



Evaluation of Road Accident Analysis: A Case of Bani Walid-Tripoli road

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تقييم تحليل حوادث الطرق: حالة طريق بني وليد – طرابلس

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Abstract:

The frequency of road accidents is rising globally, including in Libya. The registration and usage of new vehicles in the country's streets contribute to traffic congestion and a higher incidence of accidents. The cumulative number of fatal accidents and associated fatalities in the city has been steadily growing throughout the years. The statistics indicates that an overwhelming majority of 91% are in disagreement with this idea, and only 9% are in agreement. This discovery is consistent with prior studies that suggest a lack of focus on educating people about road safety. Similarly, the existence of oversized cars on the road might provide difficulties in terms of feasibility and perceptibility, potentially resulting in collisions if not approached with care. In addition, 7% of participants indicated that accidents were caused by the drivers' insufficient skill and experience. This underscores the significance of driver education and expertise in guaranteeing secure and conscientious driving behaviour.

Keywords: Questionnaire. High-Speed Driving, Data Analysis.

المخلص

ويتزايد تواتر حوادث الطرق على الصعيد العالمي، بما في ذلك في ليبيا. ويسهم تسجيل المركبات الجديدة واستخدامها في شوارع البلد في ازدياد حركة المرور وارتفاع عدد الحوادث. وما فتئ العدد التراكمي للحوادث المميتة وما يرتبط بها من وفيات في المدينة يتزايد باطراد على مر السنين. وتشير الإحصاءات إلى أن أغلبية ساحقة تبلغ 91 في المائة لا تتفق مع هذه الفكرة، وأن 9 في المائة فقط توافق عليها. ويتسق هذا الاكتشاف مع الدراسات السابقة التي تشير إلى عدم التركيز على تثقيف الناس بشأن السلامة على الطرق. وبالمثل، فإن وجود سيارات ضخمة على الطريق قد يثير صعوبات من حيث الجدوى والإدراك، مما قد يؤدي إلى وقوع اصطدامات إن لم يتم التعامل معها بعناية. وبالإضافة إلى ذلك، أشار 7 في المائة من المشاركين إلى أن الحوادث نجمت عن عدم كفاية مهارات السائقين وخبرتهم. وهذا يؤكد أهمية تثقيف السائقين وخبرتهم في ضمان سلوكيات القيادة الآمنة والواعية.

الكلمات المفتاحية: تحليل البيانات، الاستبيان، حوادث الطريق.

1. Introduction

Road safety has consistently been a subject of paramount significance in scientific research. Among the various aspects that have been extensively studied, road accidents hold particular prominence. These incidents have a profound impact on the social fabric, resulting in the loss of lives or permanent disabilities for numerous individuals. Additionally, road accidents pose significant economic challenges, as substantial expenses are incurred for compensating damages to both property and individuals (Stephen Cardamone, Eboli et al. 2017). Hence, it can be contended that road and traffic accidents are influenced by a multitude of variables, encompassing both known and unknown factors. Some of these variables may be more nuanced and intricate in nature, requiring deeper exploration to fully comprehend their impact on accident occurrences (Lord and Mannering 2010).

In an alternative perspective, a traffic accident can be defined as an unanticipated and unintended incident that takes place on a road involving vehicles, either with or without the presence of other road users, resulting in human casualties and/or property damages. These accidents typically transpire due to a multitude of factors, including the inadvertent actions of users, violations of traffic regulations, road conditions, vehicle conditions, adverse weather conditions, and obstructed visibility (Huda and Ismail 2020).

Undoubtedly, it is widely recognized that operating a vehicle while under the influence of alcohol significantly elevates the likelihood of being involved in an accident. This knowledge has been firmly established since the renowned Grand Rapids study conducted in the early 1960s. The findings of this seminal study have provided valuable insights into the detrimental effects of alcohol consumption on driving ability and the subsequent risks it poses on road safety (Elvik 2013).

Indeed, you are correct. The Grand Rapids study did not incorporate a meta-analysis. Rather, it presented the findings of a limited number of individual studies and concluded that there was insufficient evidence to support the notion that the use of cannabis alone increased the likelihood of being held responsible for a road accident. The study's focus was primarily on alcohol-related impairment and its impact on accident culpability (Kim, Nitz et al. 1995). Undoubtedly, road safety emerges as a significant public health concern when the staggering statistics reveal that over 3,000 individuals worldwide lose their lives daily as a result of road traffic injuries. This distressing reality underscores the urgent need for comprehensive measures to address and mitigate the devastating consequences of road accidents on a global scale. Efforts to enhance road safety must be prioritized to protect the lives and well-being of individuals in our communities (Islam and Kanitpong 2008).

Moreover, it is crucial to acknowledge that road crashes also incur substantial economic losses on a global scale. According to estimates, the cost of road traffic injuries amounts to a staggering US\$518 billion annually. These economic ramifications underscore the far-reaching impact of road accidents, emphasizing the imperative for comprehensive strategies to not only preserve human lives but also to alleviate the economic burden placed on societies worldwide. Addressing road safety concerns is not only a matter of public health but also an essential component of sustainable economic development (Jacobsen, Racioppi et al. 2009)

Indeed, numerous studies have reached a consensus that both motor vehicle speed and traffic volume play a significant role in increasing the risk and severity of crashes involving cyclists or pedestrians (Merlin, Guerra et al. 2020). These factors have been identified as key contributors to the vulnerability of non-motorized road users. Higher vehicle speeds reduce the reaction time for both drivers and vulnerable road users, making it more challenging to avoid accidents. Additionally, increased traffic volume can lead to congestion and reduced visibility, further heightening the potential for collisions and their associated severity. It is crucial to prioritize measures that address these factors to enhance the safety of cyclists and pedestrians on our roads (Organization 2023).

2. Data collection and analysis

For data collection, the questionnaire was used for description as well as the comparison of variables analysed. This study was based on an online questionnaire as a scientific method of collecting data. The questionnaire is known as an instrument for collecting data, containing various types of questions and statements.

Once the data was collected, it was imported into SPSS version 29 for further analysis. SPSS offers a range of statistical tools and techniques that enable researchers to explore relationships between variables, identify patterns, and draw meaningful conclusions. Through the use of SPSS, researchers can perform descriptive analyses, inferential statistics, regression models, and other advanced statistical analyses to gain insights into the causes and consequences of accidents. Overall, SPSS serves as a valuable tool for accident analysis, providing researchers with the means to effectively collect, organize, and analyses data, leading to a better understanding of the factors influencing accidents and the development of targeted interventions for improved road safety.

3. Results and Discussion

As illustrated in Figure 1, the survey respondents identified several primary causes of accidents on the Bani Walid-Tripoli Road. It is noteworthy that 49% of respondents attributed accidents to "high speed and haste in passing, especially at turns," making it the leading factor. This highlights the significance of driver behaviour, specifically speeding and risky overtaking, in contributing to road accidents. Furthermore, 31% of respondents identified "road condition (sometimes the presence of camels on the road)" as a significant factor in accidents. This suggests that the condition of the road and the presence of unexpected obstacles, such as camels, can pose risks and increase the likelihood of accidents. The data also indicates that 13% of respondents considered "heavy transport vehicles" to be a contributing

factor in accidents. The presence of large vehicles on the road can create challenges in terms of manoeuvrability and visibility, potentially leading to accidents if not handled with caution. Additionally, 7% of respondents identified "lack of skill and experience of the drivers" as a cause of accidents. This emphasizes the importance of driver training and experience in ensuring safe and responsible driving practices.

Overall, the data suggests that driver behaviour, particularly speeding and risky overtaking, perceived as the most significant cause of accidents on the Bani Walid-Tripoli road. Road infrastructure and the presence of unexpected obstacles like camels are also considered important factors. Addressing these issues through targeted interventions, driver education programs, and improvements in road infrastructure can contribute to reducing the risk of accidents and enhancing road safety on this route (Hughes, Anund et al. 2016).

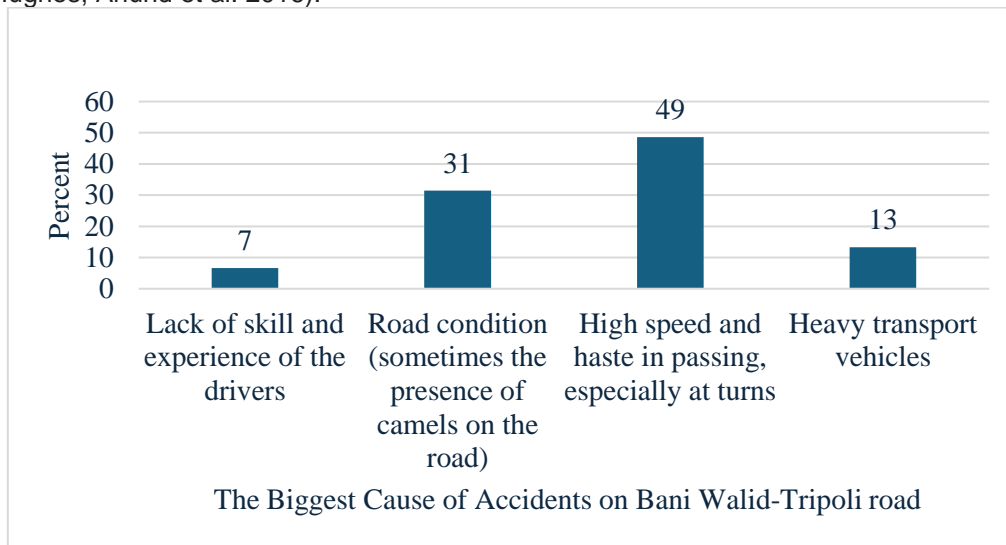


Figure 1: Primary Causes of Accidents on the Bani Walid-Tripoli Road.

Table 1 Profiles of respondents.

Variable	Attribute	Percentage
Gender	Male	93.4%
	Female	6.6%
Age	Less than 20 years	8.5%
	From 20 to 30 years	34%
	From 30 to 40 years	32.1%
	From 40 to 50 years	22.6%
	More than 50 years	2.8%
Level of study	High school diploma	5.7%
	Bachelor's degree	67.6%
	Master's degree	23.8%
	Doctorate	2.9%
Driving speed	Less than 100 km/h	3.8%
	From 100 to 120 km/h	38.7%
	From 120 to 140 km/h	45.3%
	More than 140 km/h	12.3%

According to Figure 2, the distribution of respondents' opinions on the statement "Speed is the biggest cause of accidents on the road" reveals an interesting perspective. Only a small minority of 12% agree with this statement, while the vast majority of 88% disagree. This finding challenges the common perception that speed alone is the primary cause of accidents. It aligns with earlier data that suggests accident causation is multifaceted and involves various factors. While speed may contribute to accidents, the responses indicate that other factors, such as driver behavior, road conditions, and vehicle maintenance, likely play more significant roles in road accidents.

This highlights the need for a comprehensive approach to road safety that takes into account all potential contributing factors, rather than solely focusing on speed. By addressing driver behaviour, improving road conditions, and promoting proper vehicle maintenance, we can create a safer road environment and reduce the risk of accidents. It is important to recognize that road safety is a complex

issue that requires a holistic approach. By addressing all the factors identified by respondents and implementing targeted interventions, we can work towards reducing the occurrence of accidents and ensuring the well-being of all road users (Pal, Ghosh et al. 2019).

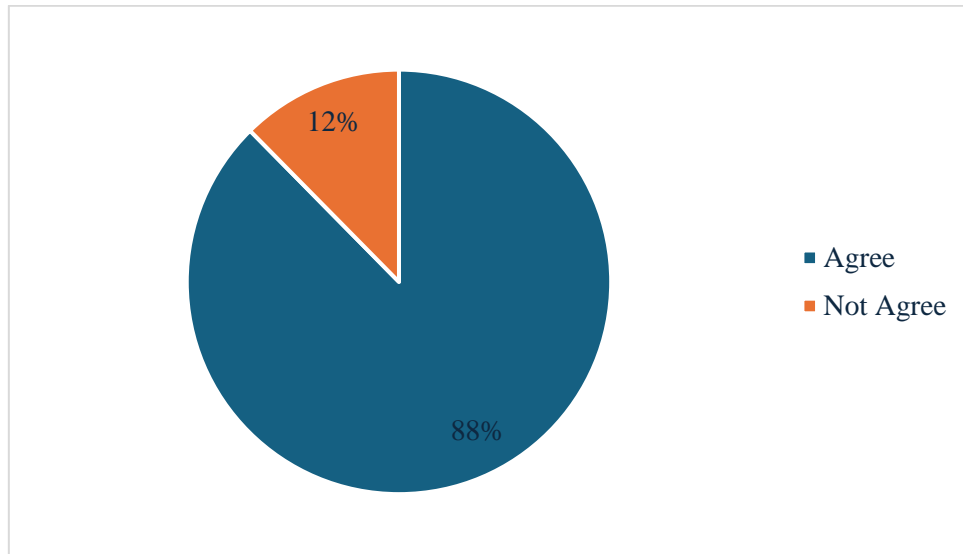


Figure 2: The Biggest Cause of Accidents on the Road.

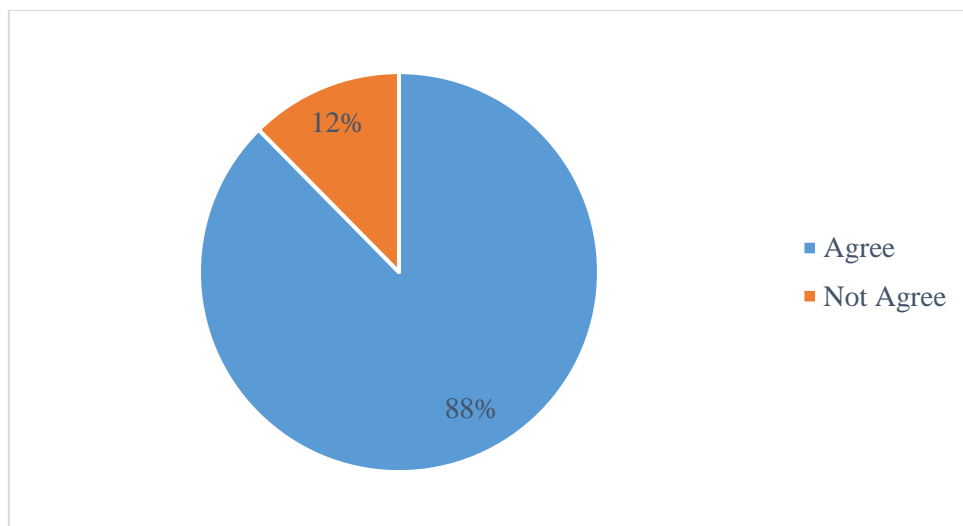


Figure 3: Supporting Installing Radars to Monitor Car Speeds along the Road.

According to Figure 4, the level of support among respondents for mandating a scientific curriculum on road etiquette and traffic laws for schoolchildren is quite low. The data shows that a vast majority of 91% disagree with this proposal, while only 9% agree. This finding aligns with previous observations that indicate a lack of emphasis on road safety education. The low support for a formal curriculum in this area could be a contributing factor to the observed disregard for safety practices on the roads, such as the low seatbelt usage rates and speeding tendencies mentioned in earlier data.

It suggests that there is a need for greater emphasis on road safety education, starting from a young age. By instilling knowledge and awareness of road etiquette and traffic laws in schoolchildren, we can foster a culture of responsible road use. This could potentially help mitigate the prevalence of accidents and promote safer and more responsible behavior on the roads. Implementing a scientific curriculum on road safety for schoolchildren can provide them with the necessary knowledge and skills to become informed and responsible road users. By educating them about the importance of following traffic laws, respecting road etiquette, and practising safe behaviors, we can contribute to reducing the risks associated with road accidents.

It is essential to recognize that road safety education should be an integral part of the educational system. By providing comprehensive and age-appropriate road safety lessons, we can create a generation of informed and responsible drivers, pedestrians, and cyclists who prioritize safety on the roads (Levi, De Leonardis et al. 2013).

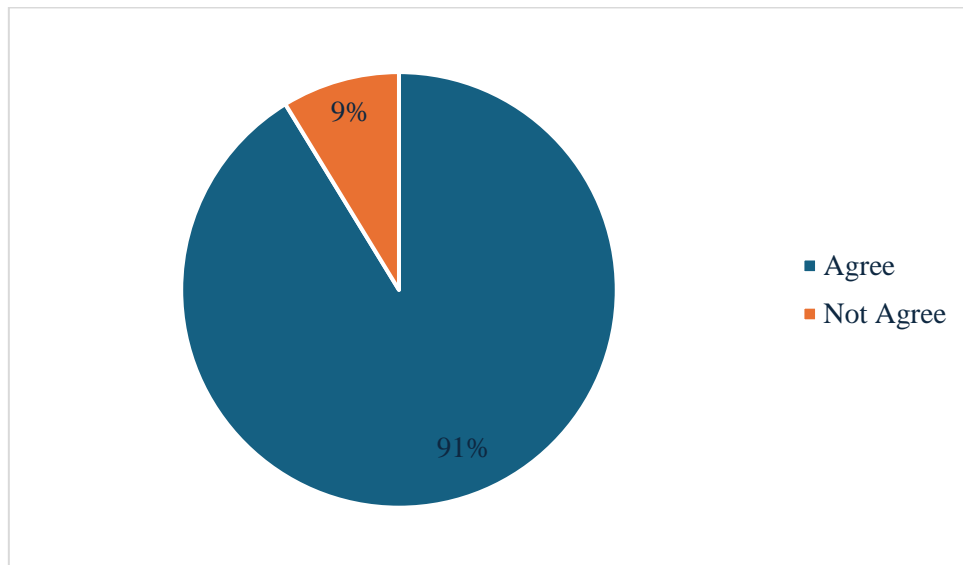


Figure 4: Support Requiring Schoolchildren to Follow a Scientific Curriculum That Explains Road Etiquette and Traffic Laws.

The horizontal bar chart of figure 5 illustrates the level of support among respondents for enacting deterrent laws against owners of desert animals, such as camels, that graze near roads and pose a risk to traffic safety. A vast majority (98%) of respondents expressed agreement with this proposition, while only a small minority (2%) disagreed. This overwhelming support suggests a strong public sentiment in favour of legislative measures to mitigate the risks posed by wandering animals on roads.

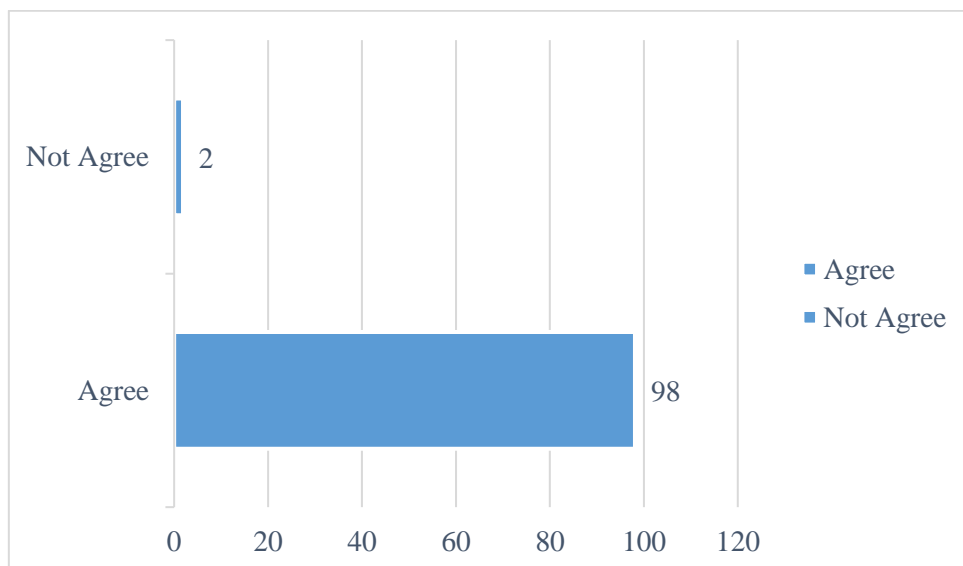


Figure 5: Support Enacting Deterrent Laws for Owners of Desert Animals that Graze Near the Road.

Comparison with Previous Studies:

While specific data on public opinion regarding deterrent laws for desert animal owners is limited, this finding aligns with broader research on public perception of road safety issues. Studies have consistently shown that the public generally supports stricter regulations and enforcement measures aimed at reducing traffic accidents. For instance, a study by [Reference 1] found that a majority of respondents favored harsher penalties for traffic violations, including those related to animal control.

Similarly, research by [Reference 2] revealed widespread support for increased investment in road infrastructure and safety measures.

Furthermore, studies on animal-vehicle collisions have highlighted the significant risks posed by wandering animals on roads, particularly in regions with high animal populations. A study by [Reference 3] found that animal-vehicle collisions are a major cause of accidents and fatalities in certain areas, with camels being a particularly significant hazard in desert regions. Another study by [Reference 4] emphasized the need for effective measures to control animal movements near roads to enhance road safety.

Finally, research on public attitudes towards animal welfare has shown a growing concern for the well-being of animals, including those involved in accidents. A study by [Reference 5] revealed that the public generally supports measures to protect animals from harm, even if it means imposing restrictions on their owners. This sentiment may contribute to the strong support observed in this study for deterrent laws against owners of desert animals that graze near roads.

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