years or 10 fatalities (in all three years put together) took place during the last three calendar years." This report uses the three-year fatal crash data from 2019, 2020 and 2021 to identify crash spots based on the MoRTH's definition for road crash "blackpots." Apart from the crash spots, the report also presents district-wise heat maps identifying high risk junctions or intersections, schools, and metro stations. These identified crash spots and high-risk areas will assist the Government of NCT of Delhi and the DRSCs to act upon improving road safety at these areas.

Finally, this report will guide DRSCs to focus on targeted strategies, activities and interventions at a district level. Road crash data as well as safety performance indicators such as speeding, seatbelt, and helmet use presented in this report will also enable DRSCs to better understand the road safety situation and focus on specific strategies for saving lives.

Methodology

In this road safety report, fatal crash data from the last three years (2019, 2020 and 2021) was analysed. The combined crash data of these three years is presented in frequency distribution tables or charts in the forms of numbers or percentages. Geographic Information System (GIS) mapping of fatal crashes was done to identify hazardous crash spots and create crash heat maps. Crash spots were identified using MoRTH's definition of road crash blackspots.

The section on "Monitoring compliance with road safety risk factors in Delhi" presents road-side observations on speeding, correct helmet, and seat-belt use. A standardised data collection method was used to collect data on the mentioned road safety risk factors at 15 city representative locations.

The last section on road safety interventions presents all road safety activities undertaken by the Government of NCT of Delhi.

Data Sources

Case-level crash data provided to the Transport Department, Delhi by DTP for years 2019, 2020 and 2021 was used to complete this report. This dataset had only a limited set of attributes. The dataset included the FIR number, name of the police station where it was filed, and Indian Penal Code (IPC) sections of the case. The analysis was restricted for those cases that included at least one fatality, indicated by IPC section 304A (Causing death by negligence). Using the FIR numbers, the data entry operators of BIGRS, individually queried, each FIR using the Delhi Police's public database (<https://www.delhipolice.nic.in/view-fir.html>). The data was extracted from these FIRs and coded into a road crash recording form that was developed by the TRIP Centre at IIT Delhi.

Data Systems and Analysis

The crash recording system includes data entry for three different categories— crash incident details, vehicle details, and person details. The 'crash form' includes all the details at the crash level, for example, date, time, location, and type of crash. The 'vehicle form' includes details of all the vehicles involved in the crash, irrespective of whether the vehicle occupant sustained an injury or not. A pedestrian is the only road user that is not considered as a vehicle. The 'person form' includes details of all the individuals involved in the crash. This includes all the occupants of different vehicles as well as pedestrians. The details of individuals are recorded, irrespective of whether they sustained any injury or not. The dataset thus obtained is relational in nature, with a hierarchical data structure. All the vehicles and persons are linked to a crash, and all the victims are linked to their corresponding vehicles, except in case of pedestrians that are linked directly to the crash.

In addition to the crash attributes that are directly coded from FIR, other data are derived from other sources. The description of crash location (street name, landmark, and direction of movement of victim) was used to approximate geocoordinates using Google Maps and Google Earth. In the vehicle form, as described above, licence plate numbers of all the vehicles involved in the crash were coded, whenever available. Those numbers were used in the online portal of MoRTH (vahan.parivahan.gov.in) to retrieve vehicle type and specifications data (e.g. model year, registration year or fuel type). To estimate death rate by different age and sex groups, the age-and-sex specific projected population of districts and states in India were taken from the U.S. Census Bureau available at the Spatial Data Repository of the Demographic Health Surveys (DHS) Program.¹²

Geospatial analysis was done through Quantum Geographic Information System (QGIS). At the same time, statistical analysis was done with R Version 4.2.1. Reported crash cases that occurred in the previous calendar year but were registered in the adjoining year (i.e. a fatal crash occurring in 2020 was registered and reported in 2021) were excluded from this analysis.

¹² <https://spatialdata.dhsprogram.com/population-estimates/>

Limitations

The data was retrieved from FIRs which contain information captured in the nascent stages of investigation. In addition, FIRs are legal documents and are designed for prosecution purposes. Some crash variables may not be available in FIRs which are later captured by DTP for their crash analysis. In addition, since the data is only coming from the police, there is a level of underreporting especially of injuries. There is a lack of comprehensive data on road safety risk factors in FIRs.

Results

Road crash injuries endanger the lives of people of Delhi. For the past three years, crash fatalities have been fluctuating primarily because of extended periods of mobility restrictions. The pandemic also influenced modal shifts which significantly increased the exposure of road users particularly of riders of MTWs. This section presents key road safety statistics over the last three years and highlights important findings related to crash epidemiology. This includes identifying the at-risk population, determining when and where crashes occur the most, and enumerating high-risk locations. It also presents a comparative analysis of crash statistics before COVID-19 pandemic and the impact of the pandemic on road safety.

Deaths by Road User Type - 2019, 2020 and 2021

The pandemic and the government's response to limit the spread of COVID-19 heavily impacted people's mobility, behaviour, and travel patterns. Traffic volumes significantly decreased and at the same time, travel mode share has shifted in favour of MTWs.

In Delhi, there was a drop in crash fatalities from 1,429 fatalities in 2019 to 1,151 in 2020. While this seems to be a success in saving lives, this reduction in fatalities should be viewed alongside other data. For example, it would be important to determine whether fatalities per distance walked or travelled have increased or decreased, or whether mobility restrictions associated with the COVID-19 pandemic were the main factor. In addition, assessing the number of fatalities together with safety performance indicators such as speeding will help reveal whether the roads have actually been made safer or not.

The following year, 2021, crash fatalities increased again by 8% most possibly due to the easing of mobility restrictions. This implies that the reduction of fatalities in 2020 was caused more by the reduction of exposure (limited presence of road users) as a result of severe mobility restrictions.

In addition, from 2019 to 2021, the share of pedestrian fatalities have continued to decrease in contrast with motorcycle fatalities, which have been increasing. During the lockdowns, there has been a proliferation of MTWs, specifically motorcycles which are used in logistics, delivery, aside from day-to-day travel. In each of these past three years, more than 90% of the deaths have occurred among vulnerable road users (pedestrians, motorcyclists, cyclists and auto rickshaw occupants).

Table 2.1 presents fatal crashes, deaths, and type of road users killed in fatal road crashes from 2019 to 2021.

Year	Total fatal crashes	Total deaths	Pedestrians	Motor-cyclists	Cyclists	Auto-rikshaws occupants	Light motor vehicle occupants	Heavy Vehicle occupants	Other
2019	1,424	1,429	47%	39%	2%	4%	5%	2%	1%
2020	1,144	1,151	44%	41%	4%	3%	5%	2%	1%
2021	1,199	1,242	43%	42%	2%	4%	5%	3%	1%

(*Light motor vehicle occupants include car/jeep/van/taxi occupants; Heavy vehicle occupants includes heavy vehicles, goods carrier/ bus/ tempo/ tractor; Other- Cycle Rickshaw, Hand drawn vehicle, animal drawn vehicle and ambulance)

Table 2.1 - Crash deaths by road user type in 2019, 2020 and 2021

Deaths by Age and Gender From 2019 to 2021

Mobility behaviour and travel patterns can be shaped by one's age and gender. Figure 2.1 reflects how different segments of the population have different travel behaviour and activities and therefore experience road risks differently.

In Delhi, male children ages 0 to 14 have almost the same rate of fatalities as females of the same age. This shows how children, whether male or female, have similar travel patterns such as going to school and therefore face particular and unique risks on the road network.

Males across all groups have a higher rate of fatalities than females and the rate is much higher for ages 30 to 59. This may be attributed to the mode of transport such as motorcycles, gender-based risk taking behaviour, and the types of journeys men take throughout the day. Females on the other hand have higher rates for ages 45 to 74 reflecting increased vulnerability at older ages. It is important to investigate further what activities make certain demographics more susceptible to road crashes.

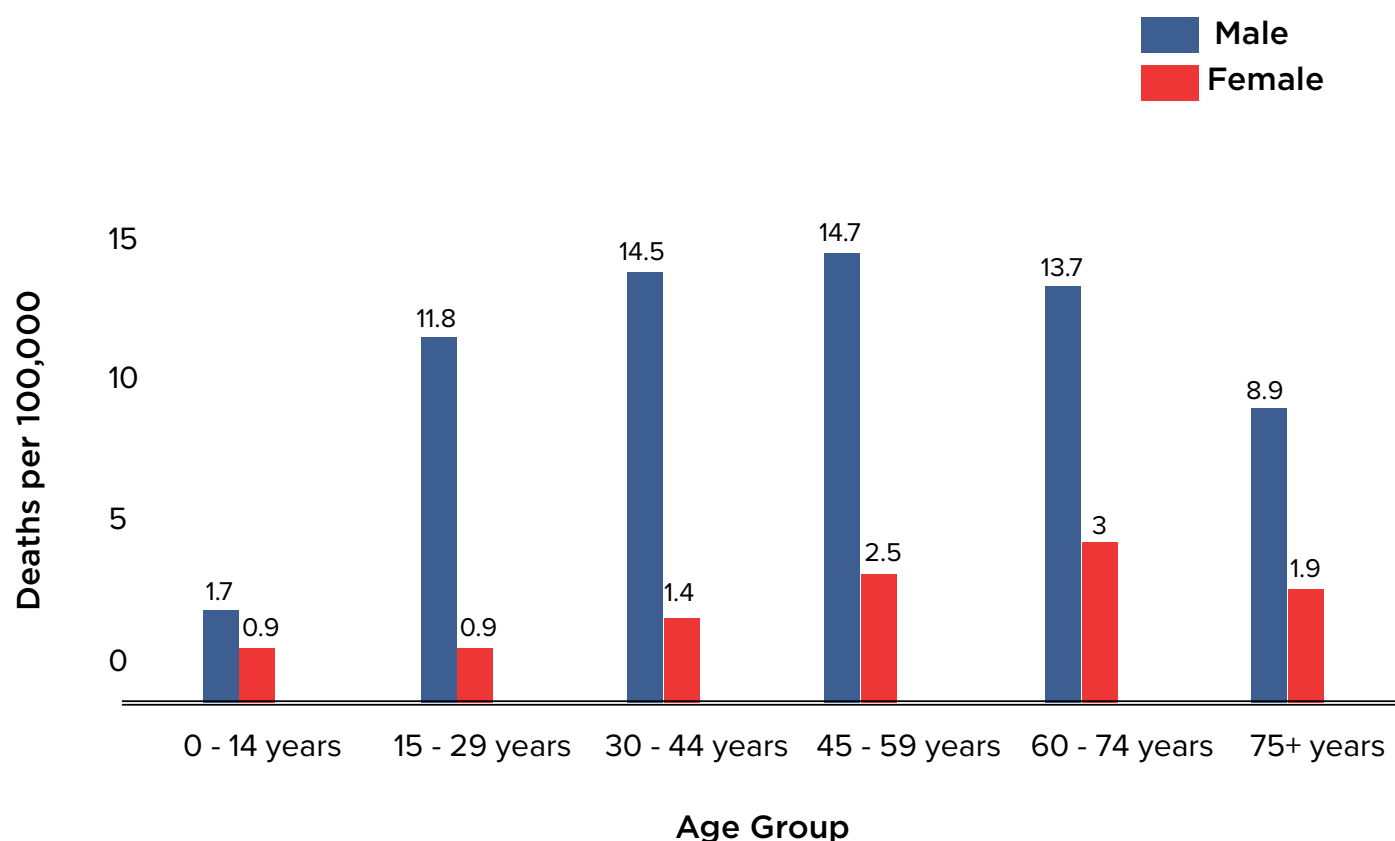


Figure 2.1- All crash deaths by age and gender from 2019 to 2021

Before the pandemic in 2019, death rate was highest for the age group of 60 to 74 for both males and females. For males, specifically, fatalities are high for ages 15 to 74 relative to other age groups whereas for women, ages 45 to 75 and above have a higher rate of fatalities. This implies the difference in journeys that these groups have, hence, the difference in road risks they face. A further investigation of trips is needed to conclude why this is the case.

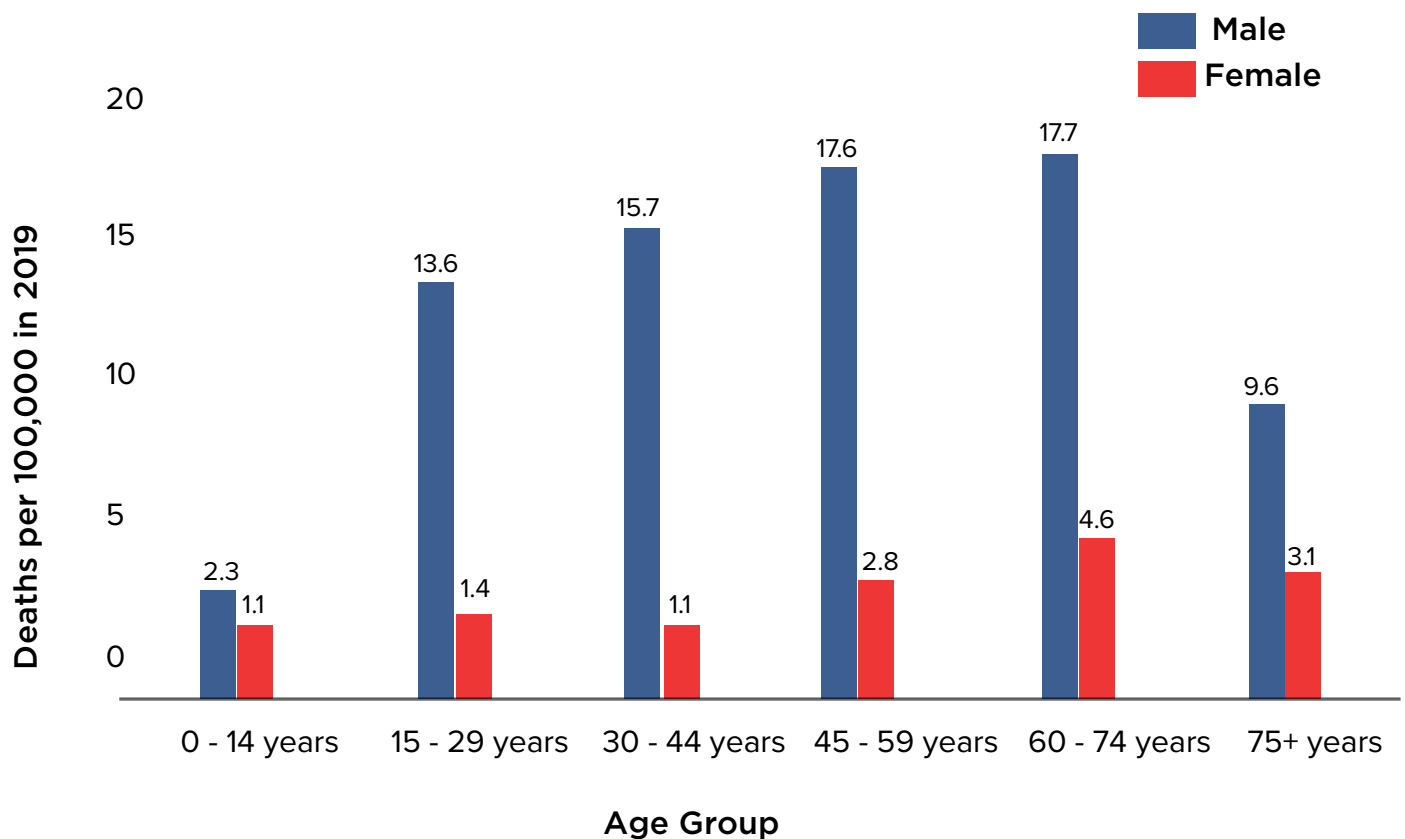


Figure 2.2 - All crash deaths by age and gender in 2019

In 2020, mobility restrictions resulted in an overall reduction of fatality rates, especially of children and the elderly but exposed women, 30 to 44 years to more road risks. For children and the elderly, the decrease can mostly be attributed to decrease in travel including the shift to online classes and mobility restrictions. For women ages 30 to 44, the increase in death rate can be because of a particular travel pattern that has been made more pronounced during the pandemic and has exposed this age and gender group to more risks on the road.

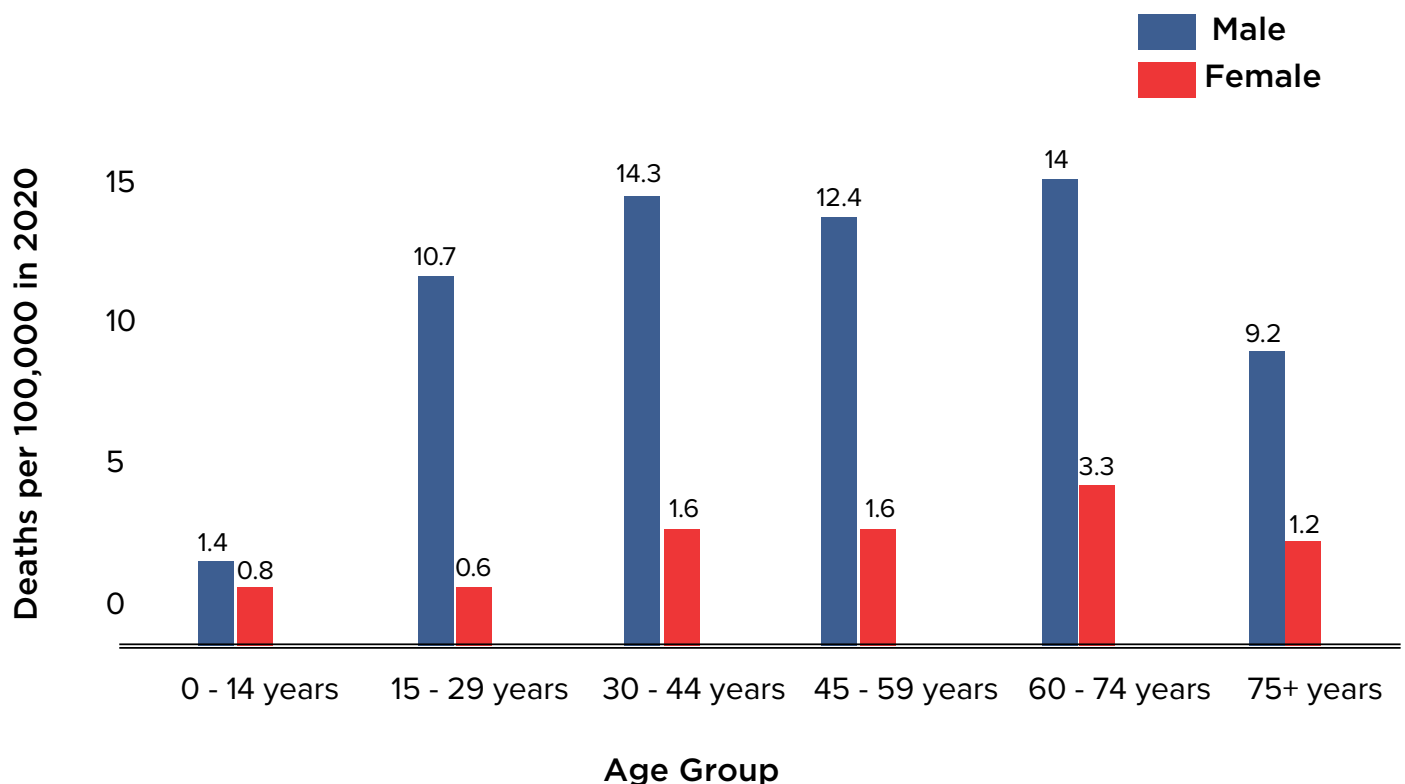


Figure 2.3 - All crash deaths by age and gender in 2020

For 2021, for both genders, ages 15 to 29 and 45 to 59 fatality rates increased as well as females aged 75 years old and above.

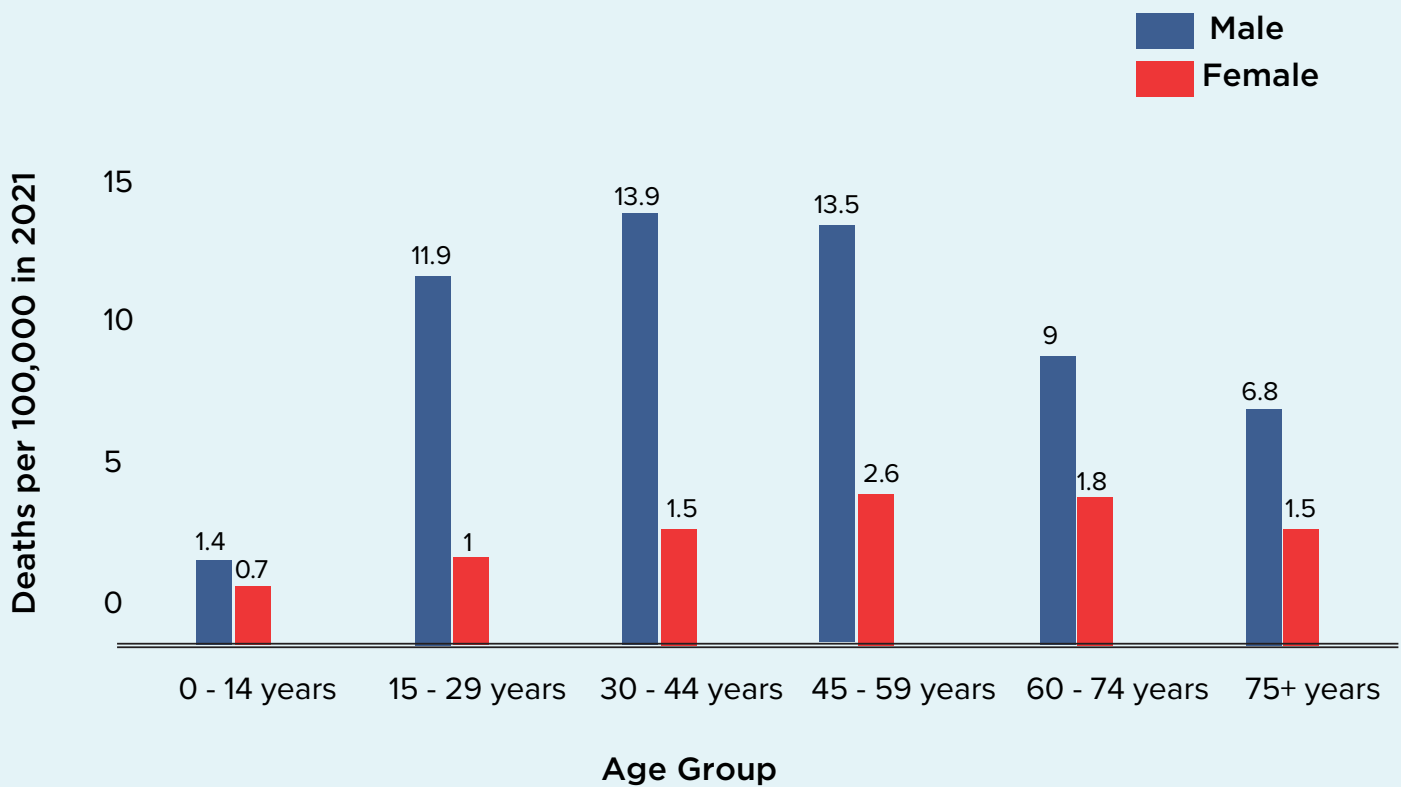


Figure 2.4 - All crash deaths by age and gender in 2021

Further disaggregating the data, pedestrian deaths were highest among males and females aged 60 to 74 years old followed by males and females aged above 75 years (see Figure 2.5). This shows that the pedestrian death rate is highest among the elderly population. At the same time, this implies that in its current state, pedestrian infrastructure is hostile. Ensuring adequate, accessible, and safe pedestrian infrastructure for the elderly will result in a significant reduction of pedestrian crashes in Delhi.

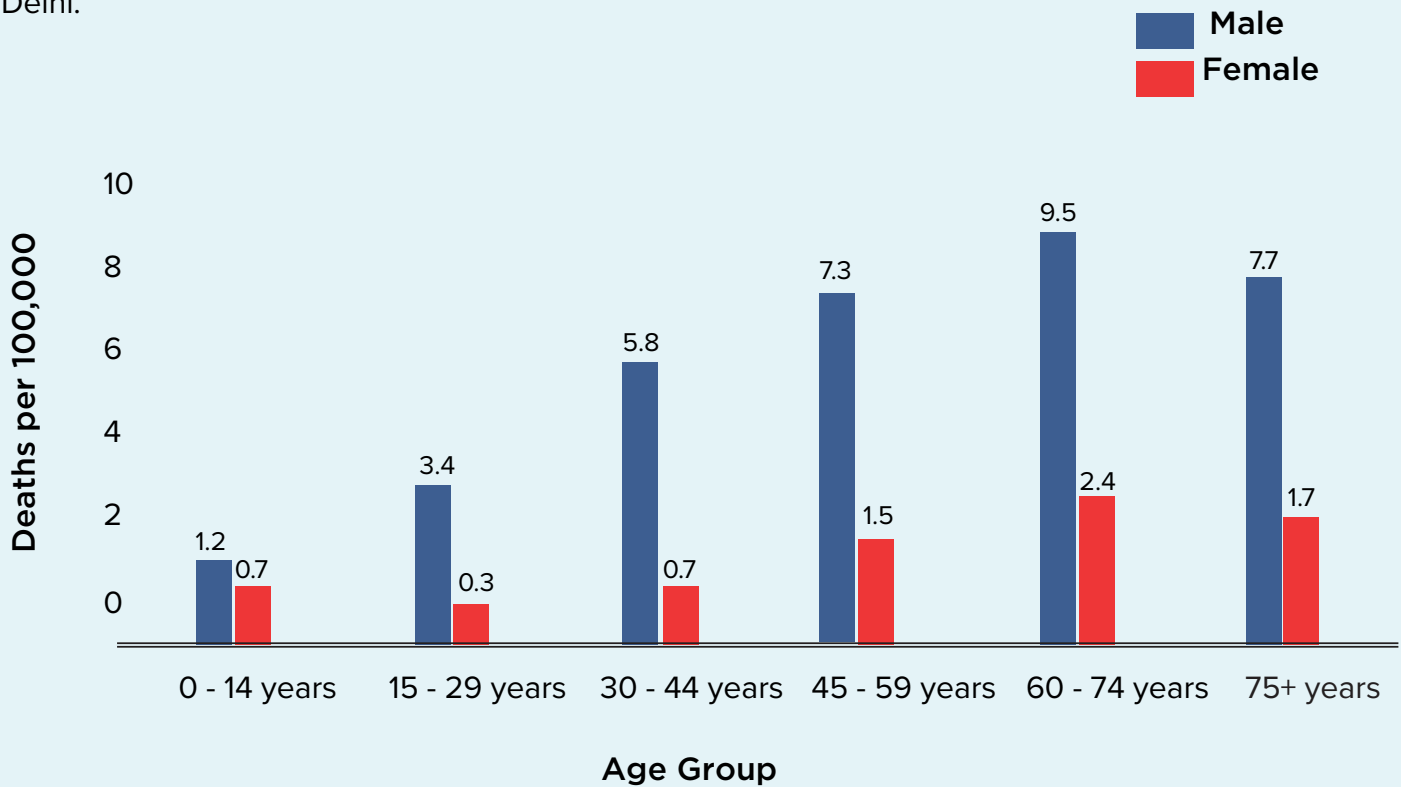


Figure 2.5 - Pedestrian deaths by age and gender from 2019 to 2021

In contrast with pedestrian fatalities, motorcyclist fatalities are highest among males aged between 15 to 29 years and 30 to 44 years old (see Figure 2.6). This demographic includes workers and also those associated with risk-taking behaviour. Among females, there was no pronounced age pattern for road crash deaths.

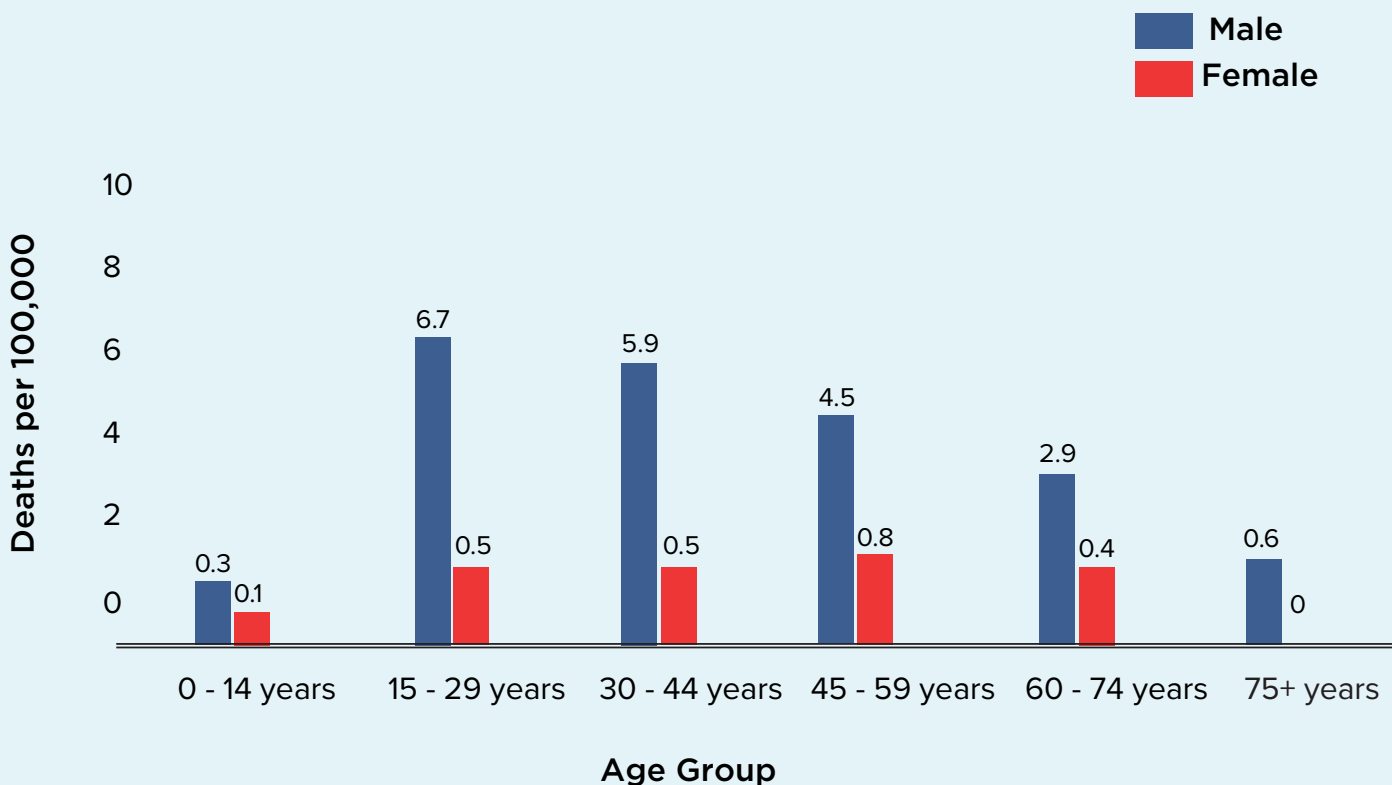


Figure 2.6 - Motorcyclist deaths by age and gender from

Deaths by Month, Time, and Day from 2019 to 2021

This section shows data on fatal crashes by month, time, and day of the week. Figure 2.7 shows the number of monthly road crash fatalities in 2019, 2020, and 2021. The graph shows how crash fatalities have drastically dropped during the first few months of the pandemic in April and May 2020 compared to the same months of the previous year. A similar pattern can be seen in the following year, in April and May 2021 when the COVID-19 Delta wave was spreading.

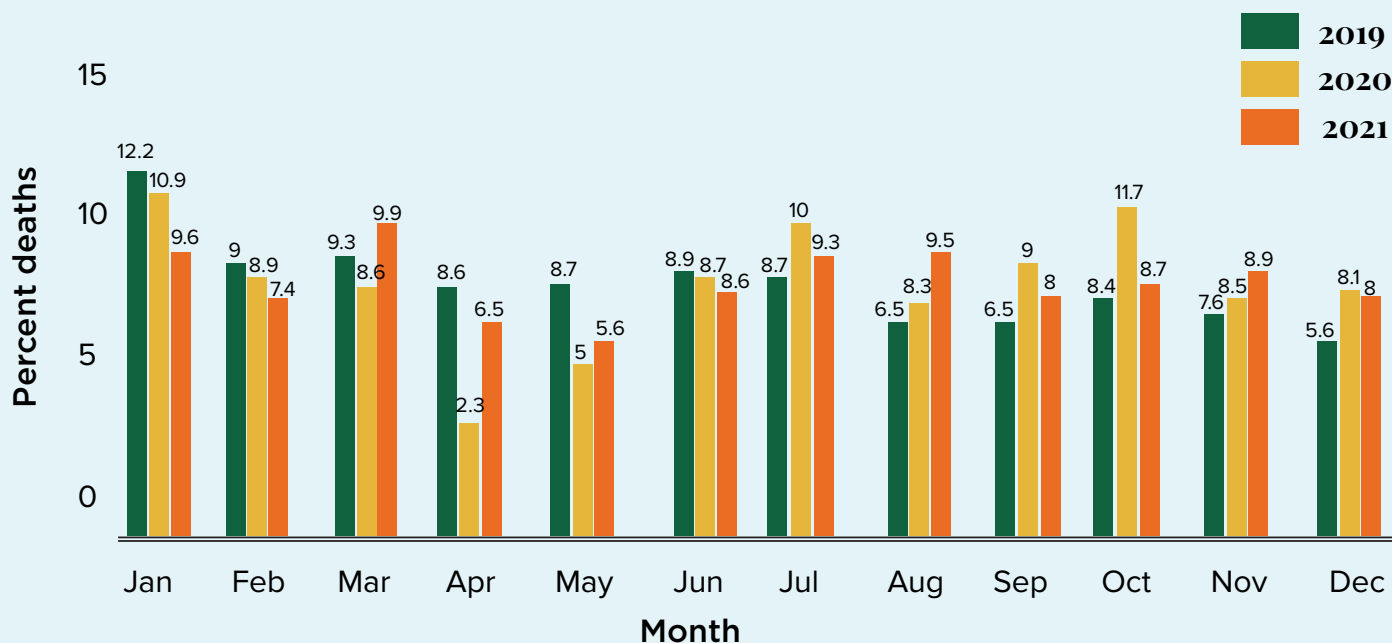


Figure 2.7 - Percent Deaths by Month in 2019, 2020 and 2021

Figure 2.8 shows month wise data on total, motorcyclist and pedestrian deaths in 2019, 2020 and 2021 combined. There is no significant deviation of pedestrian and motorcyclist deaths as compared to total deaths for all months except July, which shows a dip in motorcyclist deaths.

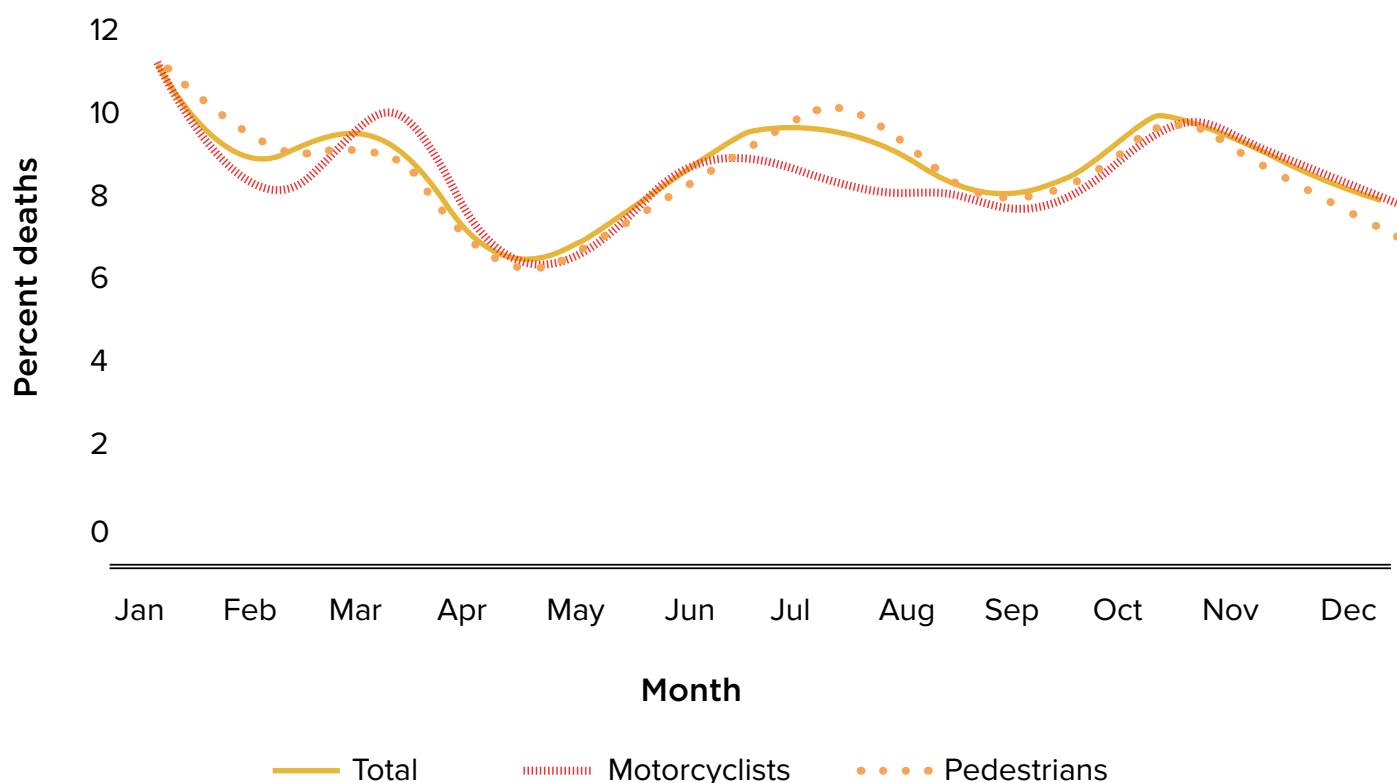


Figure 2.8 - Percent Deaths by Month and Road User Type

In terms of time-of-day and day-of-week, Table 2.2 shows that the maximum number of crash deaths occurred between 10:00 pm to midnight on Fridays. More crash fatalities occurred between 8:00 pm to 2:00 am throughout the week. Speeding and drink-driving may be two risk factors contributing to fatal crashes at these odd hours. In addition, the lack of safe and adequate infrastructure for pedestrians make them disproportionately vulnerable at night as they are also one of the road user groups with the highest fatalities.

Time	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total
0200-0400	22	35	25	37	23	21	30	193
0400-0600	26	33	32	33	28	33	33	218
0600-0800	34	51	30	30	38	45	38	266
0800-1000	28	32	43	34	33	34	29	233
1000-1200	29	38	27	31	36	39	26	226
1200-1400	20	24	22	35	37	33	37	208
1400-1600	23	40	22	33	42	40	37	237
1600-1800	41	42	31	26	39	33	30	242
1800-2000	30	47	55	49	30	37	37	285
2000-2200	65	72	59	62	72	62	71	463
2200-2400	92	70	90	81	111	72	76	592
2400-0200	64	80	62	66	57	81	77	487
Total	474	564	498	517	546	530	521	3,650

Table 2.2 - Deaths by time and day of the week

Overall deaths were highest at midnight and lowest around 1:00 pm (see Figure 2.9). Motorcyclist deaths were highest between 9:00 pm to 11:00 pm and lowest at 1:00 pm. Pedestrian deaths were highest at midnight and lowest between 2:00 am to 4:00 am. The highest number of deaths of motorcyclists and pedestrians at night might be due to speeding.

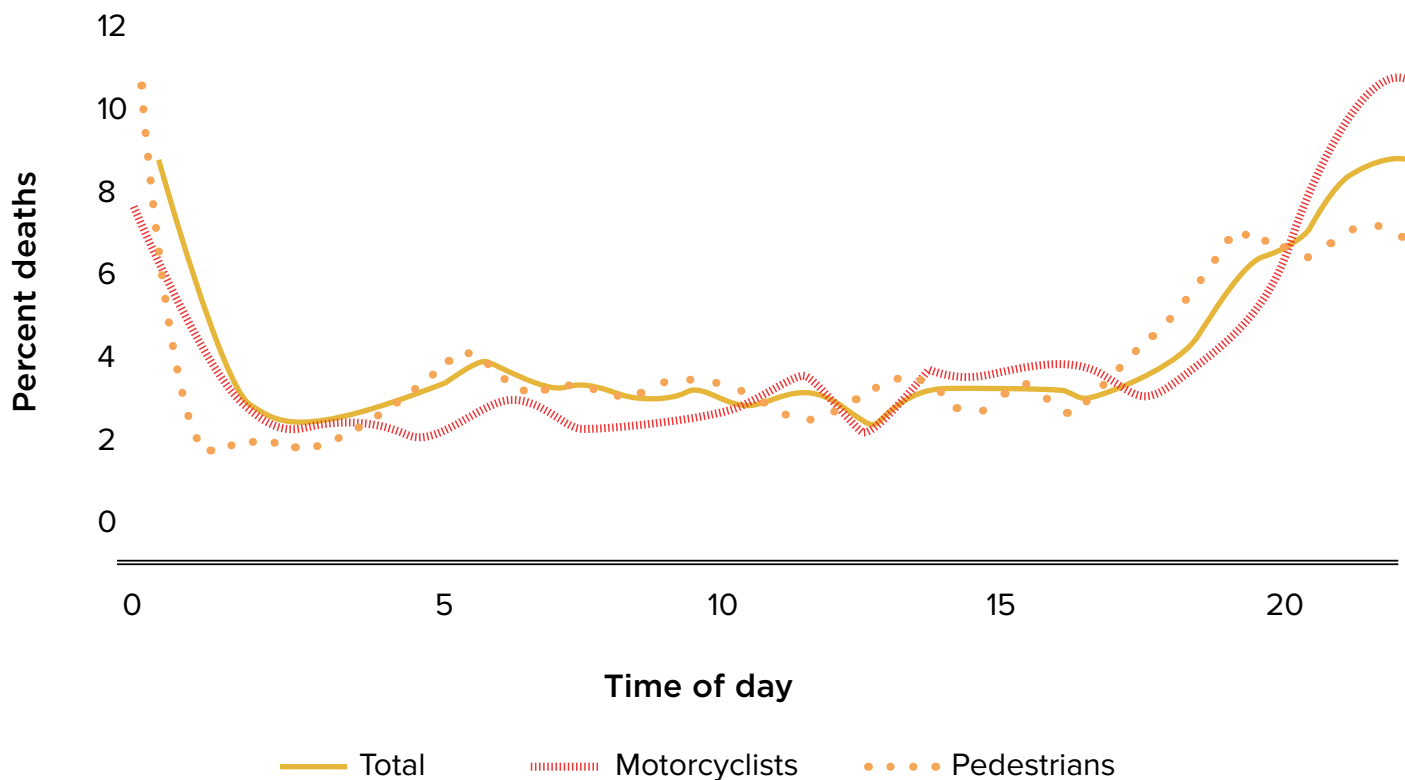


Figure 2.9 - Percent Deaths by Time of Day and Road User Type

The NCT of Delhi also reports around 50% fatal crashes as hit-and-run as discussed in the 2020 and 2021 road crash fatalities reports of the RSLA and the Transport Department. In 2019, 47% of fatal crashes were hit and run crashes which increased to 59% in 2021.¹³ The high rate of hit-and-run cases is indicative of non-reporting of accused vehicles as well as non-reporting of crashes by the public.

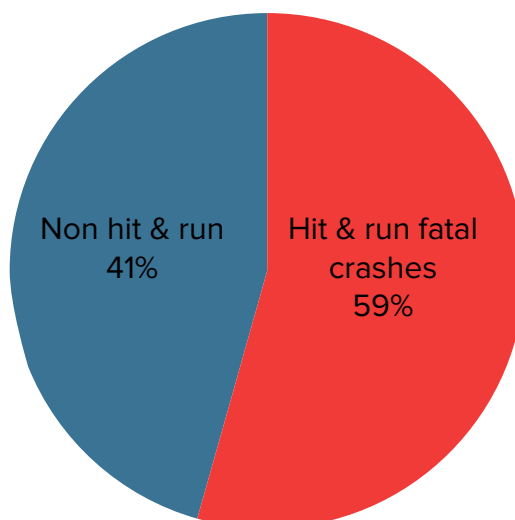


Figure 2.10 - Percentage of Hit-and-Run Fatal Crashes in 2021

¹³ Government of NCT of Delhi. Transport Department. Road Safety Lead Agency 2022. Delhi Road Crash Fatalities Report 2021. <https://transport.delhi.gov.in/sites/default/files/All-PDF/2021%20Delhi%20Road%20Crash%20Fatality%20Report%2001%2008%202022.pdf>

Who-Hit-Whom Matrix

The who-hit-whom matrix presents data on the type of victims killed by an impacting vehicle. The impact of heavy vehicles-goods carrier has resulted in highest deaths followed by the impact of light motor vehicles. The impact of heavy vehicles-goods carrier resulted in the death of the highest number of motorcyclists while the impact of light motor vehicles led to the highest number of pedestrian deaths. In more than 47% of the deaths the impacting vehicle was unknown which explains the magnitude of fatal hit-and-run crashes in the NCT of Delhi.

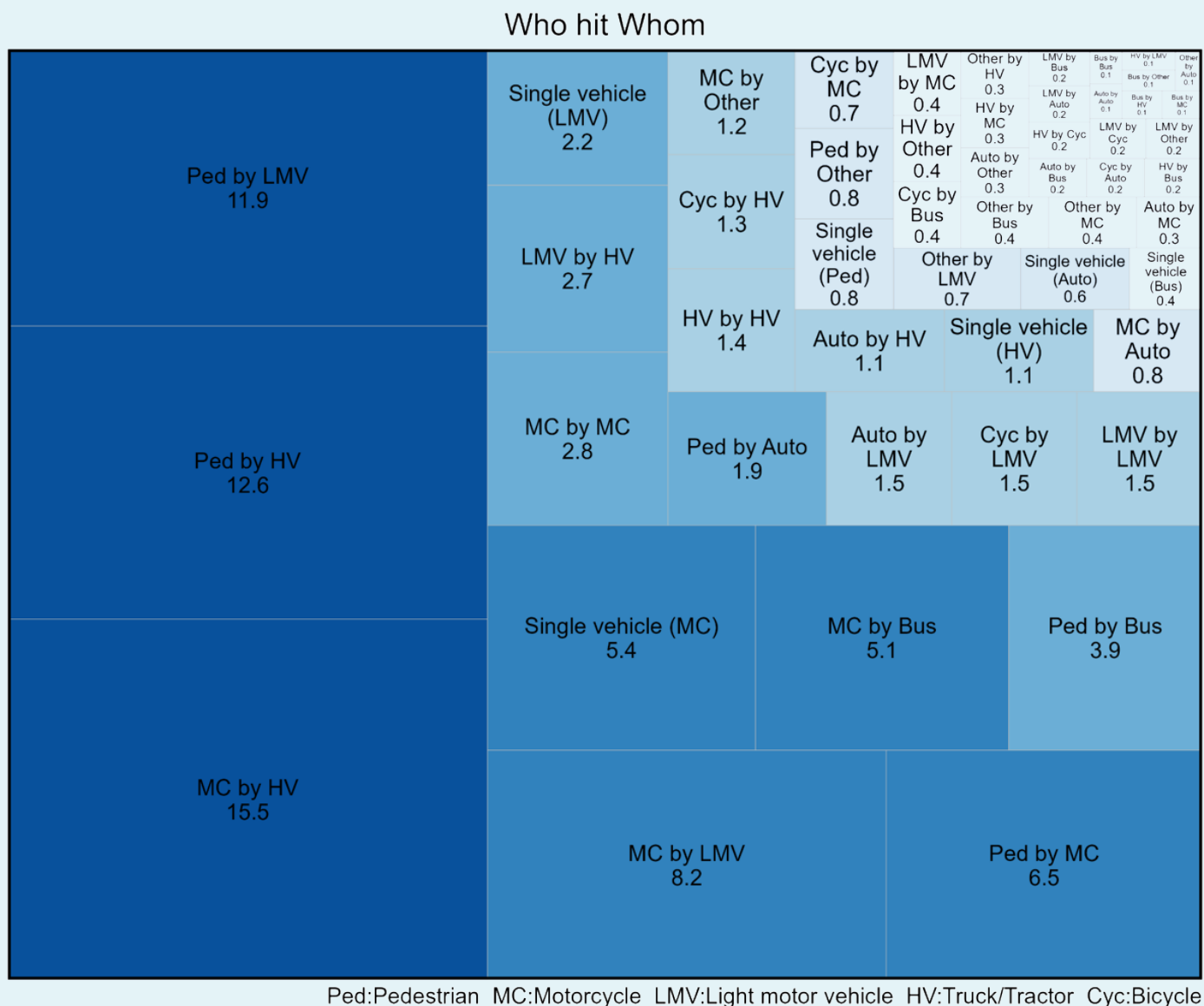
The who-hit-whom matrix first and foremost implies that there is a lot of traffic mixing in Delhi especially between vulnerable road users such as pedestrians and high-speed motorised vehicles such as heavy and light motor vehicles. Second, given that there are many crashes between these two sets of road users, the current infrastructure is inadequate and unable to protect them from getting killed on the road. Thirdly, the table shows that when a motorised vehicle crashes onto a vulnerable road user, the risk of fatality and serious injury is much higher. Finally, the magnitude of hit-and-run cases warrant safer and better infrastructure for vulnerable road users such as pedestrians but also needed improvements to crash investigation.

Victim vehicle type	Impacting Vehicles								
	Heavy Vehicles-Goods Carrier	Light Motor Vehicle	Motorcycles	Bus	Bicycle	Auto-Rickshaw	Single Vehicle Crashes	Other	Unknown
Pedestrian	234	218	120	81	1	34	2	12	982
Motorcyclists/Pillion riders	327	169	50	106	3	20	127	30	698
Auto Rickshaw occupants	29	36	3	6	2	2	15	7	34
Cyclists	26	28	11	11	0	6	0	0	25
Bus occupants	1	0	1	2	0	0	5	2	1
Car occupants	48	33	10	5	7	3	42	9	32
Other	7	11	6	5	0	2	1	0	9
Truck/Tractor occupant	27	3	8	3	4	1	21	11	8
Unknown	2	1	12	0	8	0	0	4	12

(* Light motor vehicle occupants includes car/jeep/van/taxi occupants; Other- Cycle Rickshaw, Hand drawn vehicle, animal drawn vehicle and ambulance)

Table 2.3 - Who-Hit-Whom Matrix (Combined data of 2019, 2020 and 2021)

15.5% of the motorcyclists and 12.6% of the pedestrians were killed when impacted by heavy vehicle-goods carriers. Furthermore, 11.9% of the pedestrians and 8.2% of the motorcyclists were killed when impacted by light motorcycles.



(* Light motor vehicle occupants include car/jeep/van/taxi occupants; Other- Cycle Rickshaw, Hand drawn vehicle, animal drawn vehicle and ambulance)

Figure 2.11 - Percent distribution of victims killed by impacting vehicles (combined data of 2019, 2020 and 2021)

Distribution of Road Crashes and Deaths by Location

Finding high risk locations is vital in planning road safety interventions and to make streets safer for all road users. This section uses three years of data on road crashes and deaths to understand the distribution of fatal crashes and deaths across the geography of the NCT of Delhi to identify high risk road type, high risk corridors, and crash spots through GIS mapping.

National highways and expressways only being 438 km in the NCT of Delhi has resulted in maximum number of deaths per km. Speeding may be the reason for the maximum number of deaths per km on national highways and expressways. Collector and local roads recorded the least number of deaths per km.

Hierarchy of road network	Crashes Mapped				Deaths per KM		
	Road Length (in Km)	2019	2020	2021	2019	2020	2021
National Highway and Expressway	438	328	229	240	0.75	0.52	0.55
Arterial	1,494	425	326	294	0.28	0.22	0.20
Collector	1,417	85	79	77	0.06	0.06	0.05
Local	15,502	521	507	529	0.03	0.03	0.03
Grand Total	18,850	1,359	1,141	1,140			

Table 2.4 - Distribution of road crashes and deaths as per type of road

In all three years combined, GT Karnal Road, Wazirabad Road, and Outer Ring Road recorded seven deaths per km. The identification of high risk corridors/stretches enables the design and development of interventions such as programs in speed management, enforcement on the proper use of safety equipment, and enforcement against drink-driving.

Corridor/Road Name	Road length (in km)	Persons killed from 2019 to 2021	Deaths per km
GT KARNAL ROAD Azadpur Chowk to Singhu Border	20	145	7
WAZIRABAD ROAD - MCD Toll Booth Bhopura border to Ramghat- Wazirabad	11.1	80	7
OUTER RING ROAD	47	314	7
ROHTAK ROAD Punjabi Bagh Metro station to Tikri Border	20	123	6
GRAND TRUNK ROAD Dilshad Garden Metro Station to ISBT Kashmere Gate	10	61	6
NH-24 Ghazipur Border to Indraprastha Park	8.6	52	6
NH-8 Delhi-Haryana SouthWest border to Pratap Chowk, Delhi Cantonment	13	70	5
RING ROAD BYPASS Gate no 6, IG Stadium towards Marghat Hanuman Mandir	5.2	28	5
NAJAFGARH ROAD Rajouri Garden metro station to Najafgarh Metro Station	16.5	81	5
MEHRAULI BADARPUR ROAD Intersection of Crescent road to Faridabad border	11	53	5

Table 2.5 - Top Ten High Risk Corridors for all road users, 2019 to 2021

Baba Kharak Singh Marg recorded five pedestrian deaths per km while Outer Ring Road recorded 121 pedestrian deaths with 3 deaths per km.

Road Name	Road length (in km)	Persons killed from 2019 to 2021	Deaths per km
BABA KHARAK SINGH MARG Dr RML Hospital to Connaught Place	1.9	10	5
GT KARNAL ROAD Azadpur Chowk to Singhu Border	20	84	4
NETAJI SUBHASH MARG Delhi Gate Junction to Chatta Rail Junction	3	11	4
GRAND TRUNK ROAD Dilshad Garden Metro Station to ISBT Kashmere Gate	10	30	3
WAZIRABAD ROAD - MCD Toll Booth Bhopura border to Ramghat- Wazirabad	11.1	33	3
OUTER RING ROAD	47	121	3
ROHTAK ROAD Punjabi Bagh Metro station to Tikri Border	20	51	3
RING ROAD BYPASS Gate no 6, IG Stadium towards Marghat Hanuman Mandir	5.2	13	3
NAJAFGARH ROAD Rajouri Garden metro station to Najafgarh Metro Station	16.5	37	2
NH-8 Delhi-Haryana SouthWest border to Pratap Chowk, Delhi Cantonment	13	25	2

Table 2.6 - Top Ten High Risk Corridors for pedestrians, 2019 to 2021

Dev Prakash Shastri Road recorded three motorcyclist deaths per km while Outer Ring Road recorded 139 motorcyclist deaths with 3 deaths per km.

Road Name	Road length (in km)	Persons killed from 2019 to 2021	Deaths per km
DEV PRAKASH SHASTRI ROAD Loha Mandi T-point to Indian Agricultural Statistics Research Institute	5	15	3
WAZIRABAD ROAD MCD Toll Booth Bhopura border to Ramghat- Wazirabad	11.1	33	3
OUTER RING ROAD	47	139	3
VIKAS MARG Delhi Secretariat to Karkari Mor Flyover	5.3	15	3
NH-24 Ghazipur Border to Indraprastha Park	8.6	23	3
ROHTAK ROAD Punjabi Bagh Metro station to Tikri Border	20	52	3
GRAND TRUNK ROAD Dilshad Garden Metro Station to ISBT Kashmere Gate	10	26	3
NH-8 Delhi-Haryana South West border to Pratap Chowk, Delhi Cantonment	13	33	3
MEHRAULI BADARPUR Road Intersection of Crescent Road to Faridabad border	11	26	2
MAA ANANDMAYEE MARG Kalkaji Flyover towards Mehrauli- Badarpur Road	5.4	12	2

Table 2.7 - Top Ten High Risk Corridors for motorcyclists, 2019 to 2021

Rohtak Road recorded the highest number of cyclist deaths (8 deaths) followed by Mathura Road (6 deaths) and Ring Road (6 deaths).

Road Name	Road length (in km)	Persons killed from 2019 to 2021
ROHTAK ROAD Punjabi Bagh Metro station to Tikri Border	20	8
MATHURA ROAD Tilak Bridge Red Light to Badarpur Border	17	6
RING ROAD	55	6
OUTER RING ROAD	47	4
NAJAFGARH ROAD - Rajouri Garden metro station to Najafgarh Metro Station	16.5	3
PUSTA ROAD MCD Toll Ankur Vihar to Nigam Parishad near Lalita Park	12.3	3
201 NO. ROAD DXR Point Dwarka to Maharaja Agrasen Hospital	5.3	2
GT KARNAL ROAD Azadpur Chowk to Singhu Border	20	2
MEHRAULI BADARPUR ROAD Intersection of Crescent Road to Faridabad border	11	2
MEHRAULI GURGAON ROAD Chattarpur Metro Station towards Guru Dronacharya Metro Station	8	2
PANKHA ROAD Uttam Nagar East Metro Station towards Cariappa Marg	7	2
WAZIRABAD ROAD - MCD Toll Booth Bhopura border to Ramghat- Wazirabad	11.1	2

Table 2.8 - High Risk Corridors with more than two cyclist deaths, 2019 to 2021

The Table below enumerates blackspots, based on MoRTH's definition of areas with more than 10 deaths within a radius of 250 metres in the past three years. A total of 18 crash spots, with more than 10 deaths in the last three years, are identified.

Crash Spots	No. of Deaths from 2019 to 2021
Mukarba Chowk	19
Intersection of Outer Ring Road and Wazirabad Road near Signature Bridge	16
Majnu Ka Tila- Outer Ring Road Stretch	16
Azadpur Chowk	15
Intersection of Grand Trunk Road and Main Libaspur Road near Libaspur Bus Stand	15
Nirankari Chowk	12
Burari Chowk	12
Punjabi Bagh Chowk	12
Seelampur Chowk	12
Outer Ring Road- In front of Rohini Court	11
Madhuban Chowk	11
Intersection of DND Flyway and MG Marg near Gol Chakkar Park	11
Dabri Crossing roundabout	11
Lokesh Cinema Bus stop at Nangloi	10
Shivaji Park Metro Station	10
Gazipur Roundabout	10
Power House Pitampura	10
Mukundpur Roundabout	10

Table 2.9 - High Risk Areas/ Crash Hotspots with more than 10 deaths in a radius of 250 metres from 2019 to 2021

Table 2.10 presents the crash death rate of all 11 districts. The deaths occurring in 2019, 2020, and 2021 were mapped and death rate was calculated using the population of each district. District North (574) and District Central (547) recorded the highest number of deaths while District New Delhi reported the highest death rate of 14.

District Name	Population	No. of Deaths in 2019 to 2021	Death Rate Per 100,000 population
New Delhi	973,186	403	14
Central	1,766,980	547	10
North	2,015,508	574	9
South east	1,732,605	384	7
South west	1,772,580	313	6
West	2,909,888	507	6
North west	2,415,530	380	5
Shahdara	1,562,240	216	5
East	1,130,232	154	5
South	1,588,093	167	4
North east	1,462,126	119	3

Table 2.10 - Death rate by district

Crash Heat Maps

Visualising crashes on a map is a powerful tool in road safety. Maps, specifically heatmaps, enable decision-makers to quickly identify clusters with high concentration of crashes. They also provide insights to the road safety situation especially when identifying high-risk locations. In this section, heatmaps have been generated for each district using 2019, 2020, and 2021 crash fatalities and pedestrian and motorcyclist fatalities data. The objective is to understand where the crashes are happening and provide a safety diagnosis of high-risk locations. These maps are useful for the government, specifically districts, in understanding the road safety situation and in developing evidence-based interventions.

Heatmaps of Crash Deaths Occurring in NCT of Delhi from 2019 to 2021

The heat map below (see Figure 3.1) is a map of road crash deaths. The areas in dark red represent areas with high incidence of road crash deaths.

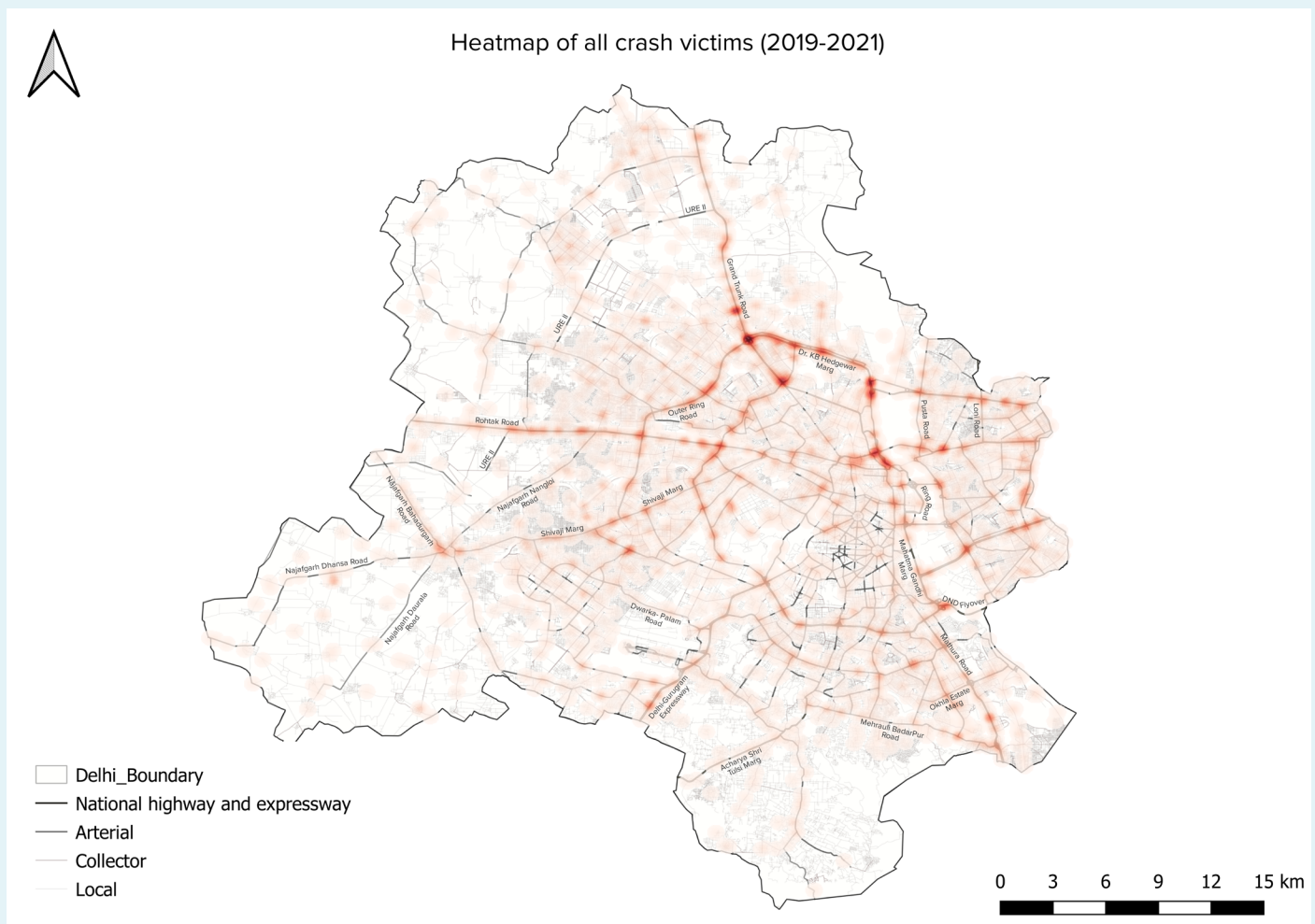


Figure 3.1 - Heatmap of all crash deaths (2019 to 2021)

The heat map below (see Figures 3.2 and 3.3) show motorcyclist and pedestrian deaths and where they happen. The areas in dark red in each of the Figures represent areas with a high incidence of motorcyclist and pedestrian deaths respectively.



Heatmap of all Motorcyclist Deaths (2019-2021)



Figure 3.2 - Heatmap of motorcyclist deaths (2019 to 2021)



Heatmap of all Pedestrian Deaths (2019-2021)



Figure 3.3 - Heatmap of pedestrian deaths (2019 to 2021)

Heatmaps of Crash Deaths Occurring in 11 Districts of NCT of Delhi from 2019 to 2021

In order to develop specific and targeted interventions, it is useful to focus on districts and investigate high-risk locations. The section below presents the heat maps of road crash deaths occurring in each of the districts in Delhi. It also highlights the high risk areas such as junctions, intersections, schools, and metro stations with high incidence of road crash deaths. These heat maps are important for the DRSCs to identify the causal factors of crashes and to address these issues accordingly.

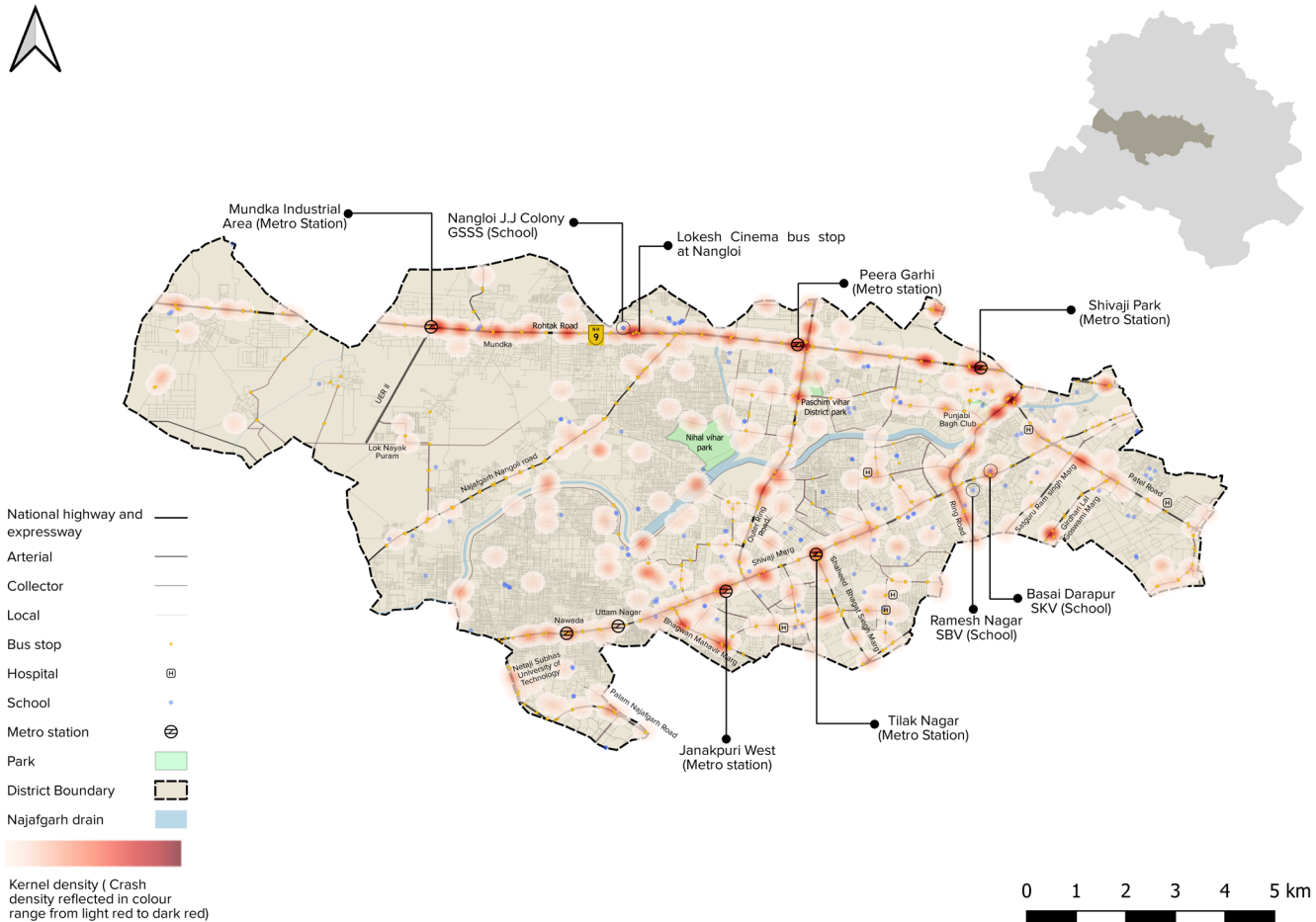


Figure 3.4 - Heatmap of all crash deaths occurring in District West (2019 to 2021)

A total of 507 road crash deaths from 2019 to 2021 occurred in District West. 232 pedestrians and 207 motorcyclists were killed in these crashes. The highest number of crashes occurred between 12am to 1am.

Looking closely at the high-risk locations, pedestrians have the highest fatalities in five out of nine of the high-risk locations in District West. Motorcyclists are highest in the remaining four locations. The high-risk areas are often located along highways or arterial roads that cut through pedestrian-heavy areas such as bus stops, metro stations, and schools. There is a lot of traffic mixing happening especially between vulnerable road users and high-speed and heavy vehicles. Despite the large volume of pedestrians, the high-risk areas often lack safe pedestrian infrastructure such as adequate sidewalks and proper crossings as well as traffic calming infrastructure. For example, in the Mundka Industrial Area (Metro Station), there is a high number of pedestrians as well as high levels of pedestrian activity. There are vendors at the side of the road, buses unloading commuters, pedestrians crossing in different places, and people walking in the middle of the road. The road environment forces pedestrians to be in conflict with incoming vehicles. The data show that the impacting vehicle for both pedestrians and motorcyclists is often unknown which is indicative of hit and run cases. It has to be noted however that a large portion of fatalities is caused by trucks. In addition, most of the crashes often happen late at night or very early in the morning.



Figure 3.5 - Heatmap of all crash deaths occurring in District South (2019 to 2021)

A total of 167 road crash deaths from 2019 to 2021 occurred in District South. 78 motorcyclists and 60 pedestrians were killed in these crashes. The highest number of crashes occurred between 12am to 1am.

In the high-risk locations in District South, motorcyclists are overrepresented in fatalities. All of the high-risk locations include motorcyclist fatalities. Many of these fatalities occur while motorcyclists are riding along the road, overtaking, or lane splitting. While there are usually median barriers which offer protection from head-on crashes, given the width of the road and the speed, there is poor delineation and absence of motorcycle facilities or infrastructure. Some of the high-risk locations are also positioned near to each other which warrant corridor-wide interventions. There needs to be further investigation to design specific infrastructure interventions and also a need to look at risk factors such as the rate of correct and proper helmet-wearing.

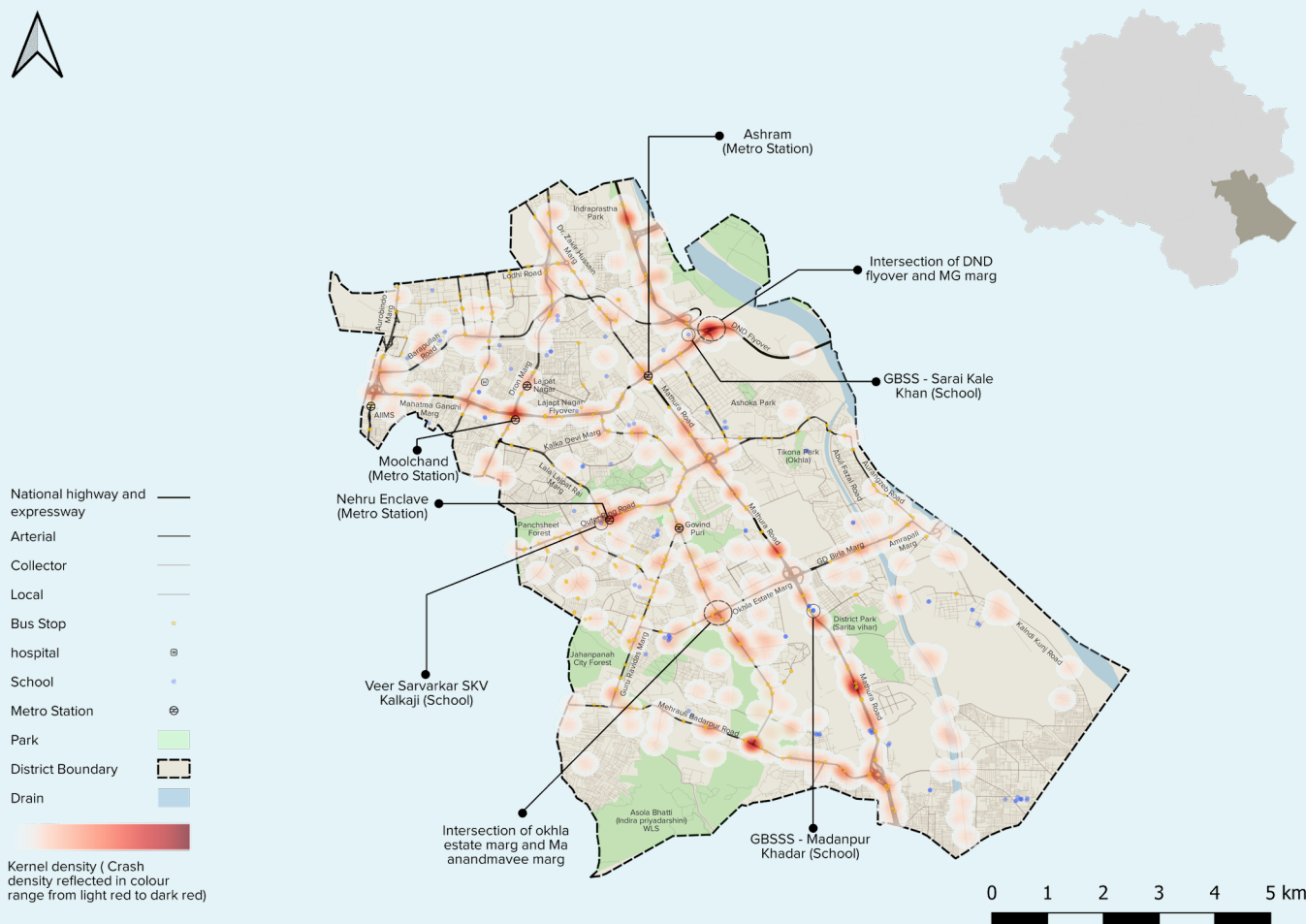


Figure 3.6 - Heatmap of all crash deaths occurring in District South East (2019 to 2021)

A total of 384 road crash deaths from 2019 to 2021 occurred in District South East. More than 150 motorcyclists and pedestrians were killed in these crashes. The highest number of crashes occurred between 12am to 1am.

In District South East, there are high-risk locations that are mostly unsafe for pedestrians, mostly unsafe for motorcyclists, and unsafe for both. For pedestrians, these high-risk locations are mostly near schools and metro stations which are places with high pedestrian activity combined with high speeds. These areas often have poor pedestrian infrastructure, lacking sidewalks and proper and safe pedestrian crossings. For motorcyclists, high-risk locations in this district are in intersections and in road corridors. For example, eight motorcyclist fatalities occurred in the intersection of the DND flyover and MG Marg. This intersection is characterised by high speeds with no delineation and no safe motorcycle facilities. High-risk locations with both high pedestrian and motorcyclist deaths are intersections such as the intersection of Okhla Estate Marg and Ma Anandmayee Marg. This intersection lacks proper pedestrian crossing facilities and sidewalks. In addition, there are indications of incidents of speeding and running the red light. A thorough blackspot investigation and observational study is needed to further design interventions.



Figure 3.7 - Heatmap of all crash deaths occurring in District South West (2019 to 2021)

A total of 313 road crash deaths from 2019 to 2021 occurred in District South West. 147 motorcyclists and 116 pedestrians were killed in these crashes. The highest number of crashes occurred between 12am to 1am.

While across the whole district, motorcyclists have the highest fatalities, most high-risk locations are mostly unsafe for pedestrians. As seen in the map, motorcycle fatalities happen across the road network which warrant network-wide or mass action interventions. On the other hand, pedestrian fatalities are often concentrated in key locations and similar to previous districts, in areas such as metro stations and schools. Common issues found at the high-risk locations include high occurrences of speeding and lack of safe and accessible pedestrian infrastructure.

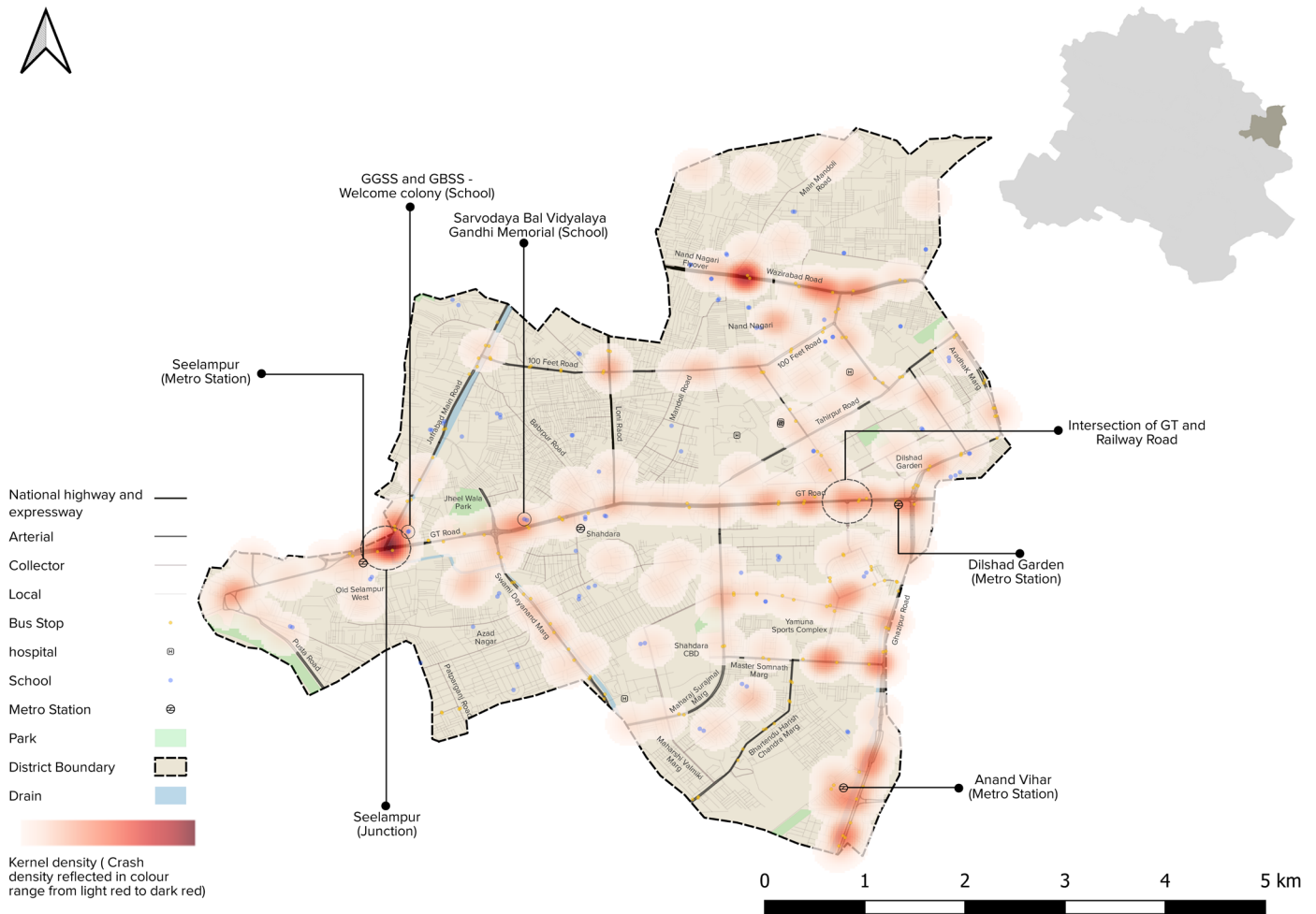


Figure 3.8 - Heatmap of all crash deaths occurring in District Shahdara (2019 to 2021)

A total of 216 road crash deaths from 2019 to 2021 occurred in District Shahdara. 116 pedestrians and 66 motorcyclists were killed in these crashes. The highest number of crashes occurred between 9pm to 12am. Most of the fatal crashes are hit and run crashes where the impacting vehicle is unknown.

Most of the high-risk locations in District Shahdara are located near metro stations, schools, and places with high pedestrian activity along national highways, expressways, and arterial roads. Fatal and serious injury crashes often occur on these roads as fast moving and high volumes of traffic are in conflict with pedestrians and vulnerable road users. The pedestrian facilities such as proper sidewalks and crossings in these high-risk locations are inadequate given the prevailing speed. At the same time, there is no clear indication in the road environment (either through traffic calming, speed limit signs) that road users are entering school zones where traffic speeds should be lower. Street lighting might also be a problem as most fatalities occur at night.

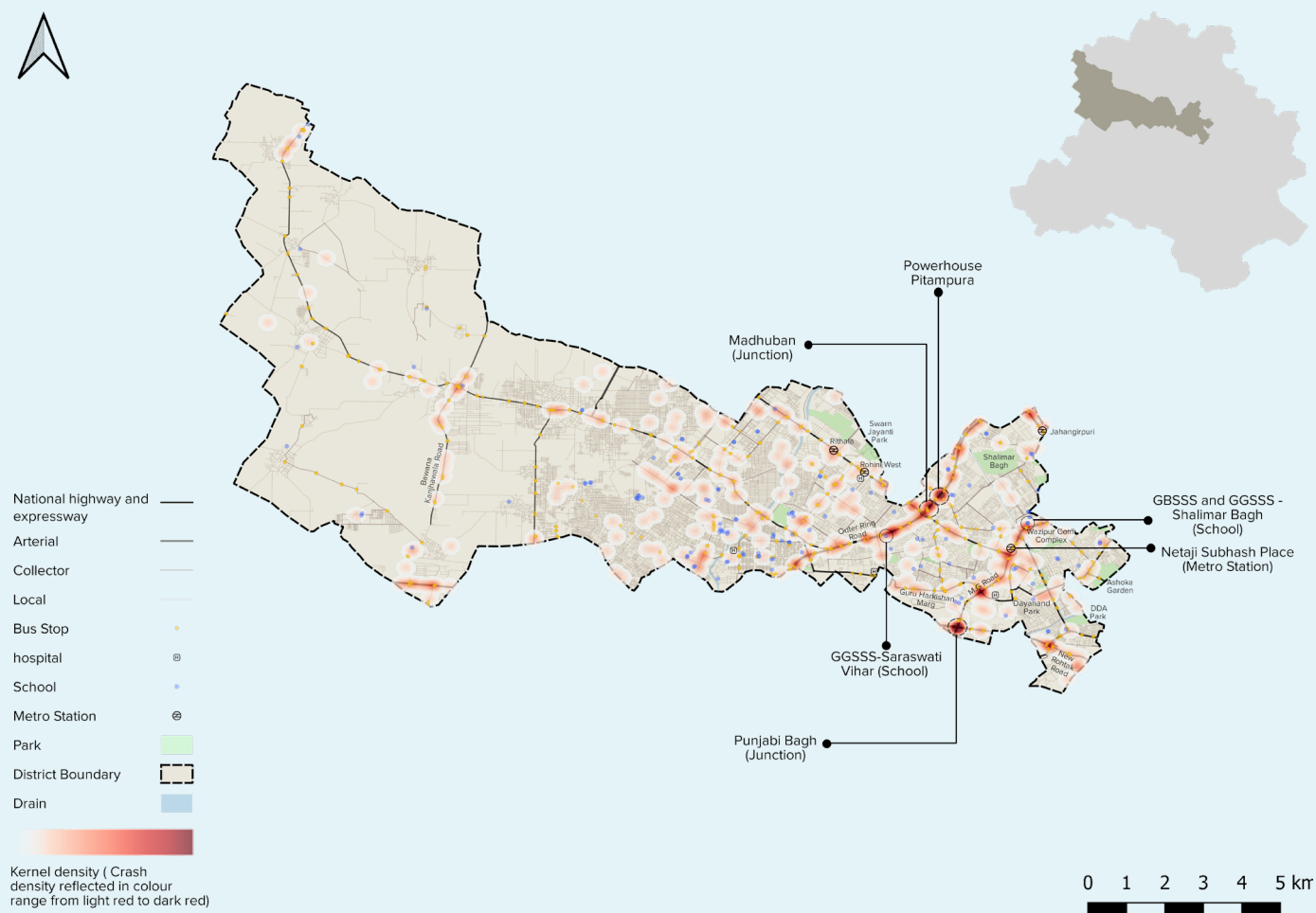


Figure 3.9 - Heatmap of all crash deaths occurring in District North West (2019 to 2021)

A total of 380 road crash deaths from 2019 to 2021 occurred in District North West. 176 pedestrians and 158 motorcyclists were killed in these crashes. The highest number of crashes occurred between 10pm to 11pm.

In District North West, half of the high-risk locations are junctions while the other half are locations with high pedestrian activity. While this is the case, motorcyclist fatalities are the highest out of all road user groups in all of the high risk locations. Motorcyclist fatalities occur because of poorly designed intersections, with poor delineation, and no posted speed limits. There is also no separation among motorcyclists and other road users such as buses and heavy vehicles. Helmet-wearing among motorcyclists, particularly clasped helmet-wearing, is also an issue.

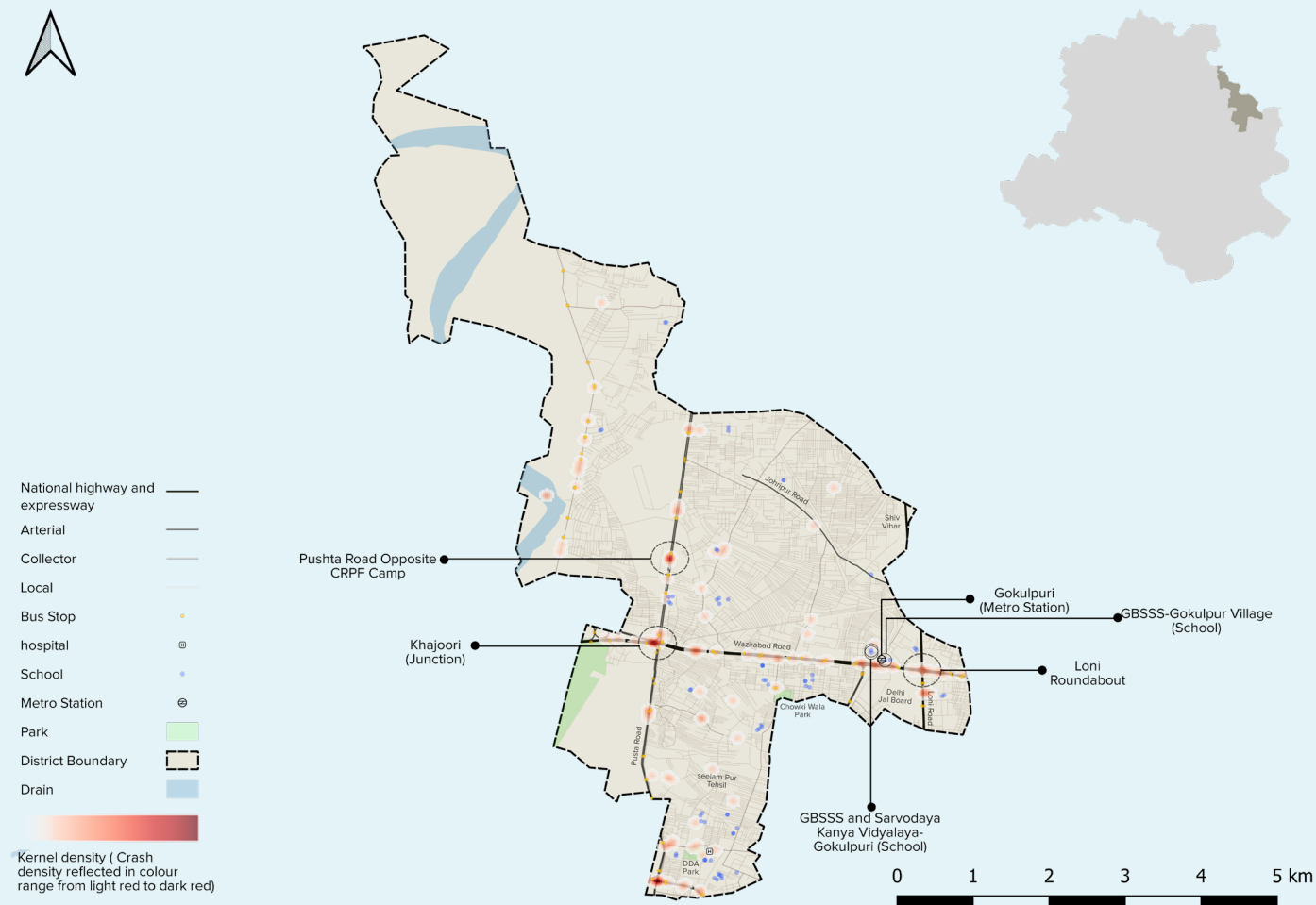


Figure 3.10 - Heatmap of all crash deaths occurring in District North East (2019 to 2021)

A total of 119 road crash deaths from 2019 to 2021 occurred in District North East. 70 pedestrians and 31 motorcyclists were killed in these crashes. The highest number of crashes occurred between 12am to 1am.

In high-risk locations in District North East, pedestrian safety is an important issue. In Khajoori for example, there are inadequate walking and crossing facilities. Because the sidewalks are not enough and are obstructed, pedestrians are forced to walk in the middle of the road together with vehicular traffic, causing conflicts and crashes. In the multileg junction, there are no proper and safe crossings which includes traffic calming for pedestrians. In Gokulpuri Metro Station, while there are sidewalks, there is also a lack of pedestrian crossing infrastructure. While pedestrian traffic in these high-risk locations is high, there is no accessible, adequate, and safe infrastructure for them. At the same time, speeding of vehicles remains as a safety risk for vulnerable road users such as pedestrians.

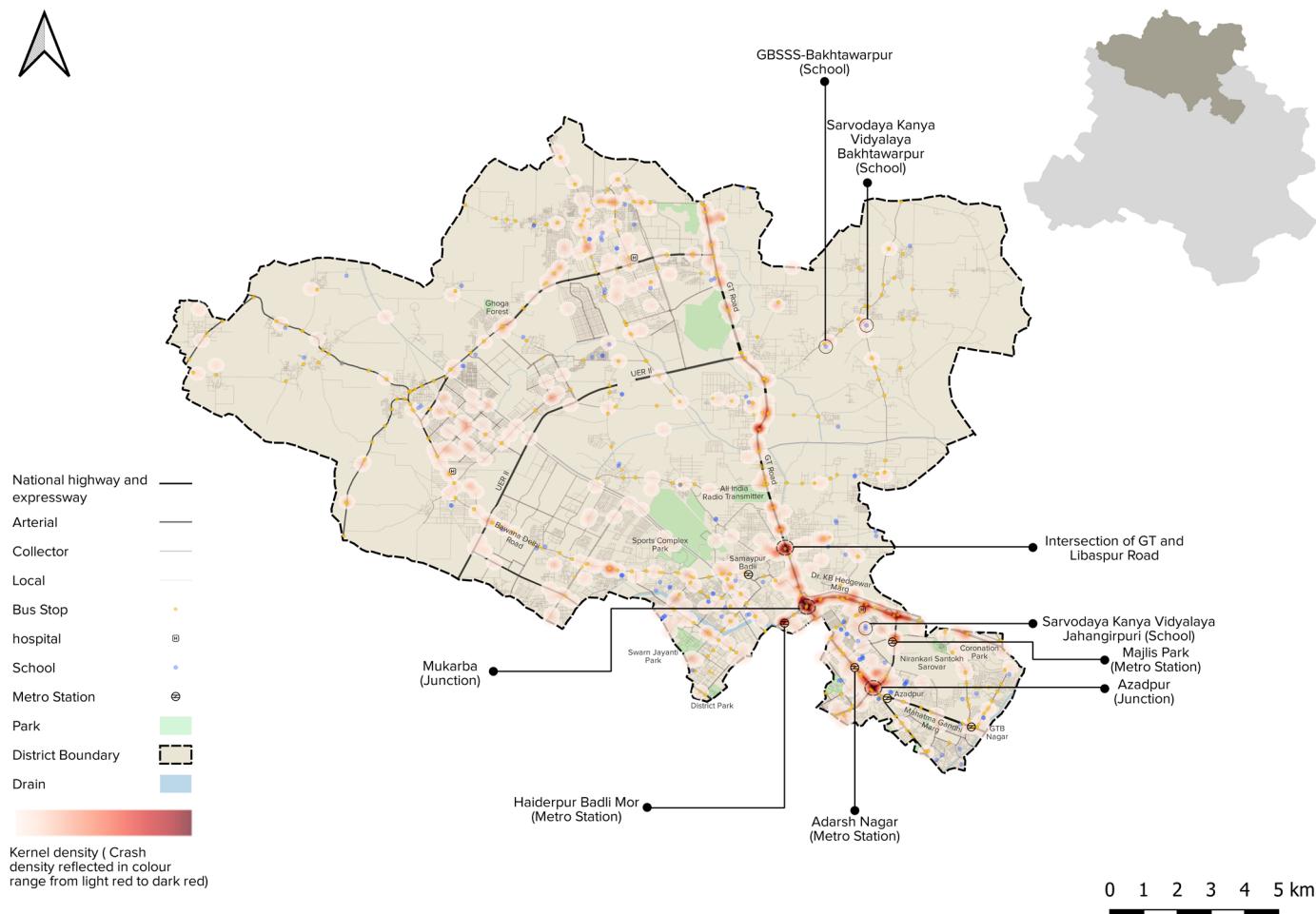


Figure 3.11 - Heatmap of all crash deaths occurring in District North (2019 to 2021)

A total of 574 road crash deaths from 2019 to 2021 occurred in District North. 275 pedestrians and 214 motorcyclists were killed in these crashes. The highest number of crashes occurred between 10pm to 11pm.

Most high-risk locations in District North are particularly unsafe for both motorcyclists and pedestrians. Three out of the nine high-risk locations can be found in high-speed multilane roads, one of which is along Mukarba. Mukarba junction is one of the leading crash spots in Delhi reporting 19 deaths from 2019 to 2021 consisting mostly of pedestrians and motorcyclists. The highest number of hit and run crashes are recorded at this junction. Safety risks include conflicts between commuters who board and deboard buses and incoming vehicles, pedestrians who are forced to cross at-grade and not use the footbridge because the former is more accessible, and mixing between vulnerable road users and high-speed and heavy vehicles. Aside from high-speed multilane roads, a number of high-risk locations are within school zones where a lot of pedestrians including children are vulnerable to crashes. There are little or no existing safety interventions such as traffic calming, designated speed limits for school zones, among others. The rest of the high-risk locations are poorly designed intersections. As with the other districts, there is a need to conduct in-depth blackspot investigation to design the most effective and appropriate interventions.

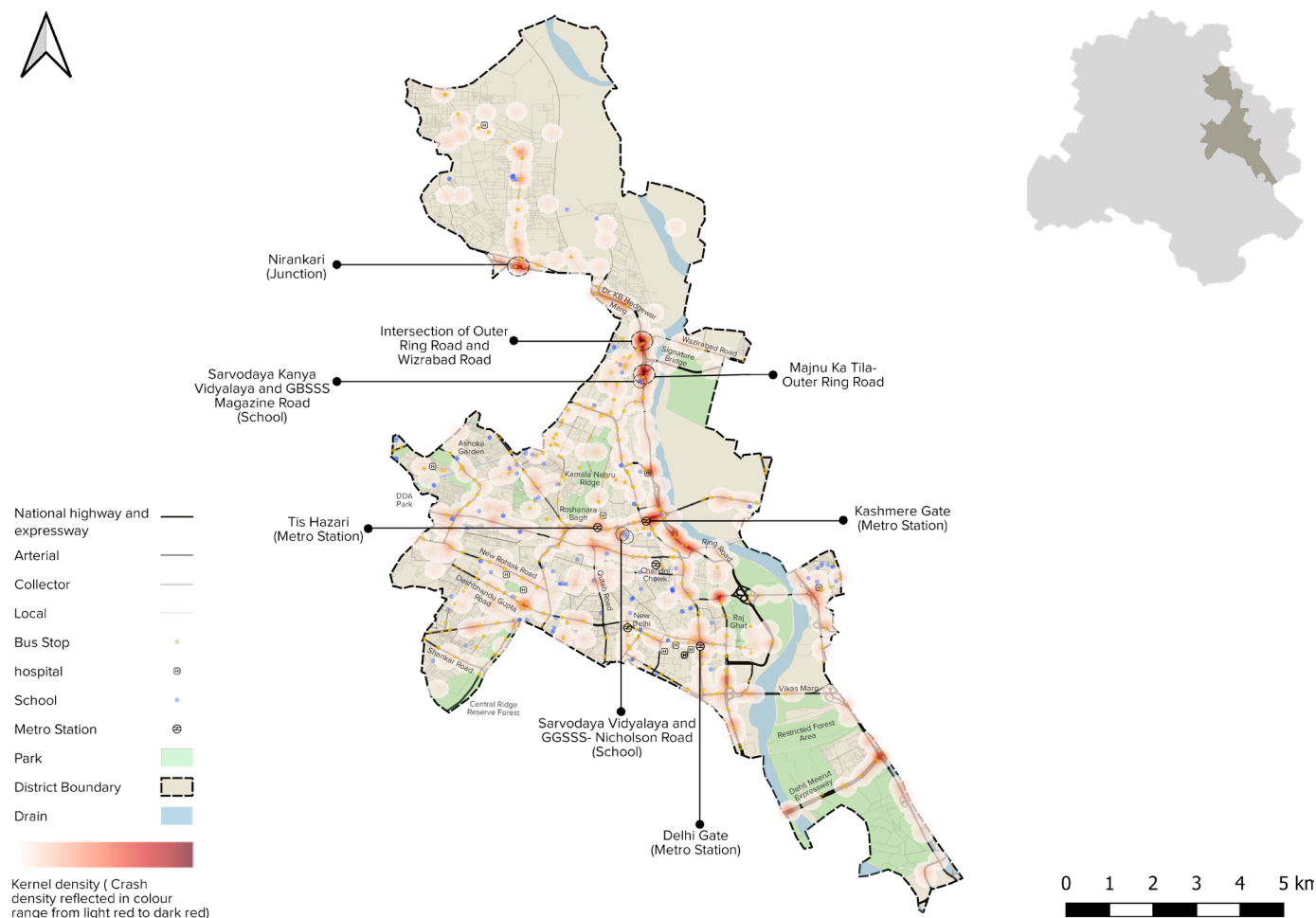


Figure 3.12 - Heatmap of all crash deaths occurring in District Central (2019 to 2021)

A total of 547 road crash deaths from 2019 to 2021 occurred in District Central. 266 pedestrians and 196 motorcyclists were killed in these crashes. The highest number of crashes occurred between 11pm to 12am.

Zooming into the high-risk locations in District Central, the highest number of fatalities come from both motorcyclists and pedestrians. Risk is often concentrated along national highways where traffic volume, traffic mixing, and speeding are high. Furthermore, there is no proper lane-marking, no speed limit signs, among other safe road infrastructure. At the same time, the high-risk locations are also places where there is high pedestrian activity. For example, Kashmere Gate (Metro Station) has the highest number of pedestrian fatalities out of all the high-risk locations. The metro station is located along a multilane highway where many pedestrians are crossing and there are no existing safe crossing facilities. On the other hand, Majnu Ka Tila Outer Ring Road has the highest number of motorcyclist fatalities which is caused by lack of safe motorcycle facilities, poor enforcement of clasp helmet wearing, among others. Interestingly, Nirankari, which is a roundabout, is also a high-risk location. This is because despite it being a roundabout, which is generally a preferred design for safety, the geometry of the roundabout does not force the road users such as motorcyclists to slow down.

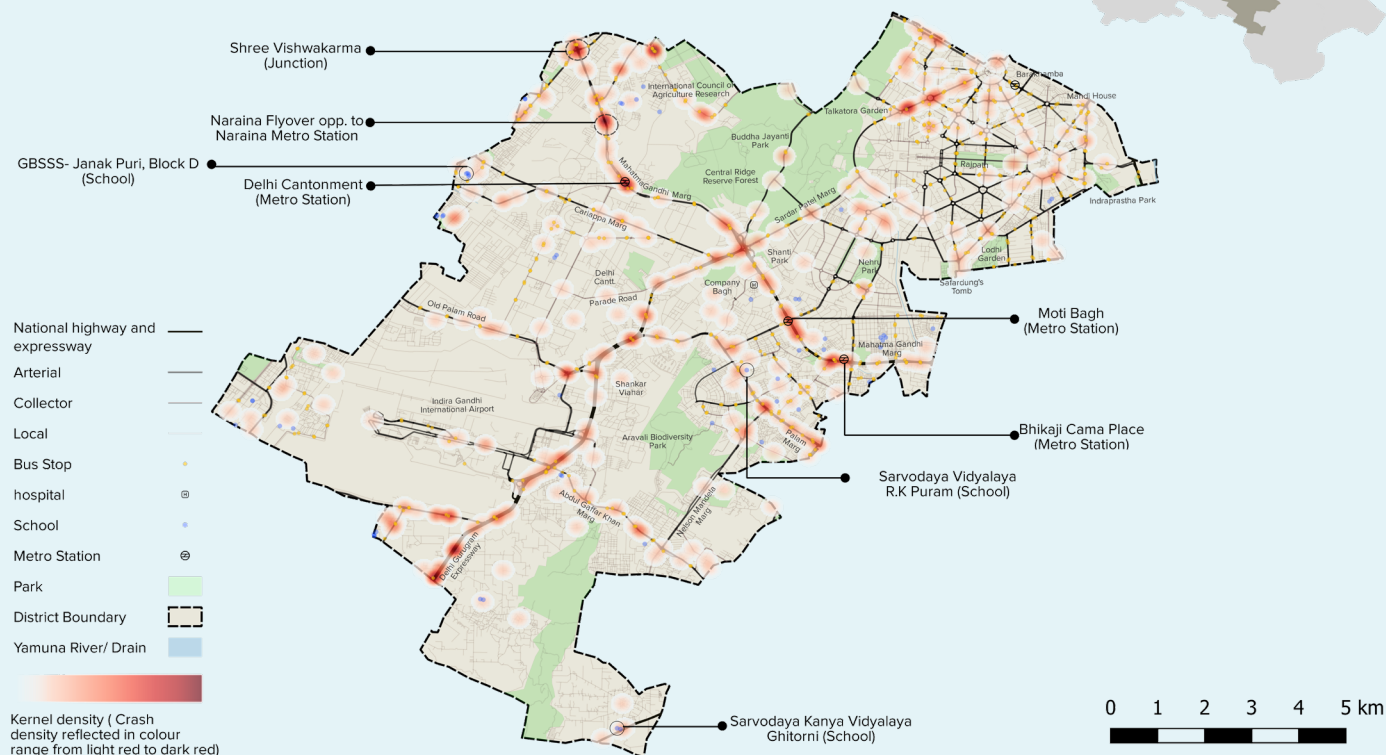


Figure 3.13 - Heatmap of all crash deaths occurring in District New Delhi (2019 to 2021)

A total of 403 road crash deaths from 2019 to 2021 occurred in District New Delhi. 176 motorcyclists, 159 pedestrians and 17 cyclists were killed in these crashes. The highest number of crashes occurred between 12am to 1am.

High-risk locations in District New Delhi comprise high-speed multilane roads and multileg junctions, many of which are located along the national highway and expressway. Shree Vishwakarma Junction has the highest number of fatalities which mostly involve motorcyclists. There are safety issues in the junction such as lack of line-marking and delineation, blind corners, lack of signage and streetlights, lack of pedestrian infrastructure, and lack of traffic calming. These are similar issues in other high-risk junctions in the district. The other high-risk locations are multilane roads such as in Delhi Cantonment Metro Station where motorcyclist and pedestrian fatalities occur. Being a high-speed road that cuts through pedestrian-heavy areas such as the metro station, there should be adequate pedestrian infrastructure such as safe crossings. At the same time, there is a lack of clear lane-marking, signs, and traffic calming. There is a need to conduct further investigation in these sites to develop evidence-based interventions.

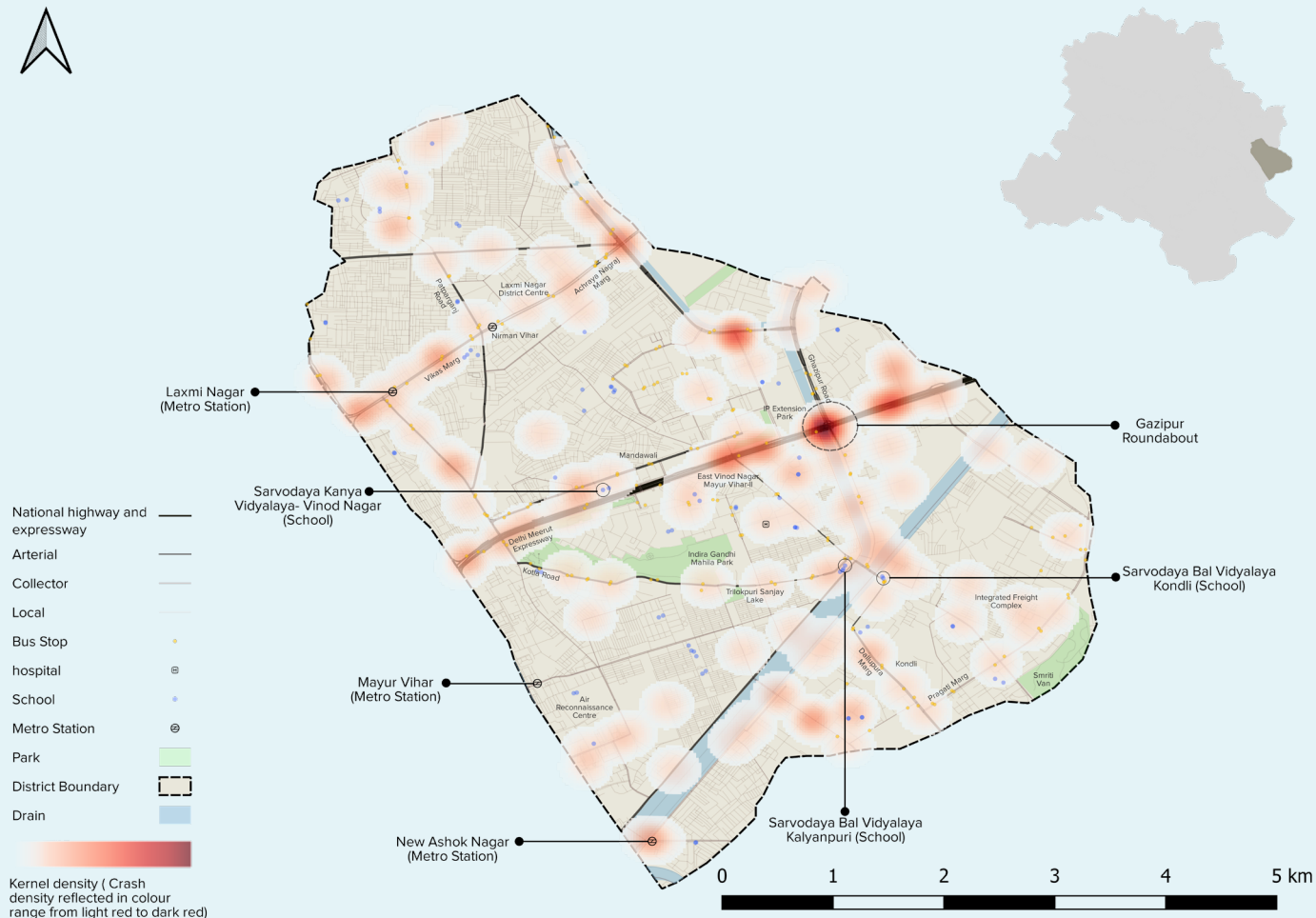


Figure 3.14 - Heatmap of all crash deaths occurring in District East (2019 to 2021)

A total of 154 road crash deaths from 2019 to 2021 occurred in District East. 75 pedestrians and 55 motorcyclists were killed in these crashes. The highest number of crashes occurred between 12am to 1am.

In District East, pedestrian fatalities are the highest in most of the high-risk locations. Looking closer, these high-risk locations are often roads in front of a school or metro station. Despite having high pedestrian activity, safe and accessible pedestrian infrastructure in these locations are inadequate or for some, non-existent. For example, in Mayur Vihar and New Ashok Nagar metro stations, there are no sidewalks for pedestrians. The high-risk location with the most over-all fatalities and pedestrian fatalities is Gazipur Roundabout.

Discussion

High-risk sites in Delhi are commonly found in high-speed national highways, expressways, or arterial roads. They are often road sections which cut through places with high pedestrian volume such as schools, metro stations, and commercial areas. They can also be poorly constructed intersections with no clear lane-markings and delineation, traffic calming, and pedestrian infrastructure.

The design of the road network forces vulnerable road users to mix with heavier and faster vehicles. In most of the high-risk locations, there is a lack of sidewalks, even in front of schools. Most of the road prioritizes smooth vehicular traffic flow rather than the safety and accessibility of the majority of road users which are pedestrians. There is a need to rethink the classification of the roads and to classify them based on function rather than ownership. This way, interventions are more applicable and more appropriate speed limits and designs are implemented.

There are also high-risk sites that are adjacent to one another, multiple sites in one stretch of road, and sites that are similar in terms of configuration and environment. In these cases, it will be helpful to zoom out and look at them together either as part of a corridor or the larger road network. Rather than individual treatments, addressing issues will then entail corridor-wide or street transformations and mass action treatments (for example, sidewalks and safe pedestrian crossings).

Infrastructure programs also need to be combined with enforcement of clasped helmet wearing and speeding. In particular, the UT government must instruct the police to enforce clasped helmet wearing. Moreover, implementing penalties should also be improved. Currently, only a small percentage of fines are getting paid, implying how people can easily get away from the law. This is a major safety risk and that there needs to be better linkage between police and the transport department to enforce penalties.

Finally, it is important that more detailed investigation be conducted on all high-risk sites either through blackspot investigation or road safety audits. This detailed investigation will enable engineers to design the most effective and appropriate interventions.

Monitoring Compliance with Road Safety Risk Factors in Delhi

The Johns Hopkins International Injury Research Unit (JH-IIRU), a partner under BIGRS, collaborated with the CSIR-Central Road Research Institute (CRRI) to conduct bi-annual roadside observations and monitor compliance for important road safety risk factors in Delhi. The study design and protocols were developed by the JH-IIRU using evidence-based guidelines and implemented in collaboration with the CRRI.

Briefly, the research team selected observation sites to obtain a representative sample of vehicles and road users in Delhi, conditional on the safety of observers for data collection. With 15 observation sites per risk factor, the team used a standardised protocol and observed vehicles in a systematic quasi-random fixed sequence. The team carried out observations between 7:00 a.m. and 7 p.m. on both weekend days and weekdays to account for variations in traffic volumes at different times of the day. The methods were designed to estimate citywide prevalence and cannot provide insights into interventions conducted in specific locations in the city.

This chapter provides results from observational surveys that represent population-level (citywide) prevalence of important road safety risk factors (speed, helmet use, seat-belt, and child restraint use).



Figure 4.1 - Roadside data collectors observing compliance with the road safety risk factors

Speeding

KEY FINDINGS

To assess the risk of speeding, the research team observed a sample size of 98,294 vehicles consisting of all types of light and heavy motor vehicles on Delhi roads.

- Overall, 21% of all vehicles were observed to be driving above the respective posted speed limits.
- Observing speeding within each vehicle type category, pick-ups/light trucks were the leading type of vehicle exceeding the posted speed limits (63%), followed by minibus/minivans (53%) and buses (44%).
- Prevalence of speeding over the posted limit was highest on the arterial road (25%), and around 23% of the vehicles on the arterial road were driving above the safe speed limit of 50 km/hour.

Number of vehicles observed for speeding	Prevalence of speeding (%)	Mean(km/h)	Std. dev. (km/h)	Median (km/h)	85th pctl (km/h)
98,294	21	44	11	44	55

Table 4.1 - Key findings of speeding observation

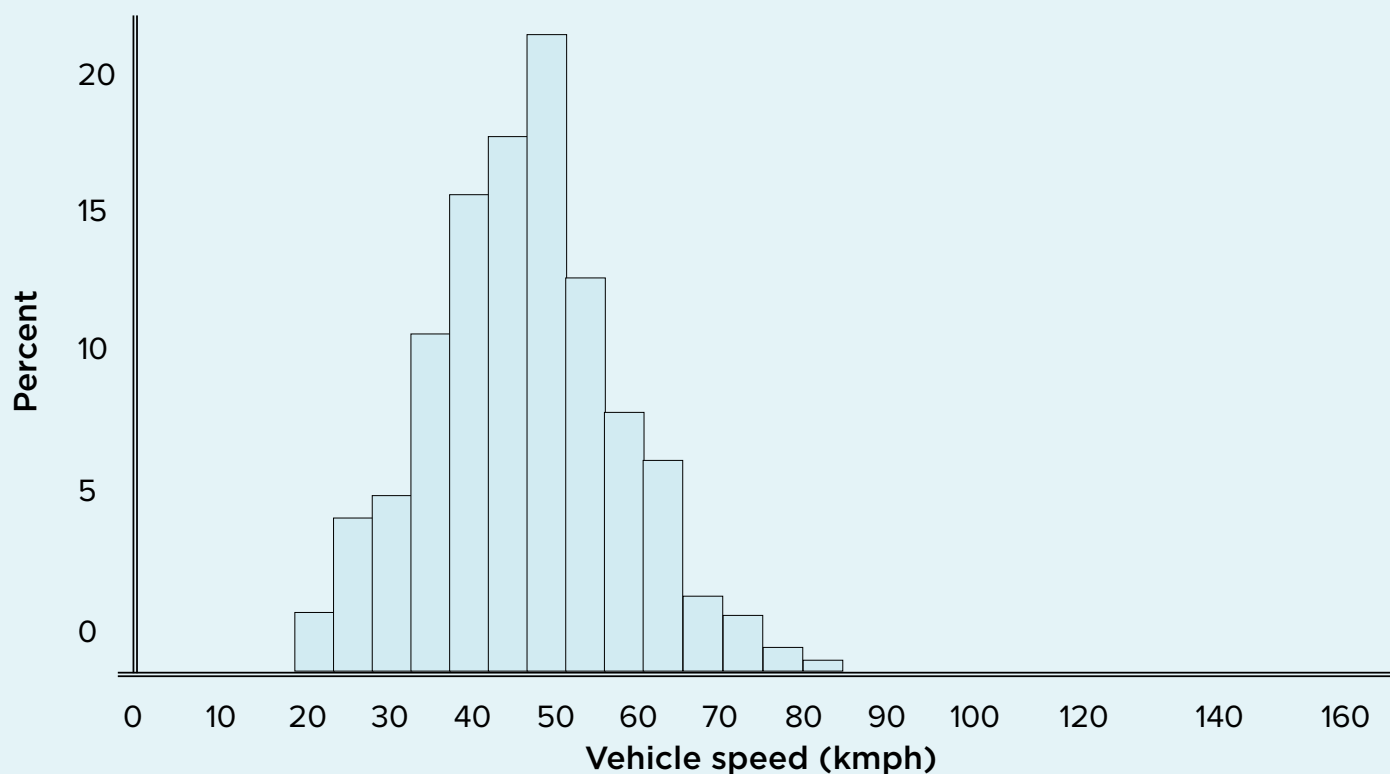


Figure 4.2 - Histogram of speed among vehicles

Speed Prevalence by vehicle type (%)

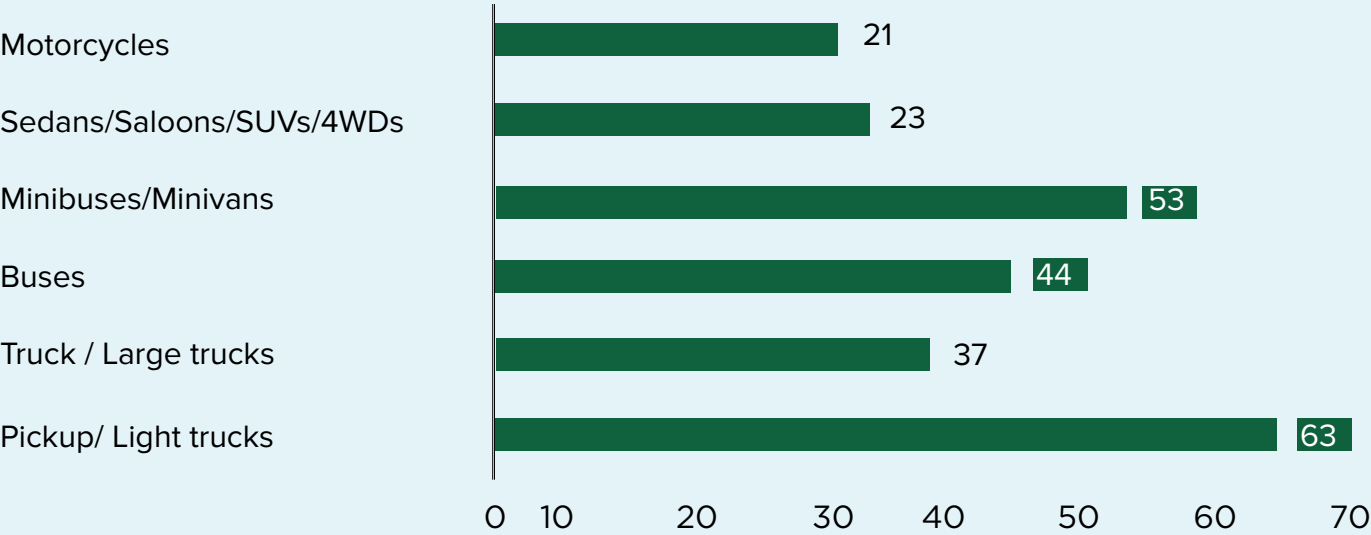


Figure 4.3 - Speeding prevalence by vehicle type

Average speed (Km/h) by vehicle category



Figure 4.4 - Average motor vehicle speed by vehicle type

Clasped Helmet Use

Overall helmet use is defined as strapped or unstrapped use of helmet of any type, and correct helmet use is defined as strapped use of full-face or non-full-face helmet (but not cap helmet). Overall helmet use is observable only when helmet use is practised, and correct helmet use is observable when helmet use, strap use, or helmet type is present. Correct helmet use becomes increasingly crucial in road safety in Delhi as 42% of road crash fatalities are motorcyclists.

KEY FINDINGS

A sample size of 206,000 individuals consisting of both the motorcycle riders and pillion riders were observed.

- Overall, 87% of all motorcycle riders and drivers in Delhi were observed to wear helmets, while only 66% were observed to wear helmets clasped.
- Specifically among motorcycle drivers, overall helmet use was 92% while correct helmet use was at 71%. For passengers only, overall helmet use was 69%, while correct helmet use was low at 46%.
- The proportion of any helmet use among males was higher than females (92% vs. 83%). Correct helmet use is substantially higher among males compared to females. (71% vs. 53% respectively).

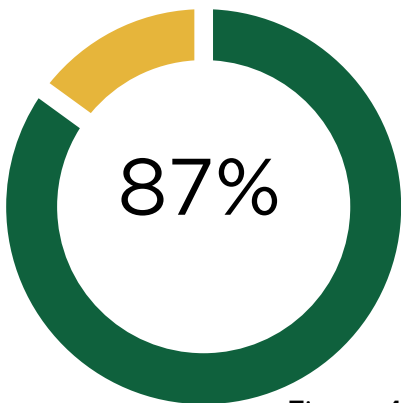
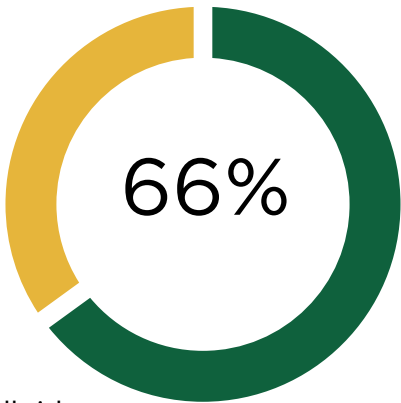
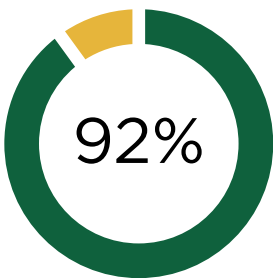


Figure 4.5 - Helmet use among all riders

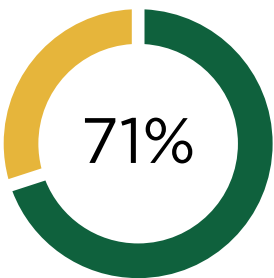


Overall Helmet Use

Correct Helmet Use

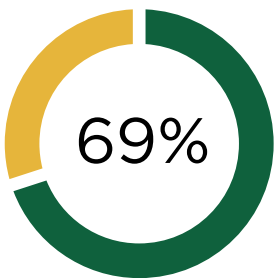


Overall
Helmet Use

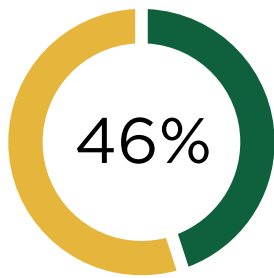


Correct
Helmet Use

PASSENGERS



Overall
Helmet Use



Correct
Helmet Use

DRIVERS

Figure 4.6 - Helmet use among passengers and drivers

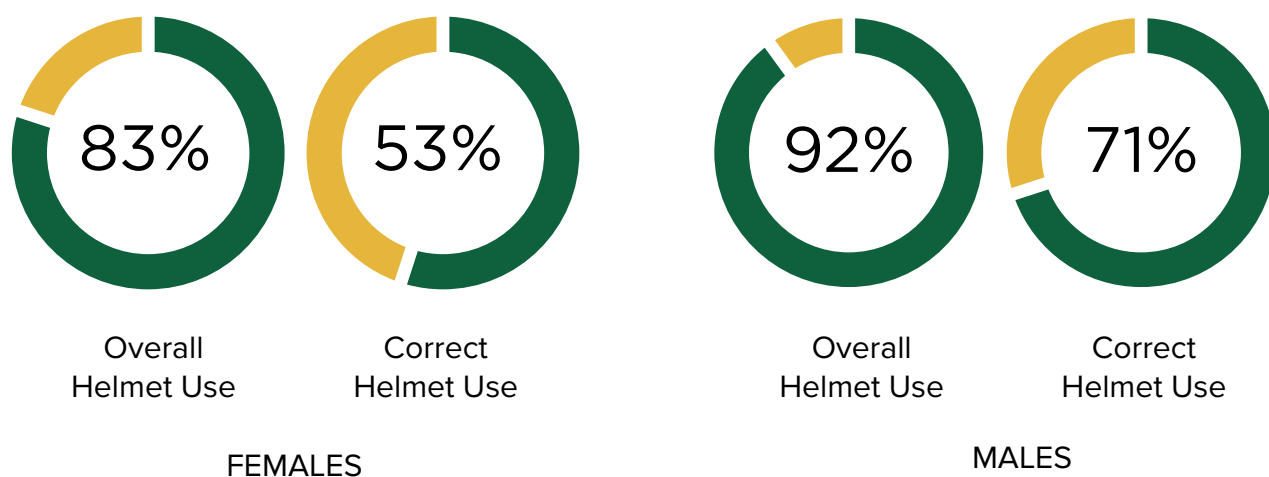


Figure 4.7 - Helmet use disaggregated by sex

Seat-belt and Child Restraint Use

In Delhi, 5% of crash fatalities belong to light vehicle occupants. While this might be a relatively small percentage, seatbelt-wearing and child restraint use are still proven interventions that can save lives on the road. A sample size of 171,886 individuals consisting of motor vehicle drivers and passengers were observed.

KEY FINDINGS

- Overall, 65% of all motor vehicle occupants use seat-belts. When disaggregated by occupant type, 85% of drivers wore seat-belts, while only 41% of passengers wore seat-belts.
- Front seat passengers had a much higher proportion of seat-belt wearing (74%) when compared to rear-seat passengers (1%).
- Very low-level use of child restraints was observed among under five-year-old children (14%), and children between 5 to 11-year-old (3%).

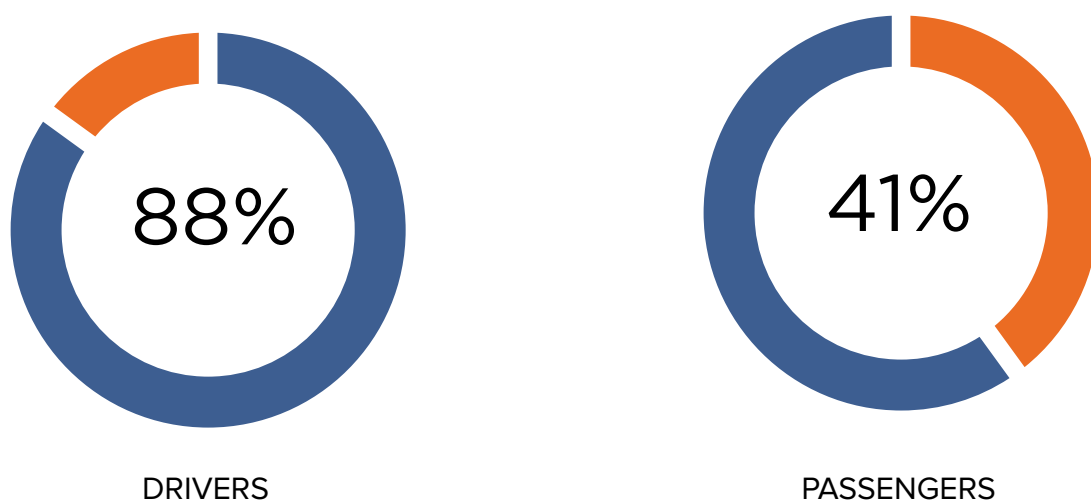
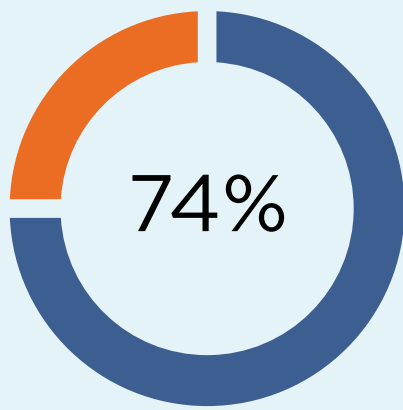
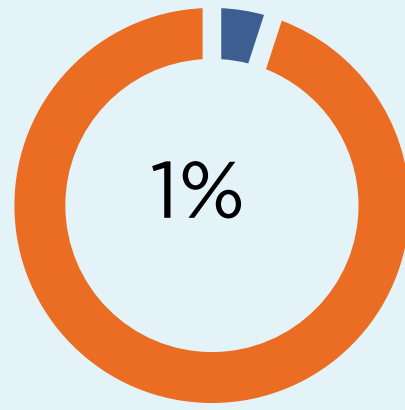


Figure 4.8 - Seat-belt use among drivers and passengers

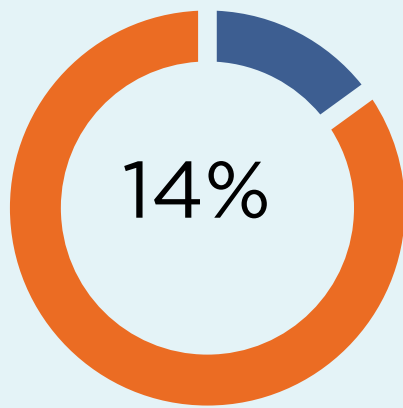


FRONT SEAT

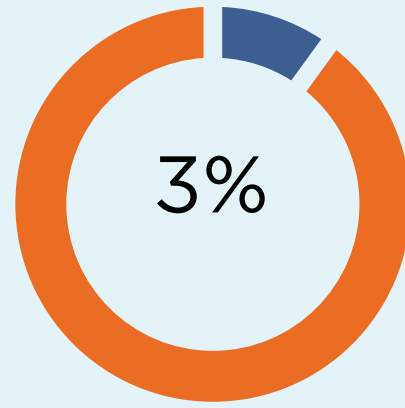


REAR SEAT

Figure 4.9 - Seat-belt use among passengers, disaggregated by front seat Vs. rear seat



< 5*



5 to 11*

Age

Figure 4.10 - Seat-belt use among child passengers

Discussion

Monitoring compliance with road safety risk factors and establishing a city-wide surveillance program are crucial to promulgate evidence-based interventions and to address the four main components of road safety: enforcement, engineering, strategic communication and emergency care.

Speeding is a primary and major cause of crash fatality and serious injury. Every 1% increase in average speed increases the risk of a serious crash by 3% and a fatal crash by 4%. However, a reduction of average speed by 5% confers a substantial benefit to safety by a 30% reduction in fatalities. Specifically in Delhi, the prevalence of speeding above posted speed limits was observed mostly among heavy vehicles - pick-ups/light trucks (63%), minivans/minibuses (53%) and large buses (44%).

It is particularly concerning that buses are one of the vehicles which mostly speed, considering they are a primary mode of public transportation used by the majority of people in Delhi (43% of travel is in buses). Hence, city-wide traffic enforcement activities need to focus on improving measures to address the higher speeds among buses and other heavy vehicles. These may include setting appropriate speed limits according to vehicle class and road use function, improvement in road infrastructure e.g., bus priority lanes, visible lane demarcations and signage, media, strict penalties and ensuring fines are paid within a certain time frame, among other interventions.

Non-wearing of clasped helmets is the second most important road safety risk factor. Correct helmet use can lead to a 42% reduction in risk of fatal injuries and a 69% reduction in head and neck injuries. In Delhi, while only 20% of travel is done through MTWs, 42% of fatalities are scooter and motorcycle riders. Given that only 66% motorcycle riders in Delhi correctly use helmets, this makes enforcement of correct helmet use a priority to reduce non-use of helmet related fatalities and serious injuries.¹⁴ Enforcement, especially of clasping, should be relatively straightforward but proper implementation of the law is key. Section 129B of The Motor Vehicles Act, 1988 explicitly requires that “helmet is securely fastened to the head of the wearer by means of straps or other fastenings provided on the headgear” but the clasping law, and the pillion rider law, is still not consistently enforced. In addition, the UT government must also instruct the police to enforce clasped helmet wearing .

Aside from enforcement of traffic laws, it is highly crucial that penalties are properly implemented and collected. Traffic laws such as laws on speeding and helmet-wearing lose their strength and weight when penalties are not collected. Currently, only a small percentage of fines are getting paid which reflect how easily people get away from traffic violations.

¹⁴ Johns Hopkins Bloomberg School of Public Health-International Injury Research Unit and Central Road Research Unit.2022. Roadside Observational Study-Technical Appendix for Delhi Round One on Speeding, Helmet, Seat-belt and Child Restraint Use 2021.

Interventions to Prevent Road Traffic Injuries and Deaths

After assessing the road safety situation and identifying high-risk locations, it is helpful to understand the current activities being done by the government and its partners on road safety. This section presents the road safety interventions carried out by the Government of the NCT of Delhi to prevent road crash injuries and deaths. These evidence-based interventions are focused on creating safer streets for all road users, implementing behaviour change through strategic communication, strengthening road safety risk factors enforcement and, using quality data for planning.

The DRSCs can refer to these activities and interventions to improve the road safety situation in their districts.

Crash Spots Improvement Projects

TECHNICAL PARTNERS: WORLD RESOURCES INSTITUTE (WRI) AND GLOBAL DESIGNING CITIES INITIATIVE (GDCI)

The Transport Department, Government of NCT of Delhi has taken up multiple initiatives under the road safety framework to improve the crash prone junctions. The Transport Department partners are currently working on 15 crash spot locations to reduce crashes at these locations by improving them. The junctions are proposed to be redesigned to ensure they are pedestrian-friendly.

Some of the junction redesigns are being tested using interim transformation materials such as temporary road markings, bollards, traffic cones, and paint to demonstrate the feasibility of design strategies. These interventions include safer pedestrian facilities, traffic calming measures, and realignment of the roadbed for safer and more efficient movement of all road users. Data is being collected during these demonstration projects to evaluate the efficiency of the redesigns to inform investment into capital construction at these locations. It is also intended that the modifications and improvements will promote replication of such interventions in other locations.



Courtesy: WRI

Figure 5.2 - Delhi Gate Junction Before trial



Courtesy: WRI

Figure 5.3 - Delhi Gate Junction during trial/ proposed design

Mangolpuri flyover Junction Redesign:

Mangolpuri flyover junction registered six fatal crashes in 2019 and was notified as a crash spot by the DTP. The Transport Department assigned the junction to GDCI, a partner under BIGRS, for technical support in redesigning and making it safer for all road users.

- Pedestrians, MTWs, and cyclists are most vulnerable at this junction.
- There are many points of conflict due to overlapping movement patterns and priority to four-wheeler vehicles.

- The basic principles of redesign include travel lane alignment, proper use of excess space, clear movement of vehicles, pedestrians and cyclists and provision of pedestrian infrastructure and signage.
- GDCI prepared the designs for this junction in consultation with the Transport Department, PWD, and DTP and were approved by all government agencies for implementation.



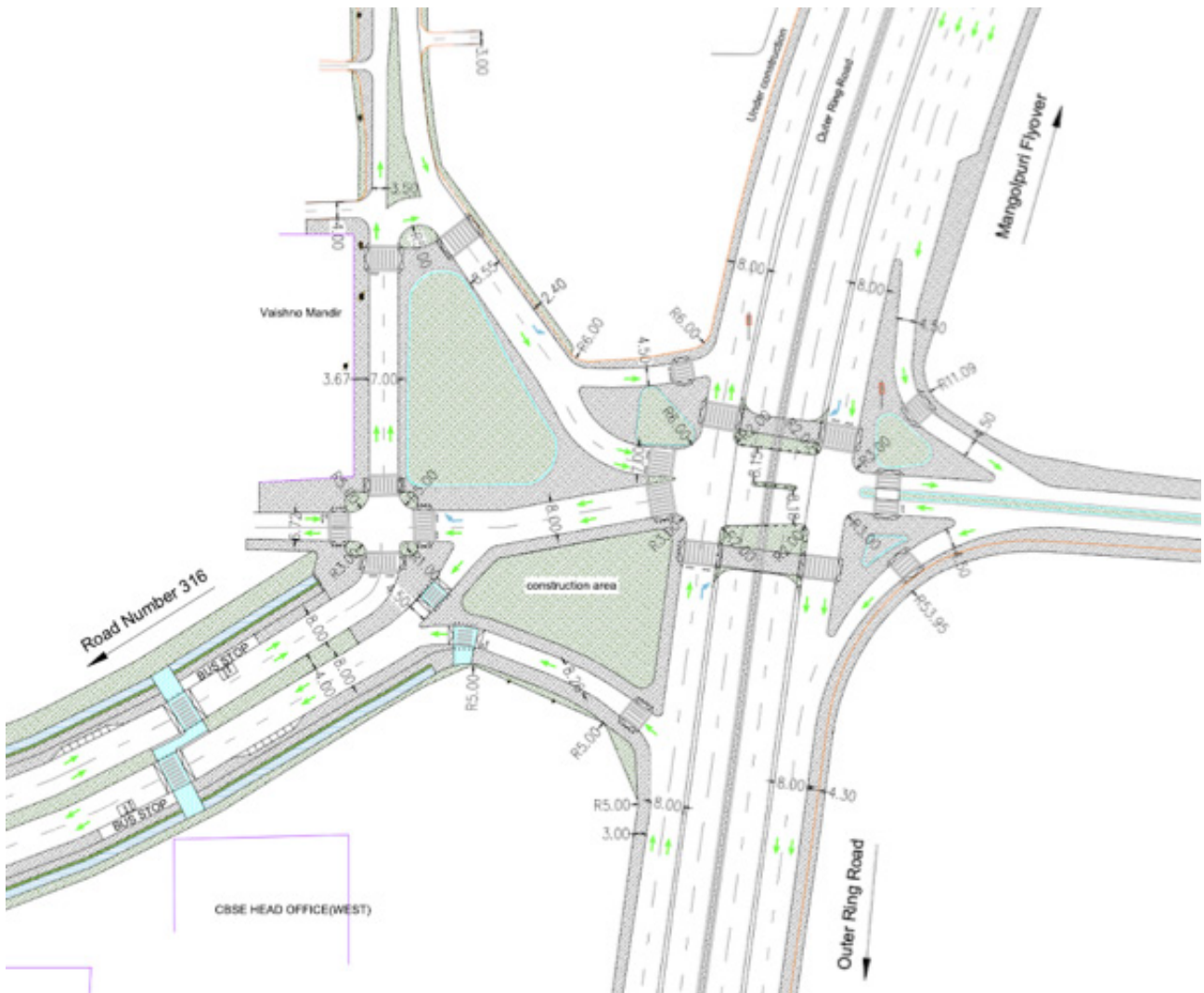
Courtesy: GDCI

Figure 5.4 - Existing condition at Mangolpuri Flyover Junction



Courtesy: GDCI

Figure 5.5 - Existing design of Mangolpuri Flyover Junction



Courtesy: GDCI

Figure 5.6 - Approved design of Mangolpuri Flyover Junction

Powerhouse Pitampura Junction Redesign:

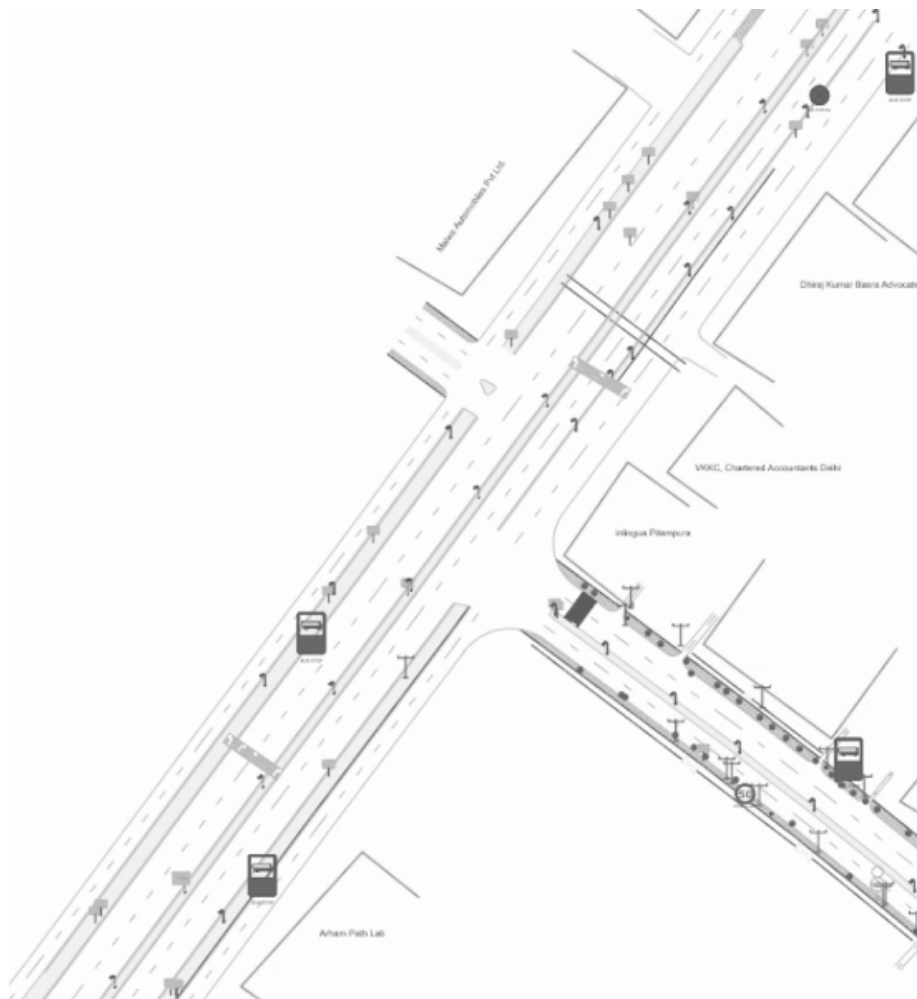
Powerhouse Pitampura junction redesign: Powerhouse Pitampura junction registered five fatal crashes in 2019 and was notified as a crash spot by the DTP. The junction was assigned to GDCI for their technical support in redesigning and making it safer for all road users.

- The above junction includes a high speed and high risk corridor.
- The basic principles of redesign include travel lane alignment, tightening of corner radii, dedicated parking and loading zones, and creation of safe and continuous spaces for the movement of vulnerable pedestrians.
- GDCI prepared the designs for this junction in consultation with the Transport Department, PWD and DTP and were approved by all government agencies for implementation.



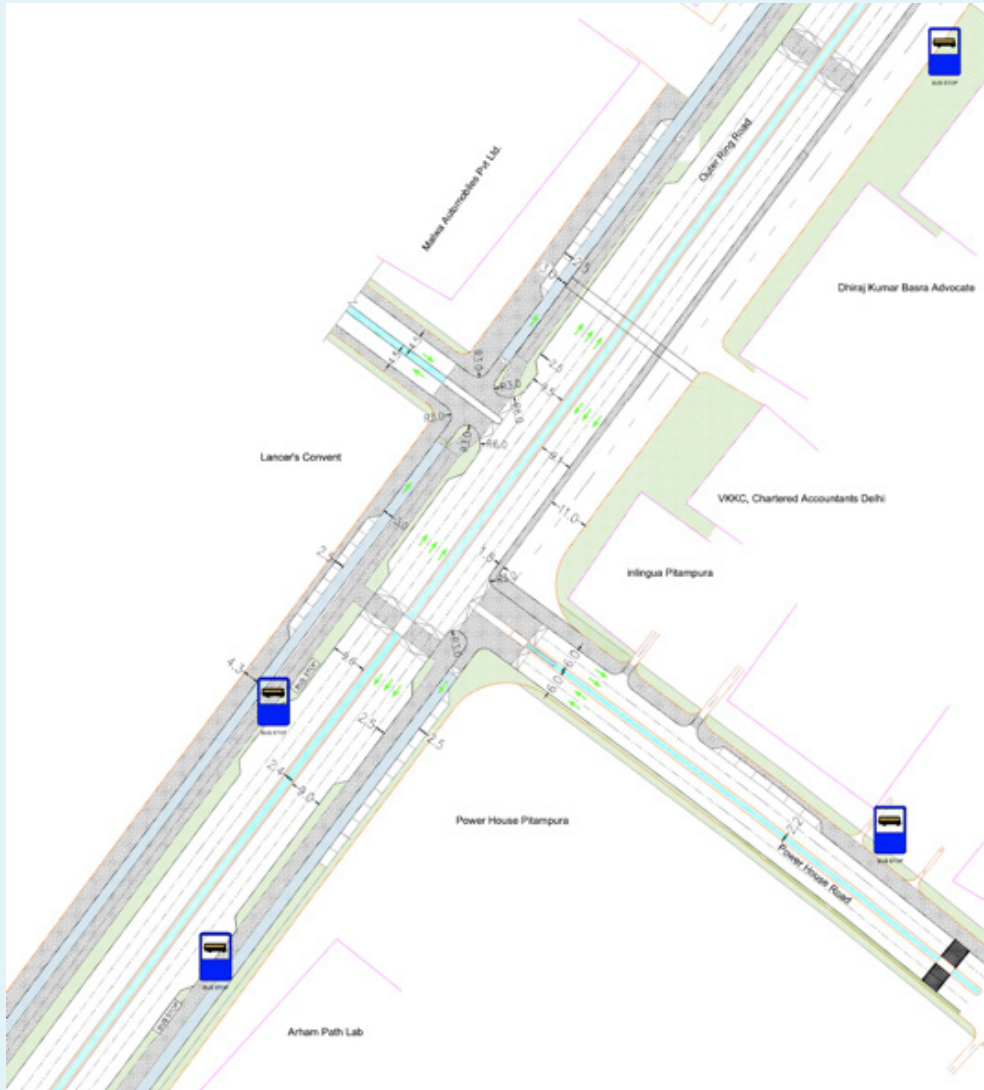
Courtesy: GDCI

Figure 5.7 - Existing condition at Powerhouse Pitampura Junction



Courtesy: GDCI

Figure 5.8 - Existing design of Powerhouse Pitampura Junction



Courtesy: GDCI

Figure 5.9 - Approved design of Powerhouse Pitampura Junction

Neighbourhood Improvement Project

TECHNICAL PARTNER: GDCI

The Municipal Corporation of Delhi (MCD), in coordination with the DTP, Transport Department of NCT of Delhi, and BIGRS, aims to transform the Old Rajendra Nagar area. The objective of this project is to create a child-friendly and pedestrian-friendly neighbourhood and improve road safety for all users.

The Rajender Nagar-zone level proposal focuses on demonstrating projects at selected sites with the principles of developing a slow speed zone for the city, lessons from which can be applied to more such neighbourhoods across the city.

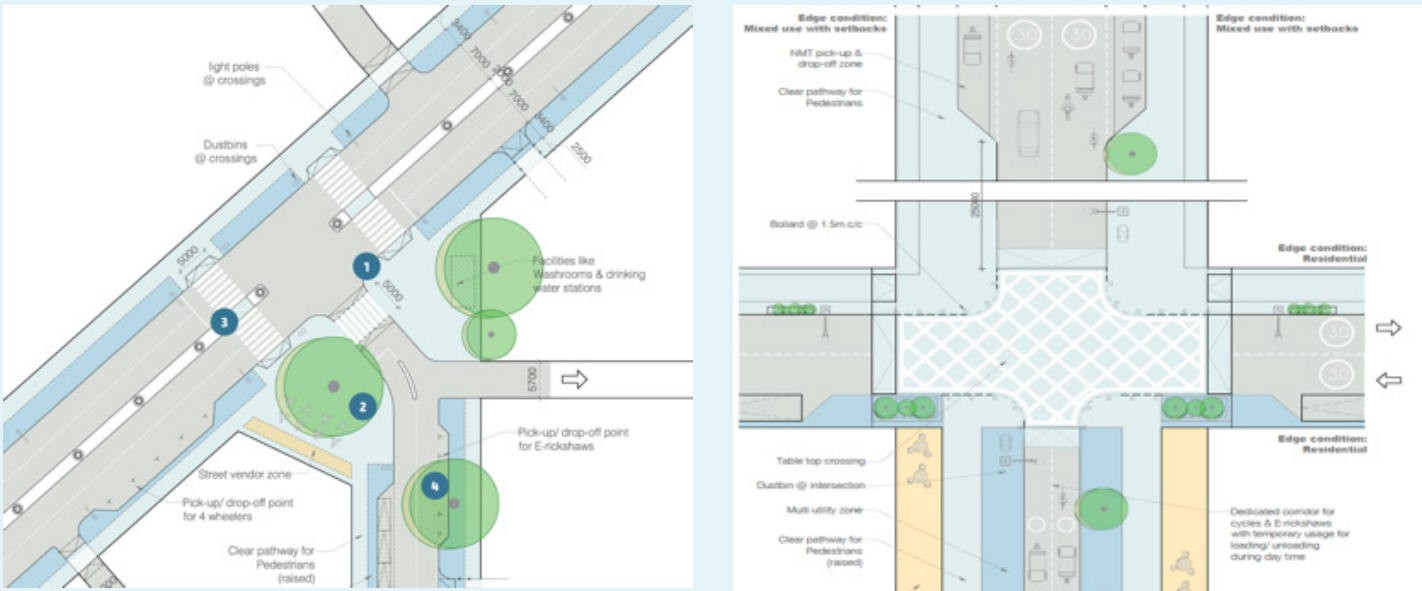
Under this project the following activities are proposed:

1. Road safety interventions to enable traffic and pedestrian movement.
2. Streetscaping and development of public space.
3. Parking management suggestions.

The site analysis and study was carried out in order to develop site specific proposals and carry out interim trials at selected intersections and corridors within the neighbourhood. Along with a detailed neighbourhood level audit and application of street design guidelines based on updated street design guidelines a zone level analysis, interventions were proposed at selected corridors and intersections along with typical street design typologies to be applied contextually across the rest.

Understanding that there are no updated street design guidelines as yet, but the latest ‘Master Plan for Delhi’ (MPD) 2041 provisions, the ‘Unified Traffic and Transportation Infrastructure’ (Planning & Engineering) Centre (UTTIPEC) guidelines, as well as the ‘Global Street Design Guide,’officially endorsed by the PWD and the Transport Department of NCT of Delhi, will be used to inform the designs. This activity is also aligned in upgrading the UTTIPEC guidelines.

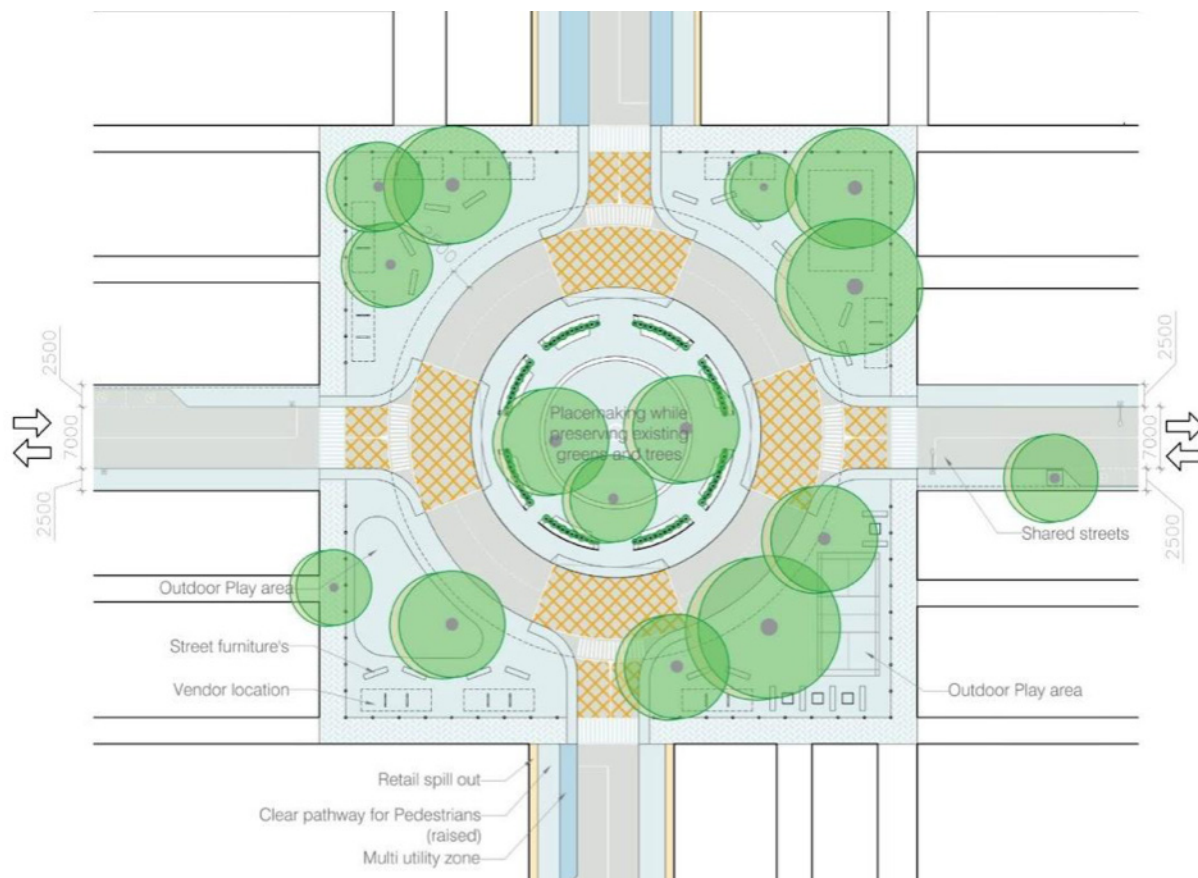
The parking study for the neighbourhood has been conducted using on-site observations and user surveys to determine parking patterns across the week and at different times of the day. The identified needs will be clubbed with the proposed redesigns and movement patterns thereby creating parking management strategies for the various corridors.



Courtesy: GDCI

Figure 5.10 - Conceptual design proposals for selected sites

Currently, a pop-up transformation is being proposed for one of the key identified sites (Gol Chakkar). Along with the pop-up intervention, stakeholder engagement is being undertaken in order to co-create and collaborate with the residents of the area.



Courtesy: GDCI

Figure 5.11 - Detailed design proposal for pilot transformation

Safe School Zones

TECHNICAL PARTNERS: HUMANQIND AND TRIP CENTRE, IIT DELHI

The Transport Department of NCT of Delhi along with HumanQind has selected model schools from all districts of Delhi, with an objective to codesign model safe school zones with school authorities, students and implement interventions in partnership with community and government. These include speed calming measures, vehicular movement plans, safe pedestrian crossings, among others.

The following are the criteria for choosing the schools:

- a. School is located within a 100m catchment of the identified 540 km network;
- b. School is in the proximity of a crash location; and
- c. Pioneers for their district, covering school mix, typology.

13 schools have been selected, each school represents one district, and all have been chosen based on the set criteria.

The 13 schools (eight government and five private schools of which three are girls-exclusive, four boys-exclusive and six co-ed) will impact the safety of over 100,000 students from model schools and their clusters. The unique approach of the project codesign a safe school plan using data, catalyse by working with school children and communities, and lead to change in partnership by the government. The Directorate of Education and PWD are closely involved in supporting project implementation. The Office of the DM and DRSC also play a key role.

Under this project the following activities are undertaken:

1. Full scale implementation of Delhi's first student-friendly street
2. City wide pilot - model safe school zone, pilot of road safety club and data tool; and
3. Safe school zone guideline.



Courtesy: HumanQind

Figure 5.12 - Proposed View: Delhi's 1st Student Friendly Street

Road Improvement Projects

Redesigning of 540 km of Long Roads

IMPLEMENTING GOVERNMENT STAKEHOLDER:
PWD- GOVERNMENT OF NCT OF DELHI,
TECHNICAL PARTNER: WRI

In 2021, Government of NCT of Delhi announced redesigning of 540 km long roads in Delhi, to create safer streets for all road users. This project was launched at a 800 m long pilot stretch between Chirag Delhi and Sheikh Sarai. WRI India is providing technical assistance to PWD in this road revamp project. According to WRI India, “the redesign will help reduce bottlenecks, increase green cover, improve efficiency of the existing space on roads, create planned spaces for vehicles, non-motorised transport and widen footpaths for pedestrians.”

In 2022, 32.5 kms of road stretch was included in the pilot phase. The roads covered under the pilot project are Ring Road from Mayapuri to Moti Bagh junction; Ring Road from AIIMS to Ashram; Vikas Marg-Laxmi Nagar/ Chungi to Karkari More; Narwana Road-Mother Dairy to Punch Mahal Niwas; Britannia Chowk to Outer Ring Road; West Enclave; Pitampura; Wazirpur Depot Crossing (NSP) to Rithala Metro Station; Shivdasपुरi Marg and Patel Road.



Figure 5.13 - Pilot Stretch at Chirag Delhi

30 km Cycle Track

IMPLEMENTING GOVERNMENT STAKEHOLDER: PWD- GOVERNMENT OF NCT OF DELHI

In 2022, in a bid to promote safer roads for cyclists, the Government of NCT of Delhi has planned to develop dedicated cycling tracks on routes frequently used by cyclists. These cycle tracks will be a part of the 540 km road revamp project. Currently, PWD is building cycle tracks on 30 km of road on a pilot basis.

The roads covered under the pilot project are Moolchand to Ashram Flyover; Narwana Road - from Mother Dairy to Panch Mahal; Ring Road from Mayapuri to Moti Bagh junction; Britannia Chowk to Outer Ring Road; Shivdaspuri Marg and Patel Road (from Moti Nagar - T point to Pusa Roundabout); Sewa Dham Road from Road no 63 to UP border with Delhi; Vikas Marg-Laxmi Nagar/ Chungi to Karkari More; Aurobindo Marg; 3 km stretch from Majlis Park to Azadpur; K N Katju Marg; Road No. 58 near Leela Hotel; ShantiVan Road; Lodhi Road opposite India Habitat Centre; Tikri Border Entry; Road no. 59 near Signature Bridge and Nelson Mandela Marg.

Bus Lane Initiative

IMPLEMENTING GOVERNMENT STAKEHOLDER:
TRANSPORT DEPARTMENT AND PWD- GOVERNMENT OF NCT OF
DELHI, TECHNICAL PARTNER: TRIP CENTRE, IIT DELHI

In April 2022, the Transport Department of NCT of Delhi initiated strict enforcement of use of bus lanes by buses and heavy vehicles. Under the bus lane initiative, it was made compulsory for the buses and heavy vehicles to drive in the left most lane of the carriageway, designated as the bus lane.

The bus lane implementation was initiated on a pilot stretch on April 14, 2022 in collaboration with TRIP Centre, IIT Delhi team and in close coordination with PWD and the Transport Department of NCT of Delhi. On-site decision making and pavement marking as per revised designs took almost two months to kick-off the pilot stretch of 4.4 km from Raja Garden to Britannia Chowk. This initiative has resulted in considerable levels of compliance by bus drivers and continuous efforts to remain within the bus lane.



Courtesy: TRIP Centre, IIT Delhi

Figure 5.14 - Bus Lane road markings and signages from Raja Garden to Britannia Chowk

In efforts to strengthen bus lane use enforcement, the Transport Department also increased the capacity of their enforcement department by procuring additional enforcement motorcycles and vans. Buses and heavy vehicles are penalised for driving in lanes other than bus lanes while other vehicles are penalised for parking or halting in these bus lanes.



Figure 5.15 - Enforcement of bus lane use/ Vehicle parked in bus lane being challenged



Figure 5.16 - Procurement of new enforcement vehicles to strengthen the capacity

The bus lane initiative is currently ongoing with the PWD engineers trained for lane markings and the Transport Department of NCT of Delhi enforcing the use of bus lanes through the enforcement department.

The Transport Department also engaged to sensitise the people of Delhi and create awareness about the bus lane rules through a two-month social media activation. It amplified voices including those of bus drivers and commuters.

Strengthening Enforcement

TECHNICAL PARTNER: INTERNATIONAL ASSOCIATION OF CHIEFS OF POLICE (IACP)

Over the past two years, IACP (the enforcement partner of the BIGRS), in coordination with IACP in-country consultant, has delivered a series of online and in-person training, focusing on 'Roadway Safety and Speed Enforcement'. Till date 2,500 police officials have been trained on 'Roadway Safety and Speed Enforcement'. The primary aim of the training has been to improve and enhance road safety knowledge, and strengthen the capability of DTP to enforce laws relating to the four risk factors: speeding, drink-driving, seatbelt use, and correct helmet use. Strengthening the capability of road traffic police to enforce traffic laws is fundamental to deterring road users from violating the laws, reducing harm to both drivers and pedestrians, and curbing unsafe driving behaviour generally.

Apart from this, IACP is also developing Standard Operating Procedures (SOPs) for the DTP to enhance their capability to build and sustain high quality policing for the improvement of road safety in Delhi.



Figure 5.17 and 5.18 - Training of DTP officials by IACP

Strategic Communication and Social Media

TECHNICAL PARTNER: VITAL STRATEGIES

In October 2021, the Transport Department of NCT of Delhi in collaboration with Vital Strategies, a partner under BIGRS, launched a six-month social media activation titled #SadakSurakshitDilliSurakshit to generate awareness and online conversations on four road safety risk factors - speeding, drink-driving, seat-belt wearing and clasped helmet-wearing. The activity was amplified on the social media handles of the Transport Department's RSLA - '@delhiroadsafety'. The #SadakSurakshitDilliSurakshit activity garnered 53 lakh reach on Facebook and 16 lakh engagements. On Twitter, the activity created 8.5 lakh impressions and 1.79 lakh engagements.



Figure 5.19 and 5.20 - Experts share their views on road crash risk factors, as part of the #SadakSurakshitDilliSurakshit activity

The activity was also aimed at sharing crucial information around the road safety risk factors. To this effect, the Transport Department of NCT of Delhi collaborated with global experts including Dr. Abdul Bachani from Johns Hopkins International Injury Research Unit, Dr. Sara Whitehead from Vital Strategies and Professor Geetam Tiwari from TRIP Centre of IIT Delhi to publicise evidence-based information that could help in managing speeding, promoting use of seat-belts and clasped helmets and also the role infrastructure plays in reducing dangerous speeds on public roads.

World Day of Remembrance for Road Traffic Victims

TECHNICAL PARTNER: VITAL STRATEGIES

The Transport Department of NCT of Delhi observed the World Day of Remembrance (WDoR) every year since 2020 to commemorate the lives lost to road crashes. WDoR is recognized globally on the third Sunday of November each year. A social media activation was launched to promote the importance of following safe speeds, wearing seat-belts and clasped helmets and the impact of alcohol on driving.

In 2021, the Transport Department of NCT of Delhi shared recorded video testimonials of road crash victims to address key risk factors including speeding and the correct use of helmets and seat belts. Among the victim testimonials was one by Shashank Shekhar, brother of road crash victim Prem Pradeep, 34. Prem, a software engineer, was severely injured when a speeding driver crashed into him on an expressway in 2017. Waking up from a two-year long coma, Prem was left with lifelong disability, lost his motor functions, including his speech, and was rendered completely dependent on his family for his day-to-day ordinary activities.



Figure 5.21 and 5.22 - Road crash victim testimonials unveiled for World Day of Remembrance in 2021

In another testimonial, 32-year-old Akshat Gupta shared how using a seat-belt saved his life when he was involved in a crash.

Road Traffic Injury Surveillance

TECHNICAL PARTNER: VITAL STRATEGIES AND TRIP CENTRE, IIIT DELHI

The RSLA of the Transport Department of NCT of Delhi with the support of Vital Strategies prepared and publicly released the 2020 and 2021 Delhi Road Crash Fatalities Report. RSLA, set up in 2017, has been mandated by the Supreme Court Committee on Road Safety to collate road injury crash data periodically, analyse the data to identify high risk areas/road stretches and at risk road user types. The 2020 and 2021 crash reports are a step towards enhancing road crash data monitoring in Delhi and presents an analysis of the data extracted from FIRs of the fatal crashes reported in 2020-21.

These reports aim to increase the understanding of the type, times and locations of fatal crashes and the profiles of those involved, so that more targeted interventions can be undertaken to prevent fatal crashes.

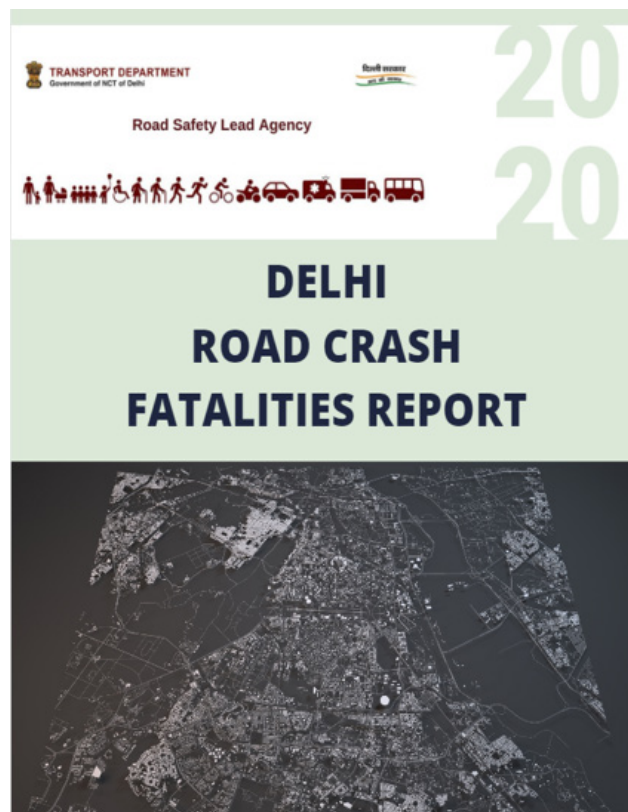


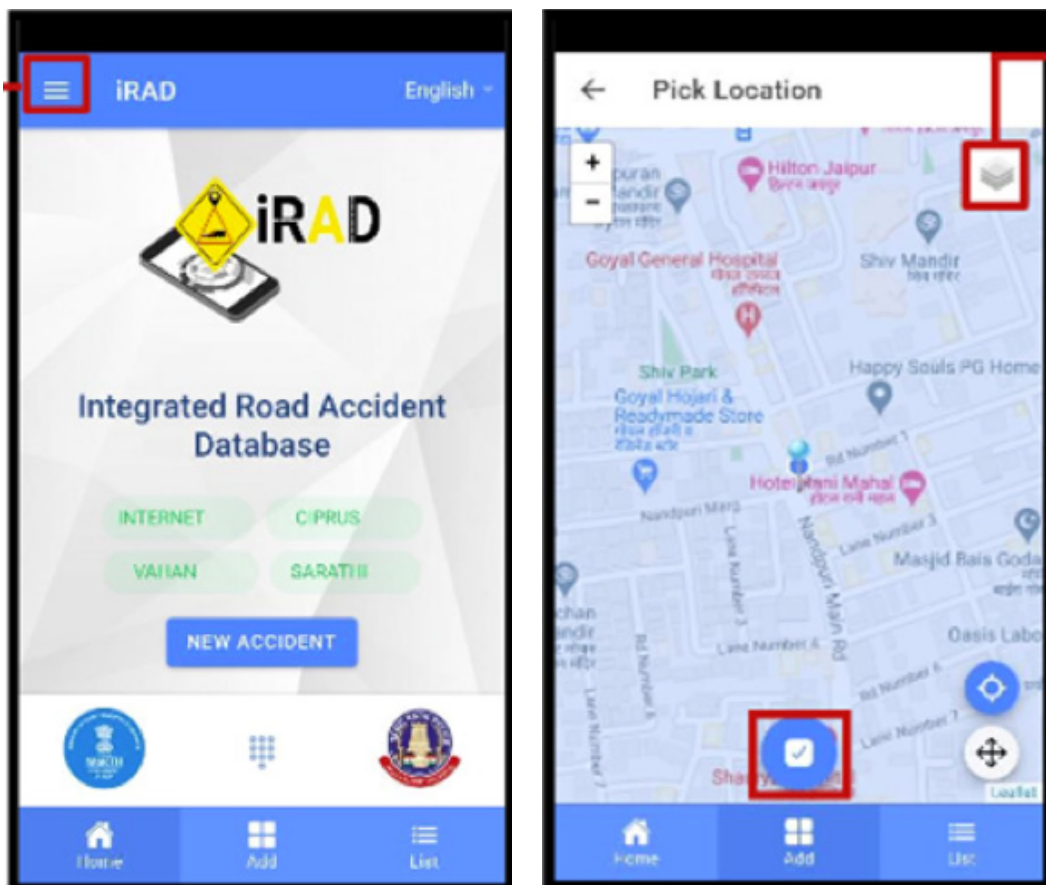
Figure 5.23 and 5.24 - Cover Pages of 2020 and 2021 Road Crash Fatalities Report released by the RSLA

Moreover, to better estimate the burden of road crash injuries in Delhi and describe the types and severity of injuries, the Transport Department of NCT of Delhi, TRIP Centre - IIT Delhi and Vital Strategies have planned a pilot crash linkage exercise. This exercise aims to gather data from multiple sources to better estimate the rate of RTI deaths and injuries.

More specifically, this assessment is a descriptive cross-sectional study using retrospectively collected routine hospital data, ambulance data, post-mortem reports, and Police Control Room (PCR) call records with linkage to already available police road crash records. This assessment will be conducted at six designated trauma centres and 16 post-mortem centres in Delhi. It is expected to take seven months to complete starting from February 2023, to the completion of the analysis by October 2023.

Launching of Integrated Road Accident Database

MoRTH launched iRAD across India in February 2021. iRAD is an app based data management system, jointly developed by National Informatics Centre (NIC) and IIT Madras, which facilitates recording of road crashes at the site on mobile application by field level officers. Once crashes are registered by police, further crash details are entered by the Transport Department, road owning agencies, and Health Department.



Courtesy: National Informatics Centre Services Inc.
Figure 5.25 and 5.26 - Screenshot of iRAD mobile application

After a series of workshops and deliberations, iRAD was launched by the Government of NCT of Delhi on 28th March 2022. Currently, efforts are being made by the Transport Department of NCT of Delhi, police and road owning agencies to upscale use of iRAD. It will also be implemented by government healthcare settings in a phased manner. The training of healthcare officials is also underway.

Road Safety Capacity-Building Trainings

TECHNICAL PARTNERS: WRI AND GDCI

The Transport Department of NCT of Delhi in collaboration with the technical partners launched a series of training sessions for engineers, police officials and journalists.

The following are the trainings conducted to date:

For engineers:

Delhi Street Lab (DSL) Learn - DSL Learn is a capacity-building initiative that aims to train engineers and all relevant stakeholders in building better and safer streets for all road users. Through this initiative, engineers will receive training from various local and international experts in the fields of urban design and planning, traffic engineering, and road safety.



Courtesy: WRI
Figure 5.27 - Launch of DSL Learn

For police officials:

Fundamentals of Safer Streets - This training aims to equip police officials with the key concepts of street design and the importance of moving people rather than moving cars.



Courtesy: GDCI
Figure 5.28 - Homepage of Online Training

Journalists:

Fundamentals of Safer Streets - This training is a combination of written and visual materials, pre-recorded presentations, and interactive exercises. It's designed to bust myths around what safe street design is and equip journalists with industry-specific vocabulary, global and local best practices, and relevant data sets that will help them communicate more effectively around issues of road safety, infrastructure needs, and related activities and interventions.



Courtesy: GDCI

Figure 5.29 - Homepage of Online Training

Press Coverage

Journalists are crucial and active partners in monitoring road safety activities and advocating for life-saving change. The multiple road safety initiatives of the Transport Department of NCT of Delhi have been reported and covered by publications in Delhi. The Transport Department of NCT of Delhi has also aimed to promote the reporting of evidence-based global best practices which will help to make road safety a priority for all.

Home / Cities / Delhi / Making streets safe for all: Delhi govt launches six-month online campaign on road safety

Making streets safe for all: Delhi govt launches six-month online campaign on road safety

A number of important conversations revolving around road safety were taken up at the summit, with officials and experts sharing the stage.

Written by **Ashna Rani** | New Delhi | October 1, 2021 8:22:38 pm

LIVE BLOG

IPL 2021, RR vs MI Live Score Updates: RR struggle for runs as MI move in for kill
1 min ago

Bigg Boss 15 October 5 Episode Live Updates: Karan Kundarra remembers Sidharth Shukla's journey on the show
10 min ago

Karnataka Bengaluru Live Updates: Govt caps attendance for Mysuru Dasara celebrations at 500
10 min ago

UP Lakhimpur Kheri Violence Live Updates: Family of one of farmers killed demands second autopsy; mortal remains of three others cremated
10 min ago

The campaign was launched by Transport Minister Kailash Gahlot at the Road Safety Summit on Friday morning. (Photo: Twitter/@kgahlot)

In an attempt to reduce the number of deaths on the streets, the Transport Department has launched a social media campaign, #SadakSurakshitDilliSurakshit. It is aimed at generating online conversations and awareness on four risk factors – speeding, drunk driving, wearing helmets and seatbelts.

A collaboration between the Delhi government and the Bloomberg Philanthropies Initiative for Global Road Safety, the campaign was launched by Transport Minister Kailash Gahlot at the Road Safety Summit on Friday morning. Over the next six months, @DelhiRoadSafety will raise awareness on Facebook and Twitter.

"The roads belong to pedestrians as much as they belong to people in vehicles. Through our campaign, we hope to increase awareness about evidence-based best practices in road safety and ensure Delhi roads are safer for all road users. Through

Figure 5.30 - Indian Express

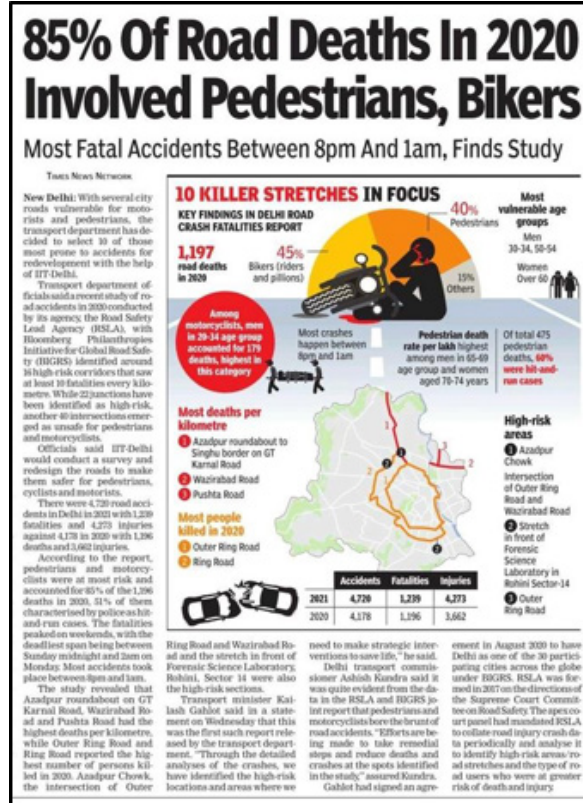
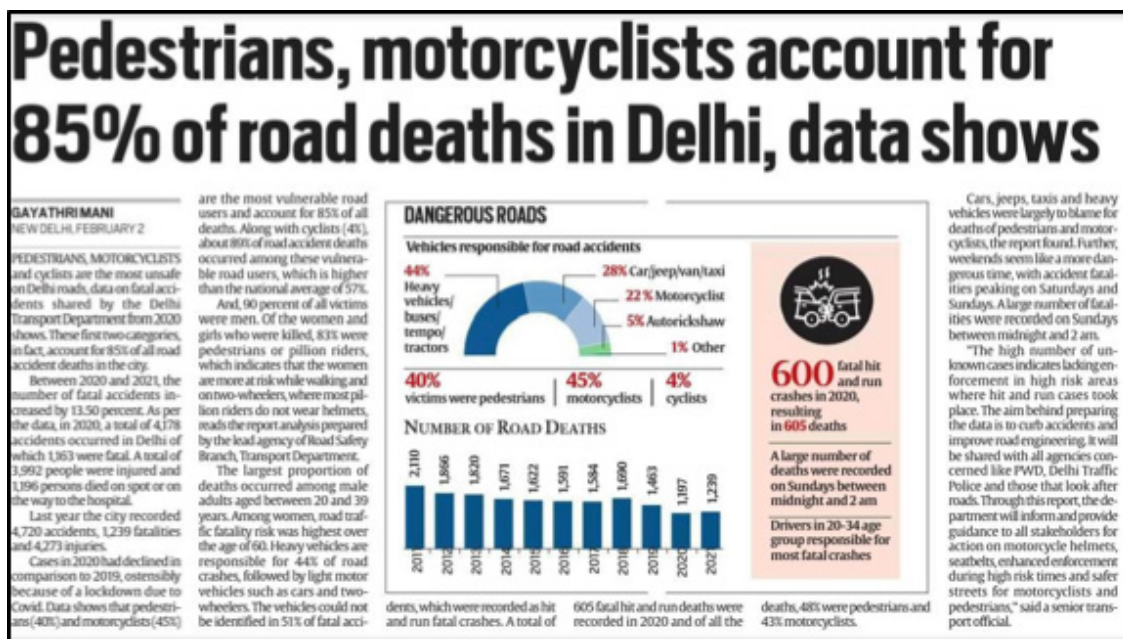


Figure 5.31 - The Times of India



5.32 - Indian Express

Conclusion

The road death rate in Delhi has been declining over the past two decades, however, it still remains much higher than many of its city counterparts. The reduction of traffic injuries has an intrinsic value, as these are preventable, and is indeed a moral imperative of the state. In addition, safer roads can also encourage the use of transport modes that provide greater physical activity and have low or negligent emissions. The risk from road crash injuries is a major barrier to the uptake of sustainable modes of transport such as walking, cycling, and public transport. Therefore, road safety is strongly tied with the objectives of cleaner air and reduced carbon emissions from the transport sector.

It is in this spirit that the Government of the NCT of Delhi, IIT Delhi and Vital Strategies, have prepared this report. By meticulously extracting data from police FIRs, a database of fatal crashes was prepared, covering a period of three years. Using this data, the report provides a descriptive summary of fatal crash patterns in Delhi.

The results give us an insight into the specific actions and policies that can help reduce road crashes. The formation of DRSCs is an important step towards decentralising road safety management within the city. To provide DRSCs with specific action points within their jurisdiction, the report provides district-specific maps highlighting blackspots and some of their key features requiring interventions.

We hope that this is only the beginning of an annual exercise that promotes evidence-based recommendations to improve road safety and that data is effectively used for transformative and meaningful action.

