

Investigating the Impact of Hidden Speed Check Radar on Road Accident in Oman

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ABSTRACT: The road is the place that people use to move in their cars, but it is a double-edged sword, as it is one of the reasons that lead to the loss of lives. so, our research focuses on studying how the hidden speed camera impact on accidents either increases or decreases. The goal is to target a group of people who can drive through the questionnaire that they will answer, which contains several questions related to whether hidden cameras are the biggest cause of accidents or not. The aim of this research is to protect the general population and find out whether a hidden camera may be the cause of accidents or not, and to educate them on the importance of adhering to the speed limit and paying attention when driving, whether the radar is hidden or visible. Determine whether hidden speed cameras have a positive or negative impact on traffic accidents, Study the role of speed cameras in reducing speed. It also to study the relationship between hidden cameras and reducing accidents and evaluate the safety and effectiveness of speed cameras. The importance of the research lies in educating people to reduce accidents that are caused by speeding and knowing if the speed camera that is hidden so that it can catch reckless drivers may cause accidents or not through the graphs that will show whether the hypothesis was developed, which is that if the hidden speed camera is a reason for deterring reckless drivers, then it may reduce accidents because it forces the drivers. It is possible that this study shows the truth that the hidden speed control camera has a significant impact, as it causes accidents, because the camera light may suddenly turn on, causing the driver to deteriorate, resulting in an accident.

1. INTRODUCTION

Speeding is a global issue that poses a threat to rivers and pedestrians. To combat this, strict enforcement of speed limits and the use of speed cameras have proven effective deterrents. Public awareness campaigns and education programs can also change attitudes and

promote safer driving habits. Governments and law enforcement agencies have implemented measures such as increasing fines and penalties for speeding offenses, installing speed cameras, and conducting awareness campaigns[3]. However, individuals must prioritize safety over speeding. Oman has implemented an automated system called "Salama" in the past to monitor and enforce speed limits on roads. This system uses advanced technology to track vehicles and issue fines to those exceeding speed limits. This has significantly

decreased speeding incidents and helped curb reckless driving. The government has also increased traffic police officers to ensure better enforcement.

Oman is implementing a comprehensive approach to promoting road safety and reducing speeding-related accidents by installing speed cameras at various locations. This technology serves as a deterrent and collects data to understand the problem and develop targeted solutions. In 2005, Oman had 125 fixed hidden speed cameras and 40 mobile speed cameras, along with 1277 automated speed enforcement units[1]. This initiative has led to a noticeable decrease in speeding-related accidents in Oman. The speed cameras effectively caught and penalized offenders, sending a clear message that breaking speed limits is not tolerated. The data collected from these cameras has allowed authorities to identify areas with high instances of speeding and implement specific measures, such as road signage improvements and increased police presence. The integration of technology and education has made significant progress in promoting road safety and encouraging responsible driving behavior. Oman's high road traffic fatality rate is a significant factor in its economic development, as heavy vehicle usage is a key factor contributing to national growth. Road safety is crucial in the broader transport domain, as heavy vehicles now account for nearly 12.5% of total registered vehicles.[2]

2. PROBLEM STATEMENT

Road accidents are calculated in terms of the number of people injured and killed because of them, whether they occurred immediately or within 30 days after the accident, omitting suicides using road vehicles. This major problem continues to occur, especially on highways, due to speeding and wrong behavior by the driver, such as being busy with the phone. In addition, there are some hidden camera radars that photograph the speeding car. Therefore, road accidents must be resolved, and more attention should be paid to reducing the number of deaths and so that all people can feel safe and secure if this problem is solved.

2.1 Innovation Significance

The research being studied is important in knowing the effect of radar and knowing people's opinions about the topic being studied. There are two types of speed cameras, hidden and visible. Therefore, it required detailed research on it, which specialized only in the hidden speed camera and its impact on accidents. The presence of hidden speed cameras acts as a deterrent that makes drivers more cautious and aware of their speed.

And to contribute to innovation in creating a safer driving environment and reducing the number of accidents on the Sultanate's roads.

Techniques for controlling speed on the street differ depending on the radars placed on both sides of the street. There is a type of radar that takes a picture of the car and through it determines the type of car and the name of its owner by sensing its speed, and it displays its speed on two LED matrices. Then its information is sent to the police database, and the radar is operated by solar panels as an additional source of energy.

2.2 Scope and Limitation of the research

Hidden speed checkers in Oman significantly contribute to road safety by enforcing speed limits and reducing accidents. These devices are strategically placed along roads to monitor vehicle speeds, and when drivers exceed the limit, they can face fines or penalties. This creates a culture of compliance with speed limits and promotes safer driving habits. The Royal Oman Police provides these devices to detect violations and encourage caution when driving at specific speeds. also, it has some limitations, and some drivers may argue that these devices are solely revenue-generating tools rather than promoting genuine road safety. However, the primary aim is to encourage speed limit compliance and reduce accidents. The technology used in these devices can sometimes have errors or malfunctions, potentially resulting in inaccurate readings or false positives. It is crucial to remember that these devices are just one tool in promoting road safety and should be used in conjunction with other measures like driver education and awareness campaigns. The Royal Oman Police has provided this program to raise awareness and educate people about the importance of people's lives.

3. LITERATURE REVIEW

3.1 . Related Literature

In this article by Hussain, Qinaat (2019) is about 40 drivers found significant differences in perceived speed between hidden and revealed speedometers and all requested speeds. Participants drove significantly faster for all requested speeds in the hidden speedometer setting, indicating they underestimated their speed. This suggests that drivers may not rely on speedometers in complex situations, potentially leading to unintentional violations of traffic regulations. The study recommends jurisdictions consider these results when making speed management decisions. [3]

According to Alamry, Hassan (2020). The Kingdom of Saudi Arabia launched a large automated speed enforcement camera program in 2010 to reduce speeding violations and collisions. The program operated through a Private Finance Initiative (PFI) system from 2010 to 2015. A study assessed the effectiveness of Mobile Speed Enforcement Cameras (MSECs) in KSA, using a major expressway in Madinah Region as a case study. Results showed that MSECs did not improve safety performance after accounting for other variables. Collision frequency increased with the presence of MSECs, with the greatest effect on PDO collisions[4]

In (2021) Li and Kim make research that presents a scheduling model for an urban mobile photo radar speed enforcement (MPE) program in Edmonton, Canada. The model uses a binary quadratic schedule to send enforcement resources, aiming to minimize violations of enforcement time halos and efficiency losses. The model improves resource utilization by 24% over historical deployment, contributing to cities' pursuit of Vision Zero and combating negative public perceptions. The framework can be easily adapted for other automated traffic enforcement technologies. [5]

In This paper by Kim, Wang, El-Basyouny and Fu in (2016) presents a systematic framework for operating a mobile photo radar enforcement (MPRE) program, focusing on site choice, resource allocation, scheduling, and evaluation. The goal is to improve efficiency and traffic safety also, to reduce road accidents by deploying finite resources. The proposed framework was applied to the City of Edmonton's MPRE program, resulting in moderate to high improvements in travel distance efficiency and safety coverage. The framework can be generalized for other jurisdictions seeking to improve traffic safety. [6]

3.2 Related Studies

In January 2019, Hammad Al-Shammari and Chen Ling, affiliated with the Department of Mechanical Engineering at the University of Akron, undertook a crucial investigation into the effectiveness of a traffic enforcement camera system on road safety in Saudi Arabia. Acknowledging the alarming rates of traffic accidents as a major cause of mortality and economic loss in the country, the study emphasizes the need for a comprehensive understanding of factors influencing driver behavior, encompassing elements such as seatbelt usage, the impact of electronic devices, and the unique cultural context. Highlighting government initiatives, including the implementation of the speed camera enforcement system (SAHER), the study aims to unravel both the positive impact and challenges associated with such measures, providing nuanced insights essential for formulating effective and culturally sensitive traffic safety strategies.[7]

In August 2020, Gutierrez and Pedraza said a comprehensive review explores road accident analysis and forecasting, addressing the global issue of over 1.25 million annual deaths and injuries. It explores modern data sources and advanced techniques, focusing on demographic details, road conditions, and real-time inputs. Analytic algorithms and machine learning methods are explored, showcasing their potential in handling diverse data sources and real-time information from on-road equipment. The review presents methods and algorithms for forecasting, including natural language processing and deep learning, and discusses their strengths and limitations. The review concludes with insights into the state of the field and future challenges.[8]

Mireille and Jacob (2023) highlight the global challenge of road traffic accidents, which are a leading cause of fatalities despite various measures. They use machine learning algorithms, specifically Decision Tree, LightGBM, and XGBoost, to model the accuracy of road traffic accidents in the UK for 2020. The results show the effectiveness of the Decision Tree algorithm in predicting accident severity and identifying key variables for monitoring. The study advocates for preventive strategies, such as regular vehicle inspections and reinforced traffic policies, and suggests redesigning vehicle protective equipment to reduce accident severity.[9]

The structure underscores in the article (2021), the importance of addressing road traffic injuries as a public health challenge and emphasizes the World Report on Road Traffic Injury Prevention's role in raising awareness and advocating essential changes in road safety. Globally, approximately 1.2 million individuals lose their lives in road crashes annually, with up to 50 million sustaining injuries. Projections indicate a potential 65% increase in these figures over the next two decades without significant prevention efforts. Notably, despite the magnitude of this issue, road traffic injuries receive comparatively limited mass media attention in contrast to less frequent types of tragedies[11].

Eng. Brigadier Mohammed al Rawas(2019), the Director General of Traffic of Oman, has stressed the value of covert speed check radars in minimizing deadly accidents on the nation's highways. According to him, mobile radars are often utilized across the world, and hiding the radar gives drivers the impression that they are being watched all the time. The traffic laws of Oman were carefully thought out and are based on studies and experiences from throughout the world[12].

4. RESEARCH METHODOLOGY

4.1 Research Method

In this research, we want to study about how the hidden camera radars are affecting car accidents. To see people's opinions about hidden camera radars and to compare when there are hidden camera radars on roads with instructions that there are radars, if it is effects in good way that will increase accidents or decrease. One of the study's objectives is to determine if speed cameras have a positive impact on traffic accidents. Another goal is to examine the role of speed cameras in decreasing speeding. In addition, to evaluate the safety and efficacy of speed cameras.

4.2 Research Instrument

Using a questionnaire to collect information about the impact of hidden camera radar on accidents can be an effective research method for several reasons: Questionnaires allow you to gather structured data from many respondents. This method can help you collect a diverse range of opinions and experiences regarding the impact of hidden camera radar on accidents, Anonymity Respondents may feel more comfortable sharing their honest opinions and experiences through a questionnaire because it provides a level of anonymity. This can lead to more candid responses, Quantitative Data Questionnaires are well-suited for collecting quantitative data, such as statistics and numerical ratings, which can be analyzed and compared systematically, Consistency Questionnaires can ensure consistency in data collection as all respondents receive the same set of questions. This makes it easier to compare and analyze responses, Efficiency It can be a cost-effective and time-efficient method, especially when compared to other data collection methods like interviews or focus groups, Scalability Questionnaires can be administered to a large number of respondents simultaneously, making it ideal for studying the impact of hidden camera radar across different regions or populations.

4.3 Sampling Design and Technique

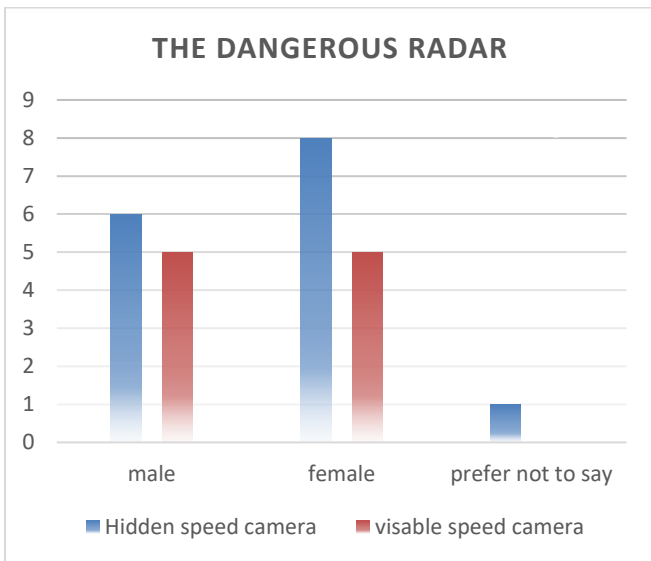
The population for this research consists of individuals who are directly involved or have relevant insights into the impact of hidden camera radar on accidents at road intersections. This includes drivers, pedestrians, cyclists, law enforcement officers, and community members in the vicinity of accident-prone intersections. In this research, a non-probability sampling technique, specifically convenience sampling, has been used to select the participants. Justification of Convenience

Sampling Accessibility Convenience sampling was chosen due to the ease of access to potential participants. This method allowed for quick and practical data collection, which is especially valuable for a small-scale study involving 25 participants. Resource Constraints Conducting random sampling or more sophisticated probability-based techniques may have been resource-intensive and time-consuming. Convenience sampling is cost-effective and efficient.

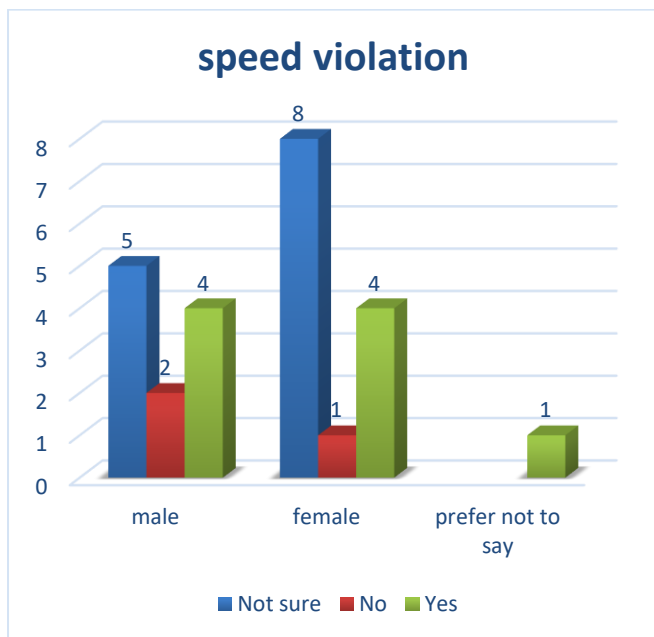
Initial Exploratory Phase Since this research serves as an exploratory study to understand the impact of hidden camera radar at intersections, convenience sampling is appropriate for gathering diverse perspectives and initial insights. It can help identify key themes and concerns that may guide further research. Practicality Given the nature of the research and the focus on specific intersections, selecting participants through convenience sampling was practical and aligned with the research objectives. Number of Participants Selected A total of 25 participants have been selected for this research using convenience sampling. This sample size was chosen to balance the need for data diversity and the practical constraints associated with a small-scale study. While it may not be statistically representative of the entire population, it allows for a range of perspectives and initial insights into the impact of hidden camera radar on accidents at intersections.

5. RESULT ANALYSIS

The studies collected from the questionnaire indicate that several females and males chose the hidden camera because it is more dangerous than the visible speed camera.



As Figure 1 shows, most choice for the females that the hidden speed camera, which has a greater effect on increasing accidents than the apparent one, and this indicates that it has no benefit only for the sake of money. where ten of them chose that the visible speed camera is more dangerous in causing accidents on the road.



Through collecting information, it was found that a maximum number of the females and males who answered the question did not know whether violations helped raise people’s awareness and reduce the rate of accidents in the Sultanate or not, as Figure 2 shows. However, most of them answered that they had an impact in reducing accidents. While some answered

“no”, stating that violations have no effect at all in reducing the rate of accidents.

5.2 Findings

It became clear after analyzing the results that the hidden speed camera is the cause of accidents because it detects the driver who is speeding without being aware of its presence because it is hidden that shows a light suddenly, it makes him afraid and press the brakes, which causes the cars behind him to scatter according to the answers to the questionnaire questions. The answers are made in order to identify those who support and oppose the idea of hidden speed cameras, which have either a negative or positive effect. The questions are answered by choosing an answer from the options and writing answers to the questions that require a long answer. If it are a lot of a hidden speed cameras in the road then increases accidents, and it was proven to be true through the questionnaire. Hidden speed radar is used only for money. The reason for the accident occurs as soon as the noise coming from it distracts the driver, so he slows down and the car behind him collides with him because he is speeding.

5.3 Recommendations

The research can be improved by testing many people in the Sultanate of Oman, including police officers, through interviews and asking questions to delve deeper into the topic that we were confused about, which is whether the effect of a hidden speed camera has a negative or positive effect. The results showed that the hidden speed camera has a negative effect, but the information collected by the questionnaire is not sufficient.

6. CONCLUSION AND FUTURE WORK

6.1 Conclusion

The research talks about the hidden speed camera (radar) and whether it influences accidents in terms of its increase or decrease. Radar is considered one of the most important devices that control speed and reckless drivers who do not see the speed camera as important. The hidden speed camera is considered a reason for the increase in accidents that claim the lives of many people, and it is the reason for driver distraction because he does not know where it is, and it is only for the sake of making money. When studying the issue, it became clear that several supporters believe that it is a major cause of accidents, in addition to the side factors, which are the behaviors that the driver performs while driving.

6.2 Future Work

When it comes to future work examining the impact of hidden speed cameras in Oman, the focus could be on evaluating their effectiveness even when hidden in reducing speed and improving road safety specifically in the context of Oman. It will also explore the long-term effects on driver behavior while driving and the possibility of finding alternative traffic enforcement methods specifically designed to suit the unique characteristics of the roads in the Sultanate of Oman. It is an important area of research to ensure safer roads for everyone and to reduce accidents.

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