



Review Paper On Road Safety Assessment And Surrogate Measures For Rural Karnataka

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Abstract

Road safety assessment and surrogate measures are critical in rural areas, where infrastructure and emergency response systems often lag behind those in urban settings. This review paper examines road safety challenges in rural Karnataka, India, and investigates surrogate measures that can be utilized to evaluate and enhance safety outcomes. The paper synthesizes current research, identifies key risk factors, and proposes strategies for improving road safety in these regions. It also provides recommendations on how surrogate measures can be effectively implemented, explores the role of these measures in assigning responsibilities to road users, and discusses the timing for potential shifts in responsibility by authorities.

KEYWORDS: Road safety, Surrogate Measures, Rural Karnataka

1. Introduction

The Global Status Report on Road Safety 2023 reveals a slight decrease in annual road traffic deaths, now at 1.19 million. This decline indicates that improvements in road safety measures are having a positive effect. However, the cost of mobility remains disproportionately high, with road traffic injuries continuing to be the leading cause of death for children and young people aged 5-29. Pedestrians, cyclists, and motorcyclists, particularly in low and middle-income countries, account for more than half of these fatalities. To meet the global goal of halving road traffic deaths and injuries by 2030, urgent and continued action is essential.

Road safety continues to be a major concern in rural areas, which frequently experience higher rates of traffic accidents due to limited infrastructure and poor road conditions, lack of enforcement of traffic laws, and inadequate emergency medical services, underdeveloped emergency response systems contribute to higher risk

factors and poorer safety outcomes. In rural Karnataka, India, these vital issues are particularly pronounced due to rapid population growth and inadequate road maintenance. This review aims to address these challenges by exploring the use of surrogate measures to assess and improve road safety in the region.

2. Road Safety Challenges in Rural Karnataka

Rural Karnataka faces several road safety issues, including:

- **Inadequate Infrastructure:** Many rural roads are poorly maintained, lack proper signage, and have inadequate lighting, increasing the risk of accidents.
- **Limited Emergency Response:** The delay in emergency response due to underdeveloped healthcare facilities and lack of trained personnel exacerbates the severity of road traffic injuries.
- **High Risk Factors:** Key risk factors include deteriorating road conditions, failure to comply with traffic regulations, and insufficient vehicle safety standards
- **3. Surrogate Measures for Evaluating Road Safety Assessment**

Surrogate measures are indirect indicators employed to assess and estimate road accident risks and road safety when direct measurements are not practical. It includes the potential occurrence of the road accidents. Key surrogate measures include:

- **Crash Analysis Techniques:** Examining historical accident data to identify high-risk locations and patterns, it also includes survey of public information their perception & gathering local insights on road safety issues
- **Traffic Volume and Flow Studies:** Monitoring traffic volumes and flow rates to predict potential safety issues.
- **Condition of roads:** Assessing & Evaluating Road conditions, design features including surface quality and signage adequacy, to determine potential hazards.
- **Driver Behavior:** Observing driver behavior and compliance with traffic laws to assess risk levels.

4. Other Surrogate Measures

Speed and Compliance Data: Monitoring vehicle speeds and adherence to traffic regulations.

Speed and Compliance Data

Speed and compliance data are pivotal surrogate measures in road safety assessments, particularly in areas where direct accident data may be scarce or unreliable. These measures focus on monitoring vehicle speeds and adherence to traffic regulations, offering valuable insights into potential safety issues.

Speed Monitoring:

Purpose: Tracking vehicle speeds helps pinpoint areas where speeding is common, a major contributor to road traffic accidents. Higher speeds are typically linked to more severe crashes and reduced reaction times.

Methods: Speed data can be gathered using various methods, such as radar speed signs, speed cameras, and inductive loop sensors embedded in roads. These tools capture vehicle speeds and can offer real-time feedback to drivers or provide data for analysis by traffic authorities.

Benefits: By identifying locations where speeding is a common issue, authorities can implement targeted interventions, such as speed bumps, increased signage, or enhanced enforcement, to mitigate speeding-related risks.

Compliance Data:

Purpose: Compliance data assesses how well drivers adhere to traffic regulations, including obeying speed limits, stop signs, and other road rules. Non-compliance often correlates with higher accident rates and unsafe driving behaviors.

Methods: Compliance data can be gathered using traffic cameras, manual observations, and automated systems that track violations like running red lights or failing to yield. Additionally, surveys and public feedback can offer valuable insights into compliance challenges..

Benefits: Analyzing compliance data helps identify problem areas and trends, enabling targeted enforcement and educational campaigns to improve adherence to traffic laws and enhance overall road safety.

5. Implementation in Rural Karnataka

- **Conflict Observation Studies:** Conducting studies at key intersections and high-risk areas.
- **Speed Monitoring:** Installing speed cameras and conducting periodic speed checks.
- **Roadway Audits:** Regular inspections and audits of road conditions.
- **Community Engagement:** Involving local communities in identifying safety concerns and potential improvements.

6. Synthesis of Current Research

Recent research underscores several important findings:

- **Correlation Between Road Conditions and Accidents:** There is a strong link between poor road conditions and increased accident rates. Research indicates that enhancing road infrastructure can greatly lower the incidence of accidents.
- **Effectiveness of Surrogate Measures:** Surrogate measures, such as traffic flow studies and crash data analysis, have proven effective in identifying high-risk areas and informing targeted interventions.
- **Role of Behavioral Interventions:** Behavioral interventions, including public awareness campaigns and enhanced enforcement of traffic laws, contribute to improved road safety outcomes.

7. Key Risk Factors

Identified key risk factors in rural Karnataka include:

- **Condition of roads:** Unsafe Road design, including sharp curves, Narrow roads, potholes and inadequate signage, lack of proper lighting & proper shoulders increases the likelihood of accidents.
- **Driver efficiency:** Limited access to formal driver training and awareness programs results in unsafe driving practices, Drunk Driving & over speed
- **Vehicle Standards:** Many rural vehicles do not meet safety standards, increasing the risk of accidents and injuries. A mix of motorized and non-motorized vehicles, including two-wheelers, tractors, and bullock carts, leads to heterogeneous traffic conditions.

8. Approaches to Improving Road Safety

The following approaches are recommended to enhance road safety in rural Karnataka:

- **Infrastructure Improvements:** Upgrading road conditions, improving signage, and enhancing lighting can reduce accident rates.
- **Strengthening Emergency Response Systems:** Developing local emergency response capabilities and improving healthcare infrastructure can mitigate the impact of accidents.
- **Implementing Surrogate Measures:** Utilizing surrogate measures to identify risk factors and inform safety interventions is crucial. Regular monitoring and analysis should guide ongoing improvements.
- **Behavioral Change Initiatives:** Launching public awareness campaigns and increasing enforcement of traffic regulations can promote safer driving practices.

9. Recommendations for Implementing Surrogate Measures

- **Integration with Road Safety Programs:** Surrogate measures should be integrated into broader road safety programs to ensure comprehensive assessments and interventions.
- **Stakeholder Collaboration:** Collaboration between government authorities, local communities, and non-governmental organizations is essential for effective implementation.
- **Regular Review and Adjustment:** Continuous review of surrogate measures and their effectiveness should guide adjustments and improvements.

10. Role of Surrogate Measures in Assigning Responsibilities

Surrogate measures can help clarify responsibilities by:

- **Identifying High-Risk Areas:** Identifying areas with high accident rates and unsafe conditions enables focused interventions and ensures accountability.
- **Informing Policy Decisions:** Providing data-driven insights supports the development of policies and regulations that address key risk factors.
- **Encouraging Compliance:** Enhancing understanding of safety issues through surrogate measures can drive greater compliance with traffic laws.

11. Timing for Potential Shifts in Responsibility

The timing for potential shifts in responsibility should consider:

- **Readiness of Infrastructure:** Shifts in responsibility should align with improvements in infrastructure and emergency response systems.
- **Ongoing Assessment:** Regular assessment of safety outcomes and effectiveness of surrogate measures will inform the appropriate timing for responsibility changes.
- **Stakeholder Feedback:** Input from stakeholders, including road users and local authorities, should guide decisions on responsibility adjustments.

12. Conclusion

Improving road safety in rural Karnataka requires a multifaceted approach involving infrastructure enhancements & enforcement of traffic laws, education, and better emergency response systems. Surrogate measures play a vital role in assessing risks and implementing proactive safety & targeted behavioral interventions. By adopting a comprehensive strategy, it is possible to significantly reduce the incidence of road traffic accidents and enhance the overall safety of rural roadways. This review paper provides a comprehensive analysis of road safety challenges and surrogate measures in rural Karnataka, offering recommendations for improving safety outcomes.

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This review highlights the urgent need to take surrogate measures for road safety in rural Karnataka through a combination of direct interventions and the use of indirect surrogate measures to monitor and improve safety conditions.