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RESEARCH ARTICLE

COMPLIANCE WITH TRAFFIC RULES AMONG PEDESTRIANS

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Abstract

Each year, more than 270 000 pedestrians lose their lives in traffic accidents. Traffic accidents occur for various reasons like inadequate traffic facilities and failure to obey traffic regulations, among others. This study determined the extent of compliance of the pedestrians with traffic rules and assessed whether a significant difference in their extent of compliance when grouped according to profile exists. The purpose of the study is to generate information to improve pedestrian safety. The study uses a descriptive and correlation research design. The findings indicate that the pedestrians are compliant with the traffic rules such as yielding the right of way to emergency vehicles and vehicles passing upon a highway but moderately comply with the use of pedestrian lanes and shoulder road while walking along the streets, and the observance in the use of loading and unloading zones. The findings also indicate that no significant difference exists in their extent of compliance with traffic rules when grouped according to their profile. It is concluded that the pedestrians are submissive to the traffic rules, but their failure to fully obey the regulations on using only the shoulder road, pedestrian crossing lanes, and the loading and unloading zones served as the primary cause of their involvement in road accidents.

Introduction:-

Road traffic injuries (RTIs) are one of the public health problems in which the community and decision makers continue to accept inevitably large-scale deaths and disabilities. Each year, more than 270 000 pedestrians lose their lives on the world's roads. Many leave their homes as they would on any given day – to school, work, places of worship, and homes of friends – never to return. These incidents cause much suffering and grief as well as economic hardship for families and loved ones.

In the Philippines, pedestrians make up the second biggest chunk of road user deaths at 19%, next to riders of motorized two- or three-wheeler vehicles which is accounted to 53%. In the Province of Cagayan, the Cagayan Police Provincial Office recorded 2,679 cases of road accident from year 2015-2016 and 177 cases of which involved pedestrians that resulted to death and injury. The province of Cagayan is one of the leading from among the five (5) provinces in the Cagayan Valley Region as far as accident rate is concerned. The province of Cagayan lies in the Northeastern part of mainland Luzon in the Philippines. Tuguegarao City, its capital is 483 kilometers north of Manila, about one hour by air travel, and ten hours by land, through the Maharlika Highway, also known as the Cagayan Valley Road.The Province comprises 28 municipalities and one (1) city.

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Framework of the Study

Article II Section 4 of the 1987 Philippine Constitution states that ―the government has the prime duty to serve and protect the people and to promote the general welfare as essential for the enjoyment of the blessing of democracy (Art. II Section 5). Along with this constitutional principle and policy, the state is therefore incumbent to safeguard its citizens from the ruinous effects of road accidents.

The systems theory approach of road safety serves as the framework of this study. The underlying assumption of the systems theory is that road traffic crashes result from the interactional malfunctioning of the components of the system. The part of the system includes the road usersi.e pedestrians, the vehicle, and the road environment. These three factors, as well as their interactions, vary in the strengths of their contribution.

This study focuses however, on the assessment of road user behavior. This is based on a premise that individual road-users potentially induce bodily harm and are responsible when traffic crashes occur.

Objectives of the Study:-

This study has been initiated to:

1. Determine the extent of compliance of the pedestrians with traffic rules; and
2. Determine whether there is significant differences exist in their extent of compliance when grouped according to age, gender, educational attainment and occupation.

Methodology:-

Research Design

The study uses the descriptive and correlation research design since it measures the extent of compliance of the pedestrians with traffic rules and the difference between the extents of compliance when grouped according to the profile variables.

Population and Locale of the Study

Respondents of the study were 78 individuals who were victims of vehicular accidents in the Province of Cagayan from year 2015-2016.For ethical grounds, pedestrians who suffered mutilations or serious injury like inability to hear speak or write due to the accident and minors who cannot give full consent to the study were excluded.

The Province of Cagayan served as the locale of the study since it is considered as the center of governance in the Cagayan Valley Region. Likewise, Cagayan province is the seat of most Higher Education Institutions (HEIs) and most business activities, as well as tourism industry, are undertaken in the region. So, it caters to thousands of students, transients, traders, local and foreign tourist, employees for both government and private enterprise living not only within but beyond the province as well, using, either public or private transport making the place more susceptible to road traffic accidents. The study was undertaken in the year 2016 and it is limited only in measuring the extent of compliance of the pedestrians with traffic rules provided under Republic Act 4136 or the "Land Transportation and Traffic Code in the Philippines".

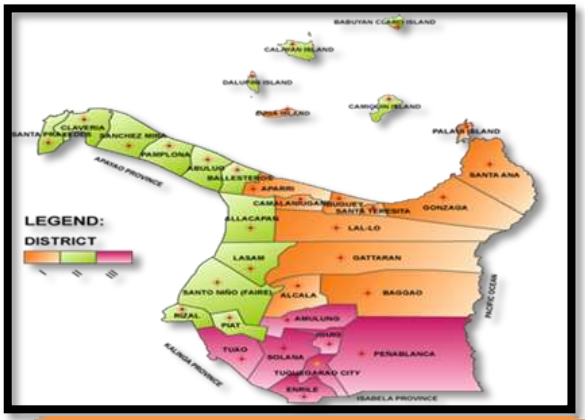

Fig. 1 Map of Cagayan

Data GatheringTool

The data were collected through a survey questionnaire. The questionnaire consists of two (2) parts. Part I of the questionnaire is designed to get the profile of the respondents. Part II of the questionnaire is designed to assess the level of compliance with traffic rules. The questionnaire was formulated based from Republic Act 4136 or the "Traffic Code in the Philippines" which provides for the traffic rules governing pedestrians among others.

The questionnaire was tested through Cronbach's Alpha test. Cronbach's Alpha based on standardized items of .749 indicates that the questionnaire is highly reliable.

Data Gathering Procedure

The questionnaire were personally administered and retrieved by the researcher. For ethical grounds, personal information, responses, and data given were treated with utmost confidentiality. The names and address of the respondents pedestrians involved in vehicular accidents were taken from the records of the Cagayan Police Provincial Office upon approval of the request to collect the data needed.

Treatment of the Data

To measure the extent of compliance of the pedestrians with traffic rules mean and weighted means were used. The formula expressed as follows:

Weighted Mean:

$$\bar{x}_w = \frac{\Sigma f_i w_i}{\Sigma f_i}$$

where: $\bar{x}_w$ - weighted mean

Σf_i - sum of frequencies

w_i -weights for each category

To interpret and analyze the extent of compliance of the respondents with the existing traffic rules, a four-point Likert scale was used:

Numerical Values	Mean Range	Verbal Interpretation
4	3.26-4.00	Very Much Complied
3	2.51-3.25	Much Complied
2	1.76-2.50	Moderately Complied
1	1.00-1.75	Not Complied

T-Test Statistics of Unequal Variance was used to analyze the difference of extent of compliance with traffic rules between male and female pedestrians. The formula t-test statistics, Unequal Variances:

$$t = \frac{\bar{x} - \bar{y}}{\sqrt{\frac{{s_x}^2}{n} + \frac{{s_y}^2}{m}}} \text{ with}$$

$$v = \frac{\left(\frac{{s_x}^2}{n} + \frac{{s_y}^2}{m}\right)^2}{\frac{\left(\frac{{s_x}^2}{n}\right)^2}{n-1} + \frac{\left(\frac{{s_y}^2}{m}\right)^2}{m-1}} \text{ degrees of freedom}$$

where:

t- t-statistic

$\bar{x}$ - mean of the first group

$\bar{y}$ - mean of the second group

${s_x}^2$ - variance of the first group

s_y^2 - variance of the second group

n- number of observations in the first group
m- number of observations in the second group

Analysis of variance (F-test) was used to analyze the following data: Differences in extent of compliance with traffic rules among pedestrians when grouped according to educational attainment, occupation and age. The formula is expressed as:

F-test = SSb
SSw

where:

SSb = Mean sum of squares between groups
SSw = Means sum of squares within groups

Discussion:-

Table 1:- Extent of Compliance of the Pedestrian with Traffic Rules. (N=78).

Traffic Rules	Mean	Descriptive Interpretation
1. Yield the right of way to incoming emergency vehicle	3.63	Very Much Complied
2. Yield the right of way to vehicles upon a highway particularly in the absence of pedestrian crossing	3.44	Very Much Complied
3. Cross only within the designated pedestrian crossing	2.50	Moderately Complied
4. Use only the shoulder road whilewalking along the streets	2.41	Moderately Complied
5. Alight in an area intended forloading and unloading	2.49	Moderately Complied
6. Wait or board on passenger cars/tricycles and buses in loading or unloading area	2.46	Moderately Complied
7. Follow or obey the existing traffic signs	2.69	Much Complied
8. Follow or obey the existing road markings	2.67	Much Complied
Over-all Mean	**2.79**	**Much Complied**

As shown in Table 1, the overall mean of 2.79 means "much" complied indicates that the pedestrians follow at an acceptable level the traffic rules on the proper and safe use of roads. However, data suggest that there are pedestrians who failed to completely follow the traffic rules particularly the use of the designated pedestrian crossing lanes and the use of shoulder road as well as the proper observance of the loading and unloading traffic rules as shown by a mean of 2.50, 2.41 and 2.49 respectively. This means that most of the respondents use the roadway or carriageway intended for the vehicle while walking along the streets or highway hence their exposure to traffic crashes.

Findings yielded are supported by Admassiewho found out that accidents in Ethiopia are not caused by cars, but by the pedestrian's improper usage of the streets wherein 6% of his respondents indicated that they always use vehicle's roadway calculatingly or unknowingly while 59% said that they sometimes do the same. While Al Hammoudidisclosed that in Abu Dhabi most pedestrians involved in the accidents reported that most of the time they crossed the road from places not designated for pedestrian crossings and nearly 70.6% of the pedestrians were crossing way when struck.

Table 2:- Extent of Compliance of the Pedestrians with Traffic Rules According to Age. (N=78).

Traffic Rules	Age					
	A	B	C	D	E	F
1. Yield the right of way to incoming emergency vehicle	3.64	3.40	3.61	3.69	3.45	3.85
2. Yield the right of way to vehicles upon a highway particularly in the absence of pedestrian crossing	3.26	3.26	3.22	3.62	3.36	3.62
3. Cross only within the designated pedestrian crossing	2.43	2.53	2.50	2.46	2.45	2.38
4. Use only the shoulder road while walking along the	2.21	2.51	2.50	2.54	2.36	2.38

streets						
5. Alight in an area intended for loading and unloading	2.50	2.54	2.28	2.54	2.27	2.69
6. Wait or board on passenger cars/ tricycles and buses in loading or unloading area	2.50	2.52	2.28	2.62	2.27	2.62
7. Follow or obey the existing traffic signs	2.57	3.28	2.50	2.85	2.64	2.85
8. Follow or obey the existing road markings	2.51	3.30	2.50	2.77	2.73	2.77
Over-all Mean	**2.70**	**2.91**	**2.67**	**2.88**	**2.69**	**2.89**

** Age of Respondents
A-18-27 B-28-37 C-38-47 D-48-57 E-58-67 F-68+

** Extent of Compliance (Mean Range)
1:00-1.75 Not Complied 1.76-2.50 Moderately Complied
2.51-3.25 Much Complied 3.26-4.00 Very Much Complied

As shown in Table 2, a weighted mean of 2.70, 2.91,2.67, 2.88, 2.69 and 2.89 means "much" complied indicates that all group of respondents obey with considerable degree the traffic rules.The data also suggest that the respondents regardless of their age group fully comply the giving of right of way to emergency vehicles and other vehicles passing in a highway particularly in the absence of pedestrian crossing.

An item mean of 2.21, 2.51, 2.50, 2.36, 2.38 indicates that respondents belong to age group of 18-27, 28-37, 38-47, 48-57 and 68 years old and above "moderately" comply the rule on using only the shoulder road while walking along the streets. It further suggests that most of the respondent pedestrians regardless of age group except those belong to 58-87 years of age habitually use the roadway or carriageway intended only for a motor vehicle exposing themselves to danger. It implies that most of the respondents are not conscious enough of their safety or due to obstructions on sidewalks such as parked vehicle and mobile vendors, they are usually forced to use the carriageway.

Table 3:- Differences in Extent of Compliance of the Pedestrians with Traffic Rules when Grouped According to Age. (N=78).

Source of Variance	**Sum of Squares**	**df**	**Mean Square**	**f ratio**
Between	64.306	5	12.861	0.90475
Within	1023.489	72	14.215	0.00984
Total:	1087.795	77		
(f .05, 5, 72) = 2.53	**Decision: Fail to Reject Ho**			

Analysis of Variance (ANOVA) was used to analyze the collected data on the differences in the extent of compliance with traffic rules among pedestrians when grouped according to their ages. The null hypothesis was that the pedestrians did not differ in their extent of compliance with traffic rules when grouped according to their ages. The alternative hypothesis was that there were differences in the extent of their compliance with traffic rules.

The result of the analysis (Table 3) revealed a computed F value of 0.90475 and the tabular F value is 2.53. Since the calculated value is less than the tabular value, the null is accepted. This result means that there were no differences in the extent of compliance with traffic rules among the pedestrians when grouped according to their ages. It says further that a pedestrian's being young or old has nothing to do with his or her extent of compliance with the land transportation and traffic rules.

Table 4:- Extent of Compliance Among Pedestrian with Traffic Rules when Grouped According to Gender. (N=78).

Traffic Rules	**Gender**			
	Male (52)		Female(26)	
	Mean	DI	Mean	DI
1. Yield the right of way to incoming Emergency vehicle	3.56	VMC	3.77	VMC
2. Yield the right of way to vehicles upon a highway particularly in the absence of pedestrian crossing	3.38	VMC	3.54	VMC
3. Cross only within the designated pedestrian crossing	2.44	MDC	2.62	MC

4. Use only the shoulder road while walking along the streets	2.38	MDC	2.46	MDC
5. Alight in an area intended for loading and unloading	2.54	MC	2.38	MDC
6. Wait or board on passenger cars/ tricycles and buses in loading or unloading area	2.54	MC	2.31	MDC
7. Follow or obey the existing traffic signs	2.73	MC	2.62	MC
8. Follow or obey the existing road markings	2.67	MC	2.65	MC
Over-all Mean	**2.78**	**MC**	**2.79**	**MC**

** NC – Not Complied MDC – Moderately Complied
MC – Much Complied VMC – Very Much Complied

As shown in Table 4, a weighted mean of 2.79 and 2.78 means "much" complied. This finding indicates that in general, both groups of respondents obey with considerable degree the traffic rules. This further implies that regardless of gender, pedestrians tend to display the same character or attitude toward traffic rules.

Moreover, an item mean of 3.77 and 3.56 means "very much" complied. This indicates that female and male pedestrians fully obey the rule of yielding the right of way to all types of emergency vehicle. The data also shows that both groups of respondents "very much" comply with the rule on yielding the right of way to the motor vehicle along the highway in the absence of pedestrian crossing lane. However, an item mean of 2.46 and 2.38 shows that both groups of respondents "moderately" comply with the rule on using only the shoulder road while walking along the road. It implies that male and female pedestrians usually used the roadway intended for motor vehicle. This further implies that most pedestrians regardless of gender do not display a high level of road safety consciousness. The data also shows that male pedestrians usually fail to use the pedestrian crossing lanes in crossing the roads while their female counterpart "much" comply with the same rule. This further implies that males tend to display a more persistent indifference with pedestrian crossing lane than their female counterpart.

Findings generated are supported by the study of Hamza who disclosed that the numbers of male casualties were almost double compared to the females and while Al Hammoudi found out that in Abu Dhabi, 71% of the pedestrians involved in the accidents are males and the remaining portion was female.

Table 5:- Differences on Extent of Compliance of the Pedestrians with Traffic Rules when Grouped According to Gender. (N=78).

Traffic Rules	**Male**			**Female**			**t**	**df**	**P value**
	$\bar{x}$	s	n	$\bar{x}$	s	n			
	2.78	0.44	5	2.79	0.52	26	0.102	76	0.919

The difference in the extent of compliance between the male and female respondent-pedestrians was analyzed with t-test statistics of unequal variances. The null hypothesis is that the male and female respondents do not differ in their extent of compliance with land transportation and traffic rules. The alternative hypothesis is that the male and female respondents differ in their extent of compliance.

Results of the comparison between the male and femalepedestrians on their extent of compliance with traffic rules specifies that no significant differences were seen ($t(76)=0.102$, $p>0.05$). This result means that the male and female pedestrians are the same in their extent of compliance with land transportation and traffic rules. In other words, whether a pedestrian is male or female, this has nothing to do with his/her extent of compliance.

Table 6:- Compliance of the Pedestrian with Traffic Rules when Grouped According to Educational Attainment. (N=78).

Traffic Rules/Educational Attainment	**A(15)**		**B(32)**		**C(31)**	
	Mean	**DI**	**Mean**	**DI**	**Mean**	**DI**
1. Yield the right of way to incoming Emergency vehicle	3.67	VMC	3.44	VMC	3.81	VMC
2. Yield the right of way to vehicles upon a highway particularly in the absence of pedestrian crossing	3.40	VMC	3.28	VMC	3.61	VMC
3. Cross only within the designated pedestrian crossing	2.33	MDC	2.34	MDC	2.74	MC
4. Use only the shoulder road while walking along the	2.33	MDC	2.25	MDC	2.61	MC

streets						
5. Alight in an area intended for loading and unloading	2.33	MDC	2.34	MDC	2.71	MC
6. Wait or board on passenger cars/ tricycles and buses in loading or unloading area	2.27	MDC	2.34	MDC	2.80	MC
7. Follow or obey the existing traffic signs	2.80	MC	2.56	MC	2.87	MC
8. Follow or obey the existing road markings	2.69	MC	2.56	MC	2.81	MC
Over-all Mean	**2.73**	**MC**	**2.64**	**MC**	**2.99**	**MC**

As gleaned from Table 6, a weighted mean of 2.99, 2.73 and 2.64 means "much" complied indicates that the three groups of pedestrians follow at an acceptable degree the traffic rules. It further suggests that regardless of the educational attainment of the pedestrian they display the same level of compliance.

The results also disclose that the respondents fully comply the rules on right of way for emergency vehicles, yielding the right of way to vehicles upon a highway particularly in the absence of pedestrian crossing. Moreover, the data display that respondents whose educational attainment is secondary and below "moderately" comply with the rules on crossing within the designated pedestrian crossing lane, using only the shoulder road while walking along the streets, alighting and waiting in an area intended for loading and unloading. This further implies that pedestrians whose educational attainment is elementary and secondary level usually violated the mentioned traffic safety rules which in most cases resulted in accidents. On the other hand, pedestrians whose educational attainment is college level "much" comply with the same traffic safety rules. It implies that to some extent, pedestrians who have at least reached or finished college degree tend to be more cautious and observant of the mentioned traffic safety rules.

Findings generated under this study are supported by Jha et al who found out that from among the 726 pedestrians' victims of traffic accidents in South India 107(21.4%) had education up to 5th class (primary level). Ninety-five (19.3%) were educated up to 8th (middle level up to secondary) while 82(16.6%) were illiterates.

Table 7:- Differences in Extent of Compliance of the Pedestrians with Traffic Rules when Grouped According to Educational Attainment. (N=78).

Source of Variance	Sum of Squares	df	Mean Square	f ratio
Between	202.852	5	40.570	
Within	296923.943	72	4123.944	0.00984
Total:	296926.795	77		
(f .05, 5, 72) = 2.53	Decision: Fail to Reject Ho			

ANOVA was used to analyze the collected data. The null hypothesis was that the pedestrians did not differ in their extent of compliance when grouped according to educational attainment. The alternative hypothesis was that there were differences in the extent of their compliance.

The result of the analysis (Table 7) revealed a computed F value of .00984 and the tabular F value is 2.53. Since the computed value is less than the tabular value, the null hypothesis is accepted. This result means that there were no differences in the extent of compliance with traffic rules among the pedestrians when grouped according to educational attainment. It implies that a pedestrians' being highly educated or lowly educated has nothing to do with their extent of compliance with traffic rules. This further means that all pedestrians regardless of their level of education possess no difference regarding their compliance with traffic safety rules and this is attributed to the fact that pedestrians in the province do not receive formal or even informal education as far as traffic safety rule is concerned. Findings generated under the study are bolstered by Al Hammoudi in Abu Dhabi who found out that most pedestrians involved in the accidents are at least educated to the high school level, with (10%) holding a postgraduate qualification.

Table 8:- Extent of Compliance of the Pedestrians on with Traffic Rules When Grouped According to Occupation (N=78).

Traffic Rules/Occupation	A	B	C	D	E	F	G
	Mean	Mean	Mean	Mean	Mean	Mean	Mean
1. Yield the right of way to incoming Emergency							

vehicle	3.22	3.61	3.80	3.71	3.86	3.90	3.42
2. Yield the right of way to vehicles upon a highway particularly in the absence of pedestrian crossing	3.00	3.30	3.50	3.71	3.71	3.30	3.33
3. Cross only within the designated pedestrian crossing	2.22	2.43	2.40	3.14	2.14	3.20	2.17
4. Use only the shoulder road while walking along the streets	2.22	2.35	2.30	3.00	1.86	3.10	2.17
5. Alight in an area intended for loading and unloading	2.11	2.52	2.10	3.00	2.43	3.20	2.17
6. Wait or board on passenger cars/ tricycles and buses in loading or unloading area	2.00	2.61	1.90	2.86	2.43	3.20	2.17
7. Follow or obey the existing traffic signs	2.44	2.74	2.30	3.00	2.57	3.40	2.42
8. Follow or obey the existing road markings	2.33	2.70	2.40	3.00	2.43	3.28	2.42
Over-all Mean	**2.44**	**2.78**	**2.59**	**3.18**	**2.68**	**3.32**	**2.53**

** A-Laborer B-Farming C-Housekeeping D-Transport
E-Sales/Trade F-Professionals G-Jobless/students
** Extent of Compliance (Mean Range)
1:00-1.75 Not Complied 1.76-2.50 Moderately Complied
2.51-3.25 Much Complied 3.26-4.00 Very Much Complied

As gleaned from Table 8, a weighted mean of 2.78, 2.59 3.18, 2.68 and 2.53 means “much” complied indicates that pedestrians whose occupation falls under the classification of farming, housekeeping, transport sector, and sales or trade respectively follow with considerable degree the land transportation and traffic rules. A weighted mean of 3.32 means “very much” complied indicates that pedestrians categorized as professionals like teachers, nurses, an employee of the government andprivate sectors fully comply with the traffic rules. This finding indicates that most respondentsprofessionals were involved in road accidents not because of their failure to follow the traffic rules but because of the failure of drivers to follow and respect their rights as part of the traffic system.

Moreover, a weighted mean of 2.44 means “moderately” complied indicates that in general pedestrians whose occupation is categorized as laborers like a construction worker, janitorial services, and crews rarely follow the traffic rules. The data suggest that the respondents regardless of their occupation consistently follow the rules on giving the right of way to emergency vehicles and vehicles on the highway especially in the absence of pedestrian crossing.

Moreover, the data shows that most of the pedestrians regardless of their occupation “moderately” comply with the rules on crossing only within the designated pedestriancrossing, using the sidewalk while walking along the roads as well as on boarding and alighting in a given loading or unloading area.

Findings yielded are reinforced by Jha et al who found out that pedestrian’ victims of traffic accidents in South India were laborers and accounted to 29.9%.

Table 9:- Differences in Extent of Compliance of the Pedestrians with Traffic Rules when Grouped According to Occupation. (N=78).

Source of Variance	Sum of Squares	df	Mean Square	f ratio
Between	436.945	9	48.549	
Within	241,501.850	68	3551.498	0.014
Total:	241,938.795	77		
(f .05, 9, 68) = 2.21	**Decision: Fail to Reject Ho**			

Analysis of Variance (ANOVA) was used to analyze the collected data on the differences in the extent of compliance with land transportation and traffic rules among pedestrians when grouped according to their occupation; the null hypothesis was that the pedestrians did not differ in their extent of compliance when grouped

according to their occupation. The alternative hypothesis was that there were differences in the extent of their compliance.

The result of the analysis (Table 9) revealed a computed F value of .014 and the tabular F value is 2.21. Since the calculated value is less than the tabular value, the null hypothesis accepted. This result means that there were no differences in the extent of compliance with traffic rules among the pedestrians when grouped according to their occupation. It indicates further that whatever trade a pedestrian has, it has nothing to do with his or her extent of compliance with traffic rules.

Conclusions:-

After evaluation of the findings under the study, it is concluded that the pedestriansareare submissive withmostofthe land transportation and traffic rules but their failure, however, to fully obey the regulations on using only the shoulder road and pedestrian crossing lane as well as their failure to properly observed traffic rules on boarding and alighting only on designated areas serve as the primary cause of their involvement in road accidents.It is also concluded that the lack of pedestrian facilities and failure to keep it free from obstructions impels the pedestrian to use roadway which exposed them to accident.

Recommendations:-

1. The Local Government Units or Department of Public Works and Highways shall consider the construction of overpass for pedestrians.
2. Removal of all obstructions and impediments along shoulder road to accommodate pedestrians.
3. Conduct traffic safety seminars among schools and to the community.
4. Observance of the yearly celebration of "Road Safety Consciousness Month" to generate awareness on traffic safety is encouraged.
5. A study of the same kind evaluating the provision of traffic control facilities within the Province shall be conducted.

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