



**GLOBAL ROAD INFRATECH
SUMMIT & EXPO 2026
5-6 Feb 2026, New Delhi**



TOWARDS SAFER ROADS: THE ROLE OF PEDESTRIAN INFRASTRUCTURE IN REDUCING CRASH SEVERITY

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INTRODUCTION

- Globally, more than half of fatalities are among **Vulnerable Road Users (VRU)**
 - Those unprotected by an outer shield;
 - Pedestrians, cyclists, three-wheelers and motorcyclists of all ages and abilities, namely children, the elderly and people with disabilities (physically or mentally impaired)
- **Pedestrians** are the most vulnerable group in road crashes
 - Globally representing the **second-largest group** of reported fatalities among road user types, accounting for 23% (*Ref: Global Status Report on Road Safety 2023*)
- Pedestrian safety standards are established at national and international levels
- Safety outcomes depend on effective implementation and regulatory compliance
- Non-compliance significantly increases crash risk and injury severity

FIRST ROAD CRASH FATALITY IN THE WORLD

17 August 1896: Bridget Driscoll (44 years)

Hit by a car reportedly travelling at a **“tremendous speed”** (about 4 mph)

Driver: Arthur Edsell, 3 weeks of driving experience

No driving tests or licences existed at the time

Driver reportedly **distracted**, talking to a passenger

6-hour inquest concluded the death was **“Accidental”**

Coroner’s remark: *“This must never happen again”*





Karl Jig

PEDESTRIAN CRASHES



- **Pedestrian Related:** Jaywalking, Distracted walking, Poor visibility



- **Infrastructure Related:** Inadequate crosswalk & sidewalk, poor lighting & lack of pedestrian facilities



- **Driver related:** Distracted driving, Speeding, Impaired driving

- **Road related:** Potholes, Uneven surfaces, Poor roadway design, Faded Road marking

- **Environment related:** Weather condition, Visibility issues, etc.

CRASH SCENARIO IN INDIA & KERALA

Year	India			Kerala		
	Total Crashes	Fatalities		Total Crashes	Fatalities	
		Total	Pedestrian		Total	Pedestrian
2018	4,70,403	157593	22656	40181	4303	1252
2019	4,56,959	158984	25858	41111	4440	1231
2020	3,72,181	138383	23483	27877	2979	720
2021	4,12,432	153972	29124	33296	3429	818
2022	4,61,312	168491	32825	43910	4317	1130



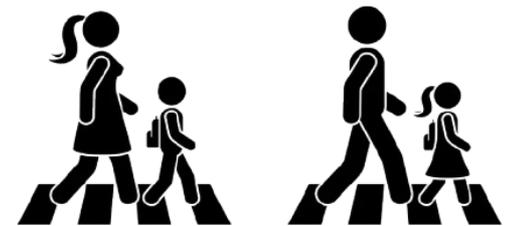
Kerala has a higher percentage of pedestrian fatalities (26.2%) compared to the national average (17.2%)

SCOPE & OBJECTIVES

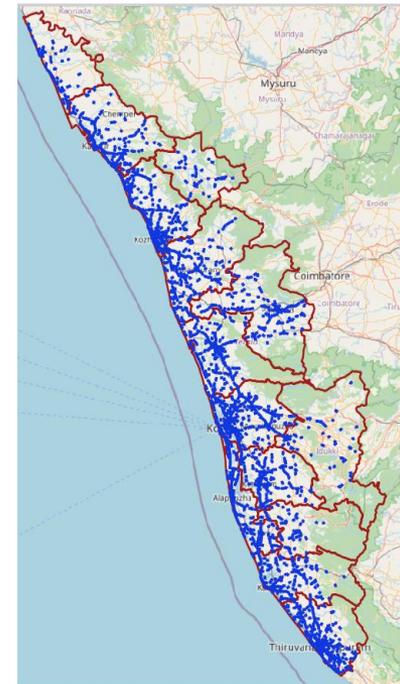
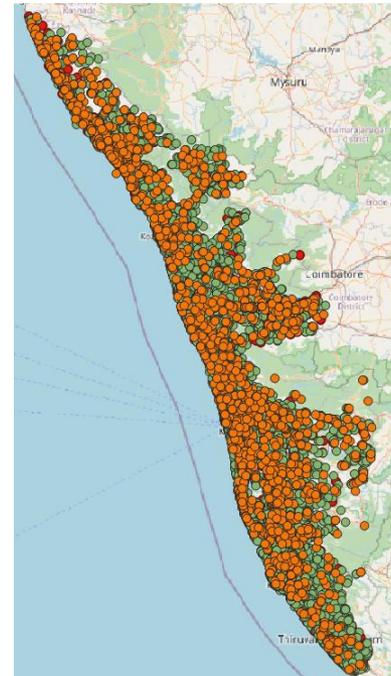
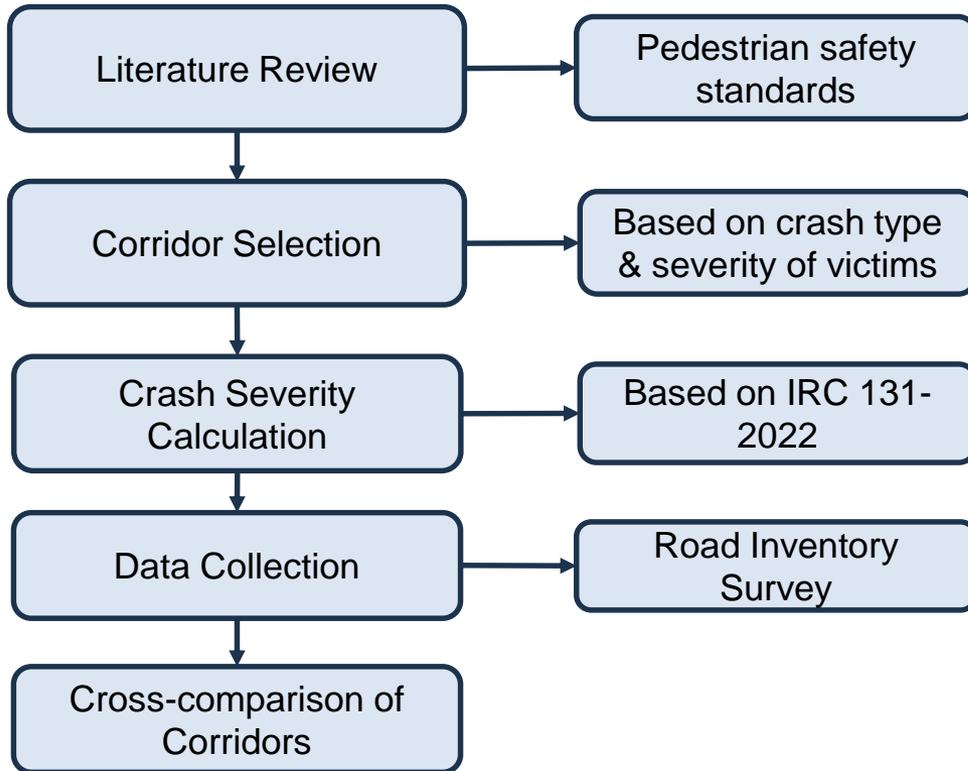
The scope of the study is limited to three selected high-risk corridors in Kerala during the years 2018, 2019, and 2022

Objective

- To assess pedestrian infrastructure and roadway characteristics on high-risk corridors and their compliance with safety standards



METHODOLOGY



Pedestrian Crash data: 2018, 2019 & 2022

Source: State Crime Records Bureau (SCR), Kerala Police

CRITERIA : DEMARCATION OF CORRIDORS



The sliding window method is used to identify the pedestrian vulnerable corridors



As the window slides, if two adjacent fatal crash locations in the same type of road fall within a distance of 500m from each other, the road segment between them forms a vulnerable corridor.



This process is repeated until the distance between two fatal crash locations exceeds 500m.



The distance from the initial crash location to the final location within the same road type and having the inter-distance between adjacent locations not more than 500m, is considered as the length of the corridor

SEVERITY OF PEDESTRIAN CRASHES

Severity Indices (Ref: IRC 131-2022, Guidelines for Identifying and Treating Blackspots)

- Fatal Crashes (A1) – 10 points (N1)
- Grievous Injury Crashes (A2) – 5 points (N2)
- Minor Injury Crashes (A3) – 2 points (N3)

Crash severity Index

$$CSI = A1 \times N1 + A2 \times N2 + A3 \times N3$$

Corridor No.	Fatal Crashes	Grievous Injury Crashes	Minor Injury Crashes	Total Crashes	Crash Severity Index (CSI)	CSI/km
1	12	22	4	39	238	44.2
2	4	17	3	26	131	24.2
3	3	31	11	48	207	32.3

CROSS-COMPARISON OF CORRIDORS

Feature	Specification	Corridor 1	Corridor 2	Corridor 3	Reference
Carriageway (m)	Four lanes: 14	13	13	12	IRC: 86-2019
Median width (m)	Four lanes: 4	3	1 to 4	0.5	IRC: 86-2019
Shoulder width (m)	Four lanes: 3.5	2.5	3.5	1.0	IRC:73- 2023
Footpath width (m)	Minimum: 2	2	1.5	Not Present	IRC: 103-2022
Kerb height (m)	Minimum: 0.15	0.15	0.15	Not Present	IRC: 103-2022
Railing barrier (m)	Height: 0.7-0.9	Not Present	0.9	Not Present	IRC: 103-2022
No. of crosswalks/km	-	5	10	9	---
Spacing of crosswalks (m)	Spacing: 80-150	400-900	100-400	500-1000	IRC: 103-2022
Crosswalk width (m)	Minimum: 3	3	3	3	IRC: 103-2022
Traffic calming measures	10-20m before crosswalk	Not Present	Transverse Bar Markings	Not Present	IRC: 99-2018

Corridor 2 shows the highest compliance resulting in a lower crash severity (CSI = 131)

Corridor 1 recorded 36 crashes with a higher CSI of 203

Corridor 3 reported the highest crashes (44) and a CSI of 207

CONCLUSIONS

- Strong relationship observed between non-compliance with pedestrian safety standards and higher pedestrian crash occurrence
- Corridors with **higher adherence** to safety guidelines exhibit **lower crash incidence** and reduced pedestrian vulnerability
- Corridor 2 demonstrates that **improved compliance with safety standards** can significantly reduce crash severity, supporting the **Safe System approach**
- Improving pedestrian safety requires systematic implementation of standard-compliant crosswalks, footpaths, median barriers, and proven traffic-calming strategies



GLOBAL PLAN

DECADE OF ACTION FOR ROAD SAFETY 2021-2030

UN General Assembly Resolution 74/299 declared a **Decade of Action for Road Safety 2021-2030**, with the target to reduce road traffic deaths & injuries **BY AT LEAST 50%** during that period.

The **Global Plan** describes what is needed to achieve that target, and calls on governments & partners to implement an integrated **SAFE SYSTEM APPROACH**.

WHAT TO DO?

- Multimodal transport & land-use planning
- Safe road infrastructure
- Safe road use
- Safe vehicles
- Post-crash response

HOW TO DO IT?

- Legal frameworks
- 30 Speed management
- Gender
- Technologies
- Capacity development
- Focus on low- and middle-income countries

WHO TO DO IT?

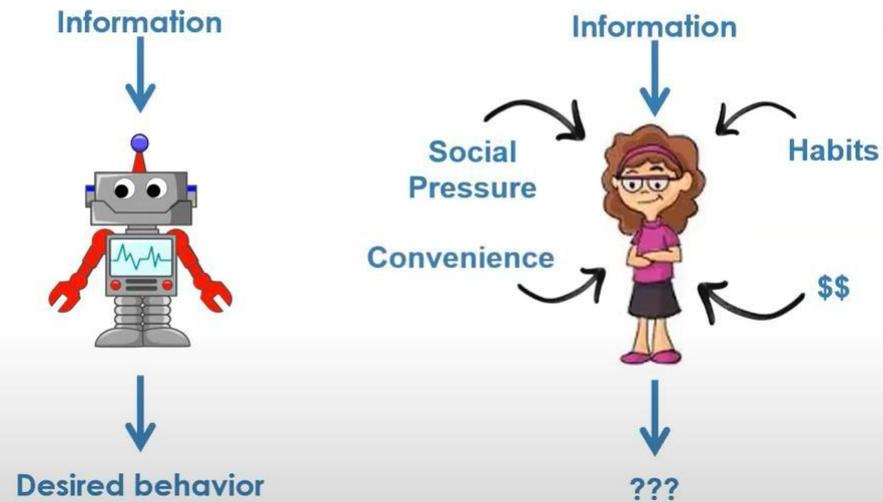
- Financing
- Government
- Civil society
- Private sector
- Funders
- UN agencies

For further information, visit: <https://www.roadwitness.org/>

World Health Organization | United Nations

DECADE OF ACTION FOR ROAD SAFETY 2021-2030

HUMANS ARE NOT ROBOTS

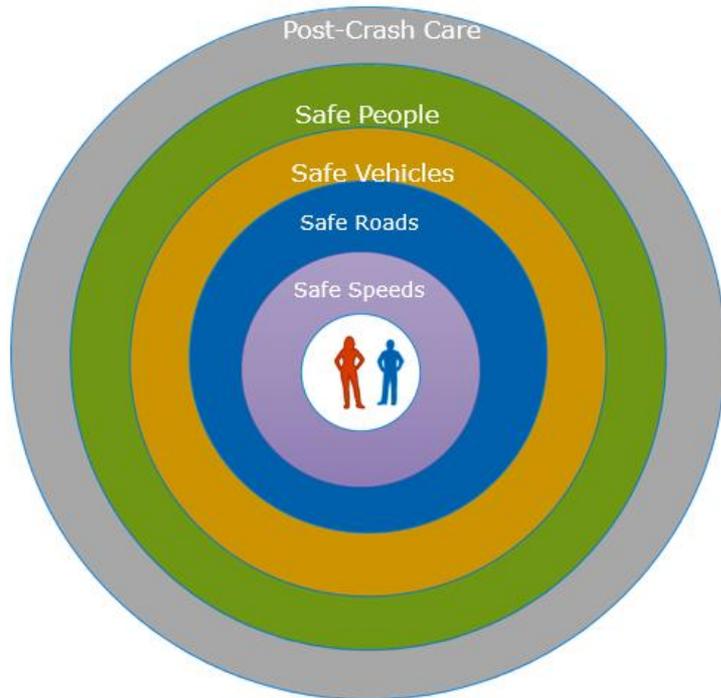


Humans make mistakes

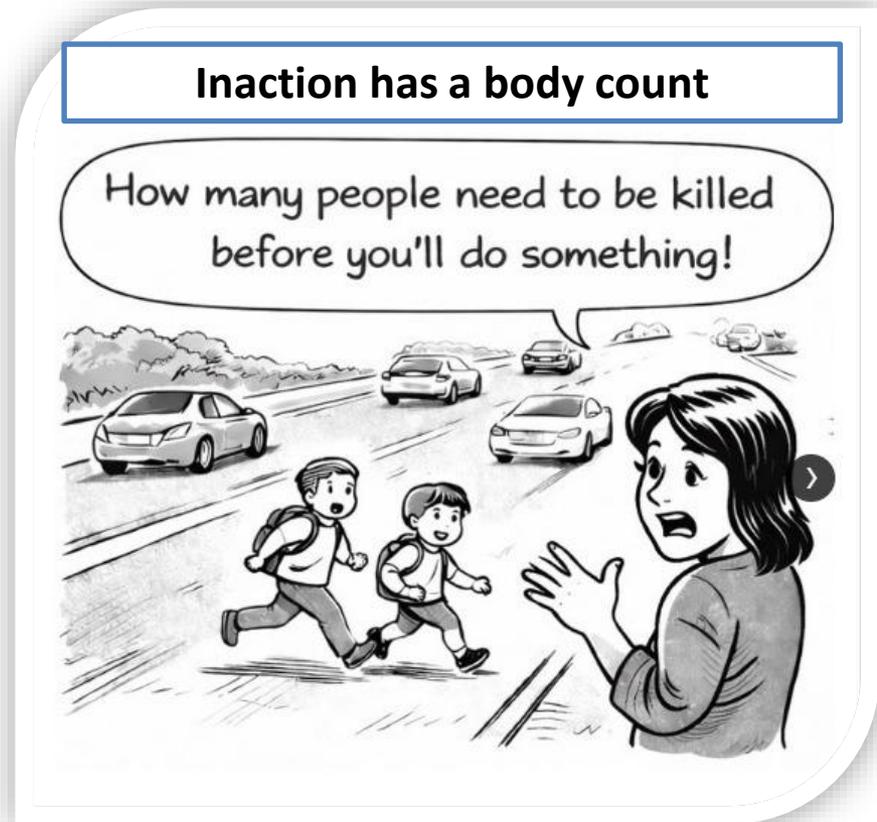
BUILDING A SAFE AND FORGIVING ROAD SYSTEM

Layered protection around people keeps them safe from death and serious injuries on the road

If one part of the system fails, the other parts will still protect people



Based on Figure 1: <http://www.towardszerofoundation.org/thesafesystem/>





Mistakes are inevitable – deaths and serious injuries from road crashes are not

Safe Speed Thresholds and Collision Scenarios

30 km/hr

- Possibility of a collision between a vulnerable road user and a passenger



50 km/hr

- Possibility of a right-angle collision between passenger vehicles



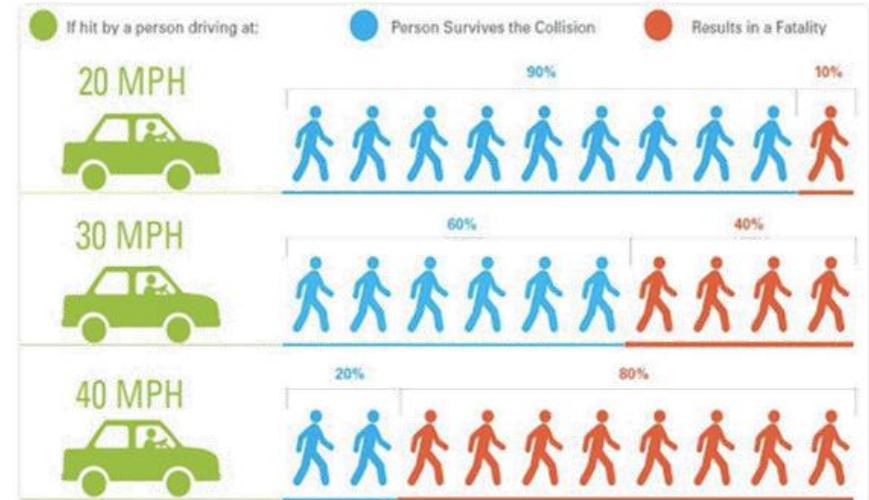
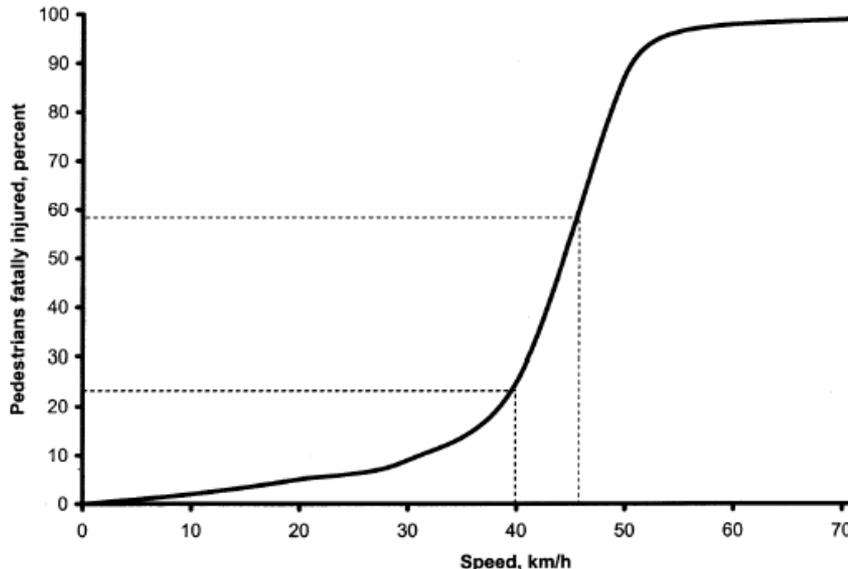
70 km/hr

- Possibility of a head on collision between passenger vehicles



≥70 km/hr

- No possible side or frontal impact between vehicles or impacts with vulnerable road user impacts





Helsinki has gone a year without a road death

Helsinki has achieved a full year without a single road traffic fatality, a milestone reached in July 2025. City officials attribute this success to long-term implementation of the “Vision Zero” strategy, including reducing speed limits (over half of streets now capped at 30 km/h), redesigning streets for pedestrian and cycling safety, improving public transport, and stricter enforcement of traffic laws.

sanB

To err is human; to
forgive, divine

Let's make our Roads Safer



Thank you

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24

REFERENCES

1. F. Haque, F. A. Kidwai, and M. F. U. Haq, “A systematic review of proactive approach for pedestrian safety at intersections,” *Transportation Research Part F: Traffic Psychology and Behaviour*, vol. 109, pp. 792–808, 2025, doi: 10.1016/j.trf.2025.01.013.
2. World Health Organization, *Global Status Report on Road Safety 2023*. Geneva, Switzerland: WHO, 2023.
3. Ministry of Road Transport and Highways (MoRTH), *Road Accidents in India 2022*, Government of India, New Delhi, India, 2022.
4. Kerala Police, *Road Accident Analysis Kerala–2022*, Thiruvananthapuram, India, 2023.
5. V. S. S. Kumar, K. R. Jinumol, E. Sam, and M. V. L. R. Anjaneyulu, “A corridor-level approach for demarcation of pedestrian vulnerability,” in *Proceedings of the 2024 Australasian Road Safety Conference*, Hobart, Tasmania, Australia, Sept. 30–Oct. 3, 2024, pp. 281–284.
6. H. Alavi and B. Corben, “Developing a practical guide to achieve Safe System outcomes for pedestrians,” in *Proceedings of the 2016 Australasian Road Safety Conference*, 2016, pp. 6–8.
7. Institute for Transportation and Development Policy, *Footpath design: A guide to creating footpaths that are safe, comfortable, and easy to use*. New York, NY, USA: ITDP, 2014.
8. Indian Roads Congress, *Geometric design standards for urban roads (IRC: 86-2019)*, New Delhi, India, 2019.
9. Indian Roads Congress, *Geometric design standards for rural highways (IRC: 73-2023)*, New Delhi, India, 2023.
10. Indian Roads Congress, *Guidelines for pedestrian facilities (IRC: 103-2022)*, New Delhi, India, 2022.
11. Indian Roads Congress, *Guidelines for traffic calming measures (IRC: 99-2018)*, New Delhi, India, 2018.