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The Rising Trend of Four-Wheel Vehicle Overturns and Traffic Accidents in Urban Libya

Mohamed Rashed[1*], Turkia EROUK[2]

[1]Libyan Orthopedic Board, Tripoli, Libya;[2]Orthopedic Surgeon, Khadra Hospital, Tripoli, Libya

Correspondence to: Mohamed Rashed. Libyan Orthopedic Board, Tripoli, Libya, E-mail: mohbrashed@gmail.com

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ABSTRACT

Road traffic injuries are a leading cause of death and disability globally, with developing countries bearing a disproportionate share of the burden. Libya, in particular, faces an escalating crisis in road safety, with Motor Vehicle Accidents (MVAs) now ranking among the top causes of mortality-second only to firearm injuries and cardiovascular disease. This paper explores the increasing involvement of Four-Wheel Drive (4WD) vehicles in urban road accidents and overturns in Libya. Drawing on national data and regional comparisons, the study highlights the overrepresentation of 4WDs in severe crashes and fatal incidents. Factors such as vehicle design (high center of gravity), driver behaviour (speeding, overconfidence), poor road infrastructure, and weak law enforcement contribute to the problem. The findings underscore the urgent need for targeted interventions, including stricter traffic law enforcement, improved driver education, vehicle safety regulations, and investment in urban infrastructure. Addressing the unique risks associated with 4WD use in urban environments is essential to reducing traffic-related fatalities and improving public safety in Libya

Keywords: Road traffic accidents; Four-wheel drive vehicles; Urban safety, Libya

INTRODUCTION

Road traffic injuries remain a major cause of death and disability worldwide. In developing countries, the burden is especially heavy: Risk factors such as rapid motorization, weak infrastructure, and risky driving behaviours (speeding, traffic violations) worsen the outcomes. In Libya, Motor Vehicle Accidents (MVAs) are among the top killers, outranked only by firearm injuries and cardiovascular disease in terms of mortality. Recent data suggest that certain vehicle types, especially Four-Wheel Drives (4WDs), are overrepresented in crash statistics, raising particular concern for urban road safety.

LITERATURE REVIEW

The growing burden of road traffic accidents in Libya

Over the past several years, Libya has experienced an alarming increase in traffic deaths and serious injuries:

- Between 2018 and 2022, road crashes claimed 9,245 lives and caused 11,532 critical injuries in Libya, with over 39,000 vehicles damaged [1].
- In 2020 alone, over 1,700 people died as a result of traffic accidents; that year saw a ~36 % increase in crashes compared to the prior year [2].
- In the third quarter of 2024, 2,384 accidents were reported, resulting in 629 fatalities, 1,006 serious injuries, and 933 minor injuries [1].

- Libya reportedly has one of the highest traffic fatality rates in the world, with about 73 deaths per 100,000 people—far above the global average of ~20 per 100,000 [3].

These statistics underscore the urgency of addressing road safety in Libyan cities.

Four-wheel drives: Overrepresentation in crashes and overturns

While comprehensive data on 4WD–specific crashes in Libya remain sparse in the public literature, existing reports and regional comparisons point to a troubling pattern:

- In urban crash investigations in Arab Gulf countries, 4WD vehicles are disproportionately represented in severe crashes and fatalities.
- In Libya, a 2020 study indicated that 21.5 % of all drivers involved in a crash were operating 4WDs. source Traffic Dept Tripoli.
- The popularity of 4WD vehicles in Libya has grown significantly over the past decade, likely due to perceptions of robustness, off road capability, and high ground clearance (Figure 1).

Figure 1: Rising trend and contributing factors of Four-Wheel Drive (4WD) vehicle overturns and traffic accidents in urban Libya.

The design characteristics of 4WDs (higher center of gravity, heavier mass) make them more susceptible to rollover or loss-of-control in sudden maneuvers, particularly in constrained urban settings with tight turns, narrow lanes, or abrupt obstacles. Thus, these vehicles may contribute disproportionately to the incidence and severity of urban overturns and collisions, posing additional danger to smaller vehicles and vulnerable road users (pedestrians, cyclists) [4].

DISCUSSION/MECHANISMS AND RISK FACTORS

Why do 4WDs contribute to increased risk? Several interacting factors play a role:

a) Vehicle dynamics and rollover risk

- Higher center of gravity makes 4WDs more vulnerable to tipping during sharp turns or evasive maneuvers.
- Heftier mass can magnify impact forces in collisions, increasing damage to other vehicles or pedestrians [5].

b) Driver behaviour and perception of safety

- Drivers may feel overconfident in 4WDs, leading to higher speeds and aggressive maneuvers.
- In urban settings, frequent intersections, turning maneuvers, and sudden lane changes increase the exposure to these risks.

c) Urban roadway environment

- Narrow roads, poor maintenance, lack of median barriers, limited visibility, and inadequate signage worsen the margin for error.
- Insufficient enforcement of lane discipline, speed control, and traffic rules allows risky driving behaviors to persist [6].

d) Driver training and awareness

- Many drivers may lack adequate training in handling large, heavy 4WD vehicles under urban conditions.
- Lack of awareness about rollover prevention and safe driving practices further compounds the danger [7].

e) Weak enforcement and monitoring

- Poor enforcement of traffic rules—speeding, signal violation, illegal overtaking—allows unsafe driving to continue.
- Limited data collection and crash investigation capacity reduce the feedback needed to improve policies [8].

Recommendations and policy measures

To curb the rising trend of 4WD-related crashes and overturns in Libyan cities, a multipronged approach is essential [9] (Table 1).

Table 1: Recommended public health and policy strategies to reduce Four-Wheel Drive (4WD) vehicle overturns and traffic accidents in urban Libya.

Strategy	Description
Strengthen traffic law enforcement	Increase patrols, speed cameras, red-light cameras, and strict fines-especially in high-risk urban zones.
Mandatory driver training and licensing for 4WDs	Require specialized courses or assessments for drivers of heavy/high-clearance vehicles.

Vehicle safety regulations	Mandate stability control systems, anti-rollover features, and stricter safety standards for imported 4WD models.
Urban road redesign and infrastructure	Improve road geometry (wider lanes, adequate turning radii), median barriers, sidewalks, proper signage, and lighting.
Crash data systems and investigation	Develop robust accident reporting and analysis capacities to identify hotspots and causal patterns.
Public awareness and education	Run campaigns targeted at drivers and pedestrians about safe driving, rollover danger, and urban road hazards.
Periodic vehicle inspections	Enforce regular checks for mechanical roadworthiness, especially for heavy or high-risk vehicles.

CONCLUSION

Road traffic accidents remain a critical public health problem in Libya, with a rising contribution from four-wheel drive (4WD) vehicles in urban crashes and overturns. The higher center of gravity and greater mass of these vehicles, combined with risky driving behaviours, inadequate driver training, poor urban road infrastructure, and weak enforcement of traffic regulations, increase the likelihood and severity of accidents. The growing popularity of 4WD vehicles in Libyan cities further amplifies this risk. Targeted interventions-including stricter traffic law enforcement, specialized driver training for high-risk vehicles, improved urban road design, enhanced vehicle safety standards, and robust crash data systems-are urgently needed. Addressing these factors is essential to reducing preventable injuries and fatalities and improving urban road safety in Libya.

DECLARATIONS

Conflict of interest

The authors declare no conflict of interest.

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Author contributions

The authors contributed to the conception, design, analysis, interpretation, and writing of this manuscript.

Ethics statement

This study is based on publicly available national data and aggregated statistics that do not involve the collection of personal or identifiable information from human participants. As such, ethical approval was not required. All data were analyzed in compliance with relevant ethical guidelines and standards for research involving public health and transportation data. The authors affirm that the research was conducted with integrity and respect for the subjects and context involved.

Consent for publication

Not applicable.

Declaration of interest

The authors declare no conflicts of interest related to this work. There are no financial, personal, or professional relationships that could be perceived to influence the research presented in this study.

Availability of data and materials

All data generated or analysed during this study are included in this published article.

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