

Evaluation of the Causes and Consequences of Road Traffic Accidents on the Bani Walid–Tripoli Road, Libya

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ABSTRACT

Road accidents worldwide are increasing, and the same problems are happening in Libya. Over the years, along the Bani Walid–Tripoli highway, the number of fatal crashes and related deaths has gradually increased. This research aims to evaluate infrastructural, behavioural, and socio-demographic factors associated with road accidents on this important route. Quantitative data were also analysed using SPSS Version 29. This work explores that 91% of respondents supported unsafe driving practices, while only 9% rejected them. In conclusion, this study contributes to improving road traffic accidents on the Bani Walid–Tripoli highway are mainly linked to reckless driving and poor road conditions. It is recommended that stronger radar-based speed enforcement, urgent road maintenance, and structured road-safety education programmes are needed to decrease accidents and protect road users.

Keywords: Traffic accidents, driver behaviour, road safety, questionnaire survey, SPSS

تقييم أسباب وعواقب حوادث المرور على طريق بني وليد – طرابلس، ليبيا

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ملخص البحث

تتزايد حوادث الطرق في جميع أنحاء العالم، وتواجه ليبيا المشكلة نفسها. فعلى مر السنين، ازداد عدد الحوادث المميتة والوفيات المرتبطة بها تدريجياً على طول طريق بني وليد – طرابلس السريع. يهدف هذا البحث إلى تقييم العوامل البنيوية والسلوكية والاجتماعية والديموغرافية المرتبطة بحوادث الطرق على هذا الطريق الحيوي، كما تم حساب البيانات الكمية باستخدام برنامج SPSS الإصدار 29. أظهرت نتائج الدراسة أن 91% من المشاركين يؤيدون ممارسات القيادة غير الآمنة، بينما يرفضها 9% فقط. وخلصت الدراسة إلى أن حوادث المرور على طريق بني وليد – طرابلس السريع ترتبط بشكل رئيسي بالقيادة المتهورية وسوء حالة الطريق. وأوصت الدراسة بضرورة تشديد الرقابة على السرعة باستخدام الرادار، والصيانة العاجلة للطرق، وبرامج التوعية المرورية المنظمة للحد من الحوادث وحماية مستخدمي الطريق.

الكلمات الدالة: حوادث المرور، سلوك السائقين، السلامة المرورية، استبيان، برنامج SPSS

1. Introduction

Road traffic accidents cause approximately 1.35 million deaths worldwide, making them a major public health and economic concern. Major Libyan cities, including Tripoli, have experienced rapid growth in vehicle ownership because of rising income levels and the availability of heavily subsidised. Without effective intervention, increasing traffic-related problems will continue to threaten public safety, reduce human capital, and place a growing burden on Libya's economy. In Libya, the transport sector plays a crucial role in the economy and makes a significant contribution to the country's social [1]. A considerable number of people lose their lives on Libyan roads each year, while tens of thousands suffer injuries [2]. Rising per capita income and the availability of affordable fuel have contributed to widespread vehicle ownership among residents of Tripoli, Libya. In 2010, approximately 2,375 people were killed, and 14,025 were injured in road traffic accidents in Libya. The number of daily road fatalities has continued to rise, placing Libya among the Arab countries with the highest traffic fatality rates despite its population being below 6.5 million [3]. Road traffic deaths occurred in around 93% of low- and middle-income countries, even though these countries account for only about 60% of the world's registered vehicles [4]. A number of studies have explored that road accidents are becoming acknowledged as a significant public health concern, resulting in substantial human resource losses and considerable socioeconomic consequences globally. The increasing incidence of road accidents is a significant concern for all nations, [5] [6]. Previous research has extensively examined the regional network that relies on the Bani Walid–Tripoli road for socioeconomic transport. Traditional international literature recognizes environmental circumstances, vehicle qualities, and road design as accident variables, but empirical studies on Libya's unique transit paths are rare [7].

Most previous studies have focused on the effects of economic impacts, demonstrating the widespread impact of road traffic accidents and the need for comprehensive initiatives to save lives and decrease the economic burden on nations worldwide [8]. Taken together, those studies suggest that endeavours have converged on the conclusion that both vehicular velocity and traffic density substantially contribute to the heightened probability [9]. In the same way, the increase in traffic volume may also cause congestion and lower visibility, increasing collision risk and severity [10]. Researchers have increasingly concentrated on examining traffic accidents to discern the elements that significantly influence their prevalence [11]. Road and transportation incidents demonstrate a significant degree of unpredictability and ambiguity [12, 13]. A number of studies have explored numerous investigations of vehicular collisions and have pinpointed various elements as significant contributors to these occurrences [14] [15]. The gravity of road accidents can typically be evaluated by the number of human fatalities and injuries sustained [16]. Road safety has long been a topic of utmost importance in scientific research. Road accidents have been thoroughly investigated and are of particular relevance among numerous factors. Traffic accidents present notable economic difficulties, since considerable costs are incurred for paying for damage to both property and humans [17]. Therefore, it may be argued that the road and a wide range of variables, including both identifiable and unidentified causes, affect traffic accidents. Collectively, the literature indicates that variables may possess a greater level of complexity and intricacy, necessitating a more thorough investigation in order to properly grasp their influence on the frequency of accidents [18].

Another definition of a traffic accident is an unexpected and unplanned event on a road involving cars and other road users that causes injuries or property damage. Unintentional user behaviours, traffic violations, road conditions, vehicle conditions, unfavourable weather, and reduced vision often cause these events [19]. This review highlights that understanding the significant impact of sleepiness on road accidents is essential for creating successful approaches to enhance driver alertness, promote adequate rest, and eventually reduce the dangers associated with driving when fatigued [20]. Based on the

reviewed literature, it can be concluded that inefficient handling of the issue of traffic accidents in Libya will yield disastrous repercussions for the safety of Libyan society.

2. Methodology

The methodology was designed to conduct a quantitative analysis of empirical data directly from the populace. The collected data were analysed using SPSS version 29 (Statistical Package for the Social Sciences). The chosen method provides a reliable means of assessing the particular variables affecting road traffic accidents and driver behaviour along the Bani Walid–Tripoli corridor.

2.1 Research Design and Participant Selection

The target population for this study was defined as active, licensed drivers who regularly commute along the Bani Walid–Tripoli road. A non-probability convenience sampling strategy was deployed to capture data across distinct driver demographics.

- **Sample Size:** A total sample size of (N=100) completed participants was achieved and utilized for final data processing.
- **Data Collection Period:** The online survey instrument was deployed from Feb 1, 2024, to May 7, 2024, to collect responses actively during this period.

2.2 Questionnaire Structure and Variables Measured

The survey instrument was meticulously structured into distinct blocks to systematically measure key operational variables:

- **Socio-Demographic Metrics:** The attributes measured are categorical, including gender and age brackets (under 20, 20–30, 30–40, 40–50, and 50+).
- **Driving Behavior Profiles:** Measured self-reported typical commuting speeds ranging from below 100 km/h up to over 140 km/h.
- **Perceptual Attributions:** Evaluated public alignment regarding the primary catalysts of accidents (speed, infrastructure quality, heavy vehicles, driver experience) using discrete categorical choices and response formats assessing support for traffic safety education.

3. Results and Discussion

Figure 1 clearly shows that survey respondents recognized several key causes of Bani Walid-Tripoli road accidents. The data indicates that 48% of participants blamed accidents on excessive speed and impatience while overtaking, particularly during turns, as the main cause. Driver behaviour, especially speed and unsafe passing, contributes to traffic accidents. In contrast, 34% of interviewees cited road conditions as a major cause of accidents. It can be observed that 9% of interviewees said the driver's inexperience caused accidents. This emphasizes the need for driver training and skill in ensuring safe and careful driving. Based on the reviewed literature, it can be concluded that driver education and road infrastructure improvements can reduce accidents and improve road safety on this route [21].

Figure 2 provides a clear overview of the spectrum of respondents' perspectives about the assertion that speed is the principal factor contributing to road accidents. It appears that only a small proportion of 88% agree with this argument, while the vast majority of 12% disagree. While speed may contribute to accidents, the findings indicate that factors such as driver behaviour, road conditions, and vehicle maintenance are likely to exert a more significant influence on road accidents. This finding is consistent with reducing the incidence of accidents and protecting the well-being of all road users; it is essential to address the factors identified by respondents and implement targeted interventions [22].

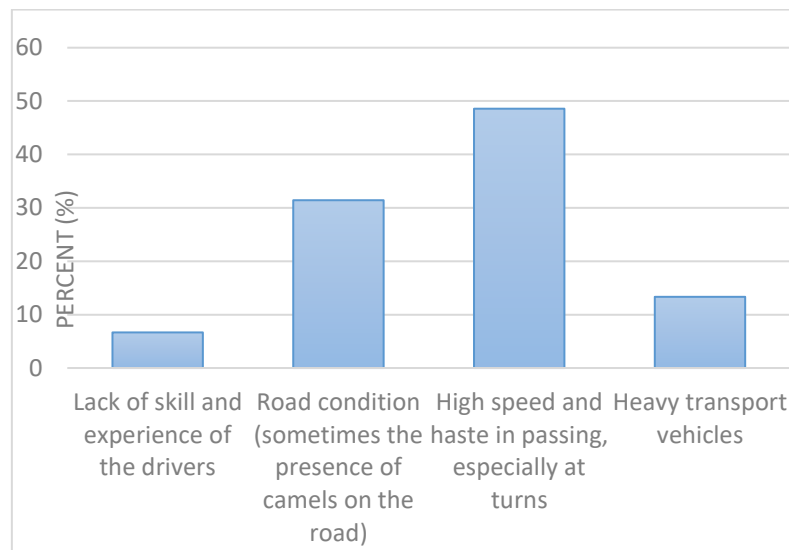


Figure 1. Major Factors Contributing to Accidents on the Bani Walid-Tripoli Road

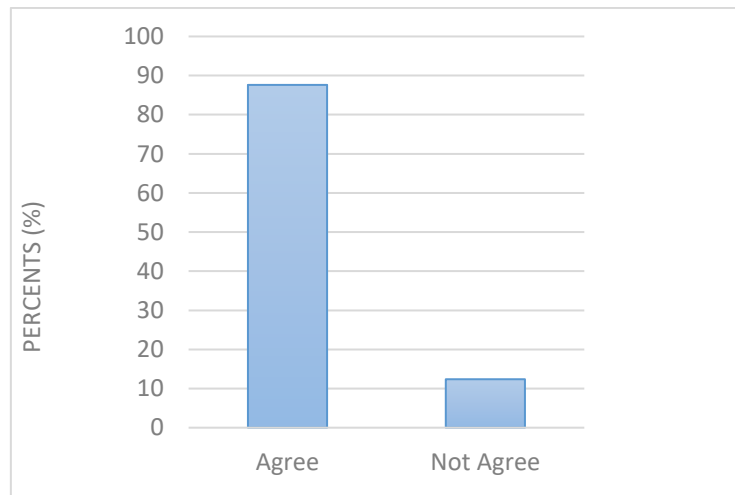


Figure 2. The Primary Factor Contributing to Road Accidents

A noticeable trend can be seen in Figure 3; it shows that 91% strongly agree with this concept and 9% reject it. This supports previous findings that road safety education is undervalued. According to a prior study, poor seatbelt use and speeding may be due to the absence of support for an organized instructional program in this field. We may encourage cautious road use by teaching students road etiquette and traffic laws. This can reduce road accidents and promote safer driving. Introducing a scientific road safety program for kids can help them become informed and responsible drivers. We can reduce road accident risks by teaching people about traffic laws, road etiquette, and safe driving. Road safety teaching in schools is vital. The observation supports the results obtained in that developmentally appropriate road safety teaching can create a generation of aware and accountable drivers, walkers, and cyclists who prioritize safety on the streets [23].

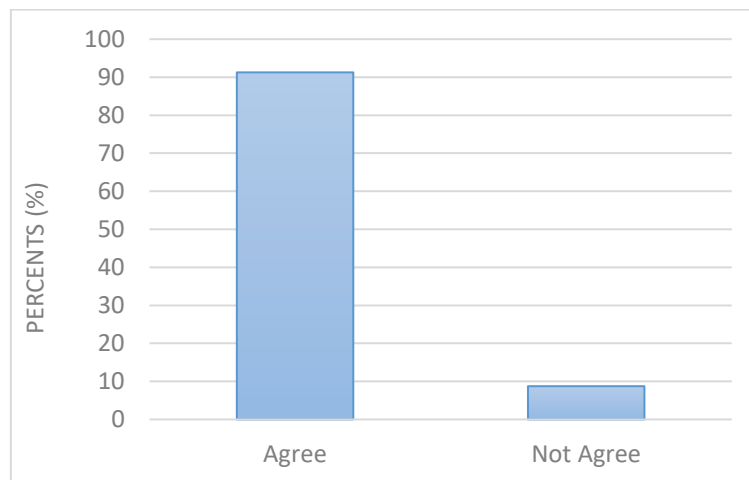


Figure 3. Road Etiquette and Traffic Laws

As presented in Figure 4, a bar chart represents the gender distribution of participants in a study or survey. The data indicates that the majority of participants (93%) are male, while a minority (7%) are female. The gender distribution in the sample is markedly imbalanced, potentially affecting the ability to generalize the results to a broader population. The restriction on women driving vehicles in Bani Walid can be ascribed to its customs and traditions.

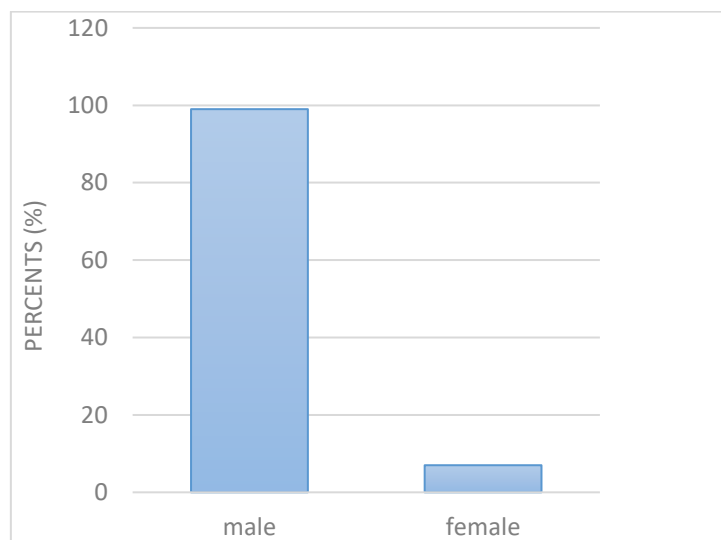


Figure 4. The Gender Distribution

Figure 5 shows that 34% of participants are aged 20–30, and 32% are aged 30–40. The remaining 34% are distributed across the other age groups: 23% (40–50), 8% (50+), and 3% (<20).

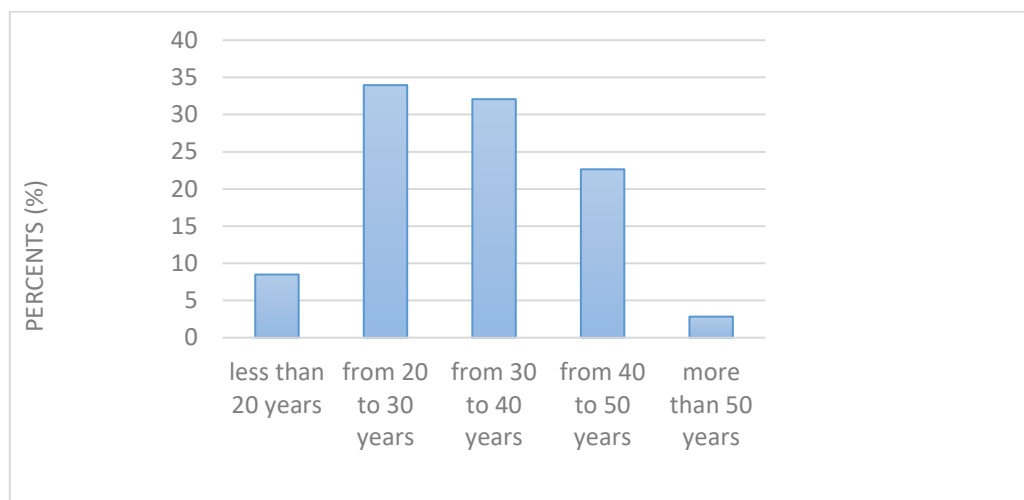


Figure 5. Age Distribution

Table 1. Age Distribution

No	Age	%
1	Less than 20 years	3
2	From 20 years to 30 years	34
3	From 30 years to 40 years	32
4	From 40 years to 50 years	23
5	More than 50 years	8

The data in Figure 6 indicate that a bar chart represents the frequency of road usage reported by the respondents. It can be observed that 65% of the participants frequent the road numerous times each month, indicating a regular presence on it. This can be explained by the fact that 30% of participants reported utilizing the road multiple times each week, suggesting a relatively diminished frequency of road utilization. Merely 5% indicated that they utilize the road daily. The figure confirms that the heightened presence of individuals on the road immediately correlates with an increased probability of accidents, hence underscoring the critical necessity of constantly utilizing seatbelts.

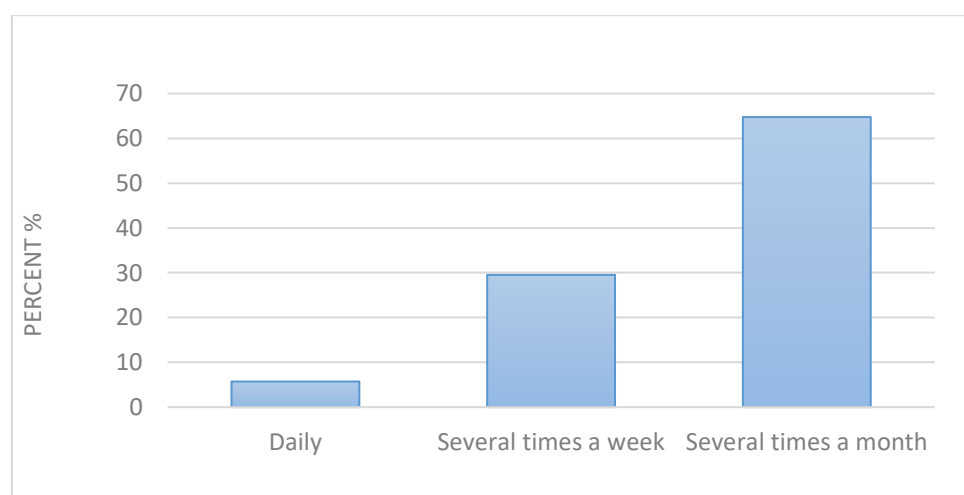


Figure 6. Road Usage Frequency Reported by Respondents

Table 2 shows that 5% of respondents use the road daily, 30% use it several times a week and 65% use it several times a month.

Table 2. Road Usage Frequency Reported by Respondents

No	Road Usage Frequency Reported by Respondents	%
1	<i>Daily</i>	5
2	<i>Several Times a Week</i>	30
3	<i>Several Times a Month</i>	65

A noticeable trend can be seen in Figure 7. It can be explained that 45% of respondents reported a speed range of 120–140 km/h, while 39% said they drove 100–120 km/h. Only 4% of participants drove below 100 km/h, while 12% drove beyond 140 km/h. These findings support previous research suggesting that many drivers want higher speeds. Compared to the results, it is evident that risk perception, driving practices, and speed limit enforcement may influence speeding behaviour in addition to knowledge and awareness. More research is needed to understand the complex interaction between speeding factors. This would allow the development of effective interventions to promote safer driving and address the core causes of high driving speeds. Further investigations are needed to identify and resolve to create a safer road environment for all road users [24].

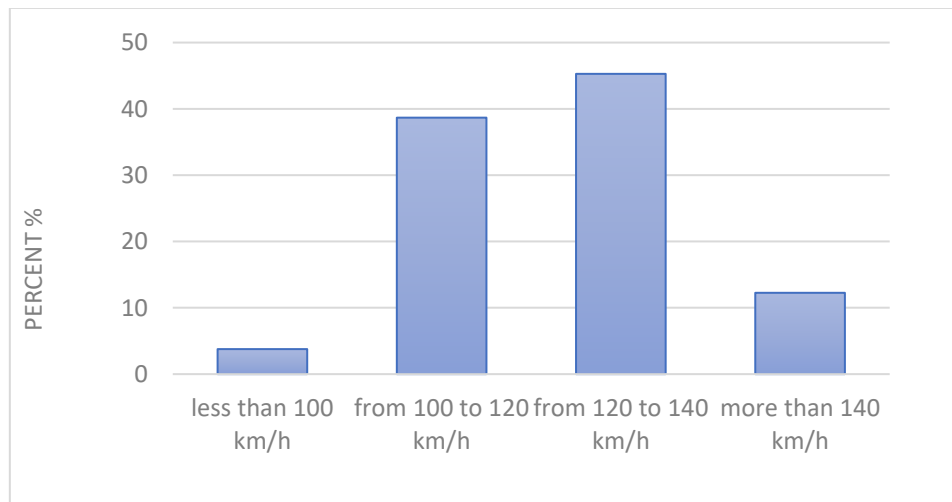


Figure 7. Driving Speeds Reported by Survey Participants

4. Conclusion

This study evaluated the major causes and consequences of road traffic accidents along the Bani Walid–Tripoli road using questionnaire data collected from 100 road users. The findings indicate that driver behaviour and road infrastructure are the principal factors associated with accidents on this road. Excessive speed and impatient overtaking, particularly during turns, were identified by respondents as the leading behavioural causes, accounting for approximately 46–48% of perceived accident causes. This finding is further supported by the reported driving speeds, with 45% of respondents driving at 120–140 km/h and 12% exceeding 140 km/h.

Road infrastructure was identified as another major contributor, with 34% of respondents attributing accidents to road conditions and associated hazards, including uneven road surfaces and wandering camels. The results also indicate a strong need for improved road-safety awareness, as 91% of respondents supported greater emphasis on road etiquette, traffic laws, and safety education.

The demographic findings show that the sample was predominantly male (93%), while drivers aged 20–40 years represented approximately two-thirds of the respondents. This demographic pattern should be considered when interpreting the findings and when designing targeted road-safety interventions.

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