



Rates of Vehicular Accidents on Highways and Roads in the City of Balanga, Bataan: A Comprehensive Study on Accident Causes and Investigation Findings

Macapagal, Alexis James A.¹; Soriano, Alexis Kent C.²; Menor, John Michael L.³; Zulueta, Jose Jr. D.⁴; Bataanon, Edrian C.⁵; Ymas, Jay Ivan C.⁶; Baluyot, Aira G.⁷; Rom, Aljohn A.⁸

^{1;2;3;4;5;6;7;8}Asia Pacific College of Advanced Studies College of Criminal Justice Education

Asia Pacific College of Advanced Studies, Inc.

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APPROVAL SHEET

This research proposal entitled “Rates of Vehicular Accidents on Highways and Roads in the City of Balanga, Bataan: A Comprehensive Study on Accident Causes and Investigation Findings” was prepared and submitted by Baluyot, Aira G.; Bataanon, Edrian C.; Macapagal, Alexis James A.; Menor, John Michael L.; Rom, Aljohn A.; Soriano, Alexis Kent C.; Ymas, Jay Ivan C.; and Zulueta, Jose Jr. D. in partial fulfillment of the requirements of the College of Criminal Justice Education (BS CRIM 4) and has been examined and recommended for acceptance and approval for oral examination.

Dr. Anjanette R. Layug, RCrim
Adviser’s Name

Approved by the Committee of Oral Examination
Jayvee F. Daracay, MAN, RN
Chairman

Annie Rose D. Reyes, MLIS, LPT
Member

Madeline C. Pangilinan, LPT
Member

Accepted in partial fulfillment of the requirement for the
Bachelor of Science in Criminology

Dr. Anjanette R. Layug, RCrim
Dean, College of Criminal Justice Education

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A.G.B.

E.C.B.

A.J.A.M.

J.M.L.M.

A.A.R.

A.K.C.S.

J.I.C.Y.

J.J.D.Z.

Baluyot, Aira G.

Bataan, Edrian C.

Macapagal, Alexis James A.

Menor, John Michael L.

Rom, Aljohn A.

Soriano, Alexis Kent C.

Ymas, Jay Ivan C.

Zulueta, Jose Jr. D.

ABSTRACT

Vehicular accidents continue to pose a serious threat to public safety, economic stability, and transportation management in the Philippines, particularly in rapidly urbanizing cities such as Balanga City, Bataan. This study aimed to determine the rates of vehicular accidents on highways and municipal roads in the City of Balanga and identify the major accident causes and investigation findings associated with these incidents. Specifically, the study examined the demographic profile of road users, the frequency and location of accidents, the time and season of occurrence, the type of accidents recorded, and the contributing driver-related, vehicle-related, and road-related factors.

The study utilized a descriptive quantitative research design to systematically analyze accident trends and patterns from 2024 to 2025. Data were collected through official accident records obtained from the Philippine National Police and the Balanga Traffic Management Office, as well as through a structured online survey administered to 300 respondents composed of motorists, commuters, and institutional stakeholders in Balanga City. Frequency distribution, percentage, and weighted mean were employed to interpret and analyze the gathered data using Microsoft Excel and Statistical Package for the Social Sciences.

Findings revealed that vehicular accidents in Balanga City were primarily associated with human error, particularly reckless driving, distracted driving, speeding, and non-compliance with traffic regulations. Motorcycle-related incidents comprised a significant proportion of the recorded accidents, while high-risk zones were commonly located along congested highways and commercial road corridors. Environmental and infrastructural conditions, including poor road maintenance, inadequate signage, traffic congestion, and adverse weather conditions, were also identified as contributing factors. Furthermore, accident occurrences were found to increase during rush hours, weekends, and rainy seasons.

The study concluded that vehicular accidents in Balanga City resulted from the interaction of behavioral, mechanical, environmental, and infrastructural variables. The findings contributed to the existing body of knowledge on localized and road safety conditions and provided empirical evidence for the formulation of data-driven traffic management policies and preventive interventions. The study further emphasized the importance of strengthening traffic law enforcement, improving road infrastructure, increasing public awareness campaigns, and implementing targeted safety programs to reduce accident rates and promote safer road usage within the municipality.

Keywords: *Vehicular Accident, Road Safety, Accident Causes, Quantitative Research, Balanga City.*

TABLE OF CONTENTS

	Page
TITLE PAGE	4601
APPROVAL SHEET	4602
ACKNOWLEDGEMENT	4603
ABSTRACT	4604
TABLE OF CONTENTS	4605
LIST OF TABLES	4606
LIST OF APPENDICES	4607
CHAPTER ONE INTRODUCTION	4608
The Problem and its Background	4608
Related Literature	4608
Locale of the Study	4613
Framework of the Study	4614
Conceptual Framework	4614
Hypothesis/Assumption	4645
Statement of the Problem	4615
Scope and Delimitation	4615
Significance of the Study	4616
Definition of terms	4616
CHAPTER TWO METHODOLOGY	4619
Research Design	4619
Sample/Population of the study	4619
Data gathering tools	4619
Data Gathering Procedure	4619
Treatment data	4620
Ethical considerations	4620
CHAPTER THREE RESULTS AND DISCUSSION	4621
CHAPTER FOUR SUMMARY, CONCLUSION, AND RECOMMENDATION	4631
Summary	4631
Conclusion	4631
Recommendation	4631
REFERENCES	4636

LIST OF TABLES

Table Title	Page
Table 1 Demographic profile of respondents in terms of Age	4621
Table 2 Demographic profile of respondents in terms of Sex	4621
Table 3 Demographic profile of respondents in terms of Type of Road User	4622
Table 4 How often do you use highways/roads in Balanga, Bataan?	4622
Table 5 Frequency of Travel on Municipal Roads	4623
Table 6 Have you been involved in a vehicular accident in Balanga City within the last 2 years (2024-2025)?	4623
Table 7 How many vehicular accidents have you personally experienced?	4624
Table 8 Number of accidents within the last 2 years (2024-2025)	4624
Table 9 Location of road accidents	4625
Table 10 Time and season of occurrence	4626
Table 11 Type of accident	4626
Table 12 Driver-related causes	4627
Table 13 Vehicle-related causes	4628
Table 14 Road-related causes	4628
Table 15 PNP Vehicular Accident Statistics Result	4629
Table 16 PNP Vehicular Incidents: Most Prevalent Barangay	4629

LIST OF APPENDICES

Appendix	Title	Page
A	Letter of Validation	4638

CHAPTER ONE

INTRODUCTION

➤ *The Problem and its Background*

Are the roads and highways safe from vehicular incidents in Balanga City, Bataan? How does it affect our community, especially those who are involved in one? And how do we prevent it from happening? This study focuses on the rates of vehicular accidents that happen on highways and roads in the City of Balanga, Bataan. This is a comprehensive type of study on accident causes of vehicular accidents on roads and highways as well as the findings of the investigation. This study not only focuses on the elements of vehicular accidents but also on the characteristics of the driver, whether he's male or female; the age of the driver; the condition of the driver; the type of vehicle used; and more. The location of a municipality can also contribute to accidents, such as the rainy or sunny seasons, the condition of the roads, the time and day of the traffic condition, and more. By knowing all of the causes and finding the researchers, they will suggest and recommend preventing more accidents from 1 happening and inform not just the drivers but also the community and spread awareness of this issue.

➤ *Related Literature*

(Asian Transport Observatory, 2021); this study poses a difficult problem that has seen some progress, but much more needs to be done to ensure everyone has access to safe roadways. In 2021, an anticipated 11,000 fatalities came from vehicle crashes, accounting for 1.4% of all deaths in the Philippines. Finding the causes of a high rate of auto accidents and putting policies in place to lessen their frequency on roads and highways are the goals of this study. Additionally, understanding the reasons behind car accidents as well as the investigation's conclusions can help you stay informed and suggest strategies to stop more car crashes on roads and highways.

A recent study by the World Health Organization (2023), in its "Global Status Report on Road Safety 2023," provides a comprehensive analysis of the current state of road safety, revealing that while there has been a slight decrease in total annual fatalities to 1.19 million, traffic incidents remain a leading global health crisis. A central finding of the report is the disproportionate risk faced by "vulnerable road users," including motorcyclists and pedestrians, who account for more than half of all road deaths. This study is particularly relevant to Table 2.4 of the research, as it provides a global benchmark for comparing the frequency of vehicle-to-vehicle collisions against non-fatal outcomes; specifically, the WHO notes that for every fatality, up to 50 individuals suffer non-fatal injuries. By utilizing this international framework, the study in Balanga City can validate local perceptions of motorcycle-related and single-vehicle accidents within the broader context of a global effort to halve road deaths and injuries by 2030.

In a study by the World Health Organization in 2023 entitled "Road Traffic Injuries," WHO (2013) estimated 1.19 million people lose their lives in traffic accidents every year. The primary cause of death for children and young adults aged 5 to 29 is traffic-related injuries. Despite owning nearly 60% of the world's automobiles, low- and middle-income nations account for 92% of all traffic deaths worldwide. Pedestrians, cyclists, and motorcyclists are among the vulnerable road users who account for almost half of all traffic fatalities. Additionally, the majority of nations lose 3% of their GDP to traffic accidents. In other countries in India, their study, which has been conducted from 2017 to 2022, shows that in most cases, there is very little time left to provide emergency medical care to the needy and injured on Indian highways in accordance with the golden hour concept. This is because the total time for emergency care accessibility in accident cases on the highways that are adjacent to/pass through the city limits or on the core highways is almost 60 minutes or more.

The recent study entitled "Philippine Road Safety 2025 " by Asian Transport Observatory (2025) report provides a comprehensive evaluation of the road safety landscape in the Philippines, highlighting a persistent crisis where road traffic fatalities estimated by the WHO at 11,000 annually account for approximately 1.4% of all deaths in the country. A central focus of the study is the extreme vulnerability of motorcyclists, noting that while they constitute a significant portion of road users, only 14% of national roads carry a 3-star safety rating or better for this group. The report further underscores the staggering economic impact of road crashes, which impose a cost of roughly \$11 billion (3% of GDP) in fatalities and serious injuries alone. By aligning these findings with the Philippine Road Safety Action Plan 2023–2028, the study emphasizes that achieving the national target of an 80% reduction in deaths by 2028 requires urgent infrastructure upgrades and targeted interventions for vulnerable road users, providing a critical national framework for your localized assessment in Balanga City.

The 1999 Mont Blanc Tunnel Fire (France/Italy) Dewey J. (2023). The Incident: A Belgian truck carrying flour and margarine caught fire inside the Mont Blanc Tunnel, a major Alpine passage. The fire rapidly intensified, reaching temperatures over 1,000°C (1,832°F) and creating a deadly mix of smoke and toxic gases. Key Findings: The investigation revealed multiple failures, including the lack of a proper emergency plan, an ineffective fire suppression system, and poor communication between the French and Italian sides of the tunnel. The fire's rapid spread was exacerbated by the truck's highly flammable cargo and the lack of a system to quickly contain the blaze. Gaps in Knowledge & Policy Changes: This disaster highlighted the critical need for cross-border emergency protocols and robust fire safety systems in long tunnels. It led to the establishment of a single command center for the Mont Blanc

Tunnel, mandatory fire safety drills, and new regulations on the transport of hazardous materials. The event underscored a gap in international cooperation on critical infrastructure safety.

The 2018 N1 Bus Accident (South Africa) - Ngcobo K. (2025). The Incident: A passenger bus overturned and crashed on the N1 highway in Limpopo province, South Africa, resulting in 24 fatalities. Key Findings: The investigation found that the driver was likely speeding and lost control on a section of the road with a steep downgrade and sharp curve. The bus was also overloaded with passengers. Gaps in Knowledge & Policy Changes: This accident drew attention to the ongoing problem of unsafe public transport in South Africa. It highlighted the need for more rigorous enforcement of speed limits, stricter vehicle maintenance checks, and better monitoring of bus companies. The accident also exposed a research gap in understanding the specific cultural and economic factors that lead to overloading and reckless driving in public transportation.

The 1982 Kinmen Bridge Collapse (Taiwan) Fulco M. (2017) The Incident: A large tour bus fell into the sea after the Kinmen Bridge collapsed under its weight. The accident killed 15 people and injured 11. Key Findings: The cause of the collapse was found to be the failure of the bridge structure due to a combination of poor maintenance, a lack of regular inspections, and the bridge's inability to support the weight of the modern tour bus. Gaps in Knowledge & Policy Changes: This incident was a wake-up call for Taiwan's government regarding the state of its aging public infrastructure. It revealed a significant gap in routine infrastructure inspections and the need for more stringent engineering standards. The tragedy led to a comprehensive review of the country's bridges and a new focus on preventative maintenance and structural safety.

The 2005 Sierre Bus Accident (Switzerland) Sullivan M. (2012) The Incident: A bus carrying a group of Swiss tourists crashed on a mountain road in the Swiss Alps, killing 14 people and injuring 15. The bus was returning from a day trip. Key Findings: The investigation determined that the driver was a tourist and was driving a bus that was not suited for the road conditions. He was also reportedly unfamiliar with the route and had a history of dangerous driving. Gaps in Knowledge & Policy Changes: This accident highlighted the need for stricter regulations on tour buses and professional drivers operating in dangerous or unfamiliar terrain. It exposed gaps in knowledge regarding the licensing and training of drivers for specific routes and the need for more rigorous safety inspections of tourist vehicles. It also brought attention to the importance of a driver's familiarity with a route, especially in mountainous or difficult regions.

The 2016 Germanwings Flight 9525 (France): Celani A. (2023) This example is a bit different as it is a plane crash, but the principles of the investigation are similar to a road accident, and the lessons learned are often cross-disciplinary. If you prefer to stick strictly to road accidents, I can replace this one. The Incident: A passenger plane crashed in the French Alps, killing all 150 people on board. The investigation determined the co-pilot deliberately caused the crash. Key Findings: The investigation revealed that the co-pilot had a history of severe depression and had been declared unfit to work by a doctor, but this information was not passed on to the airline. The flight crew protocols also allowed one pilot to be alone in the cockpit. Gaps in Knowledge & Policy Changes: The tragedy exposed a critical gap in pilot mental health screening and information-sharing protocols. It led to significant changes in aviation regulations, including a requirement for two crew members to be in the cockpit at all times and a greater emphasis on confidential mental health support for pilots. This accident underscores the need for robust mental health screening not just in aviation but in any industry where human error can have catastrophic consequences.

The study entitled "Rapid Assessment of Vulnerability of Philippine Local Governments to Road Crash" by Macalaglag R. A. & Lucia M. A. (2021). This study is about taking into account the number of fatalities and injuries caused by crashes on national primary and secondary roads, as well as exposure factors (population and road network); this paper quickly evaluates the vulnerability of road crashes in Western Visayas (Preventing Injuries). The summary of this study is based on crash rates in relation to their road network and population; municipalities in Western Visayas are identified as having varying "vulnerability scores" (Preventing Injuries). Identifies "hot spots," which are areas or sections of roads with greater fatality or injury crash rates in relation to exposure. (Preventing Injuries). Argues that variations in crash risk can be explained by factors such as traffic exposure, road network density, and road class (primary vs. secondary). (Preventing Injuries). Draws attention to issues with attribution of cause, incomplete records in certain municipalities, and data limitations in crash reporting. (Preventing Injuries). The limitations of this study does not include Mindanao or other Visayas regions; only covers Western Visayas. Cross-sectional counts and exposure-based vulnerability are used, but long-term trends spanning many years are not provided. Unreported incidents or minor crashes might not be fully captured by the method. Road lengths and traffic exposure estimates may be approximations rather than exact measurements. This study relates to our research because it offers a method for evaluating the relative rates (or vulnerability) of crashes per road network and population exposure at the regional level (for Western Visayas). To compare "rates" as opposed to raw counts, you could apply or extend this method to Mindanao or other Visayas regions.

The study entitled "Forecasting Vehicular Accidents in Digos City from 2012 to 2016" by Tabanag J. A. (2016) from the University of Mindanao repository. This study is about using PNP data and statistical forecasting techniques; this study examines the patterns and predictors of auto accidents in Digos City, Mindanao, over the last five years. The summary of its findings is that this study pinpoints specific elements (likely traffic volume, road conditions, and driver behavior) linked to a rise in accident rates over time. To predict future accident counts (such as whether they will rise or fall), they use forecast modeling. The findings suggest that accident rates could keep rising in the absence of interventions. The limitation of this study is that the study only looked at

Digos; its findings cannot be applied to larger highway networks in Mindanao or the Visayas. The relatively short time frame (5 years) may make it more difficult to identify long-term trends. Unless denominators are included, forecasting counts is not the same as calculating rates (per population or per vehicle). And the use of PNP-reported accidents may result in the exclusion or underreporting of minor collisions. The reason why this study relates to accident rates is because despite being localized, this study demonstrates how trends can be identified and accidents can be predicted using even municipal or city-level data. You could scale up the method and calculate rates per 100,000 population or per highway length for Visayas and Mindanao if you can find comparable data for other cities or highways.

The study entitled "Road Accidents in the Philippines" was done in December by Diaz C. E. (2000). This study is about a discussion of trends in the main island groups (Luzon, Visayas, and Mindanao); this is a more comprehensive national-level analysis and review of traffic accidents throughout the Philippines. The summary of this study is that it acknowledges all major islands have a high volume of motor vehicle traffic and that accident rates typically rise as the number of vehicles and infrastructure grows. Talks about the persistent problem of underreporting and reporting bias in traffic crash statistics. In the absence of improved safety measures, it is suggested that an increase in vehicle registrations and road expansion leads to a higher risk of crashes. Notes that there has been regional variation in accident trends, but there is little detailed disaggregation. The limitation of this study is that it is mostly descriptive and aggregate; no regional rates are broken down by region (e.g., per region, per road class), and it doesn't always separate trends by year or by local versus highway roads. Two significant warnings are still underreporting and inconsistent data, and rather than being limited to data from 2010 onwards, the data may be dated or taken from previous decades. This study relates to accident rates because this provides you with a national context, illustrating the relationship between crash frequency and the number of vehicles, road construction, and reporting systems. It can be used to warn about data limitations and determine whether your regional (Visayas/Mindanao) rates are higher or lower than national trends.

The study "Analysis of Human Error as a Factor in Road Crash in Metro Manila (2005-2015)" by Lu S. F. & Lu J. L. (2015) from *Acta Medica Philippina*. This study took a look at the rising number of road crashes in Metro Manila between 2005 and 2015. It found that, sadly, both the total number of accidents and the number of people killed in those accidents went up during that time. In summary, the researchers pointed a finger at human error as a big reason for the crashes. Things like speeding, not paying attention, and making unsafe turns were common culprits.

➤ *Speeding, in Particular, was a Major Issue*

The limitation of this study is that it's only about Metro Manila, so it might not tell us much about what's happening in other parts of the Philippines. It only goes up to 2015, so it doesn't include any more recent trends. It mainly looks at serious accidents, which means it might not give us a full picture of all the minor fender-benders out there. This study relates to accident rates in that it gives us the raw numbers, which is a good starting point. We can use these numbers to figure out accident rates if we know things like the population or the number of vehicles in Metro Manila.

➤ *The Study from Acta Medica Philippina is Entitled*

"Analysis of Transport and Vehicular Road Crash Cases in Metro Manila from 2016 to 2020." Herbosa T. (2022). This article follows up on the previous one, looking at road crashes in Metro Manila from 2016 to 2020. The summary of its findings tries to figure out what factors are linked to these crashes, like the type of vehicle and how people are behaving on the road, the type of crash, and where the crash happened. The bad news is that even with efforts to prevent accidents, they kept happening. The limitation of this study, just like the first study, is that it's only about Metro Manila. It doesn't always give us rates per person or per vehicle, which makes it harder to compare things. It might not include all the minor accidents. How it relates to accident rates: This study helps us estimate the rates of different kinds of accidents (fatal vs. non-fatal) based on different risk factors. It's also helpful for seeing if certain safety measures are actually working.

➤ *The study About "Analysis of Factors Affecting Road*

Traffic Accidents in the City of Makati, Philippines" by Norona R. N. & Villamaria (2018) from the IEOM Index. This study zooms out a bit to look at the whole Philippines. noting that the number of car accidents doubled between 2007 and 2018. The summary of its findings in 2018 alone:

Over 10,000 people died in traffic accidents in the Philippines. That's a death rate of about 11 people out of every 100,000. This study is limited because, even though it uses national data, it focuses on the city of Makati for some of its analysis. It doesn't have data past 2018. It doesn't look at all the possible factors, like how much people are driving or how many cars are on the road. This study relates to accident rates that give us both the total number of accidents and the death rate, which is useful for making comparisons. The fact that accidents doubled suggests there's a big problem, possibly related to more cars, more people moving to cities, or other issues.

Human Behavior: Reckless Driving: (Islam and Mannering, 2020) Speeding, bad overtaking, improper turning, drunk driving, and using mobile phones while driving are consistently identified as major causes of accidents. Awareness and Attitude: A gap exists between knowledge of road safety rules and responsible on-road behavior, with a need for better enforcement and public awareness campaigns. Infrastructure and Technology: Road Infrastructure: Poor road design and maintenance can contribute to accidents.

Enforcement Measures: Challenges in consistent and effective law enforcement, including the use of technology like the No-Contact Apprehension Policy (NCAP), also influence safety. Vulnerable Road Users: Gender and Age: Young males (15-29 years) and women are frequently identified as being disproportionately involved in accidents and suffering injuries. Vehicle Types: Motorcycles are a prevalent vehicle type involved in accidents across the Philippines, especially in urban areas like Metro Manila. Data Sources and Challenges for Balanga City Limited Local Data: The FOI response in 2023 indicated that the MMDA does not possess data on road accidents and violations in Balanga City, highlighting the need for local collection. General Data Sources: Studies on other regions and cities in the Philippines, such as Metro Manila and Angeles City, provide examples of the data that can be collected (e.g., through police blotters and command center records). Recommendations for Research on Balanga.

The study “The Effects of Bad Road Condition on Transportation System in Mayapyap Norte, Cabantuan City, Nueva Ecija” by Sarangaya M. K. (2021). This paper is a research study that examines the impact of poor road conditions on the transportation infrastructure in Mayapyap Norte, Cabantuan City, Nueva Ecija, Philippines. The research will utilize a questionnaire given to 20 individuals traveling on the roads to identify the factors influencing road damage and their effects. Research indicates that excessive loads, intense rainfall, and fluctuations in temperature can severely harm roads over time and raise maintenance requirements if not adequately managed. The findings of this research may assist in guiding effective road maintenance approaches.

➤ *The study “Road Traffic Accidents Analysis Using*

Association Rule Mining and Descriptive Analytics” by Datu N. (2023). Analysis of road accidents can be conducted through data mining to assist traffic managers in making informed choices for public safety protection. To assist in decreasing the occurrence of road accidents in Angeles City, Philippines. The research examined 1438 entries from January 2015 to June 2018. Data were sourced from the Angeles City Traffic Management and Enforcement Unit (ACTMEU) to detail the traits of the suspected drivers involved and recognize common patterns of road accidents. Analysis of the data was performed using association rule mining and descriptive analytics via pivot tables. Results indicate that there are 73 deadly and 1365 non-lethal RAs. Males represented 82.19% of deaths and 83.30% of non-fatal incidents. Individuals aged 15-29 have experienced the greatest number of accidents, accounting for 36.99% of fatal incidents and 35.09% of non-fatal ones. The data indicates that the peak occurrence of RAs (specifically 70 out of 1438, or 4.9%) took place between 8:01 PM and midnight in Barangay Balibago, with Tuesdays, Fridays, and Saturdays making up 54.3% of these incidents. Evidently, the same barangay possesses the largest count of RAs, representing 18.64%. It was also disclosed that Sunday is the day with the highest number of accidents in the city, representing 277 out of 1438, or 19.26%. Findings from the study can inform the development of traffic management plans, including the placement of traffic enforcers at times and locations where their presence is likely to be most necessary. As a result, this could enhance road safety and have a beneficial effect on the community, travelers, and drivers in Angeles City.

This study is entitled “Trend Analysis of The Causes of Traffic Accidents On The Nautical Highway of Oriental Mindoro” by Marayan A. (2023). This study is conducted locally between 2013 and 2017 along the Nautical Highway in Oriental Mindoro. Along that highway corridor, it looks at accident trends and causes (time, location, contributing factors). The summary findings of this study are that there were more accidents in urbanized areas near highways; the number of accidents peaked on Sundays and in October; five to six o'clock in the afternoon was a typical accident peak time; and it also identifies the main causes, which include overtaking, speeding, poor road conditions, and occasionally a mix of modes (tricycles, pedestrians). The limitations of this study are that the time frame is restricted to 2013–2017 and excludes 2018–2025; the study It only looks at one highway, the Nautical Highway in Mindoro, which serves more as a ferry route and connector than a general highway that runs through Mindanao or the Visayas; it might overlook minor or unreported accidents; and in all sections, counts are not always converted into standardized rates (per population or per highway length).

This study relates to accident rates because as an intermediate case (not Metro Manila), this provides a highway-corridor perspective in a region (in Mindoro). To examine the highways in Visayas and Mindanao and calculate similar rates (accidents per km or per traffic volume) over time, you could use their techniques (trend analysis by year, by time of day, and by segment).

The study “Road Safety Management: Assessment of the Accident Severity of Identified Areas and Development of Accident Prediction Model in the City of San Fernando, Pampanga” by Ong S. B. (2023). This study is all about the desire to create a reliable and secure road infrastructure, which is a fundamental requirement for the government to meet community needs. Nonetheless, the Department of Health (DOH) states that traffic incidents remain a major cause of death in the Philippines. Specifically, San Fernando City in Pampanga (CSFP) is one of the areas where the number of individuals killed or hurt in traffic accidents has significantly increased. The Department of Public Works and Highways (DPWH) indicates that inadequate data management regarding road accidents is among the nation's major issues in improving road safety. This study identified the barangays in the city that are prone to accidents by utilizing an accident severity formula, which ranked them from most to least severe, as shown by road accident mapping. Also included is the accident prediction model that indicates potential road accidents if the issues in the road transportation system are not addressed. The research employed a mixed-method approach where a survey was administered to 385 participants and analyzed using frequency and percentage calculations. Three experts in road transportation of CSFP were interviewed, and their responses were transcribed and analyzed for content. The research results indicated that Dolores is the barangay with the highest incidence of severe road accidents in CSFP. Simultaneously, there may be 4,696 traffic collisions in the city by the year 2032. The

primary cause of road accidents is human behavior, particularly the disregard for fundamental traffic regulations. The state of the city's road safety systems also exacerbated the issue, as it became clear that road signs, traffic signals, street lighting, lane markings, and road surfaces require maintenance.

The study entitled "Road Safety of Highway Traffic System of Halsema Highway" by Biangdan J. (2024). This study is all about road safety, accident trends, and adherence to safety regulations along the Halsema Highway in Luzon, Philippines. It identifies risk segments, road characteristics, and accident causes. The summary findings of this study are that it links design or maintenance flaws to key highway segments that have a higher accident rate, such as blind spots and steep curves; it talks about how road conditions (signage, pavement) and driver behavior (speeding, overtaking) can be contributing factors, and it evaluates gaps and adherence to safety regulations (road markings, guardrails). The limitation of this study's applicability is more methodological than regional because it is restricted to Halsema Highway, which is not in Visayas or Mindanao. After the study period, it might not offer long-term trend data (year-over-year accident rates). It's possible that the accident data isn't consistently reported across years or completely broken down by severity. It places more emphasis on infrastructure and design elements than on regional or demographic variations. This study relates to accident rates because it is helpful as a methodological example of how highway-specific accident analysis (for a given corridor) can be carried out, even though it is not in your target regions. For highways in the Visayas and Mindanao, you could replicate this approach (identifying high-risk segments, mapping accidents vs. road geometry) and calculate accident rates per road length segment.

The study "Causes of Vehicular Accidents in Subic Zambales" by Angoluan A. (2025). This study focuses on a vehicle incident, often referred to as a car crash, traffic collision, or road mishap, that occurs when at least one motor vehicle strikes another object, which could be another vehicle, a pedestrian, or a fixed structure. The research employs a quantitative descriptive design, and the participants consist of 75 drivers situated throughout the entire Subic Zambales area. We utilize a survey questionnaire to collect and analyze data. This research seeks to identify the causes of vehicle accidents among drivers in Subic, Zambales, aiming to pinpoint typical contributing factors and outline particular dangers, like human error or distracted driving. Grasping these factors can guide approaches to reduce risks and encourage safer driving behaviors. Through the analysis and interpretation of this data, the research can deliver important insights about traffic safety in Subic, Zambales, and may suggest recommendations for policymakers and law enforcement agencies. The study's participants are aged 41-45, with the majority being male. Additionally, the majority of participants possess a professional driver's license, while some hold a non-professional driver's license; furthermore, most respondents identify as public drivers, whereas a few are private drivers. Finally, some participants are driving jeepneys while others are in trucks. Most respondents indicated that human error is the primary cause of vehicular accidents in Subic, Zambales; additionally, natural disasters can sometimes lead to vehicular accidents. The physical body is most impacted when an individual is involved in a car accident. To decrease vehicle accidents, it's crucial to deploy traffic enforcers on specific roads. Additionally, installing traffic devices is a key element in preventing various types of accidents.

The study entitled "Speeding Coffins" Editorial citing Philippine Statistics Authority data Daily Tribune. DT (2025) This study is all about an opinion piece that uses data to highlight how dangerous the roads are becoming in the Philippines. This study summarizes that, according to the Philippine Statistics Authority, road traffic deaths went up significantly between 2011 and 2021. In 2023, the number of deaths was the highest it had been in over a decade. The limitation of this study is that it's an editorial, so it might be a bit biased. It doesn't always relate the number of deaths to things like population or how much people are driving. It mainly focuses on fatal accidents. This study relates to accident rates. These numbers can be used to figure out death rate trends if we have population statistics. They show that fatal car accidents are on the rise.

This study, entitled "La Union logs high road accident rate" Jaymalin M. (2024) is a report from the DOH-Ilocos office citing PNP data—Philstar. This article focuses on a specific province, La Union, and reports that it had a lot of car accidents in a recent year. This study summarizes that the number of accidents in La Union was much higher than the year before, and so was the number of deaths. The main reasons seemed to be speeding, drunk driving, bad roads, and people not knowing the traffic rules. The limitation of this study is that it's only about one province. It doesn't calculate rates per person or per vehicle. It doesn't discuss things like how much people are driving. This study relates to accident rates: it shows how accident rates can be different in different places. The big increase in accidents suggests that there's a growing problem in La Union, which might be different from what's happening in the rest of the country.

Risk factors for vehicle defect-related crashes: Mekonnen T. H. (2016) This study, published in BMC Public Health, analyzes crashes involving defective vehicles and identifies key risk factors. It examines driver demographics and the age and type of vehicles involved, showing that older cars are more frequently associated with crashes due to defects like brake failure and worn-out tires. The research is based on crash data and provides insights into the link between vehicle maintenance and accident causation.

Analysis of road accidents based on driver behavior and risk scenarios: Du Z. (2023). Published in Safety Science: This paper investigates the factors influencing car crashes, particularly in high-risk scenarios. The authors use a risk scenario-based analysis model that considers various elements, including driver experience, gender, and reactions to complex road conditions. The study finds that inexperienced young drivers and female drivers are more likely to react incorrectly to risky situations, contributing to crashes.

Review of factors related to road traffic accidents: Muthusamy A. P. (2015). This 2020 review from ResearchGate provides a comprehensive overview of various factors and statistics related to road accidents. The authors analyze data from different countries, focusing on the human, environmental, and vehicle-related factors that contribute to accidents. The paper also discusses safety measures proposed by researchers to help reduce accident severity and fatality rates, particularly in developing nations.

Overview of effective interventions for preventing road traffic crashes: Fisa, R. (2022). This 2022 study in BMC Public Health reviews systematic studies on interventions designed to prevent road traffic crashes. It synthesizes findings from 35 systematic reviews, mostly from high-income countries, and concludes that enforcement interventions such as random breath testing and sobriety checkpoints are effective in reducing alcohol-related crashes. The paper also highlights the effectiveness of converting intersections to roundabouts and using electronic stability control in vehicles.

The BPSU Research Group (2023) conducted a localized traffic analysis in Balanga City, Bataan, focusing on the volume and flow of vehicles along critical thoroughfares such as Aguirre Street, Capitol Drive, and A. Banzon Street. Utilizing a descriptive-analytical framework, the researchers performed manual traffic counts during peak and off-peak hours to identify patterns of congestion and road capacity limitations. The results highlighted that these specific locations experience significant traffic density due to their roles as commercial and institutional hubs, creating higher risks for vehicular incidents during peak intervals. For the current study, these findings provide a vital geographic and temporal baseline, allowing for a correlation between the high-volume zones identified by BPSU and the actual frequency, location, and types of accidents occurring within the municipality.

Prediction modeling for road traffic accidents: He M. (2025) This literature review on ResearchGate explores predictive modeling for road traffic accidents. analyzing the relationship between traffic flow and accident rates.

The study, which includes a case study of a motorway in Paris, confirms that accident rates can be linked to traffic conditions like congestion. The authors propose a method for assessing traffic management strategies by using predictive models that factor in road geometry, lighting, and weather.

➤ *Locale of the Study*

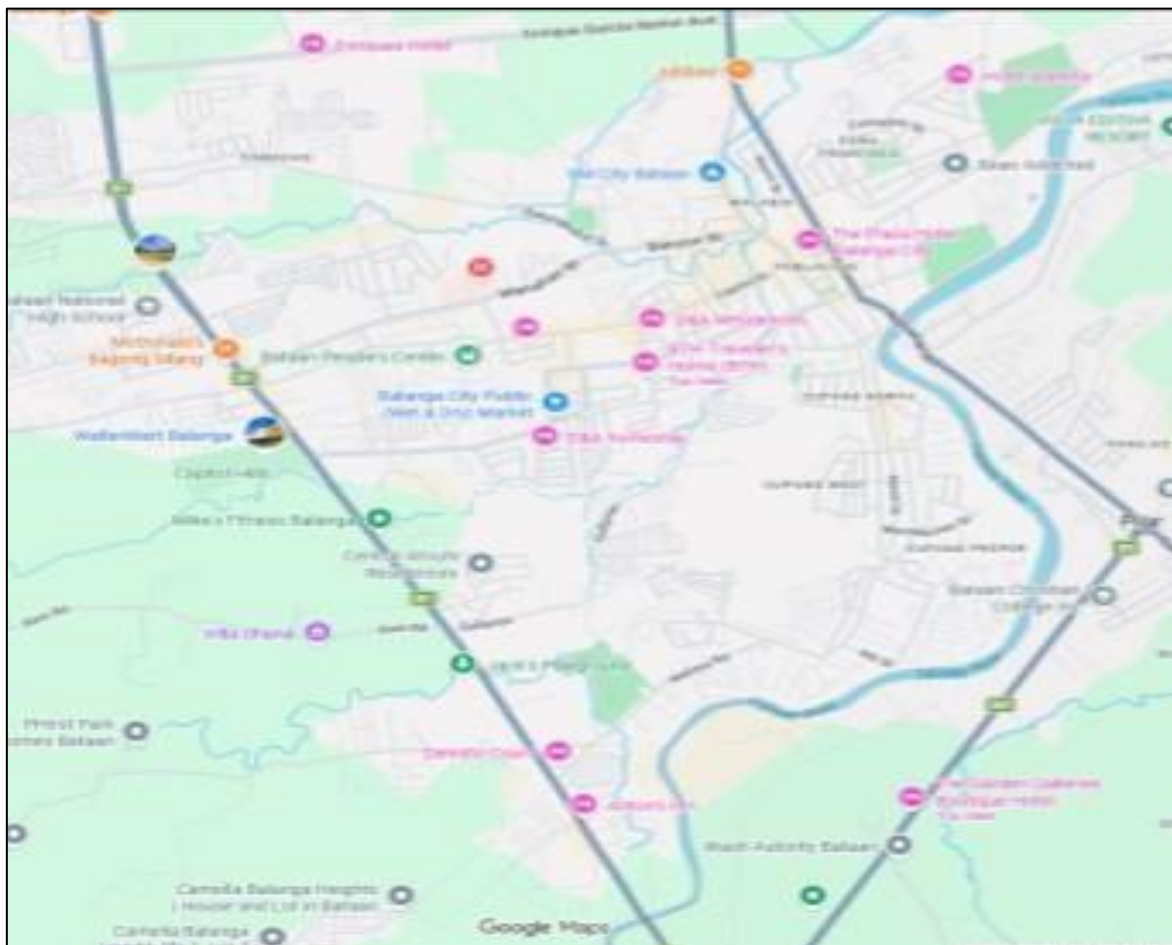


Fig 1 Locale of the Study

The study was conducted in Balanga City, Bataan, which reported a population of 104,173 as of 2024. This demographic density significantly influenced the local community, specifically through increased vehicle utilization and subsequent traffic congestion. Given its classification as an urban center, the area was identified as highly susceptible to traffic-related incidents and accidents, driven by a combination of environmental factors, economic activity, and prevailing road conditions.

This investigation utilized a quantitative research design to statistically analyze the frequency and nature of vehicular accidents within specific high-risk zones. By identifying accident-prone locations and their underlying causes, the study aimed to provide data-driven insights to mitigate road hazards and enhance public safety. Balanga City was strategically selected as the research locale to facilitate efficient data collection and collaborative coordination among the research team while ensuring the findings could be effectively disseminated to foster local community awareness and accident prevention.

➤ *Framework of the Study*

The study was established upon a structured investigation of vehicular incidents within Balanga, Bataan, necessitating the systematic collection and examination of local accident statistics to identify prevailing risk factors and evaluate safety interventions. Data indicated that between January and April 2023, Bataan recorded 263 road accidents, representing a marginal decline relative to preceding years. The Roman Superhighway was identified as the primary corridor for these occurrences. Notably, motorcycles accounted for the highest proportion of incidents (42.41%), underscoring a critical requirement for specialized safety initiatives targeting motorized two-wheeled vehicles.

The research framework encompassed the aggregation of empirical data, including incident frequency, involved vehicle classifications, geographical accident sites, specifically intersections and high-hazard zones, and contributing behavioral factors such as excessive speed and impaired driving. In response to these trends, the provincial administration, operating through the Metro The Bataan Development Authority, in coordination with the Land Transportation Office, enforced stringent regulatory measures. These included the implementation of defined speed limits, prohibitions against driving under the influence, weight restrictions for vehicle overloading, and the "keep right" protocol.

Furthermore, road safety initiatives were expanded to include comprehensive training and awareness programs for motorcyclists and the general public. The analytical structure of this study focused on monitoring annual trends, assessing the efficacy of existing policies, and identifying high-risk infrastructure segments for targeted improvements or enforcement. Ultimately, the framework was aligned with the Philippine Road Safety Action Plan 2023–2028, supporting the national objective to significantly reduce fatalities and injuries resulting from traffic-related incidents.

➤ *Conceptual Framework*

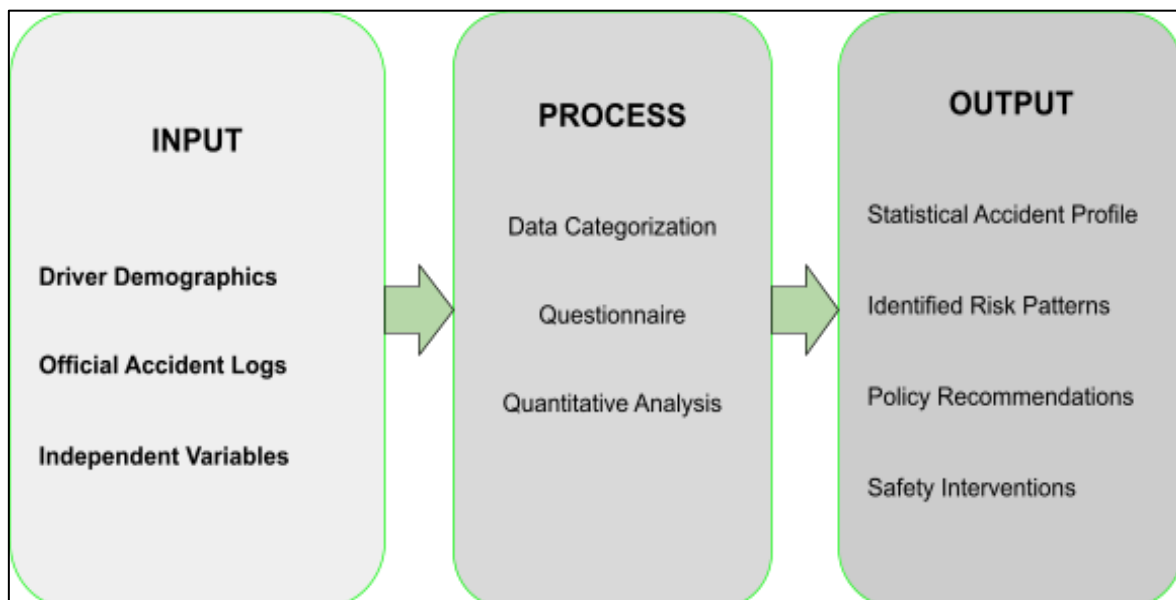


Fig 2 Conceptual Framework

The research process involved the systematic collection of data regarding the variables associated with vehicular incidents, including driver demographics (age and sex), vehicle specifications, road conditions, and environmental factors. Data acquisition was achieved through structured observations, the administration of survey questionnaires, and the extraction of archival records. Following the aggregation and statistical analysis of this data, the researchers formulated evidence-based recommendations and preventive strategies designed to Mitigate future accidents through multi-channel awareness initiatives.

The conceptual framework was anchored on the premise that vehicular accidents in the City of Balanga, Bataan, resulted from a multifaceted interplay of interrelated factors, including driver behavior, mechanical condition, infrastructure quality, and environmental variables. The researchers gathered official accident logs, law enforcement reports, and stakeholder data to establish a comprehensive profile of accident determinants. These inputs served as the empirical foundation for identifying recurring patterns and causal factors.

During the analytical phase, accident data were systematically categorized into four primary domains: driver-related, vehicle-related, and road-related factors. Findings from these investigations were quantitatively examined to validate the significance of each cause. Furthermore, the study accounted for risk exposure by analyzing travel distance and frequency as potential correlates to accident probability. The final output comprised a rigorous analysis of accident rates and causal trends, resulting in a suite of targeted interventions. These included infrastructure enhancements, intensified regulatory enforcement, and public safety programs designed to support the City of Balanga in implementing evidence-based policies for enhanced road safety.

➤ *Hypothesis/Assumption*

The study was predicated on the assumption that heightened traffic density and substandard road infrastructure constituted the primary determinants of increased vehicular accident rates, with the expectation that geographical zones characterized by peak-hour volume, inadequate signage, and degraded pavement would exhibit a statistically significant increase in incident frequency. It was further posited that data aggregated from official police and highway authority repositories provided a reliable metric for actual occurrences, while confounding variables such as meteorological conditions and idiosyncratic driver behavior were assumed to be either randomly distributed or sufficiently managed through statistical controls. Consequently, the research operated under the premise of a positive correlation between traffic density and accident frequency, alongside an inverse correlation regarding road quality and enforcement mechanisms, ultimately assuming that targeted infrastructural improvements and increased surveillance would yield a statistically measurable reduction in traffic incidents.

➤ *Statement of the Problem*

The purpose of this study was to ascertain the prevalence of car accidents on highways and roads caused by unfixed roadways. To answer the above-cited problem, answers to the following questions will be sought:

- *How may the Profile of the Respondents be Classified in Terms of:*

- ✓ Age
- ✓ Gender
- ✓ Type of road user
- ✓ Vehicle type
- ✓ Frequency of travel on municipal roads

- *How may the Rates of Vehicular Accidents in the Municipality be Described in Terms of:*

- ✓ Number of accidents within the last 2 years (2024-2025)
- ✓ Location of road accidents
- ✓ Time and season of occurrence
- ✓ Type of accident

- *What are the Causes of Vehicular Accidents in the City of Balanga as Revealed by Accident Reports and Findings of Investigations in Terms of:*

- ✓ Driver-related causes
- ✓ Vehicle-related causes
- ✓ Road-related causes

- *What Recommendations can be Proposed Based on the Result of the Study?*

➤ *Scope and Delimitation*

This study investigated the frequency and distribution of vehicular incidents across municipal roads and major thoroughfares. The primary objective was to analyze the causal factors of these accidents and evaluate the empirical findings derived from the data. The research initially prioritized the identification of accident-prone zones within Balanga City, Bataan, specifically targeting locations with statistically high incident rates.

To establish a comprehensive understanding of accident determinants, the investigation examined several independent variables: driver demographics, vehicle classification, traffic density, meteorological conditions, and temporal patterns. The ultimate goal of the study was to identify the root causes of road crashes and pinpoint high-frequency locations. By establishing this

data-driven foundation, the researchers sought to formulate strategic interventions and evidence-based solutions to mitigate future vehicular incidents. The scope of this inquiry was strictly delimited to the geographical boundaries of Balanga City, Bataan, excluding all external jurisdictions.

The research was conducted in coordination with key institutional stakeholders, including the city of Balanga and the Philippine National Police (PNP). These entities served as the primary units responsible for traffic law enforcement, the implementation of safety protocols, and emergency incident response.

The Balanga City Marshal provided technical expertise regarding the enforcement of municipal ordinances and road safety regulations. Simultaneously, the Balanga City LGU contributed critical insights into policy formulation and the execution of road safety programs. The Balanga PNP supported the study through the provision of investigative data and expert knowledge derived from the enforcement of traffic legislation and accident reconstruction. This multi-sectoral collaboration ensured the reliability and validity of the data utilized for the quantitative analysis.

➤ *Significance of the Study:*

The investigation into the prevalence of vehicular incidents on municipal roads and highways held substantial implications for public safety and infrastructure management. This research sought to enhance the empirical understanding of the multifaceted determinants of traffic accidents, including human error, infrastructural deficiencies, mechanical failures, and regulatory gaps. By isolating these variables, the study provided a data-driven framework to inform stakeholders, including transportation departments, policymakers, and urban planners, regarding specific areas requiring urgent intervention. The findings of this study offered distinct benefits to the following entities:

- **Residents of Balanga City.** The local community served as the primary beneficiary of this research. The application of the study's findings aimed to facilitate the development of safer transit corridors, thereby reducing the frequency of physical injuries, minimizing socioeconomic losses due to property damage, and decreasing mortality rates associated with road accidents.
- **Traffic Enforcers and Law Enforcement.** This research provided a diagnostic tool for identifying accident hotspots and recurring causal patterns. By utilizing these statistical insights, enforcement units were able to strategically deploy personnel and resources toward high-risk geographical zones and specific violator behaviors, optimizing the efficacy of traffic surveillance.
- **Drivers, Passengers, and Pedestrians.** Through the dissemination of identified risk factors, all road users gained an increased awareness of environmental and behavioral hazards. This empirical knowledge empowered stakeholders to adopt proactive safety measures, fostering a culture of collective responsibility and risk mitigation.
- **Future Researchers.** This study contributed to the existing body of knowledge by providing updated datasets, validated quantitative methodologies, and localized perspectives on urban traffic safety. It served as a foundational reference for subsequent academic inquiries aiming to expand upon regional transport safety models.

Ultimately, this research functioned as a critical investment in the communal well-being of Balanga City. By identifying the root causes of vehicular incidents and proposing evidence-based solutions, the study supported the creation of a more secure and sustainable urban environment.

➤ *Definition of Terms:*

• *Accident Causes*

Referred to the primary determinants and contributing variables that precipitated a collision. These were statistically categorized into human, mechanical, and environmental factors to identify recurring patterns of occurrence.

• *Commercial Areas*

Identified as high-density zones primarily utilized for business, retail, and corporate activities. In this study, these areas were analyzed for their correlation with high pedestrian volumes and frequent vehicle-to-vehicle interactions.

• *Distracted Driving*

Defined as the diversion of a driver's attention away from the primary task of operating a vehicle due to secondary activities, such as mobile device usage. This variable was measured as a leading behavioral cause of non-fatal road incidents.

• *Driver-Related Causes*

Encompassed the behavioral and physiological factors attributable to the operator of the vehicle. These included instances of fatigue, impairment, or lack of technical proficiency during the recorded incident.

- *Frequency of Travel*

Represented the quantitative measure of how often a road user utilized specific transit corridors within a defined timeframe. This variable served as a proxy for risk exposure in the statistical analysis.

- *Highways and Roads*

Consisted of the public thoroughfares and primary arterial routes designed for high-speed or high-volume vehicular transit. These locations were monitored to compare incident severity against municipal or secondary streets.

- *Investigation Findings*

Composed the empirical conclusions and verified data points extracted from official police and transit authority reports. These findings provided the factual basis for validating the causal links identified in the study.

- *Liability*

Referred to the legal and financial responsibility assigned to a party involved in a vehicular incident based on established traffic laws. In a research context, this was used to categorize the outcomes of accident reconstruction reports.

- *Mechanical Failure*

Defined as the technical breakdown or malfunction of essential vehicle components, such as brakes or steering systems, prior to an incident. These failures were isolated from driver behavior to determine the impact of vehicle maintenance on road safety.

- *Municipal Roads*

Referred to secondary or local thoroughfares managed by the local government unit rather than national agencies. These roads were analyzed for specific infrastructure deficiencies that differed from major highway systems.

- *Reckless Driving*

Identified as the deliberate disregard for traffic regulations and the safety of other road users. This category included high-speed maneuvering and aggressive lane changes that increased the probability of collisions.

- *Reckless Imprudence Resulting in Damage to Property*

A legal classification where a lack of precaution resulted in unintended destruction of physical assets or infrastructure. The study quantified these incidents to assess the economic impact of road accidents in Balanga City.

- *Reckless Imprudence Resulting in Homicide*

Defined as a grave legal incident where a failure to exercise due diligence led to the loss of human life. This metric was utilized to determine the fatality rate and the severity of high-speed collisions.

- *Reckless Imprudence Resulting in Physical Injury*

Represented incidents where negligent vehicle operation led to non-fatal bodily harm to drivers, passengers, or pedestrians. This variable was used to measure the public health burden of traffic-related incidents.

- *Residential Areas*

Defined as urban or suburban zones primarily designated for housing and domestic life. These areas were scrutinized for incidents involving lower speeds but higher risks to vulnerable road users, such as children and the elderly.

- *Road Accidents*

A general term for any unplanned event involving at least one vehicle in motion that resulted in injury or damage. This served as the primary dependent variable throughout the quantitative investigation.

- *Road-Related Causes*

Encompassed environmental and infrastructural variables such as poor lighting, lack of signage, or degraded pavement conditions. These factors were analyzed to determine the extent to which the physical environment contributed to incident rates.

- *Rush Hour*

Identified as the peak temporal intervals during the day characterized by maximum traffic density due to commuting patterns. These periods were isolated to test the hypothesis that increased vehicle volume leads to higher incident frequency.

- *Type of Accident*

Referred to the technical classification of the collision, such as rear-end impacts, head-on collisions, or sideswipes. This categorization allowed for a detailed analysis of the most common impact dynamics in the study site.

- *Type of Road User*

Classified the individuals involved in the transport network, including private motorists, public utility vehicle drivers, and pedestrians. This demographic variable was essential for identifying which groups were most susceptible to specific hazards.

- *Vehicle-Related Causes*

Pertained to the specific attributes or conditions of the vehicle involved, such as age, load capacity, or maintenance status. These factors were evaluated to determine their influence on the severity of the accidents recorded.

- *Vehicle Type*

The categorization of transport units into specific groups such as motorcycles, light cars, or heavy trucks. This variable was critical for identifying which vehicle classes were disproportionately represented in local accident statistics.

- *Vehicular Accidents*

Specific events involving the collision of a motorized vehicle with another vehicle, an object, or a person. These were the primary units of analysis used to derive the study's statistical conclusions.

CHAPTER TWO METHODOLOGY

The Materials and Methods section outlines the thorough method that will be employed to assess the incidence of vehicle collisions on highways and roads in Balanga City, Bataan, with a particular emphasis on the casual link between unmaintained roads and the occurrence of accidents. The approach is designed to tackle essential research areas, such as demographic and respondent classification, comprehensive accident data gathering, organized cause classification, investigative methods, and analytical tools for assessing accident rates. Every element has been meticulously crafted to conform with local Philippine and global standards for road traffic research, ensuring thoroughness, repeatability, and a solid basis for recommendations and interventions for public safety.

➤ *Research Design*

The study utilized a descriptive quantitative research design to systematically analyze the frequency and distribution of vehicular accidents on the highways and roads of the City of Balanga. This design was selected because the occurrence and patterns of these accidents had not been thoroughly quantified within the local context. Since the primary objective was to identify trends and clarify essential variables through numerical evidence, this quantitative approach provided an objective framework for data analysis.

The research examined the frequency and specific locations of vehicular incidents by categorizing data into measurable factors, such as human error, vehicle specifications, road infrastructure conditions, and environmental variables. This design facilitated the generation of empirical data and the formulation of hypotheses for subsequent research, prioritizing the systematic observation of facts over the testing of established theories.

The study was conducted through a structured, data-driven process that integrated multiple sources of empirical evidence. Initially, the researcher reviewed and tabulated primary data from official accident investigation reports and law enforcement records to establish a baseline of documented incidents. This was complemented by a statistical survey administered to the local community, specifically targeting individuals who operated motor vehicles, to gather quantifiable data on driving behaviors and perceived road risks. Through this dual-source approach, the data interpretation phase guaranteed that the findings were articulated through rigorous statistical measures. This methodology ensured that the final conclusions were rooted in hard evidence, providing a mathematically sound representation of the vehicular accident landscape in the City of Balanga.

➤ *Sample/Population of the Study*

The study population comprised all recorded motor vehicle accidents occurring on the highways and major roads of the City of Balanga, Bataan, within the specified timeframe of 2024 to 2025, alongside key institutional stakeholders and local motorists. For the documentary analysis, the researcher employed a census sampling technique, collecting and tabulating all available accident records from the local traffic authority to ensure that spatial and temporal patterns emerged with statistical precision. To complement these records, the study utilized a purposive sampling approach to identify information-rich participants, specifically traffic police officers, road safety officials, and transportation planners, who provided expert data through structured instruments. Additionally, a quantitative survey was administered to a calculated sample of 300 respondents to obtain measurable data regarding accident causes, investigative procedures, and perceived infrastructure deficiencies. This systematic selection of records and participants ensured that the resulting dataset offered a comprehensive, evidence-based representation of the city's vehicular safety landscape, prioritizing objective trends over generalized assumptions.

➤ *Data Gathering Tools*

The study employed a systematic data collection process centered on objective, quantifiable instruments to ensure the empirical integrity of the findings. Primary data was gathered through the acquisition of official vehicular accident records from the Philippine National Police (PNP) and the Balanga Traffic Management Office for the 2024–2025 period, utilizing Freedom of Information (FOI) protocols to ensure data transparency. This was integrated with a structured online survey administered via digital platforms to road users and institutional stakeholders, which facilitated the efficient collection of quantifiable data regarding accident causes and road safety perceptions. By utilizing this digital approach, the researcher ensured a broader reach and systematic data entry, allowing for a rigorous statistical evaluation of accident trends that served as a robust foundation for policy-oriented recommendations.

➤ *Data Gathering Procedure*

The research process commenced with the formal acquisition of administrative clearances, beginning with the researchers seeking approval from the college dean to ensure the study's alignment with institutional standards. Following this, the survey instruments underwent a systematic validation process by a panel of experts to verify their technical accuracy, reliability, and relevance to the local context of Balanga City. Once the instruments were validated, the researchers coordinated directly with the Philippine National Police (PNP) to submit formal request letters and secured the necessary legal permits to access sensitive accident records. Upon receiving official authorization, the researchers conducted an exhaustive collection of documented statistical data

from 2024 to 2025, which were then categorized, coded, and tabulated within a structured database to transform raw records into simplified, actionable information.

Simultaneously, the researchers facilitated the collection of primary quantitative data from a diverse sample of 300 residents and commuters who utilized the highways and major roads of the City of Balanga. This was achieved through the distribution of a structured online survey via digital platforms, allowing for a broader reach and efficient data retrieval from motorists and institutional stakeholders. To interpret the gathered results, the weighted mean for each survey indicator was calculated and subjected to a rigorous analysis to identify the primary behavioral and environmental factors contributing to vehicular incidents. These findings were then scrutinized to provide a clear rationale for the observed statistical patterns and were subsequently correlated with existing local and international studies to establish either consistency or divergence with established theories in road safety and traffic management, thereby ensuring a comprehensive and evidence-based conclusion.

➤ *Treatment Data:*

To ensure the accurate interpretation and empirical integrity of the gathered information, the researchers processed all collected data using a rigorous combination of descriptive and comparative statistical techniques. Frequency and percentage distributions were employed to profile the 300 survey respondents and quantify the total volume of official accident cases, providing a clear demographic and situational overview. Furthermore, the weighted mean was calculated for each specific survey indicator, which enabled the researchers to determine the primary perceived causes of vehicular incidents as identified by the participants. These numerical results were then interpreted through a standardized Likert scale, allowing for a systematic classification of road safety concerns and driving behaviors.

The analyzed data were subsequently correlated with existing literature and official police records to provide a substantiated rationale for the identified accident patterns within the City of Balanga. To maintain the highest level of mathematical precision and reliability, all quantitative information was encoded and analyzed using Microsoft Excel and the Statistical Package for the Social Sciences (SPSS). These software tools facilitated the generation of accurate statistical outputs that met the rigorous standards required for policy-oriented research. By synthesizing these diverse data points, the study ensured that the final conclusions were grounded in empirical evidence, ultimately serving as a robust foundation for future government and law enforcement interventions.

➤ *Ethical Considerations:*

The study adhered strictly to established ethical protocols to ensure the protection of human participants and the integrity of the data obtained from official sources. Prior to the administration of the online survey, each of the 300 respondents was provided with an informed consent form that clearly outlined the research objectives, the voluntary nature of their involvement, and their right to withdraw at any stage without consequence. In compliance with the Data Privacy Act of 2012, all personally identifiable information was redacted, and survey responses were assigned numerical codes to maintain absolute anonymity. Furthermore, all electronic data were stored in a password-protected database and were scheduled for permanent deletion following the completion of the study to prevent unauthorized access and protect the privacy of the motorists and stakeholders involved.

To maintain professional and academic integrity, the researchers handled all official accident reports from the Philippine National Police (PNP) and the Local Government Unit (LGU) with the highest level of confidentiality, ensuring that the names of individuals in accident records were never disclosed. The research was conducted under the principle of non-maleficence, utilizing an online platform to eliminate physical risks and provide a low-pressure environment for data collection. All statistical results were reported with complete honesty, avoiding any data manipulation or fabrication, while all secondary sources and institutional data were meticulously cited and acknowledged. This ethical framework guaranteed that the study remained transparent, objective, and respectful of the legal rights and well-being of the community in the City of Balanga.

CHAPTER THREE

RESULTS AND DISCUSSION

This chapter presents the results of the data collection process and provides an in-depth analysis of the findings in relation to the research questions established in Chapter 1. The data gathered through survey questionnaires are organized, analyzed, and interpreted to provide a clear picture of "Rates of Vehicular Accidents on Highways and Roads in the City of Balanga, Bataan: A Comprehensive Study on Accident Causes and Investigation Findings." The discussion further integrates these results with existing literature to validate the findings and highlight their significance within the field of Bachelor of Science criminal justice education.

Table 1 Demographic Profile of Respondents In Terms of Age

AGE	FREQUENCY	PERCENTAGE	RANK
Below 18	8	2.7%	1
18 - 25	187	62.3%	2
26 - 35	62	20.7%	3
36 - 45	25	8.3%	4
46 - 45	14	4.7%	5
56 and above	4	1.3%	6
Total	300	100%	-

The demographic distribution of the 300 participants indicates that the study population is predominantly composed of young adults. The 18–25 age group represents the largest segment, comprising 62.3% (187 respondents) of the total sample. This is followed by individuals aged 26–35, who account for 20.7% (62 respondents).

Collectively, these two groups signify that over 80% of the respondents are under the age of 35, suggesting that the data largely reflects the perspectives of the younger workforce and student populations.

In contrast, the representation of older age brackets is significantly lower. Participants aged 36–45 constitute 8.3% (25 respondents), while those in the 46–55 category (recorded as 46–45 in the raw data) represent 4.7% (14 respondents). The least represented groups are those below 18 years of age, accounting for 2.7% (8 respondents), and individuals aged 56 and above, who make up only 1.3% (4 respondents) of the sample. These findings emphasize that the road usage patterns and safety perceptions captured in this research are primarily driven by the younger demographic of Balanga City.

The relation of this study to a classification of respondents by age is a critical component of this research, as age is a primary determinant of vulnerability and mortality in road traffic incidents. According to the World Health Organization (2023), traffic-related injuries have become the leading cause of death for individuals aged 5 to 29, highlighting a global crisis that disproportionately affects the youth and young adult demographics. By profiling respondents according to these age brackets, this study can evaluate whether local traffic risks align with these global trends, particularly among "vulnerable road users" such as young motorcyclists and pedestrians. Furthermore, establishing the age profile provides essential context for the "golden hour" concept identified in highway studies; since younger populations represent the most mobile and economically active sector of society, delays in emergency medical care exceeding 60 minutes do not only result in individual tragedies but contribute to the broader 3% loss in GDP observed in nations struggling with road safety.

Table 2 Demographic Profile of Respondents in Terms of Sex

SEX	FREQUENCY	PERCENTAGE
Male	204	68%
Female	96	32%
Total	300	100%

The demographic profile of the respondents in terms of sex reveals a clear majority of male participants within the study. Out of the total sample size of 300 individuals, 204 are male, which constitutes 68% of the population. In contrast, females represent the remaining 32%, with a frequency of 96 respondents. This distribution highlights a significant gender gap in the sample, indicating that the data collected is primarily influenced by the experiences and perspectives of male road users in Balanga City.

The high percentage of male respondents is particularly noteworthy, as it may reflect broader societal trends regarding road usage and vehicle ownership in the local context. Since males account for more than two-thirds of the participants, the findings regarding traffic behavior and accident involvement are heavily weighted toward this group. This disparity suggests that the primary demographic navigating the city's thoroughfares consists of men, which is an essential factor to consider when analyzing road safety risks and the effectiveness of current traffic regulations.

Table 3 Demographic Profile of Respondents In Terms of Type of Road User

TYPE OF ROAD USER	FREQUENCY	PERCENTAGE
Pedestrian	1	0.24%
Bicycle rider	46	10.98%
Motorcycle rider	188	44.87%
Tricycle driver	53	12.65%
Private car driver	94	22.43%
Public utility vehicle (PUV) driver (e.g., jeepney, bus, taxi)	27	6.44%
Truck / Delivery vehicle driver	10	2.39%
Total	300	100%

The demographic profile regarding the type of road user highlights a significant concentration of motorcycle riders, who represent the largest segment of the sample at 44.87% (188 respondents). This is followed by private car drivers, accounting for 22.43% (94 respondents), and tricycle drivers at 12.65% (53 respondents). Collectively, these three groups make up the vast majority of the participants, indicating that motorized personal and small-scale public transport are the primary modes of mobility for the respondents in Balanga City.

In contrast, other forms of road usage show much lower representation. Bicycle riders constitute 10.98% (46 respondents), while Public Utility Vehicle (PUV) drivers, such as those operating jeepneys or buses, account for 6.44% (27 respondents). The smallest groups include truck or delivery vehicle drivers at 2.39% (10 respondents) and a negligible percentage of pedestrians at only 0.24% (1 respondent). These findings suggest that the study's results are heavily weighted toward the experiences of motorized vehicle operators, particularly those on two or three wheels, who are often the most vulnerable to road safety hazards in high-traffic environments.

Table 4 How Often do you use Highways/Roads in Balanga, Bataan?

HOW OFTEN DO YOU USE HIGHWAYS/ROADS	FREQUENCY	PERCENTAGE
Daily	123	41%
4–6 times a week	52	17.3%
2–3 times a week	48	16%
Once a week	28	9.3%
Rarely	49	16.3%
Total	300	100%

The data regarding the frequency of road usage in Balanga City indicates a high level of consistent exposure to the local transport network among the respondents. The largest portion of the sample, representing 41% (123 individuals), reported utilizing the highways and roads on a daily basis. When combined with those who travel 4 to 6 times a week (17.3%), it becomes evident that more than half of the participants are frequent road users. This high frequency of travel suggests that the respondents' perceptions and reported experiences are rooted in regular, long-term interaction with the city's traffic conditions.

On the other hand, the remaining segments of the population show more varied or occasional road usage. Approximately 16% (48 respondents) use the roads 2 to 3 times a week, while 9.3% (28 respondents) travel only once a week. Interestingly, a notable 16.3% (49 respondents) reported using the roads rarely, nearly matching the percentage of those who travel multiple times per week. Despite these variations, the data overall points to a participant base that is actively engaged with the city's infrastructure, providing a robust foundation for analyzing road safety and the likelihood of accident involvement.

Table 5 Frequency of Travel on Municipal Roads

TIME YOU MOST OFTEN USE THE ROAD?	FREQUENCY	PERCENTAGE
Morning (5:00 AM – 9:00 AM)	84	28%
Midday (9:01 AM – 4:00 PM)	157	52.3%
Evening (4:01 PM – 9:00 PM)	46	15.3%
Late night (9:01 PM – 4:59 AM)	13	4.3%
Total	300	100%

The data regarding the time of road usage reveals that a majority of the respondents travel during the daytime, with the Midday (9:01 AM – 4:00 PM) period being the most active. This time slot accounts for 52.3% (157 respondents) of the total sample, indicating that over half of the participants are on the road during hours typically associated with business operations, school schedules, and commercial activities. The Morning (5:00 AM – 9:00 AM) period follows as the second most frequent time for travel, representing 28% (84 respondents), which likely captures the rush hour commute as residents travel to work or educational institutions.

Conversely, road usage significantly declines during the later hours of the day. The Evening (4:01 PM – 9:00 PM) period accounts for 15.3% (46 respondents), while the Late night (9:01 PM – 4:59 AM) segment represents the smallest portion of the sample at only 4.3% (13 respondents). This distribution suggests that the peak density for vehicular activity in Balanga City occurs during broad daylight, particularly in the midday block. For research purposes, this highlights that the majority of road safety perceptions and potential accident exposures reported by the respondents are occurring under high-visibility conditions but likely amidst higher traffic volumes.

Table 6 Have you been Involved in a Vehicular Accident in Balanga City within the Last 2 Years (2024-2025)?

INVOLVED VEHICULAR ACCIDENT (2024-2025)	FREQUENCY	PERCENTAGE	WEIGHTED MEAN
Yes	29	9.7%	1.90
No	271	90.3%	
Total	300	100%	

The data regarding involvement in vehicular accidents between 2024 and 2025 indicates that a substantial majority of the respondents remained unaffected by such incidents within this two-year period. Specifically, 90.3% (271 respondents) reported that they had not been involved in an accident, suggesting that, for most road users in Balanga City, travel remains relatively safe or that they have successfully navigated the thoroughfares without serious incident. The resulting weighted mean of 1.90 further reflects this trend, as the responses lean heavily toward the "No" category.

However, the findings also highlight a critical safety concern, as 9.7% (29 respondents) confirmed their involvement in a vehicular accident during the specified timeframe. While this represents a smaller portion of the sample, it indicates that nearly one in every ten road users has experienced a collision or mishap within just the last two years. This percentage proves that vehicular accidents are a persistent reality in the city, underscoring the necessity for continued evaluation of local traffic enforcement and road safety measures to mitigate these recurring risks.

Table 7 How many Vehicular Accidents have you Personally Experienced?

HOW MANY VEHICULAR ACCIDENTS HAVE YOU PERSONALLY EXPERIENCED?	FREQUENCY	PERCENTAGE
None	167	55.67%
1	57	19%
2	35	11.67%
3	18	6%
4 or more	23	7.66
Total	300	100%

The data regarding the number of vehicular accidents personally experienced by the respondents shows that while a majority have managed to avoid road incidents, a significant portion of the population has direct experience with road trauma. Specifically, 55.67% (167 respondents) reported having never been involved in a vehicular accident. However, the remaining 44.33% of the sample has experienced at least one accident, with 19% (57 respondents) having been involved in a single incident. This indicates that nearly half of the surveyed road users in Balanga City have encountered a collision at some point, establishing accident involvement as a relatively common experience among the local demographic.

Beyond single occurrences, the findings reveal a concerning trend of repeated accident involvement among a notable segment of the respondents. Approximately 11.67% (35 respondents) have experienced two accidents, while 6% (18 respondents) reported three. Most significantly, 7.66% (23 respondents) indicated they have been involved in four or more vehicular accidents. This cumulative data suggests that for a specific portion of the community, road accidents are not isolated events but recurring risks. The presence of "repeat victims" underscores the necessity for targeted safety interventions and further investigation into whether these recurring incidents are due to high-risk professional driving, specific dangerous routes, or behavioral patterns among frequent road users.

Table 8 Number of Accidents within the Last 2 Years (2024-2025)

Question	Weighted Mean	Standard Deviation
1. How often have you witnessed a vehicular accident on highways or roads in Balanga City within the last two (2) years? (2024-2025)	2.30	0.97
2. How often do you hear or see reports of vehicular accidents in Balanga City within the last two (2) years? (2024-2025)	2.74	0.96
3. How often do vehicular accidents involve private cars within the last two (2) years? (2024-2025)	2.59	0.98
4. How often do vehicular accidents involve public utility vehicles (e.g., jeepneys, tricycles, buses) within the last two (2) years? (2024-2025)	2.56	0.95
5. Based on your observation, how often do vehicular accidents happen on major highways in Balanga City within the last two (2) years? (2024-2025)	2.67	0.92

The statistical analysis of the respondents' observations regarding vehicular accidents in Balanga City suggests a moderate to high frequency of such incidents. The weighted mean for Question 2 (2.74) indicates that respondents most frequently encounter reports of accidents, making this the highest-rated observation in the set. This is closely followed by the perceived frequency of accidents occurring on major highways (2.67) and those involving private vehicles (2.59). These values, falling within the mid-to-high range of the scale, suggest that road users are consistently aware of the ongoing risks and occurrences within the city's transport network.

Furthermore, the data reflects a consistent pattern across different vehicle types and locations, with accidents involving public utility vehicles (2.56) and direct witnessing of incidents (2.30) also showing a notable presence. The standard deviations, which range from 0.92 to 0.98, indicate a relatively low level of variance in the responses. This suggests a strong consensus among the 300 respondents; their perceptions of accident frequency are aligned, reinforcing the reliability of the data. Overall, these findings imply that vehicular accidents are a visible and recurring public safety issue in Balanga City, particularly on highways and involving private transport.

Table 9 Location of Road Accidents

Question	Weighted Mean	Standard Deviation
1. Vehicular accidents occur on highways in Balanga City.	2.64	0.98
2. Vehicular accidents occur on municipal or city roads.	2.23	0.86
3. Vehicular accidents occur at intersections.	2.74	0.90
4. Vehicular accidents occur on residential roads.	2.09	0.87
5. Vehicular accidents occur in commercial areas (e.g., markets, schools, malls).	2.1	0.85

The analysis of accident locations indicates that the highest concentration of vehicular incidents in Balanga City occurs at intersections, which earned the highest weighted mean of 2.74. This is followed closely by highways, with a weighted mean of 2.64. These figures suggest that areas characterized by high traffic volume, complex vehicle maneuvers, and higher operational speeds are perceived by respondents as the primary hotspots for accidents. The standard deviations (0.90 and 0.98, respectively) indicate a general consensus among the participants, reinforcing the finding that these specific infrastructure points are the most hazardous zones within the city's road network.

In contrast, vehicular accidents are perceived to occur less frequently on localized and slower-speed thoroughfares. Municipal or city roads received a weighted mean of 2.23, while commercial areas and residential roads yielded the lowest scores of 2.11 and 2.09, respectively. The lower standard deviations for these categories (ranging from 0.85 to 0.87) suggest even greater agreement among respondents that these areas are comparatively safer. Overall, the data implies that while accidents occur across various environments, the strategic focus for road safety interventions should be prioritized toward intersections and major highways where the risk of collision is most prevalent.

Table 10 Time and Season of Occurrence

Question	Weighted Mean	Standard Deviation
1. Vehicular accidents in the municipality frequently occur during peak traffic hours (morning and evening rush hours).	2.63	0.95
2. Vehicular accidents are more likely to occur at night compared to daytime hours.	2.80	0.91
3. Vehicular accidents are more likely during the rainy season.	2.99	0.92
4. Vehicular accidents are more frequent during weekends and holidays.	2.62	0.92
5. Vehicular accidents increase during extreme weather conditions such as typhoons or heavy rainfall.	2.89	0.97

The data regarding the time and season of occurrence indicates that environmental conditions are the most significant factors influencing vehicular accidents in Balanga City. The highest weighted mean of 2.99 was recorded for the rainy season, followed closely by extreme weather conditions such as typhoons at 2.89. These results suggest that road users perceive a strong correlation between inclement weather which typically results in slippery road surfaces and reduced visibility and an increased likelihood of collisions. Additionally, the perception that accidents are more likely to occur at night compared to the daytime yielded a high weighted mean of 2.80, further emphasizing that diminished visibility and limited lighting are viewed as major contributors to road risks.

In terms of traffic patterns and scheduling, the respondents noted a consistent but slightly lower frequency of accidents during specific periods of high activity. The occurrence of accidents during peak traffic hours (morning and evening rush hours) received a weighted mean of 2.63, while weekends and holidays followed closely at 2.62. The standard deviations, which range from 0.91 to 0.97, reflect a high degree of consensus among the 300 respondents, indicating that these observations are widely shared across the demographic. Overall, the findings suggest that while high-volume traffic periods are dangerous, the combination of environmental stressors and poor visibility represents the most critical window for vehicular accidents in the municipality.

The relation of BPSU (2023) and Datu (2023). Respondents identified the rainy season, extreme weather, and nighttime as the highest risk periods, mirroring Datu's (2023) evidence that accidents peak during late evening hours. Furthermore, the perceived danger during rush hours reflects the BPSU (2023) report on high-density traffic congestion in the city's core streets. By connecting these local perceptions with established literature, the study confirms that environmental conditions and nighttime visibility are primary catalysts for accidents, providing a strong basis for the municipality's 2024–2025 safety assessment.

Table 11 Type of Accident

Question	Weighted Mean	Standard Deviation
1. Vehicle-to-vehicle collisions are the most frequent type of accident.	3.05	0.90
2. Vehicle-to-pedestrian accidents frequently occur in Balanga City.	2.29	0.87
3. Motorcycle-related accidents are frequent.	3.12	0.88
4. Single-vehicle accidents (e.g., skidding, hitting objects) occur frequently.	2.74	0.88
5. Most vehicular accidents result in minor injuries rather than major ones.	2.55	0.91

The analysis of accident types in Balanga City reveals that two-wheeled transport and multi-vehicle interactions are the primary sources of road incidents. Motorcycle-related accidents emerged as the most frequent occurrence, yielding the highest weighted mean of 3.12, followed closely by vehicle-to-vehicle collisions at 3.05. These high scores, combined with relatively low standard deviations (0.88 and 0.90), indicate a strong consensus among respondents that motorized interactions particularly those involving motorcycles represent the dominant safety threat in the city. This aligns with the demographic profile of the respondents, many of whom are motorcycle riders, and underscores the vulnerability of these users in a high-traffic environment.

Furthermore, the data provides insight into the nature and severity of these incidents. Single-vehicle accidents, such as skidding or hitting fixed objects, also occur with notable frequency, as indicated by a weighted mean of 2.74. Regarding the physical outcome of these events, respondents perceived that most accidents result in minor injuries (2.55) rather than major ones, suggesting that while collisions are frequent, they often occur at speeds or in conditions that result in non-fatal harm. In contrast, vehicle-to-pedestrian accidents received the lowest weighted mean of 2.29, suggesting that while such incidents are a concern, they are observed less frequently than vehicle-on-vehicle or motorcycle-specific mishaps. Overall, the data points to a transport landscape where motorcycle safety and inter-vehicle coordination are the most critical areas for intervention.

The correlation of two studies entitled “World Health Organization (2023)” and the “Asian Transport Observatory (2025)” provide a unified framework for understanding the accident types in Balanga City by highlighting a systemic vulnerability among motorcyclists and pedestrians. While the WHO identifies these “vulnerable road users” as accounting for over half of global traffic deaths, the ATO localizes this by reporting that only 14% of Philippine roads are safe for two-wheeled vehicles, directly justifying the high frequency of motorcycle-related and pedestrian accidents seen in Table 2.4. Together, these studies confirm that the prevalence of vehicle-to-vehicle collisions and minor injuries in the municipality reflects a broader national trend where poor infrastructure and high traffic density result in significant economic losses. Ultimately, relating these findings proves that Balanga’s accident profile mirrors a larger national and global crisis, necessitating the urgent safety interventions outlined in the Philippine Road Safety Action Plan 2023–2028.

Table 12 Driver-Related Causes

Question	Weighted Mean	Standard Deviation
1. Overspeeding is a major cause of vehicular accidents in Balanga City.	3.32	0.93
2. Reckless or aggressive driving contributes significantly to road accidents.	3.06	1.14
3. Driving under the influence of alcohol or drugs leads to vehicular accidents.	3.48	0.86
4. Driver fatigue or drowsiness causes accidents, especially during long trips.	3.36	0.88
5. Failure to follow traffic rules and regulations results in road accidents.	3.35	0.85

The data concerning driver-related causes of vehicular accidents identifies behavioral and physiological factors as the primary catalysts for road incidents in Balanga City. Driving under the influence of alcohol or drugs emerged as the most critical factor, yielding the highest weighted mean of 3.48. This is closely followed by driver fatigue or drowsiness (3.36) and the failure to follow traffic rules and regulations (3.35). These high scores, supported by relatively low standard deviations (0.85 to 0.88), indicate a strong consensus among respondents that impaired judgment, whether through substance use, exhaustion, or willful negligence, is the leading driver-related threat to road safety.

Furthermore, speed and aggression remain significant contributors to the city's accident statistics. Overspeeding was identified as a major cause with a weighted mean of 3.32, suggesting that the velocity at which motorists navigate Balanga’s thoroughfares often exceeds safe limits. While reckless or aggressive driving also received a high weighted mean of 3.06, its standard deviation of 1.14 is the highest in the table, indicating a wider variance in respondent opinions compared to other categories. Overall, the findings suggest that the majority of accidents are preventable through stricter behavioral compliance, as the top-rated causes all stem from individual driver choices and physical states rather than external environmental factors.

Table 13 Vehicle-Related Causes

Question	Weighted Mean	Standard Deviation
1. Poor vehicle maintenance contributes to vehicular accidents.	3.05	0.91
2. Brake failure is a common cause of road accidents.	3.24	0.89
3. Tire defects (e.g., worn-out tires) increase the risk of accidents.	3.17	0.91
4. Malfunctioning lights and signals cause vehicular accidents, especially at night.	3.23	0.89
5. Overloaded or improperly modified vehicles are more prone to accidents.	3.17	0.92

The data regarding vehicle-related causes suggests that mechanical reliability and equipment standards are significant factors in road safety within Balanga City. Brake failure emerged as the most critical concern, yielding the highest weighted mean of 3.24, followed closely by malfunctioning lights and signals at 3.23. These findings indicate a strong perception among respondents that the inability to stop effectively or communicate intent to other drivers particularly in low-visibility conditions is a primary trigger for collisions. The low standard deviations (0.89) for both categories reflect a high degree of consensus, suggesting these are widely recognized issues among the 300 road users surveyed.

Other technical aspects of vehicle upkeep also contribute heavily to the perceived risk. Both tire defects, such as worn-out treads, and overloaded or improperly modified vehicles received identical weighted means of 3.17, while general poor vehicle maintenance followed at 3.05. The consistent scoring across all five categories, with standard deviations ranging from 0.89 to 0.92, indicates that the community views vehicle roadworthiness as a multi-faceted problem. Overall, the interpretation suggests that a substantial number of accidents in the municipality are attributed to preventable mechanical issues, emphasizing the need for stricter vehicle inspections and regular maintenance habits among motorists.

Table 14 Vehicle-Related Causes

Question	Weighted Mean	Standard Deviation
1. Overspeeding is a major cause of vehicular accidents in Balanga City.	3.27	0.92
2. Inadequate road signage and markings lead to vehicular accidents.	3.08	0.91
3. Insufficient street lighting increases accident occurrence at night.	3.25	0.90
4. Road congestion increases the likelihood of vehicular accidents.	2.99	0.89
5. Poor traffic management and road design contribute to accidents.	3.06	0.94

The data regarding road and environmental factors identifies overspeeding and insufficient street lighting as the primary contributors to vehicular accidents in Balanga City. Overspeeding earned the highest weighted mean of 3.27, indicating that respondents view excessive velocity as a critical danger on local thoroughfares. This is followed closely by insufficient street lighting at 3.25, which underscores a significant concern for nighttime road safety. The low standard deviations (0.92 and 0.90) suggest a strong level of agreement among the 300 respondents, highlighting that the combination of high speeds and poor visibility creates a high-risk environment for all road users.

Furthermore, the structural aspects of the road network are seen as significant secondary causes of accidents. Inadequate road signage and markings (3.08) and poor traffic management or road design (3.06) both received high ratings, suggesting that road users feel the physical layout and guidance systems of the city are lacking. Even road congestion, which received the lowest weighted mean of 2.99 in this category, remains a notable factor in the likelihood of collisions. With standard deviations remaining consistent across the board, the findings imply that the city's infrastructure and the enforcement of speed limits are viewed as essential areas for improvement to reduce the frequency of road mishaps.

The historical data provided by the Philippine National Police (PNP) showed a fluctuating trend in vehicular accidents in Balanga City over a four-year period from 2022 to 2025. The statistics revealed that the highest volume of incidents occurred in 2024, with a total of 41 recorded cases, whereas 2023 saw a significant dip to only 12 cases. Across all years, Reckless Imprudence Resulting in Damage to Property (RIR) consistently emerged as the most frequent type of accident, totaling 56 incidents or approximately 51% of the overall records. This was followed closely by RIR in Physical Injury with 43 cases, while RIR in Homicide remained the least frequent but most severe category with 11 cases over the four-year span.

Table 15 PNP Vehicular Accident Statistics Result

PNP VEHICULAR ACCIDENT STATISTICS RESULT					
Type of Accident	2022	2023	2024	2025	Total
RIR Homicide	2	2	4	3	11
RIR Physical Injury	16	4	16	7	43
RIR Damage to Property	18	6	21	11	56
Annual Total	32	12	41	21	110

The data indicated a high correlation between human error—specifically "reckless imprudence"—and road safety outcomes in the municipality. The surge in 2024 suggested an increase in road activity or a potential lapse in traffic enforcement during that year, while the decrease in 2025 to 21 cases implied that safety interventions or external factors might have successfully mitigated some risks. Notably, the fact that cases of property damage and physical injury outnumbered fatalities, aligned with the earlier findings in Table 2.4.5, which suggested that the majority of vehicular accidents in the area resulted in minor rather than major or fatal consequences.

This statistical overview was crucial for the study, as it validated the respondents' perceptions with documented law enforcement records. The recurring nature of reckless imprudence as the primary legal classification for these accidents strongly supported the findings in Section 3.1 regarding driver-related causes, such as overspeeding and aggressive driving. Consequently, these results provided a data-driven foundation for recommending a "zero-accident" roadmap for Balanga City, focusing on sustained enforcement and the continuous monitoring of high-risk periods to prevent the cyclical spikes in accidents observed in the 2022 and 2025 data.

Table 16 PNP Vehicular Incidents: Most Prevalent Barangay

PNP VEHICULAR INCIDENTS MOST PREVALENT BARANGAY			
2022		2023	
Tenejero	7	Ibayo	3
San Jose	5	Tenejero	2
Tuyo	3	Doña Francisca	2
Bagong Silang	3	Poblacion	2
Camacho	3		
Catanning	3		
Total	24		9
2024		2025	
Cupang Proper	7	Cupang Proper	9
Tenejero	5	Tuyo	4
Cabog-cabog	5	Doña Francisca	3
Tuyo	4	Total	16
San Jose	4		
Camacho	4		
Munting Batangas	4		
Total	33		

The longitudinal data indicated a significant and volatile fluctuation in vehicular incident frequencies within Balanga City over the four-year study period. In 2022, the city recorded a total of 24 incidents, which was followed by a marked decline to 9 incidents in 2023. However, this downward trend was reversed in the subsequent years, as figures climbed to 16 in 2024 and reached a peak of 33 incidents by 2025. This increase between 2023 and 2025 suggested that earlier safety interventions may have diminished in effectiveness or were superseded by external variables, such as increased vehicle density or shifts in post-pandemic mobility patterns. The data identified 2025 as a critical period of escalation that necessitated a rigorous re-evaluation of local traffic policies.

Geographically, the analysis identified Barangay Tenejero and Barangay Cupang Proper as the primary clusters for road-related risks. Tenejero exhibited a consistent presence as a high-risk area during the initial stages of the study, recording 7 incidents in 2022 and 5 in 2024, which was likely attributed to its status as a central commercial and transit hub. By 2024 and 2025, however, Cupang Proper emerged as the most prevalent site for incidents, recording 7 and 9 cases, respectively. This shift indicated that the concentration of vehicular risks migrated toward specific high-traffic corridors, suggesting that localized enforcement and infrastructure improvements became increasingly necessary in these evolving urban zones.

Furthermore, the diversification of incident locations in 2025 highlighted an expanding geographic scope of road safety hazards. While incidents in previous years were largely concentrated within a few select barangays, the 2025 data showed a wider distribution across seven distinct areas, including Munting Batangas, and Camacho. This dispersion implied that vehicular hazards were no longer confined to the urban core but had become a systemic issue affecting the city's peripheral regions. The recurring presence of Tuyoy and San Jose alongside the major hubs underscored the transition from isolated traffic concerns to a comprehensive, city-wide public safety challenge that required integrated administrative intervention.

CHAPTER FOUR

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This final chapter provides a synthesis of the entire study, beginning with a concise summary of the research findings, followed by the conclusions derived from the data analysis, and ending with actionable recommendations. The primary goal is to address the research problem identified in Chapter 1 by highlighting the most significant outcomes of the investigation. Furthermore, this chapter outlines suggestions for future research and practical applications aimed at motor vehicle accidents occurring on the highways and major roads of the City of Balanga, Bataan, within the timeframe of 2024 to 2025 based on the insights gained throughout the study.

➤ *Summary*

The demographic analysis indicated a significant concentration of young adults aged 18–25, who accounted for 62.3% of the sample, with a predominantly male distribution (68%). Regarding modal split, motorcycle riders constituted the primary respondent group at 44.87%, followed by private vehicle and tricycle operators. These data points suggest that motorcycles serve as the principal mode of transit within the study's demographic. Patterns of road exposure revealed that 41% of respondents utilize the road network daily, with a majority (52.3%) traveling during midday hours, pointing toward peak traffic density during the daytime. Although 90.3% of participants reported no accident involvement within the preceding two years, the 9.7% who did encounter such events underscore a persistent risk in the region. Furthermore, while 55.67% remained accident-free throughout their driving history, 44.33% had experienced at least one incident, with instances of recidivism highlighting repeated exposure to hazardous road conditions. Finally, the high visibility of road trauma was evidenced by the 76.7% of respondents who had witnessed accidents, many of whom observed these occurrences frequently, confirming that vehicular incidents are a recurring and visible public safety concern within the city.

➤ *Conclusion*

The research identifies young male motorists, particularly motorcycle riders, as the primary demographic of road users in Balanga City, which consequently places them at a higher level of exposure to traffic hazards. This finding is supported by the high frequency of daily road usage among respondents, lending significant credibility to the data through their consistent, firsthand experience of the local environment. While the majority of participants have not been involved in recent collisions, the 9.7% who reported recent accidents, alongside the fact that nearly half of all respondents have experienced a crash at some point, confirms that road safety remains a persistent and unresolved issue in the area. These results effectively strengthen the hypothesis that vehicular accidents in Balanga City are not isolated events but are systemic occurrences linked to high-volume traffic periods. The frequent observation of accidents by over three-quarters of the sample, particularly during peak midday hours, reinforces the connection between traffic density and road risk. Ultimately, the data indicates that structural factors such as heavy congestion, driver behavior, and the physical condition of the roads are the primary contributors to these incidents, exerting a more significant influence than environmental visibility factors.

➤ *Recommendation*

To address the systemic road safety challenges identified in Balanga City, the local government should adopt a comprehensive and cost-efficient infrastructure strategy centered on the development of a proactive “Smart-Safe Corridor” framework. Rather than relying solely on traditional static road signage, the city should transition toward technology-driven traffic management systems that can actively monitor, predict, and respond to road hazards in real time. A key component of this initiative is the implementation of the Dynamic AI-Integrated Smart Signage and Incident Response System (DISS), which utilizes artificial intelligence (AI), LiDAR sensors, and real-time traffic analytics to detect speeding vehicles, congestion build-up, pedestrian movement, and potential collision risks. Through dynamic LED warning interfaces strategically installed along major roads and highways, motorists can receive immediate predictive warnings regarding hazardous conditions, sudden traffic slowdowns, or accident-prone zones. This real-time communication system can significantly improve driver awareness and reaction time, thereby reducing the likelihood of road accidents and traffic-related injuries.

Moreover, the city should complement these advanced technologies with practical and low-cost tactical urbanism interventions designed to improve road visibility and traffic organization. High-visibility motorcycle “filter boxes” may be painted at intersections to provide designated stopping spaces for motorcycles during traffic signals, reducing lane splitting and side-impact collisions. In addition, solar-powered intelligent road studs and illuminated lane markers can be installed along poorly lit roads, pedestrian crossings, and curved sections of highways to improve nighttime visibility and guide motorists safely. The establishment of “Virtual Safety Corridors” equipped with acoustic speed alerts and automated warning systems can further discourage overspeeding in high-risk areas such as schools, markets, hospitals, and residential communities. These interventions not only enhance safety for motorists and pedestrians but also provide sustainable and energy-efficient solutions suitable for long-term urban development.

Furthermore, successful implementation of the Smart-Safe Corridor framework will require strong collaboration among local government agencies, traffic management offices, academic institutions, technology developers, and community stakeholders. The city government may establish a centralized traffic monitoring and incident response center responsible for analyzing collected road

data, coordinating emergency response operations, and evaluating traffic behavior trends. Public awareness campaigns and driver education programs should also be integrated into the initiative to familiarize motorists with the purpose and proper interpretation of dynamic traffic systems and smart warning devices. By combining innovative technology, sustainable infrastructure, and evidence-based traffic management strategies, Balanga City can develop a self-regulating transportation environment that proactively prevents accidents, improves mobility, and serves as a scalable model for smart road safety initiatives across the Philippines.

- *SoP 1 Demographic Profile*

Based on the findings under Statement of the Problem 1, which classifies respondents according to age, gender, type of road user, vehicle type, and frequency of travel on municipal roads, it is recommended that the Department of Education and local educational institutions in Balanga City implement a comprehensive School-Based Road Safety Education Program tailored to the varying characteristics and experiences of road users. Since the respondents represent diverse demographic groups with different travel behaviors and transportation modes, road safety education should be integrated into school activities and learning modules to ensure that students develop responsible road habits at an early age. The program may include age-appropriate discussions on pedestrian safety, responsible commuting, traffic signs and regulations, motorcycle and bicycle awareness, and defensive driving principles for senior high school and college students who are nearing driving age. By addressing the unique needs of different age groups and road user profiles, schools can contribute to building a culture of road discipline and safety consciousness among future motorists and commuters.

Moreover, schools should establish regular experiential and community-based activities that reinforce practical road safety knowledge and awareness. In partnership with the Land Transportation Office, local traffic management offices, and parent-teacher associations, institutions may conduct seminars, road safety simulations, traffic sign recognition workshops, and “Safe Travel Week” campaigns. Programs such as supervised pedestrian drills, bicycle safety training, and orientation sessions for public transportation users can help students better understand real-life road situations and risks associated with frequent travel on municipal roads. Gender-sensitive approaches should also be considered to ensure that both male and female students are equally informed and empowered to practice safe road behavior regardless of their mode of transportation. These activities can strengthen students’ awareness of their responsibilities as pedestrians, passengers, cyclists, or future drivers within the community.

Furthermore, the implementation of the program should include continuous monitoring, evaluation, and community participation to ensure its sustainability and effectiveness. Schools may establish Road Safety Clubs or Youth Traffic Volunteer groups that will assist in promoting safe travel practices within campuses and nearby communities. Teachers and guidance counselors may also integrate discussions on road discipline, civic responsibility, and accident prevention into classroom instruction and student development programs. Through coordinated educational initiatives, active stakeholder involvement, and consistent awareness campaigns, the school sector can play a significant role in shaping informed, disciplined, and safety-conscious road users who can contribute to reducing traffic accidents and promoting safer municipal roads in Balanga City.

- *SoP 2.1 Number of Accidents within the Last 2 Years (2024-2025)*

To further address the number of road accidents recorded within the last two years (2024–2025), the City Peace and Order Office should strengthen its road safety initiatives through the installation of solar-powered streetlights and visible “accident-prone area” hazard markers along the Roman Superhighway. Although the respondents reported the lowest weighted mean of 2.30 for personally witnessing accidents on-site, the findings still indicate that road incidents remain a concern among commuters and motorists. Improved lighting systems can significantly enhance nighttime visibility, especially in dimly lit sections of the highway, while strategically placed warning signs can alert drivers to hazardous curves, intersections, or high-risk zones. These measures can help motorists become more cautious, reduce speeding tendencies, and improve reaction time, thereby minimizing the likelihood of accidents.

In addition, the CPAOO may coordinate with local government units, traffic management offices, and barangay officials to conduct regular road safety inspections and monitoring activities along the highway. Periodic assessment of accident-prone areas can help identify damaged road surfaces, inadequate signage, or obstructed visibility that may contribute to vehicular incidents. The office may also establish a reporting and response mechanism where commuters and residents can easily report unsafe road conditions for immediate action. Through collaborative monitoring and timely interventions, authorities can ensure that preventive measures remain effective and responsive to the changing traffic conditions within the area.

Furthermore, public awareness campaigns should be intensified to educate motorists, commuters, and pedestrians regarding road safety practices and traffic regulations. Information drives, seminars, and the distribution of educational materials can encourage responsible driving behavior, particularly on busy highways such as the Roman Superhighway. The CPAOO may also partner with schools, transport groups, and community organizations to promote defensive driving, proper pedestrian crossing, and adherence to speed limits. By combining infrastructure improvements with consistent public education and enforcement efforts, the city can create a safer transportation environment and further reduce the occurrence of road accidents in the coming years.

- *Location of Road Accidents*

In response to the findings under Statement of the Problem 2.2 regarding the location of road accidents, the Sangguniang Panlungsod should enact and strictly implement an ordinance that standardizes the technical specifications of speed humps installed within barangays and residential roads. Although residential roads obtained the lowest weighted mean of 2.09, indicating fewer accident occurrences compared to other locations, the presence of unregulated or improvised speed bumps may still pose risks to motorists, particularly motorcycle riders. Establishing clear standards for the height, width, curvature, spacing, and paint visibility of speed humps can help ensure that these traffic calming devices effectively reduce vehicle speed without creating unnecessary hazards for road users. Standardized road safety infrastructure can contribute to maintaining the low incidence of accidents in residential areas while promoting safer and more organized traffic flow.

Moreover, the local government should conduct regular inspections and evaluations of existing speed humps and road obstructions within barangays to ensure compliance with approved engineering standards. Barangay officials, in coordination with the city engineering office and traffic management authorities, may identify and remove unsafe or unauthorized “DIY” speed bumps that fail to meet safety requirements. Proper reflectorized paint, warning signs, and advance lane markings should also be installed to improve visibility, especially during nighttime or adverse weather conditions. Through consistent monitoring and enforcement, the city can prevent road users from encountering sudden or poorly designed obstructions that may lead to vehicular accidents or loss of control among motorcycle riders.

Furthermore, community awareness and participation should be encouraged to support the successful implementation of the ordinance. The Sangguniang Panlungsod may organize consultations, seminars, and information campaigns to educate barangay officials and residents about the importance of standardized traffic calming measures and proper road safety practices. Residents should also be discouraged from independently constructing unauthorized speed humps without approval from local authorities or traffic engineers. By combining policy enforcement, infrastructure regulation, and public cooperation, the city can sustain the safety of residential roads and create a more secure environment for motorists, pedestrians, and commuters alike.

- *Time and Season of Occurrence*

In response to the findings under Statement of the Problem 2.3 regarding the time and season of road accident occurrences, the Balanga City Police Station, in coordination with the Land Transportation Office, should institutionalize the implementation of “Oplan Biyaheng Ligas” checkpoints during weekends, long holidays, and peak travel seasons. Although accidents occurring during weekends and holidays obtained the lowest weighted mean of 2.62, the findings still suggest the continued presence of risks associated with increased travel activity, festive celebrations, and driver complacency during these periods. Establishing regular checkpoint operations focused on sobriety testing, driver’s license verification, and vehicle inspections can help deter motorists from engaging in unsafe driving practices such as driving under the influence (DUI), reckless driving, and operating vehicles without proper documentation. These proactive measures can strengthen public discipline and contribute to sustaining or further reducing accident occurrences during high-travel periods.

Moreover, the concerned agencies should intensify traffic visibility and law enforcement operations along major roads and highways during holidays and weekends when vehicle volume significantly increases. Strategic deployment of police personnel and traffic enforcers in accident-prone areas, transportation terminals, and major intersections can improve traffic management and facilitate immediate response during emergencies. Mobile patrol units and temporary assistance desks may also be established to assist motorists, monitor traffic conditions, and ensure compliance with road safety regulations. By maintaining a strong enforcement presence, authorities can discourage violations such as overspeeding, distracted driving, and drunk driving, which are common contributing factors to road accidents during celebratory occasions and vacation periods.

Furthermore, public education campaigns should complement these enforcement initiatives to cultivate responsible driving behavior among motorists and commuters. The Balanga City Police Station and the LTO may conduct information drives through social media platforms, local radio broadcasts, schools, and transport organizations to promote safe driving practices before and during holidays. Educational materials emphasizing the dangers of DUI, fatigue driving, and non-compliance with traffic regulations can increase public awareness and encourage road users to prioritize safety. Through a combination of consistent checkpoint operations, visible law enforcement, and sustained public awareness efforts, the city can preserve the relatively low frequency of road accidents during weekends and holidays while ensuring safer travel conditions for the public.

- *Type of Accident*

In response to the findings under Statement of the Problem 2.4, the local government of Balanga City should continue strengthening pedestrian safety programs and infrastructure to sustain the low frequency of vehicle-to-pedestrian accidents, which obtained the lowest weighted mean of 2.29. Although the result suggests that existing pedestrian safety measures such as footbridges, painted crossings, and designated walkways are relatively effective, increasing traffic volume and urban activity may still expose pedestrians to future risks. To prevent a rise in pedestrian-related accidents, the city should prioritize the installation of high-visibility pedestrian signals and clearly marked “Zebra Crossings” equipped with solar-powered warning lights, particularly in areas with heavy pedestrian activity such as schools, public markets, transport terminals, and commercial zones. These enhancements can

improve driver awareness and encourage motorists to slow down and yield to pedestrians, especially during nighttime and low-visibility conditions.

Moreover, the city government, in coordination with traffic management offices and barangay officials, should regularly inspect and maintain pedestrian facilities to ensure their functionality and visibility. Faded road markings, malfunctioning pedestrian signals, and obstructed sidewalks may reduce the effectiveness of existing safety measures and increase the vulnerability of pedestrians. Routine maintenance activities such as repainting zebra crossings, trimming roadside obstructions, and repairing damaged walkways should therefore be institutionalized. In addition, traffic enforcers may be strategically assigned near schools and market areas during peak hours to assist pedestrians in safely crossing busy roads and to monitor driver compliance with pedestrian right-of-way regulations. Through consistent maintenance and enforcement, the city can preserve the effectiveness of its pedestrian protection initiatives.

Furthermore, public awareness and road safety education programs should be continuously implemented to promote shared responsibility among motorists and pedestrians. The city may conduct seminars, school-based orientations, and community campaigns emphasizing the importance of pedestrian discipline, proper use of crossing lanes, and adherence to traffic rules. Drivers should also be reminded of the legal and ethical responsibility to prioritize pedestrian safety, particularly in designated crossing areas. By combining infrastructure improvement, strict enforcement, and continuous public education, the city can maintain the low occurrence of vehicle-to-pedestrian accidents and create a safer and more pedestrian-friendly urban environment despite the anticipated growth in vehicular traffic.

- *Driver-Related Causes*

In response to the findings under Statement of the Problem 3.1, the Balanga ICT Council should initiate and sustain a comprehensive “Road Courtesy Campaign” aimed at promoting responsible and defensive driving behavior among motorists. Although Reckless or Aggressive Driving obtained the lowest weighted mean of 3.06, the result still indicates that experiences involving road rage, unsafe overtaking, tailgating, and other aggressive driving behaviors continue to occur among road users. Through the use of social media platforms, digital advertisements, radio announcements, and strategically placed billboards along major roads, the campaign can effectively raise awareness about the importance of patience, discipline, and mutual respect while driving. Promoting positive driving attitudes may help reduce impulsive behaviors that often escalate into traffic conflicts and high-speed collisions.

Moreover, the campaign should incorporate educational programs and community engagement activities that emphasize the consequences of aggressive driving on public safety. The Balanga ICT Council, in coordination with local traffic management offices and schools, may organize seminars, webinars, and information drives highlighting defensive driving techniques, emotional self-control, and proper road etiquette. Testimonials from accident survivors, law enforcement officers, and road safety advocates may also strengthen public understanding of the serious physical, emotional, and financial impacts of reckless driving. By encouraging motorists to adopt calm and responsible driving habits, the city can cultivate a safer and more cooperative road environment for both drivers and pedestrians.

Furthermore, the local government should complement awareness initiatives with stronger traffic law enforcement and monitoring systems to discourage aggressive driving practices. Traffic authorities may increase surveillance in high-risk areas through the installation of traffic cameras and the conduct of regular patrol operations to identify violations such as overspeeding, illegal overtaking, and reckless maneuvering. Visible enforcement efforts, together with public education campaigns, can reinforce accountability among motorists and encourage compliance with traffic regulations. Through the combined efforts of digital advocacy, community education, and strict enforcement, the city can effectively minimize aggressive driving behaviors and reduce the likelihood of accidents caused by driver hostility and impatience.

- *Vehicle-Related Causes*

In response to the findings under Statement of the Problem 3.2 regarding vehicle-related causes of road accidents, the local transport cooperatives and barangay councils in Balanga City should organize regular “Free Vehicle Health Check” programs to promote preventive vehicle maintenance among motorists. Although poor general maintenance obtained the lowest weighted mean of 3.05, it remains a significant underlying factor contributing to mechanical failures such as defective brakes, worn-out tires, malfunctioning lights, and engine problems that may eventually lead to road accidents. Through these community-based initiatives, vehicle owners and public utility vehicle (PUV) drivers can gain access to free or affordable basic inspections, including brake fluid checks, tire pressure assessments, oil changes, battery testing, and light functionality inspections. Encouraging routine vehicle maintenance can help identify potential mechanical issues early and reduce the likelihood of accidents caused by equipment failure.

Moreover, these vehicle health check events may strengthen collaboration among local government units, transport groups, automotive service providers, and traffic management agencies in advancing road safety initiatives. Accredited mechanics and automotive technicians may be invited to provide technical assistance, safety recommendations, and demonstrations on proper vehicle care and maintenance practices. Informational materials and seminars may also be conducted to educate drivers about the importance of regular inspections, timely replacement of defective parts, and compliance with vehicle safety standards mandated

by transportation authorities. By increasing awareness and accessibility to maintenance services, the city can cultivate a culture of responsibility and accountability among motorists and transport operators.

Furthermore, the city government may institutionalize these activities through periodic implementation schedules and partnerships with private automotive businesses and vocational institutions. Incentive programs, such as discounted repair services or recognition for well-maintained public utility vehicles, may also encourage greater participation among drivers and operators. In addition, barangay councils can establish localized monitoring mechanisms to ensure that vehicles operating within their communities meet minimum roadworthiness standards. Through consistent preventive maintenance programs, public education, and collaborative community efforts, the city can minimize vehicle-related mechanical failures and further improve the overall safety and reliability of road transportation systems.

- *Road-Related Causes*

In response to the findings under Statement of the Problem 3.3 regarding road-related causes of accidents, the local government of Balanga City should implement a comprehensive “Clearway Policy” along major municipal roads during peak traffic hours, particularly from 6:00 AM to 9:00 AM and 5:00 PM to 8:00 PM. Although road congestion obtained the lowest weighted mean of 2.99, it remains a significant contributing factor to traffic disruptions and vehicular accidents, especially during rush hours when road volume substantially increases. By prohibiting on-road parking, illegal loading and unloading, and unauthorized roadside obstructions in non-designated areas, the city can improve traffic circulation and reduce the frequent “stop-and-go” movements that commonly lead to rear-end collisions and driver frustration. A more organized traffic flow can also enhance travel efficiency and minimize delays for both public and private motorists.

Moreover, the successful implementation of the Clearway Policy will require strong coordination among traffic management offices, law enforcement agencies, transport groups, and barangay officials. Clear signage indicating designated loading and unloading zones, parking restrictions, and clearway schedules should be installed in strategic locations to properly inform motorists and commuters. Traffic enforcers should also be deployed consistently during peak hours to monitor compliance, apprehend violators, and assist in maintaining smooth vehicle movement along congested roads. In addition, alternative parking spaces and designated transport stops may be established to provide practical solutions for drivers and public utility vehicle operators affected by the restrictions. Through effective enforcement and proper infrastructure support, the city can ensure that the policy remains efficient, fair, and sustainable.

Furthermore, public awareness campaigns should accompany the implementation of the policy to encourage cooperation and understanding among road users. The city government may utilize social media platforms, local radio announcements, public consultations, and community information drives to educate motorists, business owners, and commuters regarding the objectives and benefits of the Clearway Policy. Emphasizing the connection between traffic congestion, unsafe driving conditions, and accident risks may encourage greater compliance from the public. By combining policy enforcement, traffic management improvements, and sustained public education, the city can reduce congestion-related accidents, improve mobility within urban areas, and promote a safer and more orderly transportation environment for all road users.

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APPENDIX

LETTER OF VALIDATION

Dear Dr. Layug:

The researchers, currently enrolled in the Bachelor of Science in Criminology program of Asia Pacific College of Advanced Studies, Inc., respectfully request the validation of the research instrument for the study entitled “Rates of Vehicular Accidents on Highways and Roads in the City of Balanga, Bataan: A Comprehensive Study on Accident Causes and Investigation Findings.”

The primary purpose of this study is to determine the rates, causes, and investigation findings of vehicular accidents occurring on the highways and municipal roads of Balanga City, Bataan. In line with this, the researchers developed a survey questionnaire and data-gathering instrument intended to collect reliable and relevant information from the respondents and concerned agencies.

In this regard, the researchers humbly seek your expertise, professional evaluation, and recommendations to validate the content, clarity, relevance, and reliability of the research instrument. Your comments and suggestions will greatly contribute to the improvement and accuracy of the study.

The researchers are hoping for your favorable response and continuous support for the successful completion of this research.

Thank you for your time and consideration. We look forward to your favorable response.

Respectfully yours, Macapagal, Alexis James A.

Soriano, Alexis Kent C.

Menor, John Michael L.

Zulueta, Jose Jr. D.

Bataanon, Edrian C.

Ymas, Jay Ivan C.

Baluyot, Aira G.

Rom, Aljohn A.

Researchers

Noted by:

Dr. Anjanette R. Layug, RCrim

Dean, College of Criminal Justice Education

FOR: PLTCOL VICTOR A. CACDAC

CHIEF OF PNP

BALANGA CITY POLICE STATION

BALANGA CITY, BATAAN

DATE: JANUARY 30, 2026

FROM: JAY IVAN C. YMAS

RE: REQUEST FOR DATA GATHERING ON RATES OF VEHICULAR ACCIDENTS ON HIGHWAYS AND ROADS IN THE BALANGA CITY, BATAAN

Dear Sir,

We, the criminology students from the Asia Pacific College of Advanced Studies, Inc. (APCAS), are conducting a research paper on the "Rates of Vehicular Accidents on Highways and Roads in the City of Balanga, Bataan: A

Comprehensive Study on Accident Causes and Investigation Findings."

With this, we are writing to respectfully request permission to gather data, particularly the statistical data of vehicular accidents that happen in Balanga City, Bataan, from 2022 to 2024. We recognize the sensitivity of this matter and assure you that all information collected will be treated with the highest level of confidentiality and utilized solely for academic purposes.

Thank you for your time and consideration. We look forward to your favorable response.

Respectfully yours,

Jay Ivan C. Ymas
Student Researcher

Jose Jr. D. Zulueta
Student Researcher

Noted by:

Dr. Anjanette R. Layug, RCrim

Dean, College of Criminal Justice Education
Informed Consent Form

Dear respondents:

Please read the following before signing the assent form:

Primary Researcher: **Jay Ivan C. Ymas**

Co-investigator and members: Alexis James A. Macapagal, John Michael L. Menor, Alexis Kent C. Soriano, Edrian C. Bataanon, Jose Jr. D. Zulueta, Aira G. Baluyot, Aljohn A. Rom

➤ *Name of Project:*

“Rates of Vehicular Accidents on Highways and Roads in the City of Balanga Bataan: A Comprehensive Study on Accident Causes and Investigation Findings”

➤ *Introduction:*

You are invited to participate in a research study on “Rates of Vehicular Accidents on Highways and Roads in the City of Balanga, Bataan: A Comprehensive Study on Accident Causes and Investigation Findings.” You will be asked to answer an online questionnaire, which takes about 5-10 minutes to answer. Indication of your names will be optional, but a tracking number is placed in each questionnaire. You don’t have to decide today whether or not you will participate in the research. For any questions or concerns regarding this research, please feel free to contact the researcher, Jay Ivan C. Ymas, Contact No. 0949-832-8279, E-mail jjcymas11@gmail.com.

➤ *Purpose of the Research:*

This study aims to assess the level of awareness and perceptions of motorists and road users regarding traffic safety and accident prevention. The findings of this research are intended to provide reliable data that may assist local government units, traffic authorities, policymakers, commuters, and drivers in developing effective road safety programs, traffic management strategies, and preventive measures to reduce vehicular accidents and enhance public safety in Balanga City, Bataan.

➤ *Type of Research Intervention:*

In this research, you will be asked to answer a questionnaire regarding experiences as a driver or a type of road user that uses the roads and highways in Balanga City, Bataan, in addressing the rates and causes of vehicular incidents, which takes about 5-10 minutes to answer.

➤ *Participant Selection:*

You are invited to take part in this study because you are a civilian road user in the City of Balanga, Bataan. This includes drivers, motorcycle riders, commuters, and pedestrians who regularly use the city’s highways and roads.

➤ *Voluntary Participation:*

If you have read this form and have decided to participate in this project, please understand your participation is voluntary, and you have the right to withdraw your consent or discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled. The results of this research study may be presented at scientific or professional meetings or published in scientific journals.

However, your identity will not be disclosed.

➤ *Procedures:*

You will be asked to fill out an online survey, which will be provided and collected by the researcher. If you do not wish to answer, you may skip them and move on to the next question. The researcher will not force you to completely answer the questionnaire. The information that will be gathered from this research will be kept confidential, meaning your name will be optional, but a tracking number will be printed on the questionnaire to identify you. No one else except the researcher will have access to your questionnaire and its content.

➤ *Risk or Discomforts of Participating:*

There are no foreseeable risks in participating in this survey. The benefit that may reasonably be expected to result from this survey is the identification. Your decision of whether or not to participate in this study will also not affect the study.

➤ *Benefits of Participating:*

The results of this investigation may lead to the creation of culturally relevant remedies and techniques meant to improve the security and general welfare of the native community.

➤ *Time Involvement:*

Your participation in filling out the questionnaire will take approximately 5-10 minutes.

➤ *Payments:*

You will not receive any amount as payment for your participation, but your participation will help cultural advocates and groups that support and promote the rights and welfare of the Balanga City of Bataan.

➤ *Confidentiality:*

We assure you that the data I will be getting from you will remain confidential. Any individual information will be kept secret unless otherwise specified by the respondent.

➤ *Anonymity:*

Please be assured that your identity will remain anonymous. I will not be using your name in any of the documents I will be getting from you; rather, I will be giving a number code that will represent you.

➤ *Sharing the Results:*

Nothing that will be indicated in the questionnaires will be shared with anybody outside the research team, and nothing will be attributed to you by name. The data that we will gather from this research will be shared with you. Each participant will receive a summary of the results.

Right to Refuse or Withdraw:

Choosing to participate in this research is at your discretion. You may stop taking part in the completion of the questionnaire at any time that you wish. You have the right to withdraw from participating anytime that you don't feel comfortable.

- WHO to Contact: Jay Ivan C. Ymas
- Contact Information: 0949-832-8279

Questions, Concerns, or Complaints: If you have any questions, concerns, or complaints about this research study, its procedures, risks, and benefits, you should ask the research promoters, Jay Ivan C. Ymas. You may contact him now or later at jjcymas11@gmail.com

This proposal has been reviewed and approved by the APCAS—Research Ethics Committee, which is a committee whose task is to make sure that research participants are protected from harm. If you wish to find out more about the school research committee, contact Dr. Anjanette R. Layug, RCrim, chairman of the research committee of APCAS.

➤ *Statement of the Problem (SOP):*

The purpose of this study was to ascertain the prevalence of car accidents on highways and roads caused by unfixed roadways. To answer the above-cited problem, answers to the following questions will be sought:

- *How may the Profile of the Respondents be Classified in Terms of: 1.1 Age*
 - ✓ Gender
 - ✓ Type of road user
 - ✓ Vehicle type
 - ✓ Frequency of travel on municipal roads
- *How may the Rates of Vehicular Accidents in the Municipality be Described in Terms of:*
 - ✓ Number of accidents within the last 2 years
 - ✓ Location of road accidents
 - ✓ Time and season of occurrence
 - ✓ Type of accident
- *What are the causes of Vehicular Accidents in the City of Balanga as Revealed by Accident Reports and Findings of Investigations in Terms of:*
 - ✓ Driver-related causes
 - ✓ Vehicle-related causes
 - ✓ Road-related causes

• *What Recommendations can be Proposed Based on the Result of the Study?*

➤ *Quantitative Online Survey Questionnaire:*

• Questionnaire for Research Study: Vehicular Accidents in Balanga, Bataan

➤ *Statement of the Problem*

• *Section 1: How may the profile of the respondents be classified in terms of:*

✓ *Age:*

(*Edad*)

- Below 18
- 18–25
- 26–35
- 36–45
- 46–55
- 56 and above

✓ *Sex:*

(*Kasarian*)

- Male
- Female

✓ *Type of Road User:*

(*Uri ng gumagamit ng kalsada*)

- Pedestrian
- Bicycle rider
- Motorcycle rider
- Tricycle driver
- Private car driver
- Public utility vehicle (PUV) driver

(e.g., jeepney, bus, taxi)

- Truck / Delivery vehicle driver

✓ *How Often do you use Highways/Roads in Balanga Bataan?*

(*Gaano ka kadalag gumagamit ng mga highway/kalsada sa Balanga Bataan?*)

- Daily
- 4–6 times a week
- 2–3 times a week
- Once a week
- Rarely

✓ *Time you Most Often use the Road:*

(*Oras na madalas mong gamitin ang kalsada*)

- Morning (5:00 AM – 9:00 AM)
- Midday (9:01 AM – 4:00 PM)
- Evening (4:01 PM – 9:00 PM)
- Late night (9:01 PM – 4:59 AM)

✓ *Have you been Involved in a Vehicular Accident in Balanga City within the Last 2 Years?*

(Nasangkot ka ba sa isang aksidente sa sasakyan sa Balanga City sa loob ng nakaraang 2 taon?)

- Yes
- No

✓ *How many Vehicular Accidents have you Personally Experienced?*

(Ilang aksidente sa sasakyan ang personal mong naranasan?)

- None
- 1
- 2
- 3
- 4 or more

• *Section 2: How may the Rates of Vehicular Accidents in the Municipality be Described in Terms of:*

✓ *Scale:*

- Never
- Rarely
- Often
- Very Often

1. Number of Accidents Within the Last 2 Years					
No.	Statement	1	2	3	4
1.	How often have you witnessed a vehicular accident on highways or roads in Balanga City within the last two (2) years? (Gaano ka kadalas nakasaksi ng aksidente sa sasakyan sa mga highway o kalsada sa Lungsod ng Balanga sa loob ng nakaraang dalawang (2) taon?)	☐	☐	☐	☐
2.	How often do you hear or see reports of vehicular accidents in Balanga City within the last two (2) years? (Gaano kadalas mo naririnig o nakikita ang mga ulat ng mga aksidente sa sasakyan sa Lungsod ng Balanga sa loob ng nakaraang dalawang (2) taon?)	☐	☐	☐	☐
3.	How often do vehicular accidents involve private cars within the last two (2) years? (Gaano kadalas kinasasangkutan ng mga aksidente sa sasakyan ang mga pribadong sasakyan sa loob ng huling dalawang (2) taon?)	☐	☐	☐	☐
4.	How often do vehicular accidents involve public utility vehicles (e.g., jeepneys, tricycles, buses) within the last two (2) years? (Gaano kadalas kinasasangkutan ng mga aksidente sa sasakyan ang mga pampublikong sasakyan (hal., jeepney, tricycle, bus) sa loob ng huling dalawang (2) taon?)	☐	☐	☐	☐
5.	Based on your observation, how often do vehicular accidents happen on major highways in Balanga City within the last two (2) years? (Batay sa iyong obserbasyon, gaano kadalas nangyayari ang mga aksidente sa sasakyan sa mga pangunahing highway sa Lungsod ng Balanga sa loob ng nakaraang dalawang (2) taon?)	☐	☐	☐	☐

✓ Scale:

- Never
- Rarely
- Often
- Very Often

2. Location of Road Accidents					
No.	Statement	1	2	3	4
1.	Vehicular accidents occur on highways in Balanga City. (Ang mga aksidente sa sasakyan ay nangyayari sa mga highway sa Balanga City.)	☐	☐	☐	☐
2.	Vehicular accidents occur on municipal or city roads. (Ang mga aksidente sa sasakyan ay nangyayari sa mga kalsada sa munisipyo o lungsod.)	☐	☐	☐	☐
3.	Vehicular accidents occur at intersections. (Ang mga aksidente sa sasakyan ay nangyayari sa mga intersection.)	☐	☐	☐	☐
4.	Vehicular accidents occur on residential roads. (Ang mga aksidente sa sasakyan ay nangyayari sa mga kalsada ng tirahan.)	☐	☐	☐	☐
5.	Vehicular accidents occur in commercial areas (e.g., markets, schools, malls). (Ang mga aksidente sa sasakyan ay nangyayari sa mga komersyal na lugar {hal., mga pamilihan, paaralan, mall}.)	☐	☐	☐	☐

✓ Scale:

- Never
- Rarely
- Often
- Very Often

3. Time and Season of Occurrence					
No.	Statement	1	2	3	4
1.	Vehicular accidents in the municipality frequently occur during peak traffic hours (morning and evening rush hours). (<i>Ang mga aksidente sa sasakyan sa munisipyo ay madalas na nangyayari sa mga oras ng matinding trapiko (umaga at gabi ng rush hours).</i>)	☐	☐	☐	☐
2.	Vehicular accidents are more likely to occur at night compared to daytime hours. (<i>Ang mga aksidente sa sasakyan ay mas malamang na mangyari sa gabi kumpara sa mga oras ng araw.</i>)	☐	☐	☐	☐
3.	Vehicular accidents are more likely during the rainy season. (<i>Ang mga aksidente sa sasakyan ay mas malamang sa panahon ng tag-ulan.</i>)	☐	☐	☐	☐
4.	Vehicular accidents are more frequent during weekends and holidays. (<i>Mas madalas ang mga aksidente sa sasakyan tuwing weekend at holidays.</i>)	☐	☐	☐	☐
5.	Vehicular accidents increase during extreme weather conditions such as typhoons or heavy rainfall. (<i>Tumataas ang mga aksidente sa sasakyan sa panahon ng matinding lagay ng panahon tulad ng mga bagyo o malakas na pag-ulan.</i>)	☐	☐	☐	☐

✓ Scale:

- Never
- Rarely
- Often
- Very Often

4. Type of Accident					
No.	Statement	1	2	3	4
1.	Vehicle-to-vehicle collisions are the most frequent type of accident. (<i>Ang mga banggaan ng sasakyan sa sasakyan ay ang pinakamadalas na uri ng aksidente.</i>)	☐	☐	☐	☐
2.	Vehicle-to-pedestrian accidents frequently occur in Balanga City. (<i>Ang mga aksidente sa sasakyan patungo sa pedestrian ay madalas na nangyayari sa Lungsod ng Balanga.</i>)	☐	☐	☐	☐
3.	Motorcycle-related accidents are frequent. (<i>Ang mga aksidenteng nauugnay sa motorsiklo ay madalas.</i>)	☐	☐	☐	☐
4.	Single-vehicle accidents (e.g., skidding, hitting objects) occur frequently. (<i>Ang mga aksidente sa isang sasakyan (hal., pag-skidding, pagtama ng mga bagay) ay madalas na nangyayari.</i>)	☐	☐	☐	☐
5.	Most vehicular accidents result in minor injuries rather than major ones. (<i>Karamihan sa mga aksidente sa sasakyan ay nagreresulta sa mga maliliit na pinsala kaysa sa mga malalaking pinsala.</i>)	☐	☐	☐	☐

- Section 3: What are the causes of Vehicular Accidents in the City of Balanga as Revealed by Accident Reports and Findings of Investigations in Terms of:

✓ Scale:

- Strongly Disagree
- Disagree
- Agree
- Strongly Agree

1. Driver-Related Causes					
No.	Statement	1	2	3	4
1.	Overspeeding is a major cause of vehicular accidents in Balanga City. <i>(Ang overspeeding ay isang pangunahing sanhi ng mga aksidente sa sasakyan sa Balanga City.)</i>	☐	☐	☐	☐
2.	Reckless or aggressive driving contributes significantly to road accidents. <i>(Malaki ang naitutulong ng walang ingat o agresibong pagmamaneho sa mga aksidente sa kalsada.)</i>	☐	☐	☐	☐
3.	Driving under the influence of alcohol or drugs leads to vehicular accidents. <i>(Ang pagmamaneho sa ilalim ng impluwensya ng alkohol o droga ay humahantong sa mga aksidente sa sasakyan.)</i>	☐	☐	☐	☐
4.	Driver fatigue or drowsiness causes accidents, especially during long trips. <i>(Ang pagod o antok sa pagmamaneho ay nagdudulot ng mga aksidente, lalo na sa mahabang biyahe.)</i>	☐	☐	☐	☐
5.	Failure to follow traffic rules and regulations results in road accidents. <i>(Ang hindi pagsunod sa mga patakaran at regulasyon sa trapiko ay nagreresulta sa mga aksidente sa kalsada.)</i>	☐	☐	☐	☐

✓ Scale:

- Never
- Rarely
- Often
- Very Often

2. Vehicle-Related Causes					
No.	Statement	1	2	3	4
1.	Poor vehicle maintenance contributes to vehicular accidents. <i>(Ang hindi magandang pagpapanatili ng sasakyan ay nakakatulong sa mga aksidente sa sasakyan.)</i>	☐	☐	☐	☐
2.	Brake failure is a common cause of road accidents. <i>(Ang pagkabigo ng preno ay karaniwang sanhi ng mga aksidente sa kalsada.)</i>	☐	☐	☐	☐
3.	Tire defects (e.g., worn-out tires) increase the risk of accidents. <i>(Ang mga depekto sa gulong (hal., mga sira-sirang gulong) ay nagpapataas ng panganib ng mga aksidente.)</i>	☐	☐	☐	☐
4.	Malfunctioning lights and signals cause vehicular accidents, especially at night. <i>(Ang mga hindi gumaganang ilaw at signal ay nagdudulot ng mga aksidente sa sasakyan, lalo na sa gabi.)</i>	☐	☐	☐	☐
5.	Overloaded or improperly modified vehicles are more prone to accidents. <i>(Ang mga overloaded o hindi wastong binagong mga sasakyan ay mas madaling maaksidente.)</i>	☐	☐	☐	☐

✓ Scale:

- Never
- Rarely
- Often
- Very Often

3. Road-Related Causes					
No.	Statement	1	2	3	4
1.	Overspeeding is a major cause of vehicular accidents in Balanga City. (<i>Ang overspeeding ay isang pangunahing sanhi ng mga aksidente sa sasakyan sa Balanga City.</i>)	☐	☐	☐	☐
2.	Inadequate road signage and markings lead to vehicular accidents. (<i>Ang hindi sapat na mga signage sa kalsada at mga marka ay humahantong sa mga aksidente sa sasakyan.</i>)	☐	☐	☐	☐
3.	Insufficient street lighting increases accident occurrence at night. (<i>Ang hindi sapat na ilaw sa kalye ay nagpapataas ng aksidente sa gabi.</i>)	☐	☐	☐	☐
4.	Road congestion increases the likelihood of vehicular accidents. (<i>Ang kasikipan sa kalsada ay nagpapataas ng posibilidad ng mga aksidente sa sasakyan.</i>)	☐	☐	☐	☐
5.	Poor traffic management and road design contribute to accidents. (<i>Ang hindi magandang pamamahala sa trapiko at disenyo ng kalsada ay nakakatulong sa mga aksidente.</i>)	☐	☐	☐	☐

✓ Scale:

- Never
- Rarely
- Often
- Very Often