Analysis of Factors Affecting Road Traffic Accidents at San Nicolas Poblacion Road in Concepcion, Tarlac

Joshua C. Cabigting [1], Lhia Marie K. Castillo [1], Christine L. Cuaresma [1], John Roi P. Dela Cruz [1], Mark Justine Q. Pineda [1], Rosniann B. Santiago [1], Charles Lim [1], Ana Pauline Pagador [1]

[1]Student, Department of Civil Engineering, Don Honorio Ventura State University, Bacolor, Pampanga, Philippines.

Corresponding Author: joshuacabigting1@gmail.com

Abstract: - The study analyzed the factors influencing traffic accidents on San Nicolas Poblacion Road and sought to provide solutions for reducing them. The research encompassed the type of transportation, the frequency of weekly road activity, and the roadway conditions. It also includes information about the frequency of accidents, their nature, the vehicles involved, the month of the year, and the time of day. The study also aimed to determine whether there is a significant difference in the types of accidents based on the type of vehicle utilized and if there is a relationship between the type of accident and the type of vehicle involved. The statistical tools used were descriptive statistics, ANOVA, post hoc tests, and the Chi-squared test. The significant findings are that motorcycles are the most commonly used type of transportation, most of the respondents use the road the whole week, potholes are the biggest issue with road conditions, and respondents are unsatisfied in terms of lighting, overall road quality, road signs, and the safety of the road. Moreover, most of the respondents see road maintenance as very important; 2022 has the highest accident data; November is the most numbered month with accidents; self-accident is the most commonly occurring type of incident; accidents usually occur between 6:01 p.m. and 12:00 a.m.; and there is a significant difference in the type of accidents based on the utilized vehicle. There is a significant relationship between the type of vehicle and the type of accident. The main recommendations from the study to reduce traffic accidents are to: provide checkpoints and speed limits; conduct a yearly or monthly inspection of the condition of the road; provide high-luminous street lights and highway lights; and provide enough road signs.

Key Words: — ***Factors, Road Accidents, Roadway Conditions.***

I. INTRODUCTION

Motorization has improved many lives and communities, yet there is a cost associated with the advantage. Despite a recent decline in the number of people killed in traffic accidents in high-income nations, the cost of road traffic injuries to society an4d the economy is rising significantly for most of the global population.

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Road traffic accidents are currently the eighth most common cause of mortality worldwide among all age groups. By 2030, they are expected to overtake natural causes as the seventh most common cause of death. Particularly in less developed nations, pedestrians are the most vulnerable road users. These result in the premature death of about 1.3 million persons each year. Between 20 and 50 million more individuals face non-fatal injuries, and many become disabled (World Health Organization, 2022). Road accidents cause significant financial harm to individuals, their families, and entire nations. These costs are related to the cost of medical care, lost wages for individuals who die or become incapacitated as a result of their injuries, and caregiving expenditures for families who must take time off from work or school to care for the injured.

In India, vehicle traffic accidents are a serious and expanding public health issue that causes deaths and injuries. Every week,

traffic accidents result in 9,000 injuries and about 2,650 fatalities. Thus, 137,423 people lost their lives, and 469,900 suffered injuries in road accidents in India in 2013, the most recent year for which data is available (Elsevier B.V., 2017). With approximately 140,000 deaths annually, India has surpassed China to take the top worldwide for road fatalities due to traffic accidents. India is the only country where traffic accidents result in over 15 mortalities and 53 grievances every hour. The state is generally refining in many established and emerging nations, including China, India is seeing a worsening situation. If the pattern holds, there will be a 100% increase in road traffic fatalities in India between 2013 and 2027. By 2025, India's total traffic fatalities will surpass 250,000 without more effort and innovative programs.

In 2021, 48 percent of all vehicle-related traffic incidents occurred in Metro Manila, Philippines. Motorcycle collisions came next, making for around 24 percent of all vehicle collisions in the region (Statista, 2021). The Metropolitan Manila Development Authority (MMDA) recorded 26,768 motorbikes engaged in road accidents from 1560 last year, according to the most recent Metro Manila Accident Recording and Analysis System (MMARAS) report. Due to global pandemics, the number of vehicles involved in accidents went from 125,010 in 2020 to 112,228 in 2021 (Grecia L., 2022).

1.1 Background of the Study

Concepcion is a municipality in the landlocked province of Tarlac; it has 45 barangays in total. San Nicolas Poblacion is one of the barangays in the municipality of Concepcion, in the province of Tarlac. Its population, as determined by the 2020 Census, was 4,882. It is a two-way road near school premises, public market restaurants, and a church. According to the Public Order and Safety Office (POSO), several potholes and broken roads have not been repaired since the roads were built. They only cover up its damages temporarily. Asphalt is the primary construction material for roadways.

Regarding traffic volume, weekdays are busier than weekends due to employees and students. For whatever reason, the only activities that occur locally on weekends are church attendance and shopping. According to POSO, 5,000 to 6,000 vehicles pass through on weekdays and 3,000 to 4,000 on weekends.

According to Kimiko Sy (2017), Tarlac retains the record for having the most accidents, and Concepcion reported a higher-than-average number of incidents in Central Luzon province. The study was conducted on San Nicolas Poblacion Road. San Nicolas Poblacion was the barangay in Concepcion, Tarlac, with the most accidents, according to data compiled by the Municipal Disaster Risk Reduction and Management Office (MDRRMO) for 2018 to 2022. Therefore, it was possible to get all the necessary and relevant information from these locations.

II. REVIEW OF RELATED STUDIES

Road traffic accidents are now responsible for a surprisingly large amount of the global disease burden and are one of the most causes of death worldwide and the largest cause of death by injury. According to numerous national and international studies, these have been identified as the most prevalent driving behaviors on the road that cause accidents.

2.1 Low Illumination Conditions

The presence or lack of a fatal accident occurring at night was chosen as the dependent variable and integrated with the logistic model theory. The findings indicate that key elements that influence the severity of nighttime vehicle accidents in low-light situations include the accident site, accident type, and the presence of a middle divider (Liu et al., 2019). According to Jing Liu (2019), the findings of this study may help road management create better coping methods. They can concentrate more on providing the necessary essential traffic infrastructure, particularly on low-grade highway sections and highways with median dividers, particularly dangerous road segments. Examples include speed monitoring devices, reflective traffic signs, and lighting facilities. Additionally, depending on the likelihood of fatal nighttime accidents, road management might continuously change the scope of nighttime traffic safety inspections for different road sections and seasons.

2.2 Impaired Driving

According to this study, significant risk factors for drunk driving include male drivers, private vehicles, inadequate nighttime street illumination, and poor visibility (Wang et al., 2018). Truck, bus, motorcycle, and public utility vehicle drivers should test negative for alcohol after BAC testing, which is conclusive evidence that they are operating their vehicles while impaired (Mendoza J.E., 2022).

2.3 Red Light Jumping

Saving time is the primary goal of red light running. The red-light jumper crosses the junction faster to avoid a collision in Tanzania. However, this impairs his ability to evaluate the flow of oncoming traffic, and he frequently collides. As a result, we may examine how frequently traffic accidents are caused by drivers' needless hurry (Hamisi, H.S. & Juma, H., 2019).

2.4 Geometric Design of Roadways

The road safety audit report revealed that the most vulnerable area for road traffic accidents happened in the mountainous and escarpment areas due to road design problems such as insufficient sight distance, sharp curves, missing narrow lanes and shoulders, and deficient and damaged road pavement markings. The factors investigated in the geometric design of existing roads include cross-sectional elements such as road condition, road environment, checking the road geometry (e.g., cross-sectional road features like the width of the road, width of shoulder, road barrier, the width of the median, sight distance, road marking, road light), and horizontal and vertical curves (Wedajo et al., 2017).

2.5 Roadway Condition

Traffic officers identified additional problems in the same study by Wedajo, Quezon, and Mohammed (2017), including a lack of road traffic lights, a scarcity of road traffic signals, few and narrow sidewalks, and poor road quality, all of which significantly contribute to the occurrence of traffic accidents along the route. Furthermore, the alignments—horizontally and vertically—were incompatible with the vehicles' design speeds.

2.6 Vehicle Characteristics

High speeds, in accordance with Masayoshi Tanishitaa (2017), make it more difficult for drivers to react when it's essential since they need time to receive information, decide whether to react, and, if necessary, carry out a reaction. The risk dramatically rises with speed since braking and reaction times are related to the square of the speed. As a result, the chance of averting a collision reduces as speed does. Joey Deriquito (2021) claims that this makes other drivers adjust to the vehicle's slower speed, obstructing traffic and causing a bottleneck of vehicles. As a result, other motorists overtake or switch onto a separate lane in order to pass the oncoming car, adding to the traffic.

2.7 Traffic Volume

Tanishitaa (2017) asserts that drivers must alter their vehicle's speed more frequently because a greater rate of speed fluctuation raises the risk of errors while keeping a safe separating distance from other vehicles. Congestion can also affect traffic accidents, though not usually in ways that are immediately apparent. Accidents might be expected to happen more frequently when there are more vehicles on the road, but they might also happen less frequently as speeds are reduced (Retallack & Ostendorf, 2019).

2.8 Statement of the Problem

According to the data recorded by the Municipal Disaster Risk Reduction and Management Office (MDRRMO) from 2018–2022, among the barangays in Concepcion, Tarlac, Brgy. San Nicolas Poblacion ranked first as the barangay with the most accidents. As per the rescuer, accidents are usually due to human errors. As per the neighborhood, in some areas, the lights on the roadways during the night have low visibility. Furthermore, several potholes and broken roads have not been repaired since the roads were built. For these reasons, the proponents seek to determine the following:

1. How may the road traffic accidents in San Nicolas Poblacion road be described in terms of:
   - Type of Transportation
   - Frequency of weekly road activity
   - Biggest challenge or issue with the road conditions

2. How do road conditions influence traffic accidents on San Nicolas Poblacion Road?

3. How may the incidents in San Nicolas Poblacion road be described in terms of:

- Year
- Month of the year
  - Type of incident
  - Time of day

4. Is there a significant difference in the type of accidents based on the utilized vehicle?

5. Is there a significant relationship between the type of vehicle and the type of accident?

2.9 Objectives of the study

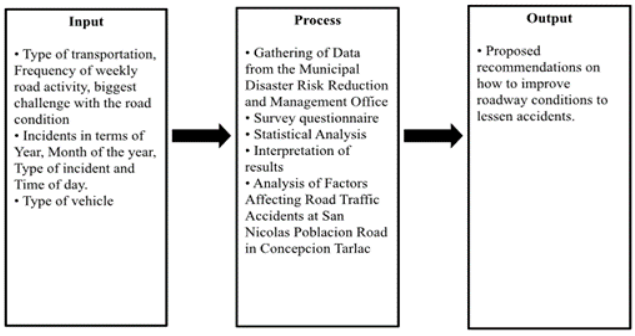
2.9.1 General Objectives

This study assessed the factors influencing road traffic accidents at Brgy. San. Nicolas Poblacion, Concepcion, Tarlac.

2.9.2 Specific Objectives

- To determine the type of transportation, frequency of weekly road activity, and biggest issue or challenge with the road conditions in San Nicolas Poblacion
- To determine how road conditions influence the road traffic accidents at San Nicolas Poblacion
- To identify the occurrence of road accidents in Brgy. San Nicolas Poblacion, Concepcion, Tarlac Road in terms of:
  - Year
  - Month of the year
  - Type of incident
  - Time of the day
- To determine whether there is a significant difference in the type of accidents based on the utilized vehicle
- To determine if there is a significant relationship between the type of vehicles and the type of accidents

2.10 Conceptual Framework



The inputs in this study were the type of transportation, frequency of weekly road activity, and the biggest challenge with the road condition. Furthermore, the data regarding roadway conditions in San Nicolas Poblacion was gathered using survey questionnaires. The secondary data obtained from the municipal disaster risk reduction and management office (MDRRMO) was used to identify the incidents in San Nicolas Poblacion. In addition, the researchers distributed survey questionnaires to the people of San Nicolas Poblacion about the road conditions in the area. The researchers conducted a statistical analysis using ANOVA and the Chi-Square Test to determine the significant difference and relationship between the type of vehicle and the type of accident. The researchers proceeded with interpreting the results. In addition, the researchers analyzed factors that affect road accidents on the San Nicolas Poblacion Road in Concepcion, Tarlac. The output of the study was to propose recommendations for improving roadway conditions to lessen accidents.

2.11 Hypothesis

Alternative Hypothesis: There is a significant difference between the type of accident and the vehicle utilized.

Null Hypothesis: There is no significant difference between the type of accident and the vehicle utilized.

Alternative Hypothesis: There is a significant relationship between the type of vehicle and the type of accident.

Null Hypothesis: There is no significant relationship between the type of vehicle and the type of accident.

2.12 Scope And Limitations

The main subject of this study was the analysis of road traffic accidents in the area of San Nicolas Poblacion Road in Concepcion Tarlac. The accident data or incident report was obtained from the Municipality Disaster Risk Reduction and Management Office (MDRRMO) at San Nicolas Poblacion. The incident report includes the type of vehicle or type of transportation composed of motorcycles, tricycles, jeeps, trucks, cars, bicycles, and walking. The types of accidents were categorized in the incident report as collision, self-accident, medical-related, vehicle vs. pedestrian, vehicle vs. animal, work-related, and sports-related. Furthermore, the months,

times, and years are included in the data given. The span of the accident data was limited to 2018–2022.

Regarding roadway conditions, the data were gathered only from the people of San Nicolas Poblacion through a survey questionnaire. The questionnaire is composed of two parts: (1) type of transportation, frequency of weekly road activity, biggest challenge or issue with the road conditions; (2) lighting availability during the night, overall quality of roads in the area in terms of smoothness, proper signage, absence of potholes, the usefulness of road signs, the importance of well-maintained road pavements, lighting, road signs, and road marking, and the safeness of the road conditions in San Nicolas Poblacion. The surveyed respondents were 100 because, according to most statisticians, in quantitative research, 100 respondents are enough to acquire meaningful results. The samples were limited only to the users of San Nicolas Poblacion Road. The study did not involve the psychological characteristics of the person involved in the accident, the vehicular condition during the accident, and the government's intervention regarding the maintenance of road conditions in San Nicolas Poblacion since no data is available.

2.13 Significance Of the Study

The findings of the study are deemed significant to the following:

The Municipality of Concepcion, local government, and the department of road and transport may use the results of this study to provide solutions and improve road conditions such as potholes, congestion, and a lack of traffic signs in the study area. Likewise, they could use the results of this study to have a wider understanding of how to identify ways to reduce the causes of road accidents and what new rules to implement for the safety of the drivers.

Motorists, commuters, and residents would benefit from this study, wherein proper authorities carry out recommendations to improve road conditions and implement rules and regulations to reduce the causes of road accidents.

Academe may use the output of this study as the basis for conducting related research on factors affecting road traffic accidents. The results and conclusions could also be used as the basis for their studies' interpretation to supplement their findings relevant to road traffic accidents as mediating variables.

Future researchers may use this study to obtain a more comprehensive understanding of the present and a reference for the factors affecting road traffic accidents. In like manner, the study's findings would motivate future researchers to pursue further studies because of the available materials.

2.14 Definition Of Terms

The terms described below were utilized conceptually and operationally to enable a complete understanding of the research project.

Accident - An accident is an unintentionally-caused incident, according to Safeopedia. The term is mostly only used to refer to accidental events that bring about undesirable events. In the context of this study, this refers to an undesirable event that happens unintentionally and without notice and typically results in harm or injury.

Accident-prone – Sayet et al. (2018) described "accident-prone" locations as having a higher accident occurrence (frequent and severe) than the accepted average. In this study, it refers to experiencing more accidents than is typical.

Factors - According to Frost (2023), factors are the variables researchers manipulate during an experiment to ascertain their impact on the response variable. Only a small subset of values, referred to as factor levels, are possible for a factor. Factors may be based on a continuous or categorical variable, but they can only employ a small number of values that the experimenters select. In this study, these are the variables that cause something to happen.

Potholes – Brubaker (2020) described potholes as irregularly shaped and sized holes in the road. They result from groundwater's expansion and contraction after it has seeped into the soil beneath the pavement. In the context of this study, a pothole is defined as a structural defect in the pavement where there is an absence of roadway surface material that causes an opening to develop and/or a void in the roadway surface layer that needs immediate repair as it is both an important safety concern to the traveling public or a significant disruption to the usual movement of traffic.

Road - According to Vocabulary.com, a road is a broad, typically paved corridor big enough for cars to travel on. In this study, it refers to the area of a roadway that has been improved, designed, or is typically utilized for vehicle transport, excluding the berm or the shoulder.

Roadway - According to Law Insider, a roadway is any highway area that has been upgraded, planned, or is typically used for vehicle travel—excluding the berm and the shoulder. It refers to the portion of a road designated for vehicles in this research, as opposed to a sidewalk or a median.

Road Accident - Road accidents involve at least one vehicle on a public road that results in at least one person being hurt or killed, according to Insee (2020). This study defines it as an accident when a vehicle travels down a highway—an accident involving that vehicle and resulting in a human fatality or injury.

Roadway Conditions – According to the Northern Territory, roadway conditions are defined as safer, well-maintained roads. They have shorter stopping distances, which is crucial for preventing accidents. Fewer crashes translate into fewer injuries and a decreased chance of fatalities. In this study, they vary from paved highways to native surfaces, some requiring stiff suspension or high clearance.

Road Sign - Rogers (2021) described road signs as notifying other road users of potential dangers and circumstances that could arise while driving. They also aid in controlling the movement of other road users, such as cyclists and pedestrians, and traffic among cars. In this study, it pertains to information on routes, directions, and warnings for drivers.

Traffic – Smith (2018) defined traffic as the number of automobiles using roadways. In this study, the term traffic refers to both the movement of people and pedestrian routes and walkways and the movement of vehicles, such as cars and trucks, which travel on roads and highways.

Traffic Lights – They control traffic by signaling when vehicles must stop and when they can go (Levinson et al., 2019). In the context of this study, it refers to ensuring a smooth traffic flow, allowing vehicles or pedestrians to pass an intersection, and assisting in reducing conflicts between cars coming from different directions at crossings.

III. METHODOLOGY

This chapter describes several data collection and analysis strategies that were significant to the study. It encompasses the research design, which refers to the overall approach we adopted to integrate the various study components coherently and logically; the research locale, which provides an overview of the place in which the study was conducted; data collection, which is the process of gathering and measuring information on the primary variables studied; data interpretation, which is the process of using different statistical methods to review the data and come to conclusions; and research ethics, which is a method of applying fundamental ethical standards to all aspects, including the planning and conducting of this study.

3.1 Research Design

This study used a descriptive research design in quantitative research, which involved survey data and secondary data. These data present a thorough and accurate description of the population or phenomenon under investigation and characterize any links, patterns, or trends found in the data. The factors affecting traffic accidents on the San Nicolas Poblacion Road in Concepcion, Tarlac, have been studied and evaluated by the researchers using survey questionnaires and recorded data from the Municipal Disaster Risk Reduction and Management Office (MDRRMO) to acquire information.

3.2 Sampling Procedure

A convenience sampling procedure was used for selecting the participants in this study. This was accomplished by selecting students, residents, traffic enforcers, bystanders, and motorists. According to Statistics by Jim, opportunity or availability sampling is another name for convenience sampling. This is the most commonly used non-probabilistic sampling method. Convenience sampling is also an approach to gathering samples that involve taking samples that can easily be obtained near a site or part of the population that is close to hand. In terms of the sample size, according to Akhilesh Gantia, the average sample size in quantitative research is 30. However, this study used 100 as a sample size to make the data more reliable. According to Sabina Fox, most statisticians consider a sample size of 100 the minimum amount of data required to provide significant results. Choose a sample size of 100 or closer to the minimum number, according to Piroska Bisits Bullen of the University of Florida, if the researchers do not intend to divide

the sample into different groups during the analysis or if they expect that most people responded similarly and that decisions that were made based on the results did not have significant consequences.

3.3 Research Instrument

The researchers used secondary data obtained from the government of Concepcion, Tarlac. A study method known as secondary research uses data already collected. Existing data is compiled and summarized to improve the overall effectiveness of the research. In addition, the proponents used validated survey questionnaires to expand the gathered data, asking about the roadway condition in San Nicolas Poblacion. According to Paul Kenyon (2000), using a survey questionnaire has a number of obvious advantages. In comparison to other methods, questionnaires produce a greater range of data. Additionally, it's important to keep in mind that surveys provide precise data that is simpler to perform, analyze, quote, and explain. The researchers used this kind of instrument with the intention of gathering information directly from the respondents in order to develop reliable and logical conclusions and suggestions for the study.

3.4 Validation of The Questionnaire

Copies of the questionnaire and research questions were given to a few transportation engineers and a grammarian during the study's validation process. These experts carefully examined the study's questionnaire and questions to make sure the instrument was suitable and adequate. Instead of using a modified 5-point Likert scale, they suggested structuring the questionnaire as a Likert scale on a four-point scale. Furthermore, a traffic engineer from the Department of Public Works and Highways (DPWH) validated the researcher's questionnaire.

3.5 Data Collection

The data that were collected from the Municipal Disaster Risk Reduction and Management Office (MDRRMO) in the years 2018–2022 were analyzed and summarized by the proponents. The proponents analyzed and summarized the secondary data from the MDRRMO to identify the most frequently occurring accidents in barangays San Nicolas Poblacion, Concepcion, Tarlac in terms of types of vehicles, types of accidents, the month of the year, and time of the day. Furthermore, the study was conducted face-to-face using a validated survey questionnaire that consisted of the primary type of transportation, how often they use the road, and the biggest challenge or issue in the road condition that causes road accidents to obtain primary data.

3.6 Data Interpretation

The data collected from Barangay San Nicolas Poblacion, Tarlac, and the surveyed data were used for descriptive analysis, analysis of variance (ANOVA), post hoc test, and chi-square test. For descriptive analysis, the proponents tabulated the data and described them to derive implications for every problem. For post hoc analysis, the researchers collected, examined data, and presented post hoc test results using simultaneous confidence intervals of the differences between means. In the analysis of variance, the proponents used the data to determine whether there is a significant difference between the type of accidents and the utilized vehicle. The Chi-square test also was used to determine whether there is a significant relationship between the type of accidents and the type of vehicle.

3.7 Research Ethics

Guidelines for the ethical conduct of this investigation are provided in this section. Research ethics are ethical standards that help researchers do and publish research without lying or intending, consciously or unconsciously, to cause harm to study participants or other members of society. This entails preserving the honor and liberty of study subjects, maintaining their privacy, and seeking their permission before beginning any research activities.

The researchers in this study on the factors affecting traffic accidents at San Nicolas Poblacion road have taken into account a few ethical considerations, such as the following: ensuring that all involved in data collection are fully aware of the purpose and scope of the study and that they have the choice to withhold information if they choose not to; seeking approval from the right authorities before performing research on the along the road; and resisting the potential for conflicts of interest, including reporting any monetary sources that might affect the research or by refraining from any acts that might advance the researcher’s financial interests.

By abiding by the aforementioned rules, the researchers can be sure that their work advances knowledge of the factors influencing traffic accidents at San Nicolas Poblacion road in Concepcion, Tarlac, and that it is used to support moral and accountable choices.

IV. Results And Discussion

This chapter concentrates on presenting statistical data related to the issues outlined in the problem statement. It presents the information that has been gathered, analyzed, and interpreted. This section of the study also includes the corresponding analysis and integration of the data. All data in this chapter was derived from information gathered by the Municipal Disaster Risk Reduction and Management Office (MDRRMO) and responses to the questionnaire the researchers had presented

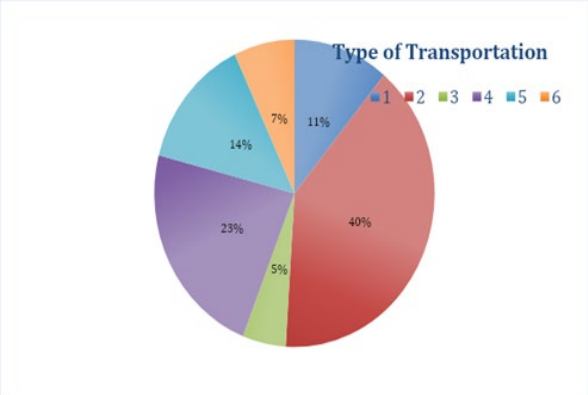


Fig.1. Primary Type of Transportation of the Respondents

As shown in the Fig.1. , most respondents chose motorcycles as a primary type of transportation. It has 40%, or 40 individuals, for the motorcycle. Second, 23% of respondents, or 23 people, selected public transportation. Meanwhile, 14% of respondents (14 people) chose walking as their primary method of transportation. Eleven people, or 11%, chose cars as their type of transportation. In addition, five people (5%) chose bicycles as their type of transportation. Finally, 7% of respondents preferred other transportation methods, such as tricycles, for a total of 7%. From the table above, it is clear that most people in Población were motorcycle users. Due to this reason, drivers who use motorcycles should be more attentive to the road and aware of the rules and regulations implemented by the local government.

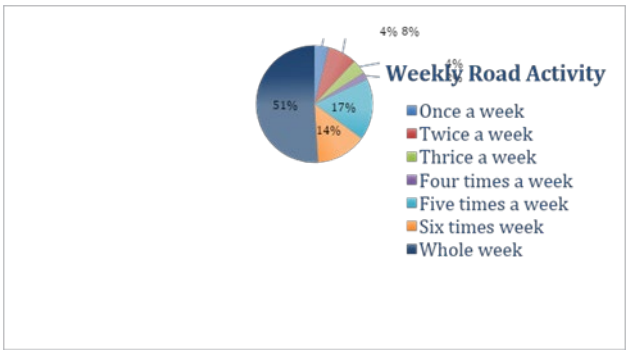


Fig.2. Weekly Road Activity of the Respondents

As shown in the Fig.2. , 51% of the respondents, or 51 people, chose the whole week for how often they use roads for transportation purposes. Seventeen respondents, or 17%, selected five times a week. 14% of the respondents, or 14 people, chose six times a week. Moreover, eight respondents, or 8%, chose twice a week for how often they use roads for transportation. Meanwhile, the choices of once a week and three times a week both accumulated 4% or four individuals. Lastly, 2% of the respondents, or two people, chose four times a week for how often they use roads for transportation. As a result, the road in Poblacion was busy the whole week. The presence of road officers and awareness among road users in the area is a must.

Fig.3. Biggest Challenge with the Road Conditions

As shown in the Fig.3., potholes were selected as the biggest challenge or issue with the road conditions in Barangay San Nicolas Poblacion, which gathered 40 respondents, or 40%, while 20% of the respondents, or 20 people, selected congestion. Meanwhile, 17 people, or 17% of the respondents, chose the lack of road signs. 16% of the respondents, or 16 people, chose lack of proper maintenance. Low lighting

accumulated a total of 6% or six individuals. Lastly, 1% of the respondents, or one person, selected inadequate signage as the biggest challenge or issue with the road conditions in Barangay San Nicolas Poblacion. As shown in the table, potholes are the biggest challenge on Poblacion Road. The local government should renovate or put signage near the potholes to warn drivers and other road users.

Table.1. Respondent's Answer Regarding the Conditions of San Nicolas Poblacion Road

Indicator	Mean	Std. Dev	Verbal Description
1. How satisfied are you with the quality of lighting on roads in your area during nighttime?	2.43	0.81	Unsatisfied
2. How satisfied are you with the overall quality of roads in your area in terms of smoothness, proper signage, and absence of potholes?	2.26	0.73	Unsatisfied
3. How satisfied are you with the use of road signs in your area?	2.20	0.85	Unsatisfied
4. Safeness of the road conditions in your area	2.26	0.93	Unsatisfied
GRAND MEAN	2.29	0.83	Unsatisfied

Indicator	Mean	Std. Dev	Verbal Description
1. How important are well-maintained road pavements, lightings, road signs, and road marking?	3.55	0.76	Very Important
GRAND MEAN	3.55	0.76	Very Important

From the gathered answers of the respondents, the following data were described: Respondents' perceptions regarding the conditions of San Nicolas Poblacion Road resulted in a grand mean of 2.29, suggesting an unsatisfied response. Furthermore, respondents highlighted that they are unsatisfied with the lighting quality on roads in their area at night. The statements above are all interpreted as unsatisfied, as confirmed by their weighted mean range of 2.43-2.20 and presented from highest to lowest weighted mean. The highest mean of 2.43, interpreted as unsatisfied, was question number 1, "How satisfied are you with the quality of lighting on roads in your area during nighttime?" While the least mean of 2.20 was also interpreted as unsatisfied, it fell under question number 3, "How satisfied are you with using road signs in your area?" Overall results suggest that the respondents have a negative response regarding the conditions of San Nicolas Poblacion Road. In question number 4, "How important are well-maintained road pavements, lighting, road signs, and road marking?" The grand mean was 3.55, suggesting a very important response.

Table.2. Incidents in San Nicolas Poblacion described in terms of Year

Table 5. Incidents in San Nicolas Poblacion described in terms of Year

Year	N	%
2018	14	6.90
2019	20	9.85
2020	10	4.93
2021	56	27.59
2022	103	50.74
TOTAL	**203**	**100.00**

According to data collected by the Municipal Disaster Risk Reduction and Management Office (MDRRMO), 103 incidents, or 50.74% of all incidents happened in 2022, the highest rate. Second, 56 accidents, or 27.59%, occurred in 2021. Meanwhile, 9.85%, or 20 incidents, occurred in 2019. In 2018, 14 accidents happened, accounting for 6.90% of all incidents. Lastly, 2020 had the fewest incidences, with a total of 10, or 4.93%. In total, 203 incidents occurred over the course of five years. Before the pandemic years of 2018–2019, the number of accidents was high and suddenly dropped during the pandemic. In the midst of 2021, the number of accidents rose until the year 2022. The locals claim that before, there were not as many accidents in the region since there were not as many vehicles transporting goods. When they began to construct numerous establishments, the frequency of accidents began to rise. On the contrary, since the pandemic began, the municipality's accident rate has fallen due to the implementation of curfews and checks at every intersection by local authorities. This was another factor in the local government's decision to restrict the number of accidents.

Table.3. Incidents in San Nicolas Poblacion described in terms of Month

Month of the Year	N	%
January	8	3.94
February	12	5.91
March	19	9.36
April	21	10.34
May	19	9.36
June	10	4.93
July	18	8.87
August	13	6.40
September	17	8.37
October	17	8.37
November	26	12.81
December	23	11.33
TOTAL	203	100.00

Over five years, 26 accidents, or 12.81%, occurred in November, according to data collected by the Municipal Disaster Risk Reduction and Management Office (MDRRMO).

In 2018–2022, 11.33%, or 23 incidents, occurred in December. Furthermore, 21 incidents, or 10.34%, occurred in April. Both March and May had 19 accidents, for a total of 9.36%. In the previous five years, 8.87% of the incidents happened in all of July, for 18. On the other hand, 17 accidents happened in September and October, accounting for 8.37% of all accidents. In August, 13 accidents occurred, accounting for 6.40% of total incidents. In June, ten accidents occurred, representing 4.93% of all accidents. Finally, in January of the previous five years, there were eight accidents, or 3.94% of all accidents. In addition, the majority of the accidents occurred in November. In conclusion, November and December during that time had the highest number of accidents. Road users were advised to be careful during those months.

Table.4. Types of Incidents that occurred on San Nicolas Poblacion Road

Type of Incident	N	%
Collision	63	31.03
Self-Accident	68	33.50
Medical Related	54	26.60
Vehicle vs Pedestrian	10	4.93
Vehicle vs Animal	1	0.49
Work Related	4	1.97
Sports Incident	3	1.48
TOTAL	203	100.00

Self-accident is the leading cause of accidents in Barangay San Nicolas Poblacion, accounting for 68 percent of all accidents, according to data collected by the Municipal Disaster Risk Reduction and Management Office (MDRRMO). Collision is the second most prevalent type of incident, with 63 incidents (31.03%). Fifty-four accidents are entirely medical-related, representing 26.60% of all accidents, with a total of 10 accidents or 4.93%, vehicle versus pedestrian is likewise one of the most common causes of incidents in Barangay San Nicolas Poblacion. MDRRMO documented three sports-related incidents, making up 1.48% of all incidents. Lastly, vehicle vs. animal is the least common cause of incidents, accounting for only one accident (0.49%). As a result, among the seven types of incidents in San Nicolas, self-accident got the highest percentage, followed by collisions.

To prevent road traffic accidents, drivers must avoid over-speeding and follow speed limits, avoid drunk driving, use helmets by two-wheeler drivers, and improve visibility, appropriate headlights, and road lighting.

Table.5. Time of Day when incidents usually occur on San Nicolas Poblacion Road

Time of day	N	%
6am to 12pm	42	20.69
12:01pm-6pm	59	29.06
6:01 pm-12:00 am	88	43.35
12:01am- 5:59am	14	6.90
TOTAL	203	100.00

According to data collected by the Municipal Disaster Risk Reduction and Management Office (MDRRMO) between 2018 and 2022, most incidents occurred between 6:01 p.m. and 12:00 a.m., for a total of 88, or 43.35% of the time. Furthermore, 59 incidents happened at a rate of 29.06% between 12:01 p.m. and 6:01 p.m. 20.69% of the 42 total accidents occurred between 6:00 a.m. and 12:00 p.m. Lastly, 14 incidents, or 6.90%, happened between 12:01 a.m. and 5:59 a.m. During the night, accidents usually happen from 6:01 p.m. to 12:00 a.m., so road users must be alert while driving and careful of the road they pass by.

Table.6. Significant Difference on the Type of Accidents based on the Utilized Vehicle

Type of Vehicle	Mean	Std. Dev	Computed F	Sig.	Interpretation
			22.869	.000	Significant
Motorcycle	1.90	0.81			
Tricycle	1.36	0.83			
Jeep	1.00	.			
Truck	2.00	2.24			
Car	1.00	0.00			
Bicycle	1.50	0.71			
Non-motorized (Walking)	3.32	1.08			

As shown in the data above, there are seven types of vehicles involved: motorcycles, tricycles, jeeps, trucks, cars, bicycles, and non-motorized (such as walking) vehicles. From the gathered answers of the respondents, the obtained mean values were the following: motorcycles have 1.90, tricycles have 1.36, Jeeps have 1, trucks have 2, cars have 1, bicycles have 1.50, and non-motorized vehicles have 3.32. Furthermore, the computed F value is 22.869 with a significance value of .000, which means the data above shows a significant difference between the type of accident and the type of vehicle given.

Table.7. Analysis of Variance (ANOVA)

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Motorcycle	96	1.90	.814	.083	1.73	2.06
Tricycle	28	1.36	.826	.156	1.04	1.68
Truck	5	2.00	2.236	1.000	-.78	4.78
Car	8	1.00	.000	.000	1.00	1.00
Bicycle	2	1.50	.707	.500	-4.85	7.85
Walking	63	3.32	1.075	.135	3.05	3.59
Total	202	2.23	1.208	.085	2.06	2.40

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	119.987	5	23.997	27.104	.000
Within Groups	173.538	196	.885		
Total	293.525	201			

Table.8. Post Hoc Tests

Multiple Comparisons

(I) Type of Vehicle	(J) Type of Vehicle	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Motorcycle	Tricycle	.539	.202	.087	-.04	1.12
	Truck	-.104	.432	1.000	-1.35	1.14
	Car	.896	.346	.105	-.10	1.89
	Bicycle	.396	.672	.992	-1.54	2.33
	Walking	-1.422*	.153	**.000**	-1.86	-.98
Tricycle	Motorcycle	-.539	.202	.087	-1.12	.04
	Truck	-.643	.457	.723	-1.96	.67
	Car	.357	.377	.934	-.73	1.44
	Bicycle	-.143	.689	1.000	-2.13	1.84
	Walking	-1.960*	.214	**.000**	-2.58	-1.35
Truck	Motorcycle	.104	.432	1.000	-1.14	1.35
	Tricycle	.643	.457	.723	-.67	1.96
	Car	1.000	.536	.427	-.54	2.54
	Bicycle	.500	.787	.988	-1.77	2.77
	Walking	-1.317*	.437	.034	-2.58	-.06
Car	Motorcycle	-.896	.346	.105	-1.89	.10
	Tricycle	-.357	.377	.934	-1.44	.73
	Truck	-1.000	.536	.427	-2.54	.54
	Bicycle	-.500	.744	.985	-2.64	1.64
	Walking	-2.317*	.353	**.000**	-3.33	-1.30
Bicycle	Motorcycle	-.396	.672	.992	-2.33	1.54
	Tricycle	.143	.689	1.000	-1.84	2.13
	Truck	-.500	.787	.988	-2.77	1.77
	Car	.500	.744	.985	-1.64	2.64
	Walking	-1.817	.676	.082	-3.76	.13
Walking	**Motorcycle**	1.422*	.153	**.000**	.98	1.86
	Tricycle	1.960*	.214	**.000**	1.35	2.58
	Truck	1.317*	.437	.034	.06	2.58
	Car	2.317*	.353	**.000**	1.30	3.33
	Bicycle	1.817	.676	.082	-.13	3.76

From this table, the researchers used the vehicles with more than one case of accident to perform the post hoc tests and determine whether there is a significant difference in the type of incident on the utilized vehicles by testing one vehicle with the remaining vehicles. The vehicles were classified as 1 for motorcycles, 2 for tricycles, 4 for trucks, 5 for cars, 6 for bicycles, and 7 for non-motorized. Jeep was not included among the data since it has only one record of an accident, thus making it impossible to perform a post hoc test.

The vehicles were compared to one another, and it showed that motorcycles and walking have a value of.000, which means they significantly differ in the type of accidents. The same is true with tricycles and walking. In terms of trucks and walking, there is no significance. Between cars and walking, there is a significant difference. On bicycles and walking, there is no significant difference. Lastly, there is a significant difference between walking and riding a motorcycle, tricycle, or car. Thus, it is concluded that walking has greatly influenced the significance of the differences among the types of accidents.

Table.9. Significant Relationship between the Type of Vehicle and the Type of Accidents Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	253.954(a)	36	.000
Likelihood Ratio	277.339	36	.000
Linear-by-Linear Association	53.630	1	.000
N of Valid Cases	203		

This table shows the relationship between the vehicle type and the accident type. The Pearson Chi-Square has a value of 253.954 (a) with a df of 36 and an asymptotic significance of .000. Additionally, the likelihood ratio has a value of 277.339, a df of 36, and an asymptotic significance of .000. In association, the value is 53.630 and has a df of 1 with an asymptotic significance of .000. Thus, the result of this test proved that there is a significant relationship between the type of vehicle and the type of accident.

Table.10. Summarized data on the Type of Vehicle and Type of Incident involved in Road Accidents at San Nicolas Poblacion

Type of Incident	Type of Vehicle						
	Motorcycle	Tricycle	Jeep	Truck	Car	Bicycle	Non-Motorized
Collision	27	22	1	4	8	1	0
Self-Accident	60	5	0	0	0	1	2
Medical Related	0	0	0	0	0	0	54
Vehicle Vs. Pedestrian	6	2	0	1	0	0	1
Vehicle vs. Animal	1	0	0	0	0	0	0
Work related	0	0	0	1	0	0	3
Sports Incident	0	0	0	0	0	0	3

This table comprises the summarized accident data and vehicles involved in the San Nicolas Poblacion. The data were used to test the significant difference and independence of the two variables: type of accidents and type of vehicles. For the first hypothesis, there is a significant difference in the types of accidents and vehicles utilized. The accident data for

motorcycles, tricycles, and cars shows significant differences from walking. As per the second hypothesis, there is a significant relationship between the type of vehicle and the type of accident. Therefore, it is concluded that the two variables

depend on each other. Based on the data, motorcycle users were most likely to commit self-inflicted accidents; tricycle, Jeep, and car users were more likely to be involved in collisions; and pedestrians who were walking were involved in medical-related accidents.

V. Summary, Conclusions And Recommendations

5.1 Summary of Findings

The descriptive method using the quantitative approach was used in this study. One hundred people were respondents from San Nicolas Poblacion in Concepcion, Tarlac. A survey questionnaire served as the instrument in this paper.

The researchers aimed to know the factors affecting road traffic accidents and came up with the following findings:

Statement of the Problem: How may the road traffic accidents in San Nicolas Poblacion road be described in terms of:

5.1.1 Type of Transportation

The results show that 40% of the accidents involve the use of a motorcycle, 23% involve public transport, 14% involve walking, 11% involve cars, 6% involve bicycles, and 7% involve others like tricycles.

5.1.2 Frequency of weekly road activity

The result proves that accidents happen anytime; 51% of the respondents said that accidents happen every day (the whole week). 17% answered five times a week, 14% answered six times a week, 8% twice a week, 4% once and three times a week, and 2% four times a week.

5.1.3 Biggest challenge or issue with the road conditions

The result shows that 40% of the respondents answered that the biggest challenge to the road condition is potholes, 20% congestion, 17% lack of road signs, 16% lack of proper maintenance, 6% low lighting, and 1% inadequate signage.

How road conditions influence the road traffic accidents in San Nicolas Poblacion road?

The results show that the respondents are unsatisfied with the road conditions in San Nicolas Poblacion. Maintaining the road pavements, signage, and lighting is very important to reduce accidents.

How may the incidents in San Nicolas, Poblacion may be described in terms of:

Year: According to the data collected by MDRRMO, 50.74% of all incidents happened in 2022, which is the highest rate. 27.59% of accidents occurred in 2021, 9.85% occurred in 2019, 6.90% in 2018, and 4.93% of all the incidents happened in 2020, the lowest rate of the 203 incidents that occurred over the course of five years.

Month of the Year: According to data collected by the MDRRMO, 26 accidents, or 12.81%, occurred in January. 11.33% or 23 incidents happened in all of December. Twenty-one incidents, or 10.34%, happened in all of April. Both March and May had 19 accidents, or 9.36%. 8.87% of incidents happened in all of July, or 18 in the previous five years. In September and October, 17 accidents, or 8.37%, happened. 13 incidents, or 6.40%, happened in August.

Type of Incident: The results show that self-accident is the leading cause of accidents accounting for 68 percent of all accidents. The collision has a total of 63 incidents (31.03%). Fifty-four are medical-related, or 26.60% of all accidents: ten accidents, or 4.93%, vehicle versus pedestrian. MDRRMO documented three sports-related incidents, making up 1.48% of all incidents. Lastly, vehicle vs. animal is the least common cause of incidents, accounting for only one accident (0.49%).

Time of Day: According to MDRRMO, most incidents occurred between 6:01 p.m. and 12:00 a.m., for a total of 88, or 43.35%. Fifty-nine incidents happened at a rate of 29.06% between 12:01 p.m. and 6:01 p.m. 20.69% of the 42 total accidents occurred between 6:00 a.m. and 12:00 p.m. Lastly, 14 incidents, or 6.90%, happened between 12:01 a.m. and 5:59 a.m.

Is there a significant difference in the type of accidents based on the utilized vehicle?

Based on the results, the computed F value is 22.869 with a significance value of .000, which means the data shows a

significant difference between the type of accident and the type of vehicle given.

Is there a significant relationship between the type of vehicle and the type of accidents?

The Pearson Chi-Square has a value of 253.954 (a) with a df of 36 and an asymptotic significance of .000. The likelihood ratio has a value of 277.339, a df of 36, and an asymptotic significance of .000. In association, the value is 53.630 and has a df of 1 with an asymptotic significance of .000. Thus, the result of this test proved that there is a significant relationship between the type of vehicle and the type of accident.

5.2 Conclusions

The researchers conclude that the following are the variables and issues influencing road traffic accidents on San Nicolas and Poblacion roadways: Most drivers on San Nicolas Poblacion Road utilize motorcycles as their primary means of transportation. As a result, motorcycle drivers must be more attentive, mindful of the road, and knowledgeable of the regulations and limitations imposed by the municipality in their area. The Poblacion Road was busy the entire week in the context of weekly road activity. The presence of traffic officers and raising awareness among road users in the region are essential. The main challenges on Población Road include potholes, traffic congestion, and a lack of road signage. The local authority should rebuild or install signage near potholes to notify cars and other road users.

In Brgy. San Nicolas, the two occurrences with the highest percentages were self-accidents and collisions. Every motorist should be reminded to wear a helmet and other protective gear, avoid driving while intoxicated, and refrain from other risky behaviors, especially those who ride two-wheelers. Two hundred three accident cases happened in the region between 2018 and 2022. Accident rates were high prior to the epidemic years of 2018–2019 and then abruptly fell during the pandemic. The number of incidents increased in the middle of 2021 and remained high until 2022. Additionally, the month of November was the one with which the majority of accidents happened.

With regard to the first hypothesis, the types of accidents and vehicles used varied significantly.

Compared to walking, the accident statistics for cars, motorcycles, and tricycles differ significantly. In line with the second hypothesis, there is a strong correlation between the type of vehicle and the type of accident. The two variables are therefore determined to be interdependent. Based on the results, those who drive motorcycles are most likely to have self-inflicted injuries; those who drive tricycles, jeeps, and cars are most likely to be involved in collisions; and those who walk are most likely to have injuries requiring medical attention.

5.3 Recommendations

Based on the above-mentioned results and conclusions, the researchers recommend the following as ways to alleviate the road traffic accidents at San Nicolas Poblacion road in Concepcion, Tarlac:

- The DPWH may use the results of this study to propose road maintenance, the installation of proper lighting, and road signage.

Type of Transportation: Police or traffic enforcers may use the output of this study to implement checkpoints and speed limits to address the current problems with the vehicles that were involved in the accident on the road of San Nicolas Poblacion.

Biggest Challenge/Issue (Road Conditions): The local government in Tarlac would benefit from this study by having a yearly and monthly inspection to avoid problems with road conditions, such as potholes, congestion, and a lack of traffic signs in the study area. As a result, if renovation is required, the government should support this initiative by allocating cash and giving it attention, providing them with the required resources, such as bright street and highway lights.

The LGU must consider illumination improvements since most accidents happen at night. Furthermore, road signs should be installed to alert drivers to intersections and damages on the road. They may also use this analysis to implement a law requiring motorcycles to have their lane since those vehicles are always involved in accidents.

Future researchers may consider interviewing local government officials to learn about and evaluate their strategies for addressing traffic incidents.

REFERENCES

[1]. Bucsuházy, K., Matuchová, E., Zůvala, R., Moravcová, P., Kostíková, M., & Mikulec, R. (2020). Human factors contributing to the road traffic accident occurrence. Transportation Research Procedia, 45, 555–561.
[2]. Al-Ghaweel, I. (2009, April 1). Factors Affecting Road Traffic Accidents in Benghazi, Libya. PubMed Central (PMC).
[3]. Liu, J., Li, J., Wang, K., Zhao, J., Cong, H., & He, P. (2019). Exploring factors affecting the severity of night-time vehicle accidents under low illumination conditions. Advances in Mechanical Engineering, 11(4), 168781401984094.
[4]. Goldenbeld, C., Torfs, K., Vlakveld, W., & Houwing, S. (2020). Impaired driving due to alcohol or drugs: International differences and determinants based on E-Survey of Road Users' Attitudes first-wave results in 32 countries. Iatss Research, 44(3), 188–196.
[5]. How Do Weather Events Impact Roads? - FHWA Road Weather Management. (n.d.).
[6]. Definition - Road accidents | Insee. (n.d.).
[7]. Research Locale The study will be conducted in the Philippines the respondents | Course Hero. (2016, September 12).
[8]. How to Determine Survey Sample Size: a Guide. (n.d.).
[9]. Wang, S., Chen, Y., Huang, J., Zhou, Y., & Lu, Y. (2018). Research on the Drunk Driving Traffic Accidents Based on Logistic Regression Model. Open Journal of Applied Sciences, 08(11), 487–494.
[10]. Retallack, A. E., & Ostendorf, B. (2019). Current Understanding of the Effects of Congestion on Traffic Accidents. International Journal of Environmental Research and Public Health, 16(18), 3400.
[11]. Tanishita, M., & Van Wee, B. (2017). Impact of vehicle speeds and changes in mean speeds on per vehicle-kilometer traffic accident rates in Japan. Iatss Research, 41(3), 107–112.
[12]. Djalante, S. (2020b). Traffic Accident Characteristic Assessment to Enhance Sustainability in Road and Transportation Infrastructures in Indonesia. OAlib, 07(10), 1–12.
[13]. Vitianingsih, A. V., Othman, Z., Baharin, S. N. A., & Suraji, A. (2022). Empirical Study of a Spatial Analysis for Prone Road Traffic Accident Classification based on MCDM Method. International Journal of Advanced Computer Science and Applications, 13(5).
[14]. Vitalis, N., Runyoro, A. K., & Selemani, M. (2022). Assessing Factors for Occurrence of Road Accidents in Tanzania Using Panel Data Analysis: Road Safety Perspective. Journal of Transportation Technologies, 12(01), 123–136.
[15]. Singh, S. (2017). Road Traffic Accidents in India: Issues and Challenges. Transportation Research Procedia, 25, 4708–4719.
[16]. Rolison, J. J., Regev, S., Moutari, S., & Feeney, A. (2018). What are the factors that contribute to road accidents? An assessment of law enforcement views, ordinary drivers' opinions, and road accident records. Accident Analysis & Prevention, 115, 11–24.