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ROAD SAFETY KNOWLEDGE AND BEHAVIOUR IN INJURYPREVENTION AMONG CHILD PEDESTRIANS IN PORT HARCOURT

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ABSTRACT

A major public health issue for children is pedestrian injury. This study assessed the role of road safety knowledge and behaviour in injury prevention amongst child pedestrians aged 10-17 yearsin Port Harcourt. The road safety knowledge and behaviour of the children was assessed using questionnaire. The questionnaire contained sections on personal information, traffic exposure, safety knowledge, pedestrian injury and road behaviour. The study population comprised of public primary and secondary school children. Cross-sectional study design and convenience sampling method was utilized in this study. A total of 550 copies of questionnaires weredistributed, out of which 519 copies were retrieved and 510 copies was used for data analysis. Cross-tabulation was used in obtaining descriptive statistical information, while binomial logisticregression was used for the model and hypotheses tests. The results indicated that 23% of the children reported being involved in pedestrian collision, and majority of the injuries were to the upper and lower limbs (73.3%), with 36.3% of the cases involving motorcycles. The results further revealed that children who walk accompanied to school are more at risk for pedestrian injury than children who walk alone to school.. Girls are more at risk than boys for pedestrian injury. Older children (13-17 years) have higher exposure to traffic than younger children and more pedestrian injuries. Increasing child pedestrian safety knowledge and behaviour was associated with a reduction in likelihood of the child involving in pedestrian injury. The results for the research questions shows that age, gender, road safety knowledge, behaviour and supervision does not statistically significantly predict child pedestrian injury in Port Harcourt. Recommendations were made for educational interventions to consider children and motorcyclists in the areas of road safety knowledge and behaviour. Children are to be equipped with reflective school-going materials, road-crossing safety skills and desired behaviour from younger age

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INTRODUCTION

A pedestrian is someone who is walking, especially in areas where vehicles go. This implies that child pedestrian connotes children who are walking in areas where vehicles go. Primarily,walking has always been a means of movement. However, where pedestrians can cross car way, or where cars can cross pedestrian way, pedestrian safety becomes a critical issue. The escalatingnumber of motor vehicles on the roads makes pedestrians more vulnerable to road injuries, with children being part of the vulnerable road-user group.

The health of children globally is challenged with a substantial threat of pedestrian injury (Morrongiello & Barton, 2009; World Health Organization, 2013). Certain fundamental road skills are necessary for pedestrians to negotiate through traffic safely, thus when crossing roads perceptual abilities is required (Tabibi et al., 2012). Factors that contribute to children‘s vulnerability to pedestrian injury include; their physical, cognitive and emotional traits and abilities, their personality and temperament (Koekemoer et al., 2017; McMahon et al., 2008; Peden et al., 2008; World Health Organization, 2011). Children below 10 years of age fail to foresee dangers present at crossing sites, thus not taking the necessary actions (Tabibi et al., 2012).

According to Ribbens et al., (2008), environmental factors such as road condition are contributors to pedestrian injury risk. Children in Port Harcourt city are exposed to dangerous traffic environment. This dangerous traffic environment is created by poor road design, use of vehicles that are not roadworthy, absence of pedestrian crossing facilities. Pedestrian walkways are often converted into kerbs by taxis and other motorists which expose pedestrians who decide to use vehicle lanes to risk of pedestrian collision.

Child pedestrian injuries can be averted if children are well educated on how to negotiate traffic safely. Road safety education can be included into the school curriculum in form of classroom training and practical training. This study is particularly interested in the assessment of children‘sroad safety knowledge and behaviour as a means of road injury prevention.

Statement of Problem

A major public health issue for young children is the issue of pedestrian injury. Toroyan and Peden, (2007) reports that about 30,000 child pedestrian are reported dead annually from injuries sustained in pedestrian accidents. Around the world, serious traffic bodily injuries and deaths are the consequences of pedestrian accidents. Over 80,000 pedestrians are injured annually while about 4500 eventually die from injuries during road accidents (National Electronic Injury Surveillance System, 2002; Traffic Safety Facts, 2001). About 11% of vehicular deaths are attributed to pedestrians (Traffic Safety Facts, 2001). Child pedestrian safety should be an area ofconcern once children develop mobility and independence. There is also paucity of data for pedestrian safety amongst children in Nigeria compared to most developed nations.

Aim and Objectives

The aim of this study is to assess the role of road safety knowledge and behaviour in injury prevention amongst child pedestrians aged 10-17 years in Port Harcourt City.

The key objectives of the study are to:

1. investigate the nature of child pedestrian injury in Port Harcourt
2. examine the nature of child pedestrian road safety knowledge and behaviour in PortHarcourt.
3. assess the relationship between child pedestrian road safety knowledge, behaviour androad injury

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Research Questions/ Hypothesis

This research provides answers to the following research questions:

1. Does child pedestrian safety knowledge statistically significantly predict child pedestrianinjury?
2. Does child pedestrian safety behaviour statistically significantly predict child pedestrianinjury?
3. Does child Pedestrian age statistically significantly predict child pedestrian injury?
4. This research will test the following hypothesis:

HA_0: Child pedestrian safety knowledge does not predict child pedestrian injury.
HA_1: Child pedestrian safety knowledge predicts child pedestrian injury.
HB_0: Child pedestrian safety behaviour does not predict child pedestrian injury.
HB_1: Child pedestrian safety behaviour predicts child pedestrian injury.
HC_0: Child pedestrian age does not predict child pedestrian injury.
HC_1: Child pedestrian age predicts child pedestrian injury.

LITERATURE REVIEW

Theoretical Framework

Systems theory

This theory, also referred to as systems approach (Dekker, 2002; Rasmussen, 1997; Reason et al., 1990; Rothe, 2002) is the most predominant framework adopted in safety related studies and researches over decades now (Salmon et al., 2010). Its root dates back to the 1940s. Chapanis (1999) in a groundbreaking study looked at aviation safety and aircraft crashes during this periodand determined that _pilot error‘ was designers error. This theory remained acceptable after its publication (Johansson, 2009; Johnson, 1999; Reason, 2008;).

Primarily, the systems theory postulates that mishaps on roads and crashes are consequences of a non-functional or erroneous system (Muhlrad et al., 2005). Consequently, human elements and vehicle factors conspire with physical and social environmental factors to cause road traffic accidents. Research has shown that not only has the theory helped in the comprehension of most of the risk factors implicated in accidents, it has significantly resulted to various safety interventions in many nations and countries for example, the Vision Zero in Sweden, Norway (Johansson, 2009) and other successful systems elsewhere in Australia and the Netherlands (Wegman et al., 2008).

Concept and Review of Pedestrian Accidents

Recent studies by researchers have examined different dimensions of pedestrian safety including pedestrian accidents. Morrongiello and Barton (2009) investigated parental supervision of kids amid intersections and crossings, modelling of safe-crossing behaviours, beliefs about how kids come to cross roads securely, and whether kid characteristics (age, sex) relate with parental practices and beliefs. The result of the study modelled safer crossing practices for sons more than daughters, particularly younger sons. findings of the investigation additionally uncovered that guardians and parents more firmly managed and supervised more younger than the older children.

Schwebel et al. (2016) achieved a realistic trial on network-based totally pedestrian safety education in digital truth. This research led to utilizing a pre-submit inside-topics trial of schooling kids in pedestrian protection

the usage of a semi-mobile, semi-immersive digital pedestrian environment located at faculties and community centers. Result showed an enhancement in delay coming into site visitors following training. Inside the research, safe crossing did no longer display exchange while secure crossings did now not reveal trade even as interest to traffic and time to touch with oncoming vehicles both decreased.

Accident prediction models was adopted to research the relationship between child pedestrian casualties and a number environmental and socio-monetary factors usually linked to deprived regions and people in a research carried out with the aid of inexperienced (Green et al., 2011). In relation to locations of accidents, the study revealed that local environments were common whilethe greatest effect on residency came from socio-economic factors.

Engineering Counter Measures in Pedestrian Accident Prevention

It might be appropriately said pedestrians have been, as it were, ignored or given immaterial idea in the arrangement of most nation's roadway structure and system. This is in light of the fact that the built environment names low need to individuals who walk (pedestrians) thereby contributingto pedestrian traffic related conflicts. In any case, it has a tendency to be troublesome for vehicles and pedestrians to share the street securely. Design and Engineering change/modifications by and large can be grouped into 3 general classes:

Separation of pedestrians from vehicles by time or space. Measures that expands the visibility and conspicuity of pedestrians, and Reductions in vehicle speeds (Retting et al., 2003).

Separating Pedestrians and Vehicles

Isolating Pedestrians and Vehicles as an intervention have by and large been assessed regarding their consequences for road user behaviour and pedestrian– vehicle conflicts instead of crashes, and their utilization is to some degree site dependent. Segregating Pedestrians and Vehicles as anintercession have been evaluated with respect to their ramifications for street client conduct and pedestrian– vehicle clashes rather than accidents, and their usage is somewhat site subordinate. One investigation published that the presence of traffic flags impressively decreased accidents at crossing signals as against where no signs were accessible for pedestrians (Garder, 1989). At convergences with movement signals elite movement flag phasing — which stop all vehicle action for part or most of the person on foot crossing signal—have appeared to on a very basic level decrease clashes (Garder, 1989; Van Houten et al., 2000).). Enough yellow and all-red clearance signals are fundamental traffic signs to ensure that drivers have satisfactory time to clear the intersection before the presentation of pedestrian walk signals. Another research study revealed that changes in yellow and all-red flag timing diminished the danger of pedestrian and bike crashes at intersections by 37% in control locations (Retting et al., 2002). Programmed pedestrian detection, which can be used at traffics in lieu of pedestrian push buttons to normally distinguish walker and demonstrate a walk flag, has been accounted for to out and out decrease clashes (Insurance Institute for Highway Safety, 2001; Retting et al., 1996). Moreover, two researches revealed that vehicle speeds and at uncontrolled intersections were decreased by pavement flashing lights that were consequently actuated by the closeness and nearness of pedestrian and were proposed to instigate drivers to yield to pedestrians (Hakkert et al., 2001).

Increasing Pedestrian Visibility

Most pedestrian road accidents occur in the night yet an increase in the intensity of roadway lighting system can assist pedestrian sight. Studies have also demonstrated the relationshipbetween roadway light intensity and the decrease in pedestrian road crashes especially at night. Parking restrictions which normally inhibit the sight of drivers and pedestrians can also be restricted. Argan et al (1996) showed that parked vehicles

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were the most significant factor implicated in pedestrian accidents in residential areas. Diagonal parking, elimination of on-street parking especially in the direction of traffic flow are some parking modifications that can significantly increase drivers and pedestrian visibility. Moving bus stops away from points of traffic intersection can also help to decrease the number of pedestrian who enter the road right before the bus stop. Crosswalk pavement markings are broadly utilized with the expectation of lessening pedestrian crashes, yet studies demonstrates that they are generally insufficient and, ina few settings, might be harmful (Koepsell et al., 2002).

METHODOLOGY

The study was a cross sectional study. The study is descriptive, hence this design was adopted. The population in this study included children within age group of 10-17 years from public schools in Port Harcourt City. A sample size of 400 was derived, hence a total of 550 questionnaires were distributed.

The study made use of non-randomized sampling method (convenience sampling method). Primary data was obtained using well- structured questionnaire. Primary data was collected using questionnaires because it can be administered to severalpersons. The use of questionnaires makes it quicker for the researcher to get lots of data and also results are easier to analyze than qualitative techniques.. A research letter was obtained from the Centre for Occupational Health, Safety and Environment (COHSE), University of Port-Harcourt,and consent was obtained from school principals before data collection commenced. After completing the data collection process, the questionnaires were sorted and the responses from the respondents tabulated against the questions asked. Data was analysed using SPSS version 23.

Presentation of Data

Cross-Tabulation of Age and Gender of Respondents

			Gender		Total
			Boy	Girl	
Age	10-13	Count	104	18(	29(
		% within Age	35.9%	64.1%	100.0%
		% of Total	20.4%	36.5%	56.9%
	14-17	Count	102	11(	22(
		% within Age	46.4%	53.6%	100.0%
		% of Total	20.0%	23.1%	43.1%

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Total	Count	206	304	510
	% within Age	40.4%	59.6%	100.0%
	% of Total	40.4%	59.6%	100.0%

Table 4.1 shows that most of the respondents are girls, 59.6% are girls and 40.4% are boys.

For age, 56.9% of the respondents are within 10-13 years old and 43.1% are within 14-17 yearsold.

Cross-Tabulation of Age and Class of Respondents

			Class			Total
			Primary	JSS	SSS	
Age	10-13	Count	23	236	31	290
		% within Age	7.9%	81.4%	10.7%	100.0%
		% of Total	4.5%	46.3%	6.1%	56.9%
	14-17	Count	3	84	133	220
		% within Age	1.4%	38.2%	60.5%	100.0%
		% of Total	0.6%	16.5%	26.1%	43.1%
Total		Count	26	320	164	510
		% within Age	5.1%	62.7%	32.2%	100.0%
		% of Total	5.1%	62.7%	32.2%	100.0%

Table 4.3: *Cross-Tabulation of Mode of Transportation and Pedestrian Collision Involvement*

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Involvement in pedestriancollision					Total
			Yes	No	
Mode of transportation	walking	Count	43	143	186
		% within Mode of transportation	23.1%	76.9%	100.0%
		% of Total	8.4%	28.0%	36.5%
	Cycling	Count	3	7	10
		% within Mode of transportation	30.0%	70.0%	100.0%
		% of Total	0.6%	1.4%	2.0%
	vehicle	Count	32	119	151
		% within Mode of transportation	21.2%	78.8%	100.0%
		% of Total	6.3%	23.3%	29.6%
	walkingand vehicle	Count	40	123	163
		% within Mode of transportation	24.5%	75.5%	100.0%
		% of Total	7.8%	24.1%	32.0%
Total		Count	118	392	510
		% within Mode of transportation	23.1%	76.9%	100.0%
		% of Total	23.1%	76.9%	100.0%

Table 4.3 Shows that 8.4% of those whose major mode of transportation is walking, have been involved in a pedestrian collision. Also 23% of the total respondents have been involved in a pedestrian collision.

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Table 4.4: *Cross-Tabulation of Gender and Involvement in Pedestrian Collision*

			Involvement in pedestrian collision		Total
			Yes	No	
Gender	Boy	Count	52	154	206
		% within Gender	25.2%	74.8%	100.0%
		% of Total	10.2%	30.2%	40.4%
	Girl	Count	66	238	304
		% within Gender	21.7%	78.3%	100.0%
		% of Total	12.9%	46.7%	59.6%
Total		Count	118	392	510
		% within Gender	23.1%	76.9%	100.0%
		% of Total	23.1%	76.9%	100.0%

Table 4.4 Shows that boys reported injuries more than girls, based on the proportions of bothgender in the study sample.

Chi-Square Parametric test

Table 4.7: *Chi-Square Test for Age*

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Value		df	Asymp.Sig. (2-sided)		
Pearson Chi-Square	.431[a]	1	.511		
Continuity Correction[b]	.303	1	.582		
Likelihood Ratio	.430	1	.512		
Exact Sig.(2-sided)	Exact Sig.(1-sided)				
Fisher's Exact Test				.526	.290
Linear-by-Linear Association					
.431	1	.512			
N of Valid Cases	510				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 50.90.
b. Computed only for a 2x2 table

Table 4.8

Chi-Square Test for Gender

Value		df	Asymp. Sig. (2-sided)	Exact Sig.(2-sided)	Exact Sig.(1-sided)
Pearson Chi-Square	.861[a]	1	.353		
Continuity Correction[b]	.674	1	.412		
Likelihood Ratio	.856	1	.355		
Fisher's Exact Test				.392	.205
Linear-by-Linear Association	.860	1	.354		
N of Valid Cases	510				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 47.66.
b. Computed only for a 2x2 table

Table 4.9: *Chi-Square Test for Supervision*

Value		df	Asymp. Sig. (2-sided)	Exact Sig.(2-sided)	Exact Sig.(1-sided)
Pearson Chi-Square	.047[a]	1	.828		

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Continuity Correction[b]	.012	1	.911		
Likelihood Ratio	.047	1	.828		
Fisher's Exact Test				.832	.455

Linear-by-Linear Association	.047	1	.828
N of Valid Cases	510		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 49.98.
b. Computed only for a 2x2 table

c. There was no significant difference between genders in experiencing a pedestrian collision $\chi^2(1) = 0.861$, $p = 0.353$. Similarly, there was no statistically significant difference between the categories of ages in experiencing a pedestrian collision $\chi^2(1) = 0.431$, $p = 0.511$. Again, there was no statistically significant difference between children who were supervised andunsupervised in experiencing injuries $\chi^2(1) = 0.047$, $p = 0.828$.

Discussion

Hypothesis HA: The results of the binomial logistic regression, from Table 4.10, show that the *p*-value for safety knowledge (TQRS) is 0.934. This value is greater than 0.05. This means that safety knowledge did not statistically significantly predict child pedestrian injury. Therefore, the null hypothesis (HAo) that child pedestrian safety knowledge does not significantly predict child pedestrian injury is accepted.
Hypothesis HB: The results of the binomial logistic regression, from Table 4.10, show that the *p*-value for safety behaviour (TQRB) is 0.147. This value is greater than 0.05. This means that child pedestrian road safety behaviour did not statistically significantly predict child pedestrian injury. Therefore, the null hypothesis (HBo) that child pedestrian safety behaviour does not significantly predict child pedestrian injury is accepted.
Hypothesis HC: The results of the binomial logistic regression, from Table 4.10, show that the *p*-value for Child pedestrian age is 0.579. This value is greater than 0.05. This means that child pedestrian age did not statistically significantly predict child pedestrian injury. Therefore, the null hypothesis (HC_0) that child pedestrian age does not significantly predict child pedestrian injury is accepted.

Conclusion

In conclusion, child pedestrian safety should be an area of concern once children develop mobility and independence. Injuries sustained from pedestrian collision claims the lives of many children annually; this makes it a public health concern. Equipping children with road safety knowledge and behaviour trainings serves as a means of preventing road injuries. Increased road safety knowledge has been shown to cause an improvement in road safety behaviour among children.
Similar to most related studies, this study shows that child pedestrian age, gender, supervision, safety knowledge and safety behaviour of child pedestrian are not significant predictors of child pedestrian injury. This emphasises that more research is needed to identify significant predictors of child pedestrian injury in Port Harcourt.
However, descriptive data from the study emphasises that educational road safety interventions should target motorcyclists and children alike, towards improving their road safety knowledge and

behaviour.

Recommendations

1. Motorcycle is the major cause of child pedestrian injury in Port Harcourt. This means that educational interventions should consider the children and motorcyclists alike, especially in the areas of road safety knowledge and behaviour.
2. This study shows that adult supervision of children alone when crossing the road is not sufficient to guarantee safety. Therefore, children are to be equipped with reflective school-going materials, as well as road-crossing safety skills and desired behaviour fromyounger age.
3. More studies need to be conducted to investigate significant predictors of child pedestrian injury in Port Harcourt.

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