STUDY ON DEMOGRAPHIC FACTORS OF DRIVER RESIDENCE ON ROAD CRASHES IN INDIA

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Abstract

Transportation engineers are particularly concerned with traffic safety. Motor vehicle collisions have a huge influence on quality of life in addition to drastically reducing the efficacy of a route. Motor vehicle accidents are one of the leading causes of injury and death in the United States, and although statistics suggest that the number of incidents is reducing yearly, engineers must continue to strive to lower the overall number of collisions and lessen the severity of collisions. Human mistake, according to researchers, is the leading cause of automobile accidents. Despite extensive studies demonstrating that diverse behaviours and attitudes have a substantial influence on traffic safety, our grasp of the human component of the collision causation equation remains inadequate. As a result, the objective of this dissertation is to address the lack of understanding about how people influence collisions and to suggest how the practise should change in order to achieve the goal of zero highway deaths.

Keywords: Highway safety, Binary logistic regression

Introduction

In India, fatalities and injuries caused by automobile accidents are a substantial and rising public health issue. Every week, road accidents claim the lives of roughly 2,650 individuals and injure 9,000 others. In India, 137,423 people died and 469,900 people were wounded in road accidents in 2013, the most recent year for which statistics is available. India currently has the terrible distinction of having the highest number of road fatalities in the world, surpassing China with about 140,000 deaths each year. India is the only nation in the world where road incidents result in more than 15 deaths and 53 injuries per hour. While the situation in many rich and emerging nations, including China, is improving, India's condition is deteriorating.

If current trends continue, India's overall number of road traffic fatalities would rise by 100% between 2013 and 2027. Without greater efforts and new initiatives, India's overall number of traffic fatalities is expected to exceed 250,000 by 2025. The study's primary goal is to examine road traffic accidents in India at the national, state, and metropolitan city levels. The focus would be on identifying the primary road safety concerns and discussing various remedies to solve the particular road safety challenges. Accidental Deaths & Suicides in India, 1970 to 2013, issued by the National Crime Records Bureau, Ministry of Home Affairs, Government of India, New Delhi, is the study's major source of data. According to the data, road accident deaths in India have climbed at a pace of 5% per year over the previous ten years, while the country's population has only expanded at a rate of 1.4 percent per year. As a result, the risk of mortality, or road-related fatalities per 100,000 persons,

has risen from 7.9 in 2003 to 11.2 in 2013. The danger of death in India is not just triple that of other industrialised nations such as the United Kingdom and Sweden, but it is also quickly growing.

It was also discovered that the distribution of road fatalities and injuries differs by age, gender, month, and time. People in the economically active age bracket of 30-59 years are the most susceptible of all age groups. However, when we look at deaths and accidents by gender, we find that men were responsible for 85.2 percent of all fatalities and 82.1 percent of all injuries in 2013. Furthermore, road accidents are more common in May-June and December-January, indicating that harsh weather has an impact on the frequency of road accidents. Accidents are rather consistent and high between 9 a.m. and 9 p.m., and variable but low between midnight and dawn. This does not, however, mean that daytime driving is riskier than nighttimes driving. The research also aims to determine the cause-by-cause distribution of traffic accidents. There are various elements that contribute to accidents, but the most significant is driver error, which accounted for 78 percent of all incidents in 2013.

The major purpose of this study is to use the quasi-induced exposure approach to determine the likelihood of a motorist being the at-fault driver in an accident based on the socioeconomic features of the driver's domicile. The binary logistic regression models produced in this work provide a depiction of the likelihood of a motorist being at fault when engaged in collisions, as a function of the socioeconomic and demographic parameters of the driver's zip code. The results of this study may be used to identify groups of drivers or zip codes having a high risk of being involved in an accident. In other words, the final models built as a result of this research enable identifying those drivers who contribute to future collision occurrence and who belong to a certain group (e.g., age, gender, economic or educational status) or geography (e.g., rural/urban). This is crucial information for policymakers, and it may be utilised as further evidence to design effective safety initiatives for these populations.

Logistic regression is used to study the relationship between accident incidence and the socioeconomic status of the driver's zip code. When the dependent variable is categorical, logistic regression models are optimal. When the impacts of more than one explanatory variable affect a result, this modelling method is equally useful. The independent variables might be discrete or continuous, and the response variable is the probability of the result, which is calculated using the predictor values. Different regression models for two- and single-unit crashes are built as a function of several socioeconomic and demographic factors using this methodology and a series of variable selection procedures. After that, the models in each category are examined to see which have the greatest predictability.

The findings of the model for single-unit and two-unit collisions are quite similar. Fault status is shown to be a function of age, gender, rurality, poverty level, average conviction, and driver population density in two-unit collisions. All of these factors are proven to have a substantial impact on single-unit accidents. When educational attainment (percentage of people with a bachelor's degree or above)

took its place, poverty level was omitted from the model. At the 95 percent confidence level, all of the predictors in the final model are significant.

For both two-unit and single-unit collisions, the odds ratios for younger and older drivers reveal a larger risk of causing a crash, following the normal U-shape curve of crash participation. This is in line with previous studies, which has shown a link between age and accident participation. According to Aguero-Valverde et al. (2006), age categories below 25 and over 65 have a positive relationship with accident risk, and the majority of prior research reveals a link between young drivers and collisions or deaths. Several research on elderly drivers have shown that they are more likely to be involved in crashes, as well as the risk factors they generate for themselves and other drivers. Other studies have shown a link between young and elderly drivers and accident participation, suggesting that they are more likely to be the at-fault driver in a collision. These results are in line with those of this research.

Male drivers are more likely to be at danger while they are younger, but with practise and experience, they become better drivers. The aggressive and risk-taking behaviour of young male drivers might be the cause of the high-risk rate. Male drivers are more exposed than female drivers since they travel more kilometres, which might be another factor for the increased engagement of young guys. Female drivers do better while they are young, but as they become older, their performance deteriorates.

The following lists give a rapid overview of the research's important results, which may be used to design specific initiatives to address them (as mentioned below). The results are divided into two lists and are based on the analysis from which they were produced. The first section explains the results of the geographical study, while the second lists the results of the statistical analysis and models that were constructed.

Conclusion

Many car accidents occur as a result of a driver's failure to make the correct judgement. The majority of avoidable accidents are caused by human mistake. As a result, it's critical to keep track on current drivers' performance and raise safety awareness among certain groups. The results of this research might aid practitioners in identifying groups of drivers who are at a greater risk of being involved in a collision. Based on this information, safety initiatives may be developed to more effectively target the most vulnerable populations in order to improve overall traffic safety.

This survey also reveals that young drivers are more likely than any other age group to be involved in car accidents. The importance of high-quality driver education and supervised driving procedures in preventing rookie driver accidents cannot be overstated. Teen drivers should be required to complete such driving education classes in order to be eligible for an intermediate licence. Police officers are road safety professionals with unrivalled knowledge of the hazards and threats that exist on the road. Retired cops and firefighters may serve as competent teachers who can pass on their experience of road safety. DMVs may host seminars taught by these professionals to raise knowledge of traffic

rules and their relevance. Before taking the road test, you may be required to complete practise instruction that includes a minimum number of driving lessons on rural and urban roads (including highways).

Virtual driving simulators may be a cost-effective tool to teach new drivers, particularly young drivers, about real-world risky scenarios they may encounter on the road. This is a fun approach for new drivers to improve their defensive driving skills without really being in a dangerous scenario. Driving simulators supplement standard classroom and behind-the-wheel learning methodologies by allowing active learning. "Driving simulators offer active learning by allowing for rapid feedback on driver performance," according to the National Highway Traffic Safety Administration. It's as near as a person can get to learning to drive on actual roads with a professional instructor without the danger of crashing.

Driving is a skill that requires knowledge and ethical behaviour in order to keep yourself and other road users safe. As a result, it is essential to strictly enforce traffic laws in order to encourage drivers to maintain a high level of safety. To identify traffic violations more efficiently, traffic enforcement cameras may be extensively used. It might be connected to a computerised ticketing system. The registered owner of the vehicle is usually assumed to have driven the vehicle when the citation was issued, which might be a downside of this method. If someone else was driving the automobile, however, the registered owner may be permitted to offer proof.

More police enforcement may improve the efficiency with which the offender is punished, thereby emphasising the significance of adhering to traffic laws. When a high-risk group of drivers is found guilty of a traffic infraction or an accident on many occasions, the punishment may be harsh, and the penalty can be raised on successive offences. For example, the penalty for exceeding the speed limit by more than 25 miles per hour may be raised to a fine of up to $250 for the first offence and up to $500 for consecutive offences. Similarly, for serious violations, traffic violation points might be raised.

Automobile manufacturers place a greater emphasis on improving safety elements in their vehicles. Lower-income people may not be able to buy these high-tech autos with improved safety measures. Furthermore, elderly and younger drivers are more likely to drive older, less costly vehicles with less safety features, increasing their chances of being involved in a collision. As a result, safety inspection tests may be performed on all registered cars as part of the licence renewal process to verify that they fulfil safety criteria. However, whether routine vehicle inspections are a cost-effective strategy to increase road traffic safety is a point of contention.

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