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Child Occupant Safety in the Sekondi-Takoradi Metropolis, Ghana: An Observational Study

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Abstract

Seating positions and restraint use influence the severity of injury among child passengers in the event of a crash. In light of this, legislation mandating age-appropriate child restraint use, in suitable seating positions was enacted, yet very little is known about its compliance level. This study therefore aimed to assess restriant use and seating positions among children riding in vehicles. Covert but unobstructed synchronised observations of restriant use and seating positions were conducted at 11 automated signalized intersections in the STM. Overall, 3849 occupants, comprising 1535 motorists and 2314 child passengers were clearly observed. A little over one third of the children were riding in the front seats, of which one-half were younger than 5 years of age. 1 in 5 of the children observed were riding on adults laps, with 42% in the front seats. Motorists' belt use 50.6% (95% C.I=48.10-53.10) was significantly higher than children 6.6% (95% C.I=5.83-7.37). Restraint use among front-seated child passengers (14.0%; 95% C.I=12.63-15.37) was markedly higher than rear-seated ones (3.7%; 95% C.I=2.80-4.61). Children were twice as more (OR=2; 95%C.I=1.14-2.25) likely to be restrained when motorists were belted; and thrice as more (OR=3.18; 95%C.I=2.15-4.72) while travelling with a female motorist. Restriant use was prevalent in private cars, during rush-hours and increased with child's age. Restriant use was incredibly generally low among children, with significant proportion riding in front seating positions. Efforts should be directed at elevating the understanding of parents concerning the importance of restraining younger children in the rear seats, alongside the provision of restraints at subsidized rates or preferably free of charge, while encouraging their use through well-planned and adequately resourced extensive public education and enforcement campaigns.

Key words: Child restraint use, legislation, seating position, Sekondi-Takoradi Metropolis, Ghana

1. Introduction

Every year lots of people lose their lives needlessly on the world's roads through road traffic crashes (RTCs). Annually, over 1.2 million people die prematurely and up to 50 million sustain non-fatal injuries through RTCs (World Health Organization (WHO), 2013). Low-and-middle income countries are most affected. Approximately 91% of the world's traffic fatalities occur in low-and-middle income countries, which account for 72% of the world's population, but have only a little over one-half of the world's registered vehicle population. This indicates that, low-and-middle bear a disproportionately high burden of road traffic fatalities relative to their level of motorization, (WHO, 2014; as cited in WHO, 2013).

Motor vehicle occupants constitute a significant proportion of global road traffic fatalities. Approximately 31% of the world's traffic fatalities are vehicle occupants. The situation in Africa as regards in-vehicle fatality is dreary. In Africa, approximately 43% of traffic fatalities are vehicle occupants, which exceed the global average (WHO, 2013).

Road traffic injuries (RTIs) are the leading cause of deaths among children and young adult in both developed and developing countries, accounting for 22.3% of child fatalities globally. RTIs particularly, are the leading cause of deaths among 15-19-year-olds, the second leading cause death among 5-9-year and 10-14-year-olds, and the ninth leading cause of death among 1-4-year-olds globally (WHO, 2008). In Ghana, over 1900 persons die through RTCs, of which 46.4% are vehicle occupants. Children between 0-15 years are the most vulnerable road users, accounting for 20.7% of traffic fatalities annually (Building and Road Research Institute, 2011).

The seating positions of children in motor vehicles influence the severity of injury sustained and even death in the event of frontal RTCs. The rear seats have been identified to be the best and safest place for children to ride in a motor vehicle. The risk of rear-seated children dying in a fatal RTC overall is 36% lower compared with children in the front seats (Elisa *et al.,* 1998). Lennona *et al.* (2008) also realized that, in the event of RTCs, the risk of fatality while in the front-seating position more than doubles for children 12 years and younger, with an increase in fatality risk by four-fold for the unrestrained.

Child seating positions in a motor vehicle has attracted the attention of road safety professionals and other stakeholder institutions in recent times, particularly for motor vehicles equipped with air bags. Air bags, though, effectively protect adult occupants they are unsafe for child passengers, because of their cataclysmic effect during a RTC. A research conducted by the Children's Hospital of Philadelphia (CHOP), revealed that children exposed to air bags during a RTC are twice as likely to suffer a serious injury (CHOP, 2014).

Studies have reported that restrained rear-seated children are offered superior occupant protection compared with restrained front-seated children (Zhu et al., 2007; Elisa *et al.,* 1998). In a study to determine the effects of seating position, combined with restraint use on children's risk of dying in crashes, rear seated children had 35% reduction in risk of dying in vehicles without any airbags, 31% in vehicles equipped only with driver airbags, and 46% in vehicles with passenger airbags compared with children restrained in the front seat (Elisa *et al.,* 1998). Children secured in the rear seats with age-appropriate restraints are thus offered the best protection while travelling in a vehicle.

An unrestrained child passenger is likely to be killed or seriously injured during a crash. The risk of fatality for unrestrained child passengers increases by four-fold during crashes (Lennona *et al*., 2008). In a 50-km/h crash, an unrestrained child would be thrown forward with a force 30 to 60 times the child's body weight (Royal Safety Authority, 2009). They would therefore be prone to be thrown about easily, colliding with the interior of the vehicle and seriously injuring themselves and other vehicle occupants, and possible ejection from the vehicle. Without restraints, even a crash at only 15-km/h can be lethal (European Transport Safety Council, 2006).

A suitable child restraint primarily works by restraining the child passenger in the event of a RTC. Besides, child restraints are effective in reducing injuries that can occur during non-crash events, such as a sudden stop, a swerving evasive manoeuvre or a door opening during vehicle movement (Agran *et al.,* 1985).

The effectiveness of child restraint as a safety measure has technically been established. Child restraints reduce the likelihood of a fatal crash by approximately 70% among infants and between 54% and 80% among young children (Elvik & Vaa, 2004; Zaza et al., 2001; as cited in WHO, 2013)

There are lots of health benefits associated with correctly installed and usage of child restriants. For instance, in 2010, in the United State of America, child restraints use saved the lives of 303 children ages 4 and younger (Centers for Disease Control and Prevention, 2014). Furthermore, in the United Kingdom, it was speculated that, new rules on the use of child restraints rather than adult seat belts for children up to age 12 years and above will save over 2000 child injuries or deaths annually (United Kingdom Department for Transport, 2006; as cited in FIA Foundation for Automobile and Society, 2009). It was also reported that in Quebec in Canada, annually, the 1150 annual traffic fatalities and injuries of children under 9 years would have been reduced by 70% if they were restriened (Societe de l'assurance automobile, 2014).

In light of the health benefits associated with restraints use, lots of countries have enacted legislations, mandating age-appropriate child restraint use in the rear seating positions. In Ghana, efforts to reduce in-vehicle child injuries and fatalities, led to the enactment of seat law (Act 683, 2004). The legislation mandates children under 5 years to be appropriately restrained and ride only in the rear seats. Children 5-18 years of age, in contrast, are required to travel restrained in any seating position, and motorists have the legal reponsibility to ensure adherence to this traffic safety regulation. Yet a decade after the enactment of this traffic safety regulaion, little is known about its actual compliance in any of the ten regional capitals in Ghana. This aim of this study among others, was to determine restriant use by child passengers who are 15years of age or younger, as well as their seating positions in the Sekondi-Takoradi Metropolis, the regional capital of the Western Region of Ghana. This study will provide a snapshot of the level of child safety delivery in Ghana.

2. Materials and Methods

The aim of this study was to assess child passengers age 0-15 years, restraint use and seating position in the STM, as they are most vulnerable road users in Ghana. Additionally, this cohort has special needs while riding in a motor vehicle. Roadside observation survey was employed in this study, as it captures child restrain use in the real world-settings. It thus has a high validity compared with say, self-reported studies, which is more prone to biases as it relies on the integrity of a respondent.

A detailed road map of the study area was obtained, and observational sites were selected. Automated signal-controlled intersections were selected as they encourage detailed recording of data. These sites were selected in close proximity to shopping malls, educational institutions, and restaurants, essentially to maximize the number of children observed. These sites facilitate detailed screening and recording of restraint use, demographic, and motor vehicle characteristics while these vehicles are momentarily stationary. They also guarantee the safety of the data collectors.

In all, 11 automated signal-controlled intersections were identified in the STM. These sites are fairly distributed in the study area, to provide a representative picture of restraint use across the STM.

Vehicles included in the survey were primarily taxis, private cars, and pick up, save those with tinted windows in this vehicle category. The tinted glasses obscure reliable data collection. Besides, only vehicles with children in the target-age group were included in the study.

Observational survey was conducted in a Wednesday, in December, 2013, purposely to capture traffic flow that is representative of the week. Since good lighting was essential for reliable data collection, visual observations

were made during the day light hours, from 7:00 am - 6:00 pm. Synchronized observations were made in the morning and afternoon peak and non-peak traffic times, to capture seatbelt use characteristics across these different traffic times, with each observation session lasting for a period of 60 minutes. The morning and afternoon peak periods were 7:00 am-8:00 am and 3:30 pm-4:30 pm respectively, and the corresponding non-peak periods were 10:00 am -11:00 am and 2:00 pm-3:00pm respectively.
In order to avoid doctoring the collected data, covert but unobstructed observations were made at the signal-controlled intersections while vehicles were momentarily stationary at intersections' approaches. Child and driver restraint use, seating position, estimated age group, and gender were recorded for all eligible vehicles observed.
Well-trained observers, conscientiously screened vehicles, when traffic stopped at the intersection's approach, by moving along the queue of vehicles to register vehicle occupants restraints, seating positions, as well as vehicle and demographic characteristics of each vehicle in turn. These observers receded to their positions, at the traffic lights, when the queue began to move, as the traffic lights turned green. The process was restarted when the lights were back on red, and continued until the 60 minutes observation time elapsed. Each observation site was served for a period of 4-hours, resulting in a total of 44-hours for the entire exercise.

2.1 Data Analysis

The *Statistical Package for the Social Sciences (SPSS), version 16.0, and Microsoft Excel Spreadsheet* were employed in all data analysis in this study. A database was created using Microsoft Excel Spreadsheet based on previously developed coding scheme. The database was then imported into SPSS for data cleaning. The data cleaning process aided in unearthing and correcting inconsistencies in the database. Frequency tables were generated and cross-tabulations performed using chi-square test to assess statistical significance. Odds ratios (OR) were also calculated at 95% confidence interval (C.I).

3. Results

3.1 General Characteristics of observational survey

Motor vehicles were clearly observed for child restraint use and seating positions in the STM. The road side observation lasted 44-hours, during which time a total of 1535 vehicles were registered (Table 1). Taxis were predominant, with 62% of the observed vehicles, followed by private cars (33%), and pick-up trucks (5%).
In all, a total of 3849 occupants were observed in the 1535 vehicles registered. More than one-half (60%) of these occupants were children and the rest motorists (40%). Among the children population, those younger than 5 years were in the majority (47.4%), followed by 5-6 year olds (34.5%), and 10-15 year olds (18.2%). Similarly, motorists older than 30 years of age, constitute a greater proportion (61%) of the driver population. Male occupants were appreciably higher (69%) than their female counterparts (31%)

3.2 Overall Restraint use in the Sekondi-Takoradi Metropolis

In the roadside survey, 3849 vehicle occupants were screened for restraint use. Of these, 24.1% (95% C.I=22.94-25.26) were restrained while riding in motor vehicles in the STM (Table 2). Seat belt use was significantly higher for motorists 50.6% (95% C.I=48.10-53.10) than for child passengers 6.6% (95% C.I=5.83-7.37). Again, usage rate of front-seated (14.0%; 95% C.I=12.63-15.37) children was appreciably higher than those in the rear seating positions were (3.7%; 95% C.I=2.80-4.61).

Table 1: Characteristics of Observational Survey

Descriptor	Number oberved	Percent (%)
Gender		
Male	2654	69
Female	1195	31
Total	3,849	100
Driver and vehicle type		
Taxi	948	62
Pick-up	81	5
Private car	506	33
Passenger and vehicle type		
Taxi	1413	61
Pick-up	130	6
Private car	771	33
Driver Estimted Age (yrs)		
< 30	596	39
≥30	939	61
Passenger Estimated Age (yrs)		
<1	173	7.5
1-4	923	39.9
5-9	798	34.5
10-15	420	18.2

Source: From author's field study, 2013

Table 2: Restraint use among vehicle occupants in the Sekondi-Takoradi Metropolis

Occupant Group	No. Observed	No. Belted	Usage Rate (%)
All occupants	3849	929	24.1
Drivers	1535	777	50.6
Passengers	2314	152	6.6
Front-seat passengers	645	90	14.0
Rear-seat passengers	1669	62	3.7

	Front-seat passengers			Rear seat passengers		
Descriptor	**No. Observed**	**No. Belted**	**Usage Rate (%)**	**No. Observed**	**No. Belted**	**Usage Rate (%)**
Age						
<1	66	2	3.0	107	8	7.5
1-4	260	16	6.2	663	15	2.3
5-9	185	30	16.2	613	20	3.3
10-15	134	42	31.3	286	19	6.6
Vehicle Type						
Taxi	358	33	9.2	1056	22	2.1
Pick-up	45	6	13.3	84	4	4.8
Private car	242	51	21.1	529	36	6.8
Time of Day						
7:00 am-8:00 am	315	43	13.7	795	38	5.0
10:00 am-11:00 am	37	4	10.8	60	5	9.1
2:00pm-3:00pm	137	9	6.6	369	7	1.9
3:30pm-4:30pm	156	34	21.8	445	12	2.8

Source: From author's field study, 2013

3.3 Child Seating Position

A total of 2314 of child passengers were registered. Majority of these children were observed travelling in the rear seats (72%), while the rest were front seat occupants (28%) (Table 3). One-half of these front-seated occupants were younger than 5 years, with infants (<1 year) making up 10% of this cohort.

Table 3: Percentage distribution of child seating position in targeted vehicles, and estimated age:values are number (%)

Vehicle type	Age (years)-Front seat passengers					Age (years)-Rear seat passengers				
	<1 n(%)	1-4 n(%)	5-9 n(%)	10-15 n(%)	Total	<1 n(%)	1-4 n(%)	5-9 n(%)	10-15 n(%)	Total
Taxi	42(12)	124(35)	112(31)	80(22)	358(10 0)	67(6)	375(36)	408(39)	205(19)	1055(10 0)
Pick-up	3(7)	19(42)	16(36)	7(16)	45(100)	6(7)	35(41)	28(33)	16(19)	85(100)
Private car	21(9)	117(48)	57(24)	47(19)	242(10 0)	34(6)	253(48)	177(33)	65(12)	529(100)
Total	66(10)	260(40)	185(29)	134(21)	645(10 0)	107(6)	663(40)	613(37)	286(17)	1669(10 0)

Source: From author's field study, 2013

In general, the odds of children riding in the front seats of private cars were 35% higher (OR=1.35, 95%C.I=1.11-1.64) than taxis. Children younger than 5 years, particularly, were 28% more likley (OR=1.28, 95% C.I=1.00-1.68) to ride in the front seating positions of private cars compared with taxis. Children, however, were 14% less likely (OR=0.86; 95% C.I=0.6-1.28) to ride in the front seats of private cars compared with pick-up trucks, but not statistically significant.

Children under 5 years of age were observed to be more inclined to ride in the front seats, of vehicles operated by motorists under 30 years of age compared with vehicles operated by motorists older than 30 years, but not statistically significant (OR=1.14; 95% C.I=0.82-1.57)(Table 4).

Table 4: Relationship between Driver's age and Child Seating position

Driver Age (years)	Age of Children (years)				Total
	<1	1-4	5-9	10-15	
<30 (Front seat)	34	87	66	43	230
≥30 (Front seat)	32	173	119	91	415

Source: From author's field study, 2013

Approximately 1 in 5 (430) of the 2314 child passengers observed were riding on adults' laps. Of these, 42% (179) were in the front and 58% (251) in the rear seating positions (Table 5).

Table 5: Proportion of children riding on adult's lap and and estimated age:values are number (%)

Vehicle type	Age (years)-Front seat passengers					Age (years)-Rear seat passengers				
	<1 n(%)	1-4 n(%)	5-9 n(%)	10-15 n(%)	Total	<1 n(%)	1-4 n(%)	5-9 n(%)	10-15 n(%)	Total
Taxi	28(27)	64(62)	7(7)	5(5)	104(100)	32(17)	109(57)	45(24)	5(3)	191(100)
Pick-up	2(20)	6(60)	2(20)	0(0)	10(100)	4(67)	2(33)	0(0)	0(0)	6(100)
Private car	16(25)	43(66)	5(8)	1(2)	65(100)	14(26)	36(67)	4(7)	0(0)	54(100)
Total	46(26)	113(63)	14(8)	6(3)	179(100)	50(20)	147(59)	49(20)	5(2)	251(100)

Source: From author's field study, 2013

Most of these adult-lap riders were in taxis (69%), followed by private cars (28%), and pick-ups (4%) (Table 6). Regardless of vehicle type, majority (83%) of the adult lap-riders were younger than 5 years. Among the 179 front-seated occupants, 89% were younger than 5 years. Similarly, 79% of adult-lap riders in the rear seats were under age 5 (Table 5).

Table 6: Proportion of child passengers riding on adult's lap and vehicle type

Vehicle type	Front seat passengers	Rear seat passengers	Total n(%)
	No. observed n(%)	No. observed n(%)	
Taxi	104(35)	191(65)	295(69)
Pick-up	10(62.5)	6(37.5)	16(4)
Private car	65(55)	54(45)	119(28)
Total	179 (42%)	251(58%)	430(100)

Source: From author's field study, 2013

3.4 Use of restraints by seating position and child's age

In general, there was a very strong statistically significant association between restraint use by age and seating positions. Restraint use increased with age, and from the front to the rear seating positions. In general, restriant use was markedly greater for children older than 4 years of age than for children who are younger ($p<0.001$)(Table 7).

Table 7: Child's age and restraint use

Age (years)	No. observed	No. Belted	Usage rate (%)
<1	173	10	6
1-4	923	31	3
5-9	798	50	6
10-15	420	60	15

Source: From author's field study, 2013

The odds of children riding in the front seats, using restraints were more than four-folds (OR=4.2, 95% C.I= 3.00-5.89) compared with their rear-seated counterparts (Table 2). Front-seated children older than 1 year, in particularly, were 5 times more (OR=5.01, 95% C.I= 3.50-7.13) likely to be restrained as those in the rear seats. However, for children under 1 year old, a reverse trend was observed. For this cohort, front seated passengers were 61% less likely (OR=0.39, C.I=0.08-1.88) to be restrained compared with passengers in the back seats, but not statistically significant.

3.5 Relationship between Driver and Child Passenger Seatbelt Use

The proportion of motorists observed using seat belts was appreciably higher than children using restraints were (50.6% *vs* 6.6%, $p=0.006$) (Table 8). There was statistically significant association between motorists' belt use and child passenger restraint use. Children were twice as more likely (OR=2; 95%C.I=1.14-2.25) to be restrained while riding in a vehicle operated by a restrained motorist compared with an unbelted motorists.

Table 8: Association between Driver belt use and Child restraint use

	Children's restraint status		Total
Drivers' seat belt status:	Unbelted	Belted	
Unbelted	1043	56	1099
Belted	1119	96	1215
Total	2162	152	2314

Source: From author's field study, 2013

3.6 Children's restraint use and Drivers' Gender

The proportion of female motorists observed using seat belts were appreciably higher compared with male motorists (65.4% *vs* 48.9%, $p<0.001$) (Table 9). Children were approximately thrice as more likely (OR=3.18; 95%C.I=2.15-4.72) to be restrained while riding with female motorists compared with male motorists.

Table 9: Occupants restraint use and Gender

Driver gender and belt use						
	Female			Male		
Driver Gender	observed	belted	Usage rate (%)	observed	belted	Usage rate (%)
	162	106	65.4	1373	671	48.9

Relationship between Driver gender and children belt use			
	Children's restraint status		
Drivers' seat belt status:	Unbelted	Belted	Total
Unbelted	1957	114	2071
Belted	205	38	243
Total	2162	152	2314

Source: From author's field study, 2013

3.7 Restraint use and Time of Day

A consistent temporal trend associated with restraint was observed among front-seated children during the day. Restraint use, particularly, in the peak periods was higher compared with the non-peak periods. As indicated in Table 2, restraint use in the morning's peak period (7:00 am- 8:00 pm) was higher than the corresponding non-peak (10:00am-11:00am) period (13.7% *vs* 10.8%, p=0.631). Similarly, usage rate in the late afternoon's rush hour (3:30pm-4:4:30 pm) was higher compared with the afternoon's non-rush hour (2:00pm-3:00pm), (21.8% *vs* 6.6%, p<0.001).

The odds of front-seated children using restraints in the morning rush hour was 30% higher (OR=1.3; 95% C.I=0.44-3.87) compared with the corresponding non-rush hour. Likewise, front-seated children were more than thrice (OR= 3.6; 95% C.I=1.66-7.82) as likely to be restrained during the late afternoon's rush hour as the afternoon non-hour.

Finally, front-seated occupants during the late afternoon's rush hour were approximately twice (OR=1.8; 95% C.I=1.07-2.90) as more to likely be restrained as the morning rush hour.

3.8 Restraint use and Vehicle Type

Children riding in private cars consistently registered higher restraint use compared with the other vehicle types (Table 2). The proportion of private car occupants restrained was higher compared with taxis (11% *vs* 4%, p< 0.001). The odds of children riding in private cars were more than thrice (OR= 3.1; 95% C.I= 2.21-4.46) likely to be restrained as taxis. Similarly, children riding in private cars were 50% (OR=1.5; 95%C.I=0.76-3.00) more likely to be buckle up compared with occupants of pick-up trucks. Again, the odds of pick-up trucks occupants buckling up were approximately twice (OR=2.1; 95% C.I=1.03-4.18) as taxi occupants.

4. Discussion

Road traffic injuries are one of the leading causes of premature deaths, and permanently acquired disability among vehicle occupants, including children in Ghana. In order to ameliorate the situation, legislation, mandating suitable child restraint use in the appropriate seating positions while riding in a vehicle, was enacted. However, very little is known about its compliance level.

The roadside observation survey recorded 2314 child passengers, with an overall restraint use rate of 6.6%. Front-seated occupants registered use rate of 14.0%, while rear seated occupants only 3.7%. Approximately one-fourth (28%) of these children, were riding in the front seating position, and one-half of these front-seated passengers were below age 5. The overall child restraint use rate in the STM compares poorly with 73% in the North Carolina, 66% in Michigan, and 67% in Texas (Ferguson *et al.*, 2000) in the United States of America. Clearly, child restraint use in the STM is incredibly too low.

The low restraint use among children in the STM is not a phenomenon exclusive to Ghana, but other African countries are equally grappling with exact same safety challenge. For instance, roadside observational surveys realized child restraint use rate of 4.1% in the Ibadan Metropolis, in Nigeria (Sangowawa, *et al.,* 2006), and use rate of 8.8% in Bloemfontein, South Africa (Hallbauer, *et al.,* 2011). The low usage of restraints among children on the continent may be due to poor enforcement regime. Laxity in enforcement has been observed as one of the key factors militating against the success of traffic safety regulations in most developing countries.

There is mounting evidence that, it is safer for children to ride in a motor vehicle correctly restrained in the rear seating position. In light of this, it is very worrying that, only 1 in 15 of the children observed in the STM was restrained, and approximately 1 in 4 was riding in the front seating position. Efforts should be directed at elevating restraint use among child passengers, as well as moving them to the rear seating position.

The low restraint use and riding in unsanctioned seating positions predisposes children to traffic injuries in the event of a crash. The risk of fatality for unrestrained child passengers increases by four-fold during crashes (Lennona *et al.,* 2008). According to Ghana's seat belt law (Act 683, 2004), motorists or parents have the legal responsibility to ensure that children under 5 years are correctly secured using the age-appropriate restraints in the rear seats, while those older than 5 years of age should be appropriately restrained in any seating position, while riding in a motor vehicle. The non-compliance of this traffic regulation in the STM is clearly dereliction of motorist/parental statutory responsibility.

Motorists or parents reneging on their statutory responsibilities may stem from lack of awareness. One of the conditions necessary for the success of a traffic regulation is that, it must be known by road users (European Transport Safety Council, 2011). In Ghana, most adult road users are unaware of the requirements of the seat belt law (Densu & Salifu, 2013). If motorists or parents are ignorant of their legal responsibilities, then they are less likely to comply. This partly explains the unfettered traffic safety violations among children in the STM. This underscores the need for the National Road Safety Commission of Ghana (NRSC) to engineer innovative measures of sensitizing the motoring population, particularly motorists and parents, the importance of restraining young children in the rear seats. For instance, the NRSC could take advantage of the recent skyrocketing penetration rate of cellular phones in Ghana, to educate the public on road safety via text messaging.

In general, there was a very strong statistically significant association between child restraint use and age. Restraint use increased with age. Use of restraints was markedly greater among children older than 4 years of age than for children who are younger. This observation is consistent with earlier study in Nigeria (Sangowawa, et al., 2006). This, however, is not the experience in developed countries. In developed countries, more infants and young children ride restrained compared with older children. For instance, Ferguson et al. (2000), Eby et al. (1999) and Williams (1998) found out that, in the United States, restriant use was significantly greater for children less than 4 years of age than for older children. Though, high restraint use among older children has lots of benefits for road safety, efforts should be made to encourage restriant use among younger children as well, given that they are the most vulnerable members of every society.

In agreement with earlier studies (Hallbauer, *et al*., 2011; Sangowawa, *et al.,* 2006; Ferguson, et al., 2000; Eby *et al*., 2001; Eby, *et al.,* 1999), children were more likely to ride restrained when motorists were belted. Though, no causality can be inferred from this statistical association, the strength of the association suggests more children will be restrained when more parents were encouraged to belt up and vice versa. This trend may have been triggered by the influence of safety conscious parents and guardians on children in their company. Naturally, these responsible parents will often ensure that all traffic safety regulations are observed while travelling. A well-informed and safety conscious parent will thus not compromise the safety of his/her children, but will ensure that they are correctly secured in the appropriate seating positions. Besides, it may be due to the subliminal influence parents have on their older children. Children learn by example; parents and other adults particularly are role models, and hence can influence their children's behavior in respect of complying with traffic safety regulations. Parents, who are regular belt users, are thus more likely to imbue in children, in their company, this healthy traffic safety habits. Social influence has been observed to be the key factor predicting the relationship between driver and older children belt use (Cunill *et al.,* 2004). In light of the low belt use among the adult motoring population in Ghana (Densu, 2013; Densu, 2011), the NRSC and other stake holder institutions could take advantage of this relationship to educate and encourage seat belt use among the adult motoring population.

Children were more, particularly, likely to ride restrained in motor vehicles operated by female motorists. Female motorists have been established to be safer motorists. They have a strong sense of obligation to obey traffic regulations, and they would comply with traffic laws even in situations where non-compliance was not perceived as risky (Yagil, 1998; Waller et al, 2000 as cited in Social Issues Research Centre, 2004). They are thus, less likely to breach traffic regulations. Men motorists, in contrast, are more likely to evaluate traffic laws negatively and to underestimate the risks associated with traffic violations (Yagil, 1998). This tendency to disregard traffic rules is rooted in their general deviant and antisocial behaviours (Social Issues Research Centre, 2004). The penchant of female motorist to comply with traffic safety regulations may explain the high restraint use of children in their company.

Approximately 1 in 5 of the 2314 child passengers observed were riding on adult's lap, with majority (83%) of these cohorts younger than 5 years. Most of these adult-lap riders were in taxis (69%), followed by private cars (28%), and pick-ups (4%). In Ghana, it is common practice for parents or guardians to carry their children or wards on their laps while travelling in a motor vehicle, primarily incentivized by the need to protect their young ones, because of their extreme vulnerability. This explains the higher proportion of children under 5 years of age riding on adult laps. Additionally, parents or guardians encourage this practice essentially to reduce travel cost, especially for patrons of public transport, such as taxis, as additional pasenger seat attracts extra travel cost.

Though, these may good intentions, they are unhealthy practices, as these children are highly put at risk. According to the Royal Safety Authority (2009), it is not safe for a parent to hold a child on ones lap, because in the event of a RTC, the child could be crushed between the parent's body and part of the car's interior. Besides, this unhealthy practice may culminate in a whole generation of Ghanaians un-imbued with basic traffic safety habits, which will in turn lead to a general apathy to seat belt use, and other traffic safety related regulations. In view of this, it is imperative that parents are educated and encouraged to appreciate the superior protection offered by age-appropriate child restraints.

Finally, restraint use was associated with vehicle type. Private car occupants were more likely to be restrained compared with taxis and pick-trucks. In general, however, restraint use in all vehicles was abysmally low. Child restraints are not in-built, as in the case of seat belts, but accessories recommended for child's protection. Access to these safety devices therefore comes at an additional cost to the parent. Additionally, these safety devices are used only for a limited period, commensurate with the child's body size and weight. Changing a restraint to meet the protective needs of a child therefore comes at a cost. In light of the costs involved, children from economically disadvantage families are at greater risk while travelling, as these parents cannot afford the procurement and maintenance of the safety device. Again, it has been well established that, even children from high social backgrounds are equally at risk, as their parents often find it difficult to choose and use an appropriate child restraint (Road Safety Observatory, 2014), culminating in general apathy towards child restraints use. These factors may explain the low restraint use among children in the STM. It is therefore imperative that, child restraints are made available to parents at subsidized rates or preferably free of charge, while encouraging their use through well-planned extensive public education and enforcement campaigns. Parents should also be offered technical support in choosing age-appropriate child restraints and educated on their correct usage.

5. Conclusions

1. Child restraints use rate in the STM was incredibly low, with significant proportion of children riding in the front seating position, and on adult passengers' laps.
2. Restraint use was influence by child's age and seating position, driver belt use and gender, time of day, and vehicle type.
3. The low restraints use among children in the STM present a significant traffic safety challenge to these vulnerable road users.

6. Recommendations

1. The NRSC should take advantage of the social influence parents have on children restraint use to elevate restraints use among the child motoring population.
2. Efforts should be directed at elevating the understanding of parents concerning the importance of restraining younger children in the rear seats.
3. Child restraints should be made available to parents at subsidized rates or preferably free of charge, while encouraging their use through well-planned and adequately resourced extensive public education and enforcement campaigns.

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