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Risk Factors in Road Crash Incidents (RF-RCI) in the Selected Municipality in Partido Area, Bikol Region, Philippines

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Abstract:- This study intends to ascertain the risk factors in traffic accidents in the chosen Municipality in the Partido Area, Bikol Region V. A. Y 2019–2022, as well as the degree of traffic law awareness.This study used document analysis from the records that were available from the Municipal Police Station of San Jose, Goa, Tigaon, and Sangay in Partido Area Camarines Sur from 2019 to 2022. This study employed a quantitative data collection method and a descriptive design to assess respondents' knowledge of traffic laws. Findings showed that human variables, such as inattentive drivers, impaired drivers from alcohol or drugs, weariness, a lack of driver education, and destructive driving, for example, made up 73.33 percent of the risk factors in road crash events.According to the respondents' (2.61WM) knowledge of Philippine traffic laws, it is illegal to drive while using a cellphone, argue with a passenger, follow a vehicle too closely, overtake recklessly, listen to music while driving, ignore traffic signs, lack of skill, and drive without first checking the vehicle. The public safety office and the law enforcement agency may utilize the study's findings as a starting point when implementing traffic regulations and ordinances in the future.

Keywords:- *Risk factors, road crash incidents, partido area, Philippines.*

I. INTRODUCTION

In developing countries, poor roadway and lighting infrastructure challenges have a significant impact on traffic accident fatality rates.Reuben Tamakloe, et, al. (2021) A potential cause of these accidents, according to Abbas Sheykhfard, et, al. (2021), may be a lack of attention to giving behavioral instructions to road users, as well as underdeveloped driver education procedures. Jonathan J.et al (2018) the primary causes of traffic accidents were inexperience, lack of proficiency, and risk-taking behaviors, which have been linked to collisions involving young drivers. In order to increase road safety, it is crucial to identify the underlying risk factors of the severity of fatality for various types of drivers. Shumin Feng, et. al.(2016) found that each driver's fatal accident has a unique set of causes. Abbas Sheykhfard, et, al.(2021) believe that a potential cause of these accidents is a lack of attention to providing behavioral instructions to road users, as well as underdeveloped driver education procedures. Reuben Tamakloe, et, al.(2021) Poor roadway and lighting infrastructure challenges have a significant impact on traffic accident fatality rates in developing countries.

On the other hand human error in operational processes, such as inattention, inappropriate behavior, and distraction, are the main causes of traffic accidents.Several organizations and businesses have contributed to raising driving standards and lowering accident rates.Road perception and lane recognition stand out among all of these methods as being extremely important.Ying Yang (2020). To improve road safety, understanding of the preventable causes of road crash occurrences is necessary. Although there are less accidents in rural areas than in metropolitan areas, fatal wrecks are more frequent in rural areas.Yazdani-Charati J., Siamian (2014), as cited in Sherafati F. (2017) The credibility of police-reported contributing factor data has been questioned by academics and road safety agencies about the causes of traffic accidents (DfT, 2014a). The influence of the risk variables is the same for all types of drivers, according to Shumin Feng, et, al.(2016) study. Ghandour, Ali J. et, al.(2020) Road traffic injury accounts for a substantial human and economic burden globally. Understanding risk factors contributing to fatal injuries is of paramount importance.Ali J. Ghandour, et, al.(2020) individual factors were significantly associated with fatality occurrence, namely crash category, injury severity, spatial cluster-ID, and crash time (hour), and to translate knowledge into safety programs and continued to improve road policies. Reuben Tamakloe, et, al. (2021) investigated the effects of contributing factors on the severity of accidents under different pavement and light conditions.

According to Jamal, Arshad, et, al.2020), a thorough sensitivity analysis of the optimized model was also carried out to demonstrate the impact and relative contribution of various predictor factors on the severity of the subsequent collision injuries. Risk variables, such as the number of lanes in each direction, the profile of the roadway, the presence of water on the road surface, etc., only affect "young and elderly drivers with a history of traffic offences," according to Shumin Feng, et, al. (2016) study. Abbas Sheykhfard, et, al.(2021) Although several previous studies on pedestrian safety have been conducted, the majority of the studies have been conducted on urban roads. There is currently no study that has looked at the accident-risk factors. Reuben Tamakloe, et, al. (2021) have all been referenced in the literature as important indicators influencing road accidents. According to Angela Watson et al. (2015), there are significant ramifications for road safety

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research and policy in terms of prioritizing money and resources, focusing road safety initiatives in high-risk locations, and assessing the burden of injury from traffic accidents.

II. BACKGROUND OF THE STUDY

Danger factors for traffic accidents include, but are not limited to: inattentive drivers, a lack of driver education, drunk driving, excessive speeding, and deteriorated cars, among other things.According to the World Health Organization (WHO), 1.25 million people die in traffic accidents worldwide each year.Many of the victims are citizens of low- and middle-income nations.Road injuries are the greatest cause of death for people between the ages of 15 and 29. This makes people in their prime particularly vulnerable.The major causes of death for various age groups were identified in a 2002 WHO report. For people aged 5 to 24 years old, traffic accidents rank among the top 3 killers.After self-inflicted injuries and pregnancy conditions, it is the leading cause of death for those between the ages of 15 and 19.It is the second most common cause of mortality for those in the 20–24 age group, behind only self-inflicted injuries and HIV/AIDS.

The risk factors, such as traffic volume, average travel speeds, weather, on-site damage circumstances, road and vehicle type, and pedestrian involvement, are the most sensitive variables, according to Jamal, Arshad, and Waleed Umer (2020). As for the Philippines, the Philippine Statistical Authority (PSA) reports that the number of fatalities from traffic accidents has been rising since 2006.10,012 deaths were reported overall in 2015, a 45.76% increase from the 6,869 deaths reported 2006.621 deaths as a result of road accidents happened in the Bicol region. A total of 4,743 road crash events were registered in Naga City from 2015 to July 2017, making it the city in the area with the most such incidents, according to the Philippine National Police.As reported by the most recent government statistics, 8,666 Filipinos lost their lives in 2014 due to traffic accidents.(PSA, 2015) Although there are several rules in the nation intended at safeguarding road users, there has been a recurrent issue with their improper application.According to Angela Watson et al. (2015), it can be difficult to rely solely on police statistics for calculating the number of people injured in car accidents because it is widely known that not all injuries are reported to the police, which understates the true burden of road crash injuries. These patterns inspire the researcher to carry out this investigation into the camarines Sur province's risk variables for traffic accidents.

III. RESEARCH OBJECTIVES

This study aims to determine the road crash incidents in the Municipality of San Jose, Goa, Tigaon, Sangay, Camarines Sur, Philippines for the Annual Year 2019–2022, identify the risk factors in road crash incidents and determine the level of awareness of traffic laws of the respondents.

IV. CONCEPTUAL FRAMEWORK

This study adapts this conceptual paradigm to explain on how the objectives of this study in determining the number road crash incidents in the Municipality of San Jose, Goa, Tigaon, Sangay, Camarines Sur, Philippines for the Annual Year 2019–2022, identify the risk factors in road crash incidents and determine the level of awareness of traffic laws of the respondents. This framework served as guidelines in the realization on the objectives to accomplish, *first*, the researcher conduct an initial coordination with the target respondents of this study such as the Philippine National Police in san jose, goa,tigaon, sangay camarines sur. And the to selected barangays as the subject of this study. *Second*, data collection process to with, the distribution of questionnaire as the main instrument in gathering primary data and the secondary data coming from the concerned office to determine the number of road crash incidents, risk factors in road crash incidents, and the level of awareness of the respondents in traffic regulations.

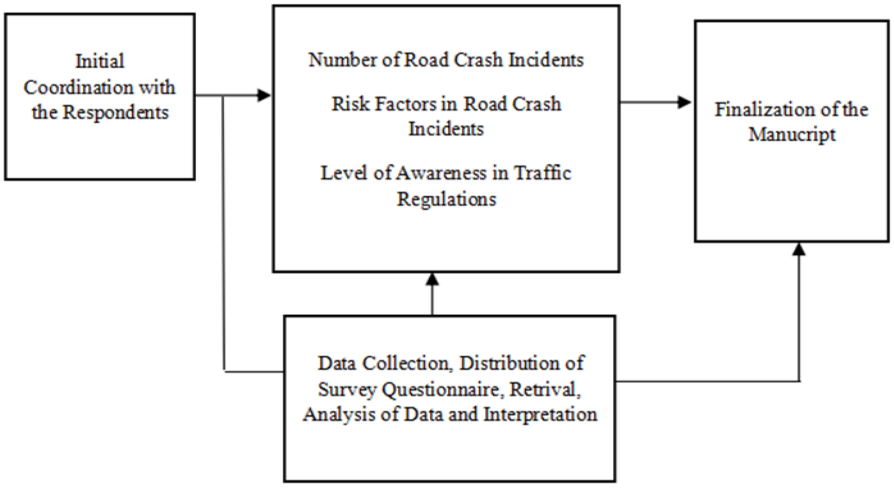

Fig. 1: Conceptual Paradigm in Risk Factors in Road Crash Incidents in the Philippines 2022

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V. RESEARCH METHODS

A. Study Sites

The province of Camarines Sur is located in the Bicol Region of the Philippines, encompassing the remote island provinces of Masbate and Catanduanes as well as the southeast peninsula of Luzon. Pili Municipality serves as its capital.The province has a total land area of 2,128.16 square miles or 5,511.90 square kilometers. The 2020 Census found 2,068,244 people living there. This was equivalent to 34.01% of the Bicol Region's entire population, 3.33% of the Luzon island group's entire population, or 1.90% of the entire Philippine population. Based on these data, the population density was calculated to be 375 people per square kilometer, or 972 people per square mile.

The selected municipalities in the province of Carmines Sur's 4th congressional district will be the subject of this study. for instance, San Jose, Goa, Tigaon, and Sangay. According to the 2020 Census, Goa and Tigaon is a first-class municipality with a population of 76,368 and 60,524 respectively. According to the 2020 census, Sangay and San Jose have a population of 36,841 and are classified as a 4th Class municipality. San Jose, with a population of 40,973, exploited and developed. The third of Camarines Sur's four congressional districts is called Partido.Its total land area is 197,306 square miles.This is 37.46% more than a third of the province's land area.341,487 people, or 22% of the province's total population, live in the ten (10) covered municipalities.It is mostly an agricultural region, affluent in natural resources.These natural resources are only waiting to be properly exploited and utilized to help its inhabitants better their quality of life.

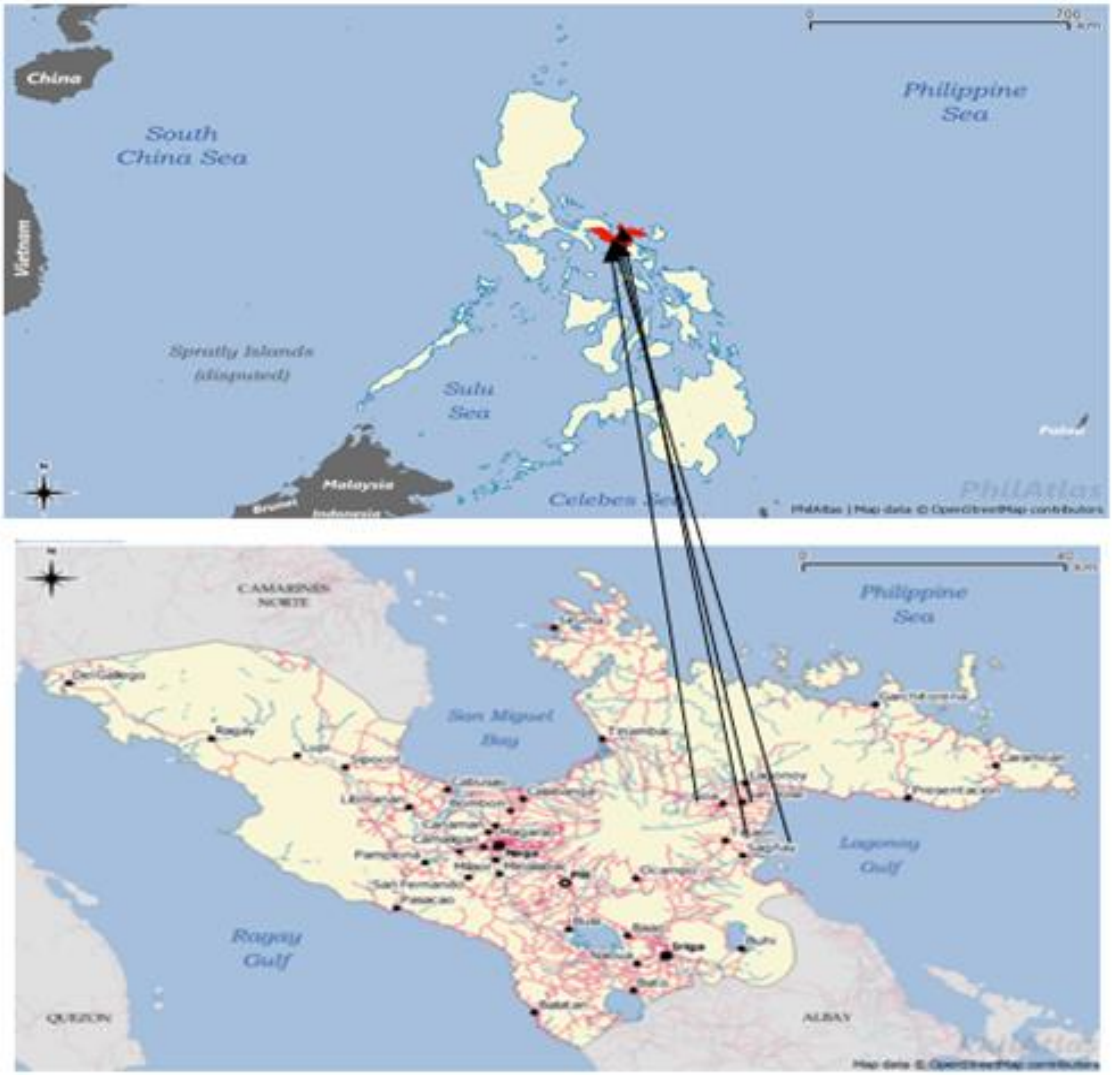

Fig. 2: Map in the Province of Camarines Sur

Source: https://www.philatlas.com/luzon/r05/camarines-sur.html

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B. Study Limitations

This study limited to the number of road crash incidents, identify the risk factors in road crash incidents in the selected Municipality in Partido Area, Bikol Region V. such as San Jose, Goa, Tigaon, Sangay, Camarines Sur, Philippines for the Annual Year 2019–2022, and determine the level of awareness of traffic laws. The respondents of this study are the chief of police, Traffic investigators, Police assigned in the traffic, selected barangay officials and drivers of the public and private utility vehicles and tricycle and habal -habal drivers etc., in the selected municipality in Partido Area; Bikol Region V.

C. Research Design

This study was used documentary analysis from the available records of the Municipal Police Station of San Jose, Goa, Tigaon, Sangay in Partido Area Camarines Sur. Along national highway and the major thoroughfares Camarines sur from 2019 up to 2022. Descriptive design was used in this study and quantitative data collection technique to determine the level of awareness of the respondents in traffic laws.

D. Procedure in Data Collection

Before the start of the data-gathering process, two (2) researcher-made questionnaires were designed personally by the researcher. These were used as the primary data gathering instruments with a focus on the risk factors in road crash incidents in the selected municipality in Partido area, bikol region V. Upon approval of the Provincial Director on the gathering of data in the municipal police stations, the survey questionnaires were distributed to the chiefs of police and investigators during an activity where all the target participants are present. It was collected back after giving them ample time to answer, and the clarificatory interview on the open-ended questions was conducted based on the availability of the participants. On the data collection from barangay officials and community members, the target barangays were first identified by the researcher. Then, coordinate with Barangay Chairmen were made. Upon approval, the research participants were identified for the conduct of the interview

E. Data Analysis

The quantitative portion of the data analysis utilized a four-point Likert scale, whereas the qualitative portion utilized a theme analysis.For the latter, the following rubrics were applied: For the Awareness Questionnaires, the following rubrics were applied: 3.25– 4: 00 Fully Aware, 2.51 – 3.24 Aware, 1.76 – 2.50 Moderately Aware, 1.00 – 1.75 Not Aware.

F. Statistical Treatment of Data

The researcher employed the weighted mean statistical technique to provide a clear interpretation of the information gleaned from the survey questionnaires. When values do not have equal weight, the weighted mean is utilized (Bluman, 2009).

The following formula was employed in the investigation.

$$\bar{X} = \frac{w_1X_1 + w_2X_2 + \ldots w_nX_n}{w_1 + w_2 \ldots + w_n} = \frac{\sum wX}{\sum w}$$

$$\bar{X} = \frac{w_1X_1 + w_2X_2 + \ldots w_nX_n}{w_1 + w_2 \ldots + w_n} = \frac{\sum wX}{\sum w}$$

where:

w1, w2, . . . , wn = weights
X1, X2, . . . , Xn = values
N = Total number of frequencies

VI. RESULTS AND ANALYSIS

A. Road Crash Incidents

This table 1 shows the number of traffic accident incidences in the municipalities of San Jose, Goa, tigaon, sangay, and camarines for the period of 2019–2022.According to data, there were 773 incidents of road crashes in the four (4) municipalities of Partido area, Bikol Region V. In the camarines sur municipality of Tigaon, the largest number (N= 427) or 55.23 percent was noted.San Jose, Camarines Sur, however, reported the fewest (N=36) or 4.65% traffic accident incidences.Also, the table below demonstrates that the most road crash events (681) occurred in the years 2019 and 2020. According to Angela Watson et al. (2015), the possible bias of this discrepancy (under-reporting) was also evaluated according on gender, age, road user group, and geographic area and the amount of underreporting varied depending on the data set to which the police data was matched.

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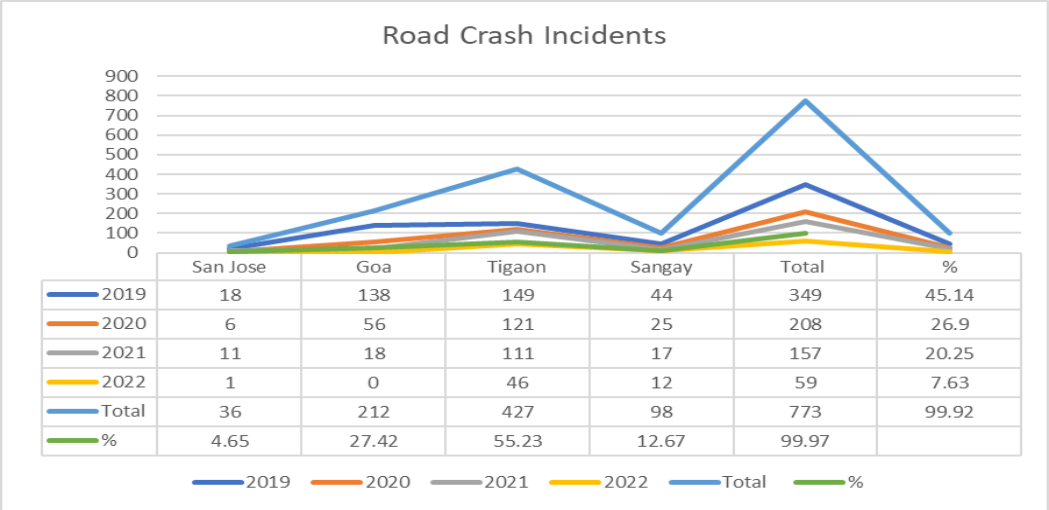

	San Jose	Goa	Tigaon	Sangay	Total	%
2019	18	138	149	44	349	45.14
2020	6	56	121	25	208	26.9
2021	11	18	111	17	157	20.25
2022	1	0	46	12	59	7.63
Total	36	212	427	98	773	99.92
%	4.65	27.42	55.23	12.67	99.97	

Table 1: Road Crash Incidents in the Municipality of San Jose, Goa, Tigaon, Sangay Camarines Sur AY 2019-2022

Source: MPS San Jose, Goa, Tigaon, Sangay, Camarines Sur, Philippines

Road accidents and injuries have been growing at an alarming rate throughout over the past 20–30 years. The major reason for this problem is the lack of road infrastructure and the ineffectiveness of tools and techniques to maintain the traffic control system. An artificial intelligence system for handling traffic accurately is a very important part of research in most developing countries, because in many developing countries automatic traffic control systems are still waiting to be implemented. Usha Mittal (2022) The advancements in technology are a basic reason for the increasing traffic congestion taking place, especially in urban areas. The congestion leads to heavy traffic jams and also increases air, noise, and soil pollution, carbon emissions, and time and energy wastage. The major cause of the problem is the increase in vehicle population, inefficient road infrastructure, and lack of modern tools and technologies to manage such problems. The victims of road crashes cause enormous economic losses to society. To reduce traffic-related problems, some rules have been defined by the government and the people have agreed to those rules. Road infrastructure is being improved by designing multilane roads, with each lane having sufficient space required for a vehicle. However, if only new rules are defined, instead of improving infrastructure, when vehicle density reaches a threshold, the situation becomes untenable. To avoid these problems, an adaptive and intelligent system is needed to analyze the vehicle density, make decisions on lanes, provide green signals, optimize the signal timings depending upon the current situation, and apprehend those who violate the law. Poor quality of transport services leads to road accidents and many other problems that endanger human life and cause air and sound pollution. Traffic congestion is the most prevalent factor in developing countries like Philippines. It wastes time and also causes health hazards, air and noise pollution, and fuel waste. The key is to manage road capacity using the supply-demand equation, appropriate utilization of traffic control strategies, and creation of intelligent and smart transportation systems.Usha Mittal (2022) If traffic is heavy in one direction, the green signal should be on for a longer duration. This should eliminate inefficiencies at intersections and reduce the costs of commuting and pollution.

B. Risk Factors in Road Crash Incidents

Table 2 presented the risk factors in road crash incidents in the municipality of san jose, goa, tigaon, and sangay camarines sur. Table 2 presented in three classification of risk factors in road crash incidents such as human factors, road conditions, vehicle defect factors. In this table 2 presented the respondents perception of knowledge on risk factors in road crash incidents in the selected municipality in Partido Area, Bikol Region V. data shows that out of 180 respondents 132 or 73.33 percent's is human factors are the highest risk factors in road crash incidents or undisciplined disciplined driver, driving under the influence of liquor/drugs, fatigue, lack of driver education, over speeding destructive driving eg. Talking on a cellphone, arguing with passenger etc. following vehicle to closely, unsafe overtaking, driving while listening to music, ignoring the traffic sign, lack of skills, failure to check vehicle before using it. While 18 or 10% were vehicle defect or loss of brakes, dilapidated vehicle, poor visibility/lack of lighting, brake failure and mechanical error. The 2015 Global Status Report on Road Safety, which included information from 180 countries, including the Philippines, corroborated these findings.

According to the report, the number of people killed in traffic accidents has stabilized at 1.25 million per year, with low-income countries having the highest rates. At least one rule in 17 countries has been revised in the last three years to follow international best practices, whether it be one relating to seat-belts, drunk driving, speeding, motorcycle helmets, or child restraints. According to Abbas Sheykhfard, et, al. (2021), poor quality of cars manufactured, as well as poor design of intersections and major roads (urban) and ring roads (suburban), may be important reasons for the increased fatal accidents. Therefore, it is advised that local government officials and law enforcement agencies carefully enforce traffic laws at the local level based on the findings of this study.

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Classification of Risk Factors in Road Crash Incidents		Frequency	Percentage
Human Factors	Undisciplined Driver	47	26.11%
	Driving under the influence of liquor /drugs	25	13.88%
	Fatigue	3	1.66%
	Lack of Driver Education	2	1.11%
	Over Speeding	21	11.66%
	Destructive Driving – ex-eating, talking on a cell phone, arguing w/ passengers etc.	1	0.55%
	Drivers Error	10	5.55%
	Following vehicle too closely	2	1.11%
	Unsafe overtaking	5	2.77%
	Driving while listening to music	3	1.66%
	Ignoring the traffic sign	11	6.11%
	Lack of skills	1	0.55%
	Failure to check vehicle before using it	2	1.11%
Road Conditions	Lack of proper road signs	9	5%
	Poor road conditions (slippery road, road under construction, road construction)	12	6.66%
	Road obstruction (illegal parking)	5	2.77%
	Road Re-Blocking	1	0.55%
	Entire vehicle obstruction	2	1.11%
Vehicle Defect	Loss of brakes	5	2.77%
	Dilapidated vehicle	3	1.66%
	Entire vehicles combustion's	0	0%
	Poor visibility/lack of lighting	7	3.88%
	Brake Failure	2	1.11%
	Mechanical Error	1	0.55%
Total		**180**	**100%**

Table 2: Risk Factors in Road Crash Incidents in the Municipality of San Jose, Goa, Tigaon and Sangay, Camarines sur, Philippines. N-180

Moreover, there is no recorded data on entire vehicles combustion's during the period of the duration of the study. The causes of motor vehicle collisions are complex, but broadly depend on characteristics of drivers. Skill level (McGwin & Brown1999), road crash incident also the result of many interacting factors. Most of accident causes classification systems have been focused on the errors and actions of the road user that immediately led to the conflict (eg. not giving a way). The actual reasons why the driver failure occurred are not taken into account. Bucsuházy K. et al., (2020). In addition, according to the KII participants the loss of brakes, dilapidated vehicle, , poor visibility, no signal lights, tail lights, brake lights, no side mirror, no horn etc are the other risk factors in road crash incidents in partido area, Bikol region V. Hence, to guarantee that the driver is following the rules for road safety, the Municipal Police Station and the Public Safety Office may strictly enforce traffic laws and regulations.

C. Level of Awareness on Traffic Regulations in the Philippines

Table 3 presents the respondents level of awareness on traffic regulations in the Philippines. In this table 3 data revealed that the overall average weighted were (2.61) interpreted that the respondents are aware of the traffic regulations implemented in the Philippines. However, the respondents are (3.415) fully aware on traffic regulations in wearing helmet, driver license possession. While the respondents are (1.495) not aware Restriction on the manner of driving and speed of car/motorcycle, Restriction of over passing of overtaking a vehicle. This finding suggested that in order to improve the motorist's understanding of traffic laws, the Municipal Police Station may host a public safety awareness session.

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Traffic Regulations	WM	Verbal Interpretation
Wearing of helmet	3.45	Fully Aware
Driver license possession	3.38	Fully Aware
Driving a registered /motorcycle	2.40	Moderately Aware
Restriction on the manner of driving and speed of car/motorcycle	1.37	Not Aware
Restriction of over passing of overtaking a vehicle	1.62	Not Aware
Giving way on overtaking vehicle	3.20	Aware
Signal on starting, stopping or turning car/motorcycle	1.48	Not Aware
No parking, no double-parking rules	2.43	Moderately Aware
Loading and unloading on designated places	3.18	Aware
No horn- blowing on noise-sensitive areas (ex. church and school)	2.50	Moderately Aware
Reading of road signs	3.24	Aware
Taking a u turn on places where there is traffic signs saying “No U-turn”	3.14	Aware
Average Weighted Mean	**2.61**	**Aware**

Table 3: Respondents Awareness on Traffic Regulations in the Philippines

Legend: 3.26– 4: 00 Fully Aware,2.51 – 3.25 Aware, 1.76 – 2.50 Moderately Aware, 1.00 – 1.75 Not Aware

VII. CONCLUSION AND RECOMMENDATION

The municipality of tigaon in camarines sur reported the highest occurrences of traffic crashes, according to the findings.Instances of road accidents were lowest in San Jose, camarines Sur, nevertheless.The years 2019 and 2020 also had the highest number of road crash incidents.In addition, three categories of risk factors, including human factors, road conditions, and car defect factors, were present at the research sites when incidents of road crashes occurred.The respondents are fully informed of all traffic laws, including those pertaining to wearing a helmet and having a license.The fact that there are limitations on how cars and motorbikes can be driven, their top speeds, and their ability to pass or overtake other vehicles is unknown to the respondents. Hence, It is advised that the law enforcement agency and the local government official strictly enforce the traffic laws at the local level based on the findings of this study.To make sure that the driver is following the rules for road safety, the Municipal Police Station and the Public Safety Office may strictly enforce traffic laws and regulations.A public safety awareness session could be held by the municipal police station to increase drivers' understanding of traffic laws.

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