

# Movements Towards Child Safety: A Spatial Approach, Jamaica 2007



## **Movements Towards Child Safety: A Spatial Approach, Jamaica 2007.**

### **Transportation Study**

**Track:** GIS for Non-Motorized Transportation

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### **Abstract**

Over the past seven years Jamaica has lost two hundred and forty-eight children due to traffic crashes. This represents a large category of vulnerable road users whose lives, in many circumstances, could have been saved if the necessary road safety mechanisms were in place to prevent these crashes. The fact that a lot of children travel to school by foot means that there needs to be measures put in place to ensure that Child Safety is given the priority it deserves. This paper will provide thorough Spatial Analysis of Crashes involving children and highlight how, with the assistance of geographic information systems we will be able to seriously address the issue of Child Safety, especially since Children are our heritage. The Ministry of Transport and Works therefore has moved aggressively to ensure that every child in all Schools is adequately educated with regards to proper road safety practices.

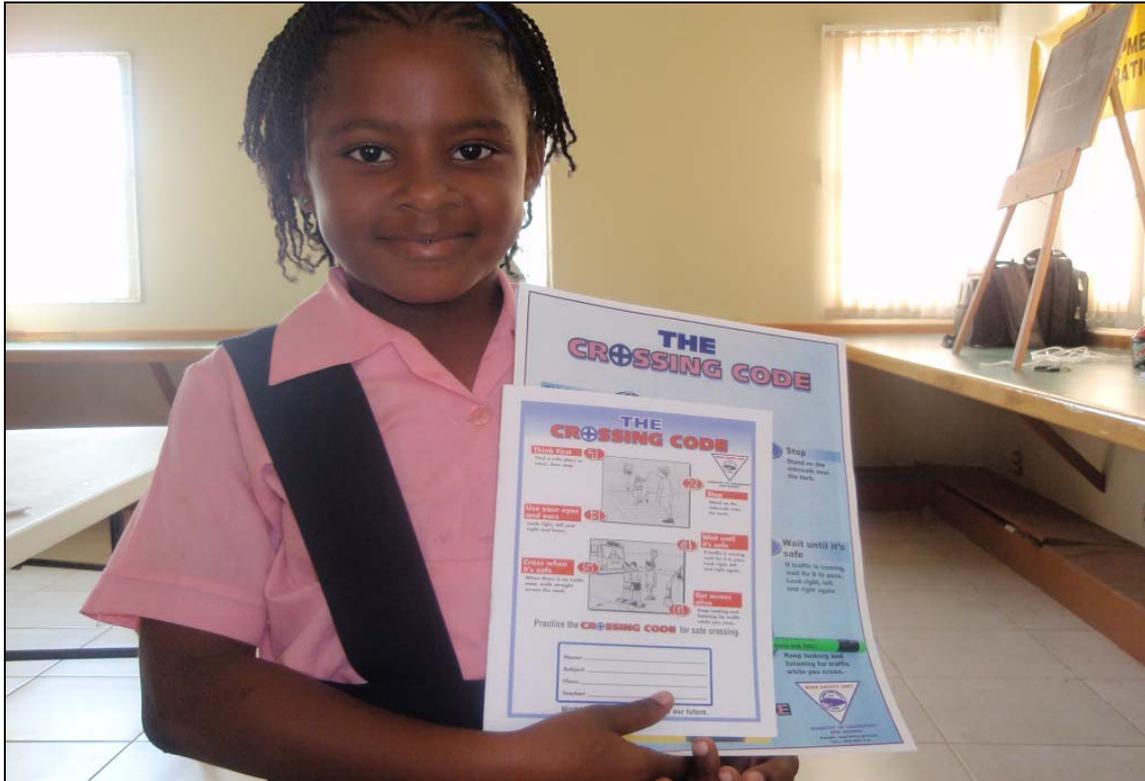
Key words: GIS, Traffic accidents, children.

### **1.0 Introduction**

A road-traffic crash/accident is an event involving a road vehicle that results in harm. Road-traffic accidents are one of the world's largest public health and injury prevention problems. The problem is all the more acute because the majority of victims are overwhelmingly healthy prior to their accidents. According to the World Health Organization (WHO) more than a million people are killed on the roads each year ([wikipedia](#), 2008). The WHO has identified through studies in disability-adjusted life years that road accidents will be the third leading cause of death by 2020. (Cal et al, 2005, p.3184).

The problem of road safety transcends the transport sector. It is a health, social and economic problem as well. The health sector has to stretch its bed capacity in order to

administer to traffic accident victims while still overseeing other important illnesses. Families are displaced and their futures shattered because of the sudden demise of their breadwinners, which is a social welfare problem (Cal et.al, 2005, p.3183). It is estimated that the Ministry of Health has expended over \$ 251 million Jamaican dollars in direct cost for treating motor vehicles accidents in 2006 alone.



**Figure 1: Child displaying the Crossing Code.**

A Critical Policy of the Ministry of Transport and Works is to develop strategies and mechanisms to foster the minimization of child pedestrian and passenger injuries by educating the children in order to improve their knowledge of road use and traffic discipline. It is within this framework that the Ministry has developed a sustainable Road Safety Education in Schools Programme whereby children are empowered in the area of traffic safety. After highlighting fundamental reasons why crashes involving children were occurring, the Ministry will develop additional strategies to curb the prevalence of children in traffic crashes. These strategies will be developed in a collaborative manner with all the relevant governmental, non-governmental and private sector agencies that are involved in child safety. The Child Care and Protection Act require that children are provided with the necessary mechanisms that would allow them to be safe.

## 2.0 The Country

Jamaica is located in the Caribbean, south of Florida. Kingston is the Capital City of Jamaica and is located to the south of island. The country is approximately 234 kilometres in length and 80 kilometres in width and has a population of over 2.7 million people. The country has a mountainous terrain, with its highest peak of 7,402 feet (Wikipedia 2008).

## 2.1 Location Map



Source: [www.worldatlas.com](http://www.worldatlas.com)

## **3.0 Methodology**

### **3.1. Statistical**

#### **DESCRIPTIVE STATISTICAL VISUALISATION**

Descriptive statistics were used to analyse the traffic crashes involving children via the software program, Micro-Computer Accident Analysis Package (MAAP). The analysis is represented in graphs and tables. Statistical Information was obtained from Jamaica Constabulary Force (JCF), Police Traffic Headquarters.

### **3.2. Geographical information System (GIS)**

#### **GIS ANALYSIS**

Traffic accidents locations for the period 2007 were collected with the use of Global Positioning System (GPS) in datum JAD\_2001. GPS data was then transferred to Arc Map 9.2.

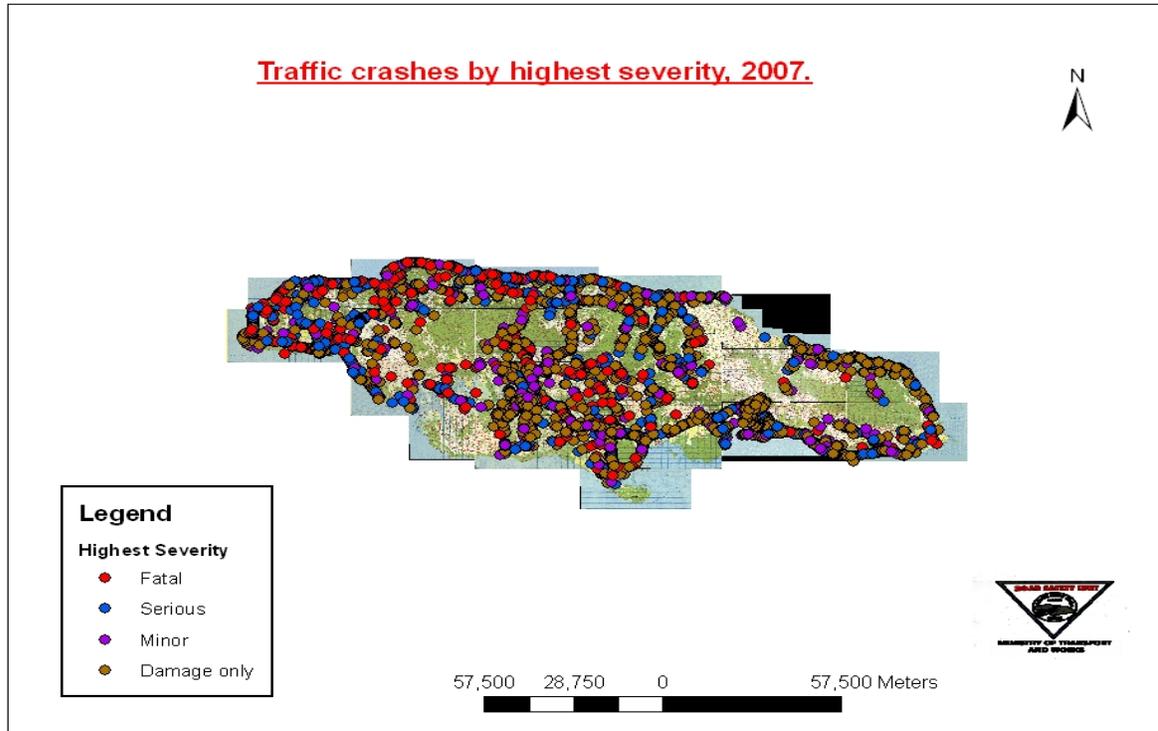
Topographic base map (1:50,000) of the island, Road and GPS points on accidents were correlated to create the maps.

### **3.3 Challenges**

A number of challenges encountered while preparing this paper. These include but are not limited to the following:

- Data availability and collection of GPS points for the entire island; and

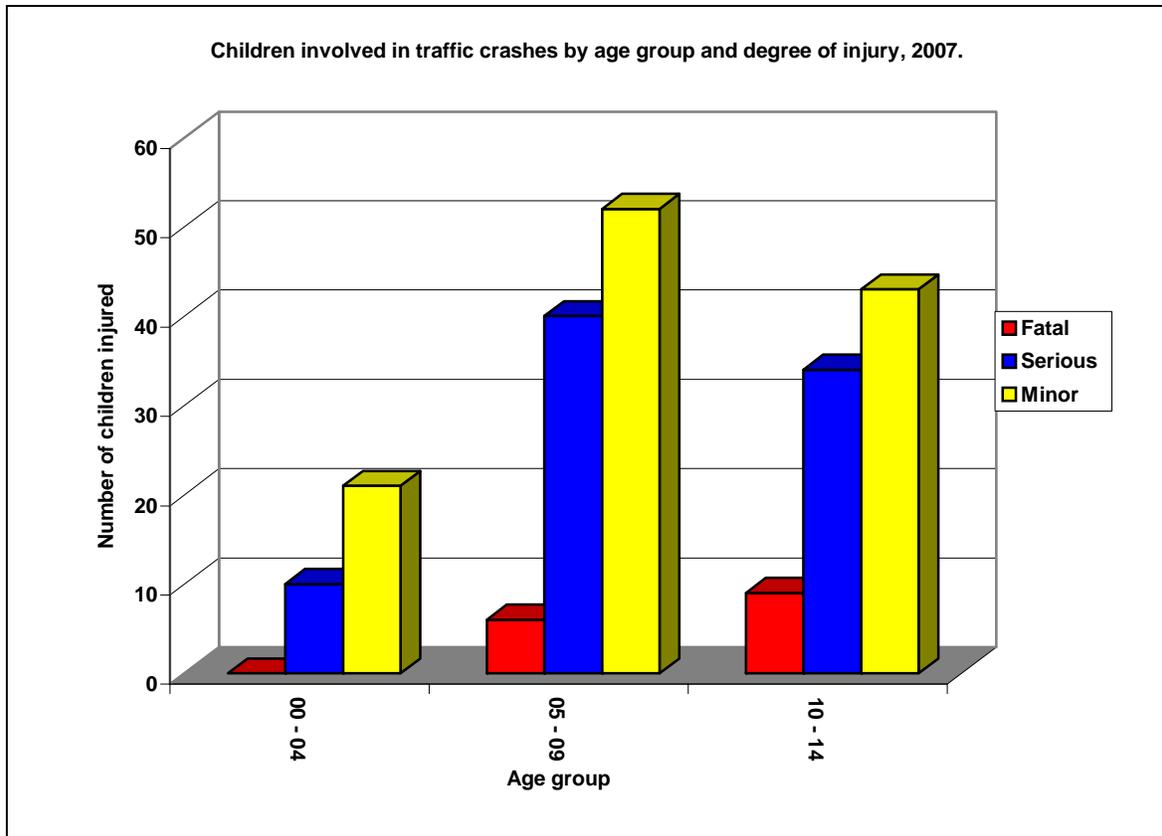
## Results



**Table 1: Children involved traffic crashes by age group and degree of injury, 2007.**

Age group	Casualty			
	Fatal	Serious	Minor	Total
Casualty age				
00 - 04	0	10	21	31
05 - 09	6	40	52	98
10 - 14	9	34	43	86
Total	15	84	116	215

In 2007, there were 184 traffic crashes that involved children. These crash involved 264 motor vehicles and lead to 215 children being injured. 43% of the children injured belonged to the 5-9 age group, while 49% belonged to the 10-14 age group. 39% of these children received serious injuries while 54% received major injuries. 71% of the children involved in these crashes died as a result of these crashes.

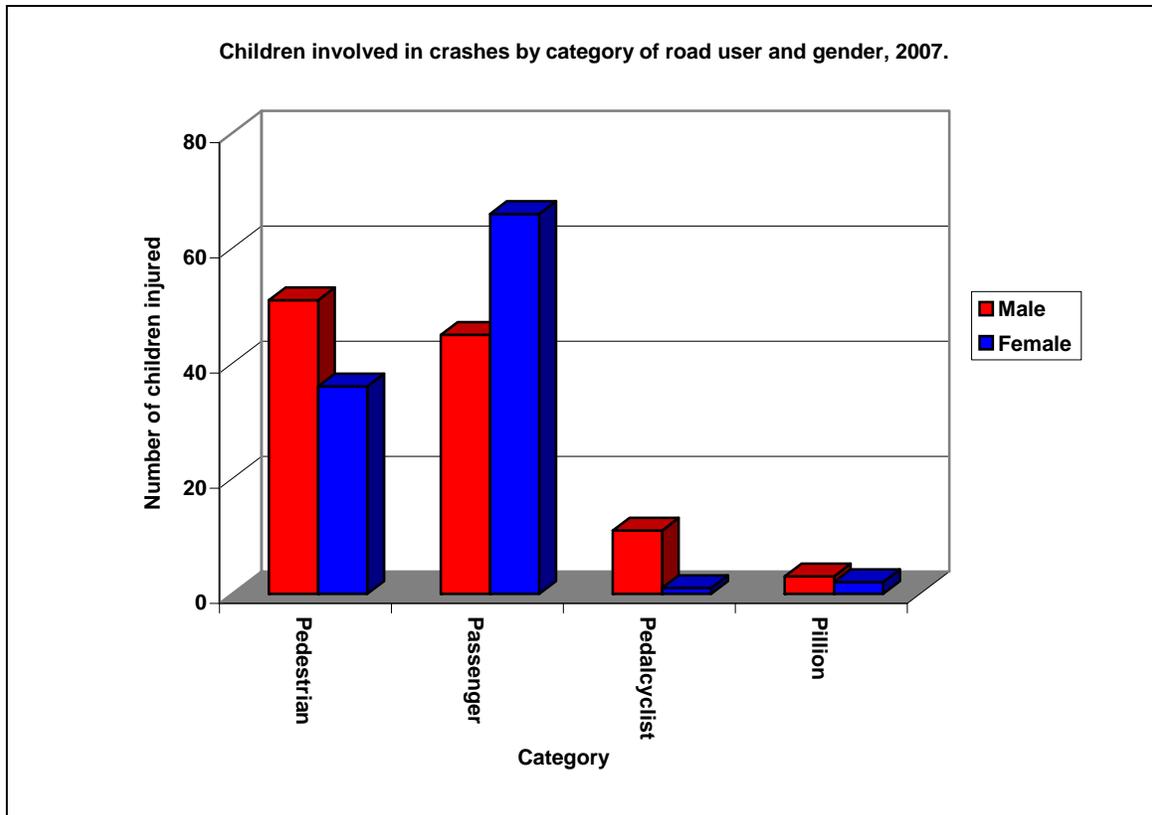


**Figure 2: Children involved in traffic crashes by age group and degree of injury, 2007.**

**Table 2: Children involved in traffic crashes by category of road user and gender, 2007.**

Category	Gender		Total
	Male	Female	
Pedestrian	51	36	87
Passenger	45	66	111
Pedal cyclist	11	1	12
Pillion	3	2	5
<b>Total</b>	<b>110</b>	<b>105</b>	<b>215</b>

51% of the children injured in these crashes were male and 49% were female. 41% of the children injured were pedestrians, while 51% were passengers in motor vehicles. 5% of the children injured were pedal cyclists and it should be noted that they were not wearing a helmet. However, pedal cyclists are not mandated by the Road Traffic Act to wear a helmet.

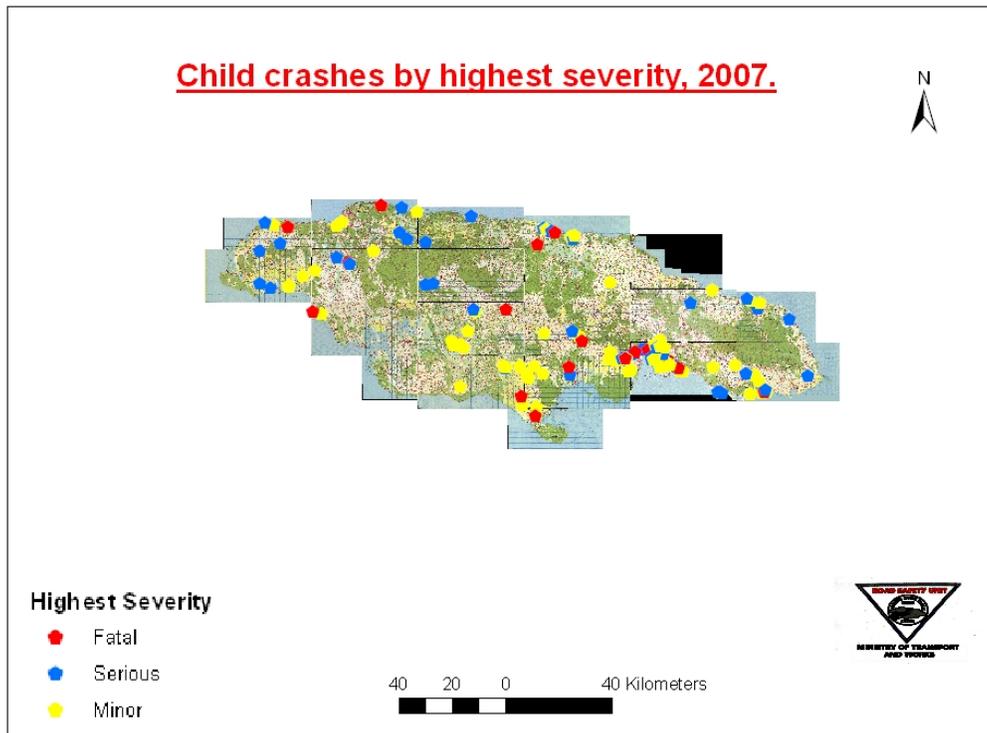


**Figure 3: Children involved in crashes by category of road user and gender, 2007.**

64% of the vehicles involved in these child crashes were motorcars, while 11% were station wagons. 42% of the vehicles involved in these fatal collisions were motorcars, while 16% were station wagons. 21% of these vehicles were trucks while 11% were buses.

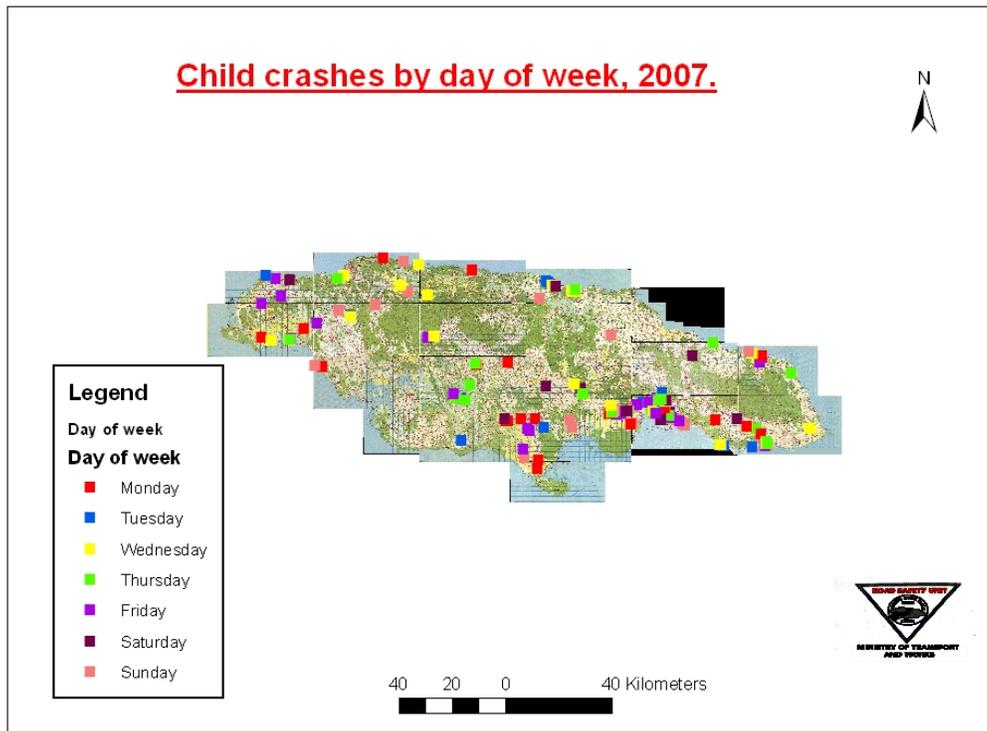
**Table 3: Children involved in traffic crashes by element type and vehicle specification, 2007.**

Element Type	Vehicle Specification						Total
	Police vehicle	Other government vehicle	Private motor vehicle	Public passenger vehicle	Commercial motor vehicle	Other	
Car	1	0	146	22	1	0	170
Station wagon	0	0	21	8	0	0	29
Pick up	0	0	11	0	1	0	12
Van	0	1	4	1	2	0	8
Truck medium	0	0	4	2	4	0	10
Truck heavy	0	0	2	0	8	0	10
Mini bus	0	0	3	12	1	1	17
Bus	0	0	0	3	0	0	3
Motorcycle	1	0	2	0	0	0	3
Tractor	0	0	0	0	2	0	2
<b>Total</b>	<b>2</b>	<b>1</b>	<b>193</b>	<b>48</b>	<b>19</b>	<b>1</b>	<b>264</b>



The data revealed that 73% of the vehicles involved in these crashes were private motor vehicles, while 18% were public passenger vehicles. It was further revealed that 7% of these vehicles were commercial motor vehicles; however, 53% of the vehicles involved in these fatal crashes involving children were private motor vehicles, while 32% were public passenger vehicles. Commercial motor vehicles accounted for 16% of the vehicles involved in fatal crashes involving children. It is profoundly clear that private motor vehicle drivers drove most of the vehicles in child crashes. 53% of the private motor vehicle drivers involved in these crashes caused serious injuries to the children, while 42% caused minor injuries.

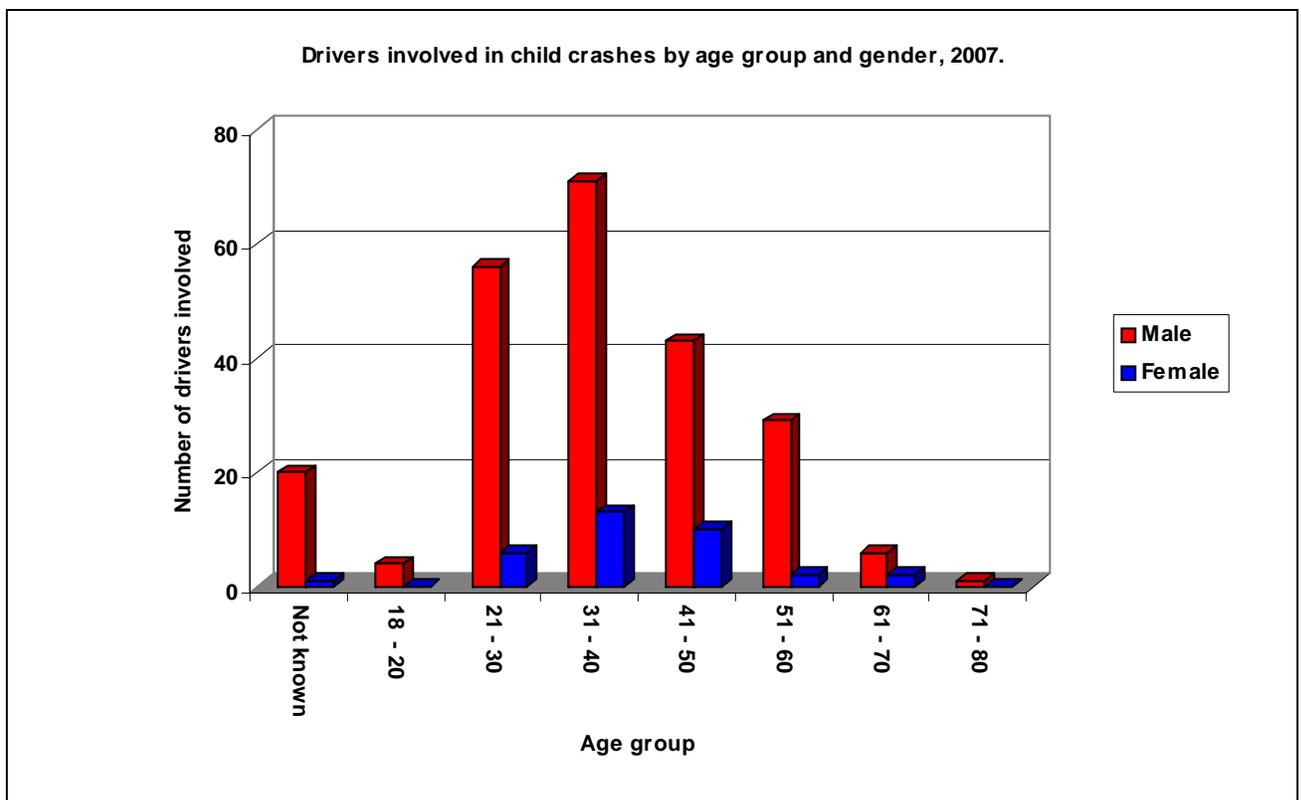
76% of the private motor vehicles involved in these crashes were motorcars while 11% were station wagons. Trucks accounted for 3% of the private motor vehicles involved in these crashes. However, the data further reveals that 46% of the public passenger vehicles involved in these crashes were motorcars, while 17% were station wagons. Minibuses accounted for 25% of the public passenger vehicles involved in crashes involving children.



While it was not possible to ascertain the case of 8% of the drivers involved in 19 crashes involving children the data revealed that 24% of these drivers belonged to the 21-30 age group, while 32% belonged to the 31 - 40 age group. Additionally 20% of the drivers involved in these crashes belonged to the 41-50 age groups. 2% of these crashes involved drivers who belonged to the 18 – 20 age group. 21% of the driver involved in fatal collisions that lead to death of children belonged to the 21 – 30 age while 37% belonged to the 31 – 40 age group. Therefore 58% of the drivers involved in fatal crashes that killed children belonged to the problematic at 21 – 40 age group. 87% of the drivers involved in the crashes were males while 13% were females. However 90% of the drivers involved in these crashes who belonged to the 21 – 30 age group were males while 10% were females. It was also revealed that 80% of the drivers involved in these crashes who belonged to the 31 – 40 age group were males while 15% were females. 24% of the male drivers involved in these crashes belonged to the 21 – 30 age groups while 31% belonged to the 31– 40 age group.

**Table 4: Drivers involved in child crashes by age group and gender, 2007.**

Age Group	Gender		
	Male	Female	Total
Not known	20	1	21
18 - 20	4	0	4
21 - 30	56	6	62
31 - 40	71	13	84
41 - 50	43	10	53
51 - 60	29	2	31
61 - 70	6	2	8
71 - 80	1	0	1
Total	230	34	264



**Figure 4: Drivers involved in child crashes by age and gender, 2007.**

An overwhelming 88% of the drivers involved in child crashes were travelling forward at the time of the collision while 4% were involved in improper overtaking manoeuvre. 3% of these crashes in improper swerving manoeuvre while 2% were reversing improperly. 68% of the drivers involved in fatal collision were travelling forward while 11% were engaged in improper turning manoeuvre. Other drivers were involved in improper overtaking, reversing and swerving manoeuvre.

**Table 5: Children involved in traffic crashes by vehicle manoeuvre and highest severity, 2007.**

Vehicle Manoeuvre	Highest Severity			
	Fatal accident	Serious accident	Minor accident	Total
Forward	13	117	93	223
Stopping, still standing	0	3	4	7
Starting, entrance	0	1	0	1
Overtaking	1	3	6	10
Turning	2	2	3	7
Reversing	1	0	3	4
Parked	0	1	0	1
Swerving	1	5	3	9
Skidding	1	1	0	2
Total	19	133	112	264

Children are essential to our heritage and are very important for the development of Jamaica. 50% of the traffic crashes were serious crashes while 41% were minor crashes. It should be noted that most of these crashes occurred during the period when the children are most vulnerable in the traffic environment.

**Table 6: Child crashes by accident type and highest severity, 2007.**

Accident type	Highest Severity			
	Fatal accident	Serious accident	Minor accident	Total
Bicycle accident	0	12	4	16
Crossing accident	0	7	3	10
Head-on accident	0	12	10	22
Overtaking accident	1	3	4	8
Pedestrian accident	8	46	36	90
Rear end accident	0	5	12	17
Single accident	5	4	3	12
Turning accident	1	1	2	4
Other accident	1	2	2	5
Total	16	92	76	184

50% of the fatal crashes involving children were pedestrian accident while 31% were single vehicle accidents. However it should be noted that 48% of the crashes involving children were pedestrian crashes while 12% were head on crashes. It was further revealed that 9% of these crashes were rear end crashes while 7% were single vehicle crashes. 26% of the child passengers injured in these crashes were involved in head on crashes while 19% were involved in rear end crashes. 17% of child passengers injured were involved in single vehicle crashes.

The issues of children wearing protective devices is a cause for concern as none of the child pedal cyclist injured were wearing protective helmet and the data revealed that only 80% of the child pillion passengers were wearing protective helmet.

**Table 7: Child crashes by main causes and highest severity, 2007**

Main code	Highest Severity			
	Fatal accident	Serious accident	Minor accident	Total
proceeding at excessive speed with no regard to conditions	5	9	3	17
failing to keep to the near side or to the proper traffic lane	0	10	8	18
overtaking improperly on the inside	0	1	0	1
overtaking improperly on off side	1	4	6	11
swerving	1	3	3	7
failing to stop to afford the free passage of pedestrians	0	3	3	6
reverse negligently	1	0	4	5
failing to comply with traffic signs or signals	0	7	1	8
changing from one traffic lane to another without due care	0	1	0	1
inattention or diverted attention	0	5	3	8
turning to the left without due care	0	2	1	3
turning to the right without due care	1	0	3	4
crossing without due care at road junction	0	6	3	9
cyclist holding to another vehicle	0	0	1	1
losing control	0	2	1	3
moving off without taking proper precautions	0	1	0	1
following too closely behind another vehicle	0	4	14	18
skidding (all vehicles)	1	1	0	2
pedestrian crossing road from nearside	0	2	4	6
pedestrian crossing road off nearside	1	2	1	4
pedestrian crossed road, masked by stationary vehicle	0	4	1	5
pedestrian crossed road, masked by moving vehicle	0	1	0	1
pedestrian crossed road, not masked by moving vehicle	0	1	0	1
pedestrian walking or standing in road	0	3	2	5
pedestrian playing in road	0	1	2	3
pedestrian stepping/walking/running/verging into the road off footpath	2	17	10	29
pedestrian slipping or falling	1	0	0	1
boarding or alighting public passenger vehicle without due care	0	0	1	1
falling inside vehicle or from vehicle	0	0	1	1
mechanical defects or failure of tyres or wheels	1	2	0	3
mechanical defects or failure of steering	1	0	0	1
<b>Total</b>	<b>16</b>	<b>92</b>	<b>76</b>	<b>184</b>

The inappropriate usage of the roadway by child pedestrian was the predominant factor that contributed most of these crashes and occurred while children were crossing from both the nearside and offside of the road. These children were also stepping out into the roadway without adhering to the tenets of the crossing code.



**Figure 5: Pedal cyclist approaching pedestrian crossing.**

There were also instances when the children were playing in the road, thus increasing the probability of them being hit by motor vehicle. These behaviours by the child pedestrian in the traffic environment contributed why they were involved in these traffic crashes.

Excessive speeding on the part of motorists accounted for 10% of the reasons why child crashes occurred in 2007. Motorists were speeding without regards for the condition of the road surface or the environment in which they were travelling at the time of these collisions. 31% of the fatal crashes involving children were due to the fact that motorist were engaged in improper speeding manoeuvres, thus, in many crashes, they lost control of the motor vehicle.

Tailgating was also another factor that contributed to the prevalence of crashes involving children. These crashes accounted for 10% of the crashes involving children in 2007. Improper overtaking, turning, swerving, reversing and crossing manoeuvre were other factors that contribute to these crashes.

**Table 8: Child crashes by weather condition and road surface, 2007.**

Weather	Road surface				Total
	Wet + Asphalted	Dry + Asphalted	Wet + Unpaved	Dry +Unpaved	
Fine	10	152	1	2	165
Cloudy	2	5	0	0	7
Rain	12	0	0	0	12
Total	24	157	1	2	184

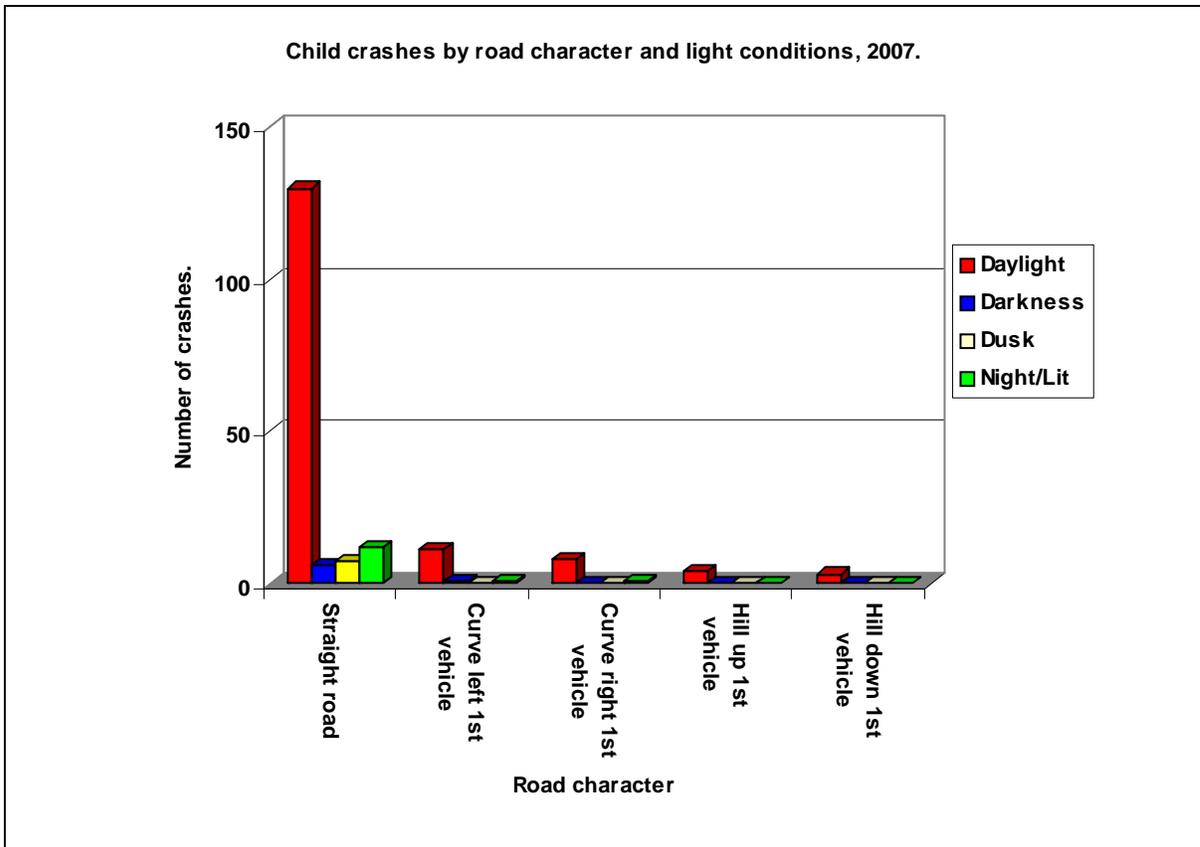
90% of the crashes involving children occurred during fine weather while 7% occurred during rainy weather. 33% of the crashes that took place during rainy weather occurred during the 4 – 6 pm time frame. 88% of the fatal crashes involving children occurred during fine weather. 85% of the crashes occurred on road surface that was wet and asphalted. 88% of the fatal crashes involving children occurred during fine weather it was revealed that 81% of the crashes took place on road surface that were dry and asphalt vehicle 13% transpired in areas where the road surface was wet and asphalted.

**Table 9: Child crashes by road character and light conditions, 2007**

Road character	Light conditions				Total
	Daylight	Darkness	Dusk	Night/Lit	
Straight road	130	6	7	12	155
Curve left 1st vehicle	11	1	0	1	13
Curve right 1st vehicle	8	0	0	1	9
Hill up 1st vehicle	4	0	0	0	4
Hill down 1st vehicle	3	0	0	0	3
Total	156	7	7	14	184

84% of these crashes occurred on straight roads while 12% occurred at corners. 85% of these crashes occurred during daylight whilst 8% occurred in areas illuminated by street lights.

63% of the fatal collision occurred along the straight roads while 31% occurred at corners. 75% of the fatal collision occurred during daylight while 13% occurred in darkness.



**Figure 6: Child crashes by road character and light conditions, 2007.**

## Findings

The data revealed some very interesting issues that must be dealt with in order to ensure that our children are safe within the traffic environment.

1. Most of the crashes involving children were occurring during school days.
2. Most of the crashes were occurring during that time frame when the children were on their way to or from schools.
3. Most of the children injured in traffic crashes were passenger in motor vehicles, even though most of the children killed were pedestrians.
4. Inappropriate usage of the roadways by children was the primary factor that contributed to their injuries.
5. Excessive speeding was a very serious factor that contributed to crashes involving children, especially in light of the fact that a child's body is not fully developed to handle the level of the stress that inevitably occurs as a result of collision.
6. Child pedestrians continued to use the road ways improperly which therefore means that serious efforts will be further made to teach them the crossing code and to have them adhere all the time.
7. The non-use of protective helmet by the child pedal cyclists is of profound concern as all the children injured as a result of these crashes never wore protective gear.
8. The lack of seat belt usage by child passengers is a cause for profound concern.
9. Most of the motorists involved in child crashes were males who belonged to the 21– 40 age group.
10. Most of the vehicles involved in these child crashes were private motorcars.
11. Child crashes were occurring on straight roads where the speed limit was 50km/h.
12. Children aged 5 – 9 who are in Primary Schools accounted for 43% of the children injured in these crashes.

## Conclusion

There is no doubt that the Ministry of Transport and Works has taken the issue of Child Safety serious, as it is an integral tenet of the Ministry's Operations. The Ministry has extended itself further by being an active member of the National Taskforce on Child Protection, thus deploying its resources to further improve the safety of children travelling on public passenger vehicles and disseminating the message to them in a child friendly manner. To this end, the Ministry will be carrying out further studies to make school areas safer by ensuring that all pedestrian crossing facilities are in good condition. Further Spatial Analysis will be carried out to assess traffic crashes that are occurring within 500metres of schools and pedestrians crossings.



Presently, the Ministry has developed a Children Against Reckless Driving (C.A.R.D.) Movement whereby children are being used to bring about an uncommon transformation in the traffic environment. The Ministry will further develop more child friendly road safety materials and definitely, the children will play an integral role in the development of these materials. The Ministry attends most of the activities island wide geared towards children, thus providing us with the opportunity to spread the road safety messages. The Ministry has developed the following programmes to promote road safety to all road users, using the appropriate technology, strategies and media to respond to the current situations.

- Drive for life

- ❑ Walk Good
- ❑ Road Scholars
- ❑ Child Safety

There is a critical need for motorists to transport our children safely, thus the Jamaica Constabulary Force will be called upon to have a zero-tolerance approach, with regards to enforcing the Protective Devices Legislation. All efforts will be made to ensure that no child is thrown from a motor vehicle as was the case in a very tragic and unfortunate situation, which triggered national outcry. Nonetheless, the empowerment of motorists, parents and guardians is critical as of the importance of practising Child Safety will continue.

## Glossary

Children	Individuals under 15 years old.
Bicycle accident	Accident involving bicycle and/ or moped, except pedestrian.
Crossing accident	At junction, motor vehicle on different roads, turning or not turning.
Fatal accident	An accident, which results in death.
Fatality	One resulting in the death of an injured person within 30 days of the accident and as a direct result of the accident.
Head – on accident	Motor vehicle on the same road in the opposite directions, no turning.
Hospital	An institution for health care providing treatment by specialized staff and equipment, and often but not always providing for longer-term patient stays.
Killed	Killed in a traffic accident means, (For the purpose of uniform international statistics) which the person has died within 30 days after the accident has happened as a direct result of injuries received in the accident.
Motor vehicle	Any power – driven vehicle which is normally used fro carrying persons or goods or one that is drawn on the road; vehicle used for the carriage of persons or goods.
Pedestrian accident	Accident involving pedestrian and/or handcart.
Road traffic accident	Is an event, which has occurred in traffic on a road, involving at least one vehicle in motion and has caused injury and/or property damage.
Road	The entire surface of any way or street open to public traffic.
Road user	Anyone traveling or staying on a road or in a vehicle on the road.

Other accident	Collision with train, animal or animal – drawn vehicle, other vehicle like tractors, parked vehicles, when reversing, turning around, entering or moving off the road or when due data are missing.
Overtaking accident	Motor vehicle on the same road when overtaking and travelling in the same direction.
Rear end accident	Motor vehicle on eth same road heading in the same direction, no turning or overtaking.
Single vehicle accident	Accident involving only one moving vehicle, with the exception of pedestrian and bicycle and accident with parked vehicles.
Turing accident	At junction, motor vehicle on the same road, in opposite direction, when turning, intended or carried out.
Vehicle	Any conveyance or structure, which is designed to be propelled or drawn on land and is not rail borne.