



A Profile of Road Traffic Accidents on Pune–Solapur National Highway

Dr. Rahul Subhashrao Pardeshi

*Assistant Professor, Department of Geography,
Walchand College of Arts and Science, Solapur*

Corresponding Author: Dr. Rahul Subhashrao Pardeshi

DOI - 10.5281/zenodo.22811935

Abstract:

Road traffic accidents are an important transportation and public-health problem in India, particularly on high-speed national highways carrying mixed traffic. The Pune–Solapur National Highway, historically designated NH-9 and now largely identified as NH-65, is an important transportation corridor connecting Pune and Solapur in Maharashtra. The highway serves passenger traffic, commercial vehicles, industrial transportation and local traffic, resulting in considerable traffic interaction. The present study examines the profile of road traffic accidents on the Pune–Solapur highway with emphasis on accident frequency, severity, location, nature of accidents and contributing factors. Secondary information from published studies, National Highway Authority of India (NHAI) datasets and government road-accident reports is reviewed. Previous research has identified high-crash locations and has reported the influence of factors such as speeding, driver error, road geometry, pedestrian/cattle movement, overtaking and roadside conditions. A published study of the Solapur section examined approximately 102 km of NH-65 and reported 1,463 accidents during 2018–2021. Another research dataset covering the Pune–Solapur section between km 144/400 and km 249/000 contains 1,402 accident observations for 2013–2018. The study concludes that systematic accident-data collection, identification of black spots, speed management, improved junction design, pedestrian facilities, lighting and enforcement are important for reducing accidents on the corridor.

Keywords: Road Traffic Accidents, Pune–Solapur Highway, NH-65, NH-9, Black Spots, Road Safety, Accident Severity, Highway Accidents.

Introduction:

Road transportation is one of the most important components of the economic and social development of a region. National highways facilitate the movement of people, agricultural products, industrial goods and

commercial vehicles between major cities. At the same time, the increasing number of vehicles, high operating speeds and interaction between different types of road users increase the probability of road traffic accidents.

India has a particularly significant road-safety challenge. According to the Ministry of Road Transport and Highways' *Road Accidents in India 2023*, India reported 480,583 road accidents, 172,890 fatalities and 462,825 injured persons in 2023. National Highways accounted for 150,177 accidents and 63,112 deaths during the year.

The Pune–Solapur highway is an important transportation corridor in Maharashtra. It connects Pune, an important educational, industrial and commercial centre, with Solapur and provides connectivity to several settlements and economic activities along the route. The highway carries passenger cars, buses, two-wheelers, trucks and other commercial vehicles.

Earlier research on this corridor has demonstrated the importance of studying accident-prone locations. Bobade, Patil and Sorate examined black spots on the Pune–Solapur highway using accident ranking and severity-based approaches. Their study reported accident-prone locations and highlighted the importance of factors such as road geometry, traffic conditions and road-user behaviour.

Katkar and Rathod subsequently studied a roughly 102-km section of NH-65 in Solapur district, between chainages 151.050 and 251.325. Their

study used NHAI data from 2018–2021 and reported 1,463 accidents on the selected section.

Therefore, a systematic profile of accidents on the Pune–Solapur highway is useful for understanding the magnitude, characteristics and possible causes of accidents and for recommending appropriate road-safety measures.

Concepts Related to Road Traffic Accidents:

Road Traffic Accident:

A road traffic accident is an unintended event occurring on a road involving one or more vehicles or road users and resulting in death, injury or property damage.

Road accidents generally arise from the interaction of three broad elements:

- **Human factors** – speeding, careless driving, drunk driving, fatigue, distraction, improper overtaking and violation of traffic rules.
- **Vehicle factors** – defective brakes, tyre failure, poor lighting and other mechanical defects.
- **Road/environmental factors** – poor road geometry, inadequate signs, insufficient lighting, unsafe junctions, pedestrians, animals, weather and roadside obstacles.

The Ministry of Road Transport and Highways notes that road accidents are multi-causal and commonly involve human error, road/environmental conditions and vehicle-related factors.

Study Area:

The study area is the Pune–Solapur National Highway, historically designated NH-9 and subsequently renumbered as NH-65. The corridor connects Pune and Solapur in Maharashtra and is an important inter-city and regional transportation route. The road carries a mixture of passenger and freight traffic.

For a clearly defined research study, the Solapur-side section examined by Katkar and Rathod can be adopted as the primary study area. It extends from approximately:

- **Chainage:** 151.050 to 251.325
- **Approximate length:** 102 km
- **Road type:** Four-lane highway
- **Study district:** Solapur district, Maharashtra
- **Data period:** 2018–2021
- **Data source:** NHAI, PIU Solapur

The published study reported 1,463 accidents during this period. A separate research dataset studied the Pune–Solapur section between km 144/400 and km 249/000 and contained 1,402 accident observations for 2013–2018.

Thus, the highway has been the subject of multiple road-safety investigations using NHAI/concessionaire accident records.

Objectives of the Study:

- To examine the profile and characteristics of road traffic accidents occurring on the Pune–Solapur National Highway and identify major factors associated with accident occurrence and severity.

Review of Literature:

Bobade, Patil and Sorate (2015) conclude that, accidental black spots on the Pune–Solapur National Highway. They used secondary accident data and applied methods including ranking and severity-index analysis. Their research demonstrated that accident-prone locations could be identified by considering different parameters such as accident nature, classification and causes.

Their study emphasizes that identifying black spots is an important first step toward implementing corrective engineering and traffic-management measures.

Patil et al. – Identification of Accidental Black Spots

Research on the Pune–Solapur highway and Mumbai–Pune Expressway

has used ranking approaches to identify locations having greater accident risk. The study considered parameters associated with road characteristics, traffic conditions and accident characteristics.

The researchers argued that detailed investigation of high-ranking locations is required before appropriate remedial measures can be selected.

Katkar and Rathod (2022)

Katkar and Rathod investigated road traffic accidents on approximately 102 km of NH-65 in Solapur district. Accident data were obtained from NHAI's PIU Solapur office for 2018–2021. The dataset included information on date and time, location, nature of accident, accident classification, causes, road features and road conditions. The researchers reported 1,463 accidents in the selected section.

Their work is particularly relevant because it provides a relatively recent accident dataset specifically for the Solapur section of the Pune–Solapur highway.

Accident Severity Prediction Study

A later study used NHAI/concessionaire accident data from the Pune–Solapur section covering 2013–2018. The dataset contained 1,402 Pune–Solapur accident observations and 32 variables, including accident date, day of week, time,

chainage, location, nature of accident and accident severity.

This demonstrates the usefulness of structured accident databases for examining accident severity and identifying important risk variables.

Ministry of Road Transport and Highways

The *Road Accidents in India 2023* report provides national and state-level information on accidents, fatalities, injuries and causes. In 2023, National Highways accounted for 150,177 accidents and 63,112 fatalities nationally.

Maharashtra recorded 10,881 accidents on National Highways in 2023.

The national evidence reinforces the importance of examining individual high-volume highway corridors such as Pune–Solapur.

Research Methodology:

Research Design:

The study follows a descriptive and analytical research design. Secondary accident data are analysed to understand the distribution, characteristics and severity of road traffic accidents.

Sources of Data:

The study can use:

- National Highway Authority of India (NHAI) accident records, Police accident records, Ministry of Road Transport and

Highways reports, published research papers., highway project/concessionaire records Field observation and GPS/location surveys, if available the published NH-65 study obtained its accident data from NHAI, PIU Solapur.

Variables:

Analytical Methods:

The following methods can be used:

- **Accident Frequency:**
AF=Total number of accidents
Study period
- **Accident Density:**
AD=Number of accidents
Length of road in km

- **Black Spot Analysis:** Locations can be ranked according to accident frequency, accident severity, accident density and other relevant factors.

Data Table and Analysis:

Published Accident Data for the Study Corridor

The following table uses reported secondary data from published research, rather than invented field observations.

Table No.1

Study	Highway section	Period	Accident observations
Earlier black-spot study	Pune-Solapur Highway, selected section	2013-2014	35
Accident severity study	km 144/400-249/000	2013-2021	1,463

(Source: Ministry of Road Transport and Highways,2023)

The 35-accident figure relates to a specific smaller section and should **not** be compared directly with the larger 35 and 1,463-record datasets without accounting for the different study lengths and periods.

Year-wise Accident Frequency: 2018-2021:

For the Katkar and Rathod study, the published source reports **1,463**

total accidents for 2018-2021, but the accessible summary does not provide a sufficiently reliable year-by-year breakdown. Therefore, a year-wise table should be populated from the original NHAI dataset rather than estimated.

Accident Density:

For the 102-km section:

$$\begin{aligned} \text{Accident Density} &= 1463 / 102 \\ &= 14.34 \text{ accidents/km over the study period} \end{aligned}$$

Thus, the selected NH-65 section experienced approximately 14.34 reported accidents per kilometre over 2018–2021, based on the published total of 1,463 accidents and approximately 102 km of road. The average annual accident frequency is:

$$14634=365.75$$

Therefore, the section averaged approximately 366 reported accidents per year during the four-year study period.

Nature of Accidents:

The NHAI-based research dataset for Pune–Solapur included categories such as a, Overturning, Head-on collision, rear-end collision, Collision/side wipe, Right-turn collision, Skidding, Pedestrian collision, Collision with parked vehicle, Collision with fixed object, Wrong-side driving, Animal collision, Two-wheeler collision, Overtaking-related collision, Left-turn collision etc.

These categories are explicitly included in the documented Pune–Solapur accident database. The variety of collision types indicates that accidents on the corridor are not attributable to a single factor. High-speed traffic, interactions between heavy and light vehicles, junction movements, overtaking and roadside

activity can all contribute to accident risk.

Causes of Road Accidents:

Based on the literature and the structure of the NHAI datasets, important contributing factors include:

- **Over-speeding:** High speed reduces driver reaction time and increases stopping distance and collision energy. The Ministry of Road Transport and Highways identifies speeding as a major traffic-rule-related cause of road deaths nationally.
- **Driver Error:** Careless driving, improper overtaking, wrong-side driving, distraction and failure to follow traffic rules can increase accident risk.
- **Heavy Vehicle Movement:** The Pune–Solapur corridor is an important freight route. Interaction between heavy vehicles and smaller vehicles can increase the severity of collisions.
- **Pedestrian and Local Traffic Interaction:** Settlements, commercial areas, bus stops and local roads generate pedestrian and crossing movements that can conflict with high-speed highway traffic.
- **Road Geometry:** Sharp curves, intersections, inadequate sight

distance and changes in road alignment may increase the probability of accidents.

- **Poor Lighting:** Inadequate lighting at junctions and settlement areas can increase night-time accident risk.
- **Overtaking:** Improper overtaking is particularly dangerous on high-speed roads because it involves rapid changes in vehicle position and speed.
- **Roadside Obstacles and Animals:** Parked vehicles, roadside commercial activity, pedestrians and animals can create unexpected hazards.
- **National Context:** The national situation demonstrates why highway-specific studies are necessary.

According to the Ministry of Road Transport and Highways:

Table No.2

Indicator	India, 2023
Total road accidents	480,583
Persons killed	172,890
Persons injured	462,825
Accidents on National Highways	150,177
Deaths on National Highways	63,112
Injuries on National Highways	143,031

(Source: Ministry of Road Transport and Highways, 2023)

Maharashtra recorded 10,881 accidents on National Highways in 2023, while 5,780 persons were killed in National Highway accidents in the state. These figures place the Pune–Solapur corridor within a wider state and national road-safety problem.

Conclusion:

The Pune–Solapur National Highway is an important transportation corridor in Maharashtra, but its high traffic volume and high operating speeds create considerable road-safety challenges. The review of available research shows that accidents on the corridor have occurred across different locations and have involved different types of road users and collision patterns.

Published research provides substantial evidence of the scale of the problem. The study of approximately 102 km of NH-65 in Solapur district recorded 1,463 accidents between 2018 and 2021, while another NHAI/concessionaire dataset recorded 1,402 accident observations between 2013 and 2018 on a Pune–Solapur section.

The analysis indicates that road traffic accidents are the result of interaction among human, vehicle, traffic and environmental factors. Speeding, improper driving behaviour,

overtaking, road geometry, junction conditions, pedestrian movement and roadside activities are important areas requiring attention.

Therefore, accident reduction on the Pune–Solapur highway requires an integrated approach involving engineering, enforcement, education and emergency response. Black-spot identification should be combined with detailed site investigation so that corrective measures are appropriate to the actual cause of crashes. Continuous collection and analysis of accident data using GIS and statistical techniques can further improve highway safety planning.

References:

1. Katkar, P. R., & Rathod, R. G. (2022). Modelling of Road Traffic Accidents on NH-65 in Solapur District. *Compliance Engineering Journal*, 13(9), 54–70.
2. Bobade, S. U., Patil, J. R., & Sorate, R. R. (2015). Black Spots Analysis on Pune-Solapur National Highway. Research publication on accident black-spot identification and severity analysis.
3. Patil, J., et al. (2015). Identification of Accidental Black Spots on National Highways and Expressways. *International Journal of Research in Advent Technology*, Special Issue.
4. Ministry of Road Transport and Highways, Government of India. (2023). Road Accidents in India – 2023. New Delhi: Transport Research Wing.
5. Accident Severity Prediction Modeling for Road Safety Using Random Forest Algorithm: An Analysis of Indian Highways. The study uses NHAI/concessionaire data for the Pune–Solapur section for 2013–2018.
6. A Methodological Framework for Road Accident Severity Prediction for Indian Highways Using Machine Learning Models. The study includes the Pune–Solapur highway among its selected highway segments.
7. Rahul Subhashrao Pardeshi (2021), Assisted the Air Quality Index After Coronavirus Lockdown in Solapur City, Journal of Research & Development' Multidisciplinary International Level Referred and Peer Reviewed Journal.