

Study and Review of Pedestrian Accident Factors and Safety Issues on Urban Roads

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ABSTRACT

Pedestrian safety is an important part of urban transportation planning because pedestrians are among the most vulnerable road users. Rapid urbanization, increasing traffic volume, mixed traffic conditions, inadequate footpaths, unsafe road crossings, poor street lighting, traffic-rule violations, and improper parking can increase the risk of pedestrian accidents. Akola, like many growing urban areas, experiences interaction between pedestrians, two-wheelers, cars, buses, auto-rickshaws, and other vehicles on busy roads. This micro project studies the major factors responsible for pedestrian accidents on urban roads in Akola and identifies the safety issues faced by pedestrians. The study considers road conditions, traffic behaviour, pedestrian behaviour, vehicle-related factors, environmental conditions, and shortcomings in traffic management. It also examines the difficulties faced by children, elderly people, persons with disabilities, and other vulnerable pedestrians. The project suggests measures such as proper footpaths, pedestrian crossings, adequate street lighting, traffic calming, effective enforcement of speed limits, removal of roadside encroachments, improved road signs, pedestrian signals, and public awareness campaigns. The study concludes that pedestrian accidents can be reduced considerably through better road infrastructure, responsible road-user behaviour, effective enforcement, and systematic urban transportation planning.

Keywords :- Pedestrian Safety, Pedestrian Accidents, Urban Roads, Road Safety, Traffic Management, Accident Factors, Road Traffic, Pedestrian Crossing, Footpaths, Zebra Crossing, Traffic Signals, Driver Behaviour, Speeding, Road Infrastructure, Street Lighting, Road Safety Measures, Traffic Awareness, Urban Traffic, Accident Prevention, Sustainable Transportation.

1. INTRODUCTION

Walking is one of the most common and economical modes of transportation in urban areas. People walk to schools, colleges, workplaces, markets, bus stops, railway stations, hospitals, and residential areas. Despite its importance, pedestrian movement is often not given sufficient priority in road planning. Akola is an important urban centre in Maharashtra with busy commercial areas, educational institutions, residential neighbourhoods, markets, and major connecting roads. The increasing number of motor vehicles and the interaction between different types of road users can create pedestrian safety problems. Pedestrians require safe and continuous walking facilities, suitable road crossings, adequate lighting, and sufficient time to cross roads. When these facilities are missing or poorly maintained, pedestrians may be forced to walk on the carriageway or cross roads at unsafe locations. Therefore, studying pedestrian accident factors and safety issues in Akola is useful for identifying problem areas and suggesting practical measures for improving urban road safety.

2. WHY DO PEDESTRIAN ACCIDENTS OCCUR?

Pedestrian accidents generally occur because of a combination of human, vehicle, road and environmental factors.

3. FACTORS AND ISSUES RESPONSIBLE FOR PEDESTRIAN ACCIDENTS

- Human Factors
- Speeding by drivers.
- Drunk or impaired driving.
- Mobile-phone use while driving or walking.
- Failure to observe traffic signals.
- Unsafe pedestrian crossing behaviour.
- Lack of knowledge of traffic rules.
- Fatigue and lack of concentration.
- Road Infrastructure Factors
- Missing or damaged footpaths.

- Lack of pedestrian crossings.
- Poorly designed intersections.
- Inadequate pedestrian signals.
- Lack of road markings.
- Poor drainage causing pedestrians to walk on the carriageway.
- Encroachment on footpaths.
- Vehicle Factors.
- Excessive speed.
- Poor braking condition.
- Poor lighting.
- Large blind spots, especially in heavy vehicles.
- Poor visibility of pedestrians at night.



Figure1. Agrasen Chowk.

4. DETAILED STUDY

Pedestrian safety depends on the interaction between pedestrians, vehicles and road infrastructure.

4.1 Pedestrian Behaviour Pedestrians may cross roads without using designated crossings, suddenly enter the road, ignore traffic signals or use mobile phones while walking. Such behaviour increases the possibility of accidents.

4.2 Driver Behaviour Driver behaviour is an important factor. Speeding, distracted driving, failure to yield, dangerous overtaking and violation of traffic signals can cause serious pedestrian collisions.

4.3 Footpath Conditions A continuous and obstruction-free footpath provides a safe space for pedestrians. However, damaged footpaths, parked vehicles, shops and other encroachments often force pedestrians to walk on the road.

4.4 Pedestrian Crossings Zebra crossings, pedestrian signals, pedestrian bridges and underpasses can provide safer road-crossing opportunities. Their effectiveness depends on proper design, visibility and public use.

4.5 Street Lighting Adequate lighting improves the visibility of pedestrians. Speed limits should be appropriate for the surrounding land use, pedestrian activity and road design and vehicles, especially at night. Poorly lit roads and intersections increase accident risk.

4.6 Speed Management Vehicle speed strongly affects both the likelihood and severity of pedestrian.

5. WHAT IS A PEDESTRIAN?

Pedestrian is a person who travels on foot rather than using a motor vehicle. A pedestrian may include:

1. A person walking along a road or footpath.
2. A person crossing a road.
3. A person walking to or from a bus stop.
4. Children walking to school.
5. Elderly persons
6. Persons with disabilities using walking or mobility aids.
7. People walking in markets and public places.

Pedestrians are considered vulnerable road users because they have little physical protection in a collision with a motor vehicle.

6. WHAT IS AN ACCIDENT?

road accident is an unexpected event occurring on or near a road involving one or more road users that may result in injury, death, or property damage. A pedestrian accident generally occurs when a pedestrian comes into conflict with a moving vehicle or another road-related hazard.

- Vehicle hitting a pedestrian while crossing.
- Two-wheeler collision with a pedestrian.
- Pedestrian falling because of a damaged footpath.
- Accident caused by poor visibility or inadequate lighting.
- Collision at an uncontrolled intersection.



Figure 2. Nehru Park chowk

7. CAUSES OF PEDESTRIAN ACCIDENTS

- Over-speeding.
- Drunk driving.
- Distracted driving.
- Failure to follow traffic signals.
- Unsafe road crossing.
- Lack of pedestrian facilities.
- Poor road design.
- Poor street lighting.
- Illegal parking.
- Roadside encroachment.
- Lack of traffic awareness.
- Poor visibility.
- Heavy traffic and congestion.
- Inadequate traffic enforcement.

8. ISSUES OF PEDESTRIAN ACCIDENTS

Pedestrian accidents create several social and economic problems:

1. Serious injuries and loss of life.
2. Medical expenses for victims and families.
3. Loss of income due to disability or death.
4. Psychological stress for victims and families.
5. Traffic congestion following crashes.
6. Increased burden on emergency and healthcare services.
7. Reduced public confidence in walking as a mode of transport.
8. Negative impact on the overall quality of urban life.

9. REASONS FOR INCREASING PEDESTRIAN ACCIDENTS

- Rapid urbanization.

- Growth in vehicle population.
- Increasing traffic congestion.
- Poor pedestrian infrastructure.
- Footpath encroachment.
- Unsafe road crossings.
- High vehicle speeds.
- Inadequate traffic management.
- Insufficient street lighting.
- Lack of awareness and enforcement.



Figure 3. Ashok Vatika Chowk

10. MEASURES TO DECREASE PEDESTRIAN ACCIDENTS

- Engineering Measures
 - Construct continuous and properly designed footpaths.
 - Provide zebra crossings at suitable locations.
 - Install pedestrian traffic signals.
 - Provide pedestrian refuge islands where appropriate.
 - Improve street lighting.
 - Provide proper road signs and markings.
 - Improve intersection design.
 - Remove footpath encroachments.
 - Provide safe pedestrian facilities near schools, hospitals and markets.
 - Introduce traffic-calming measures in high-pedestrian areas.
- Enforcement Measures
 - Strictly enforce speed limits.
 - Penalize dangerous driving and signal violations.
 - Prevent illegal parking on footpaths.
 - Enforce pedestrian crossing rules.
 - Control unauthorized roadside activities.
- Educational Measures
 - Conduct road-safety awareness programmes.
 - Teach children safe road-crossing practices.
 - Promote the use of pedestrian crossings.
 - Encourage drivers to give priority to pedestrians at designated crossings.
 - Promote responsible use of mobile phones near traffic.
- Technological Measures

11. FINDINGS

The study indicates that pedestrian accidents are caused by a combination of human behaviour, road infrastructure, vehicle characteristics and environmental conditions. The major findings are: 1. Excessive vehicle speed increases the risk and severity of pedestrian crashes.

2. Lack of proper footpaths forces pedestrians to share road space with vehicles.

3. Poorly designed or insufficient pedestrian crossings increase unsafe crossing.

4. Poor lighting creates additional risk at night.

5. Driver distraction and traffic-rule violations are significant contributing factors.

6. Footpath encroachment reduces safe walking space.

7. Better road design, speed management and enforcement can reduce pedestrian accidents.

8. Public awareness and responsible behaviour are essential for long-term improvement.

12. CONCLUSION

Pedestrian accidents are an important urban road-safety concern. The problem is not caused by a single factor but by the interaction of pedestrian behaviour, driver behaviour, vehicle characteristics, road design, traffic management, and environmental conditions. In Akola, improving pedestrian safety requires a coordinated approach. Continuous footpaths, safe crossings, pedestrian signals, proper street lighting, traffic calming, removal of obstructions, speed enforcement, and road-safety awareness can substantially improve walking conditions. The most effective approach is to design urban roads not only for the movement of vehicles but also for the safe movement of pedestrians. Regular accident-data analysis and field surveys should be used to identify high-risk locations and prioritize improvements.

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