Civil and Environmental Research
ISSN 2224-5790 (Paper) ISSN 2225-0514 (Online)
Vol.6, No.4, 2014

Distracted Driving: Cellular Phone use among Motorists in the Sekondi-Takoradi Metropolis, Ghana

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Abstract
It is well established that use of cellular phone by motorist in traffic elevates the risks of RTCs. In light of this, the practice was proscribed in Ghana, in 2012. However, very little is known about its actual prevalence. This study therefore aimed to determine the incidence of in-vehicle motorist phone use in the Sekondi-Takoradi Metropolis, the regional capital of the Western region of Ghana. Covert but unobstructed synchronized roadside observations of motorist phone use in traffic were made at 13 observation sites in the Sekondi-Takoradi Metropolis. Using SPSS, binary logistic regression was conducted to assess the influence of gender, vehicle type, time of day, location, and front-seat occupancy on phone driving. In all, 9868 motorists were clearly observed, of which 2.6% were using cellular phones. Logistic regression analysis revealed that, phone driving was significantly associated with front-seat occupancy, time of day, and vehicle type characteristics. Motorist cellular phone use in traffic is significantly, a burgeoning traffic safety concern in the Sekondi-Takoradi Metropolis, despites its proscription. Efforts should be directed at encouraging motorists to adopt responsible use of cellular phones while operating motor vehicles, alongside the rolling out of strict and sustainable enforcement regime to dissuade phone driving.
Keywords: Cellular phone use, motorist, traffic, RTCs, Sekondi-Takoradi Metropolis, Ghana

1. Introduction

Travelling by a motor vehicle is one of the essential activities that we routinely carry out to meet our socio-economic needs, particularly in low-and-middle income countries, as other modes of transport are either nonexistent or in their nascent stage. This activity has become so ordinary that, the risk associated with motor vehicle operation is often overlooked.

Crash data indicates that, lives lost on U.S. roadways each year are equivalent to lives that would be lost from a 100-passenger jet crashing every day of the year (National Safety Council White Paper, 2010). In fact, RTCs were the leading cause of accidental deaths in the US in 2008 and are the leading cause of all deaths for people between the age of 1 and 35 (Strayer *et al.*, 2011).

In light of the risk associated with motor vehicle operation, it is desirable that motorists employ all mental resources on the primary driving task. Occasionally, however, the attention of a motorist may unconsciously be disengaged either by in-vehicle or external activities. For instance, eating, smoking, and interacting with a passenger are some of the traditional in-vehicle motorist distractions. With the advancement in technology, newer forms distractions, such as watching video movies, the use of iPods and communicating over cellular phones, have subtly inched their way into motor vehicles. According to Strayer *et al*. (2011), these new sources of distraction are more impairing than the old standards because they are more cognitively engaging and are often performed over more sustained periods. In general, dual-tasking activities that tie up mental resources for longer periods will create greater cumulative impairments than activities with shorter durations (Strayer *et al*., 2011). This degree of impairment has detrimental effect on driving performance.

Though there are other sources of driver distraction, cellular phone driving has attracted global attention, because of the exponential growth in cellular phone ownership in recent times. Its penetration rates stand at 96.2% globally; 128% in developed countries; and 89% in developing countries (International Telecommunication Union, 2013). In Ghana, the penetration rate as of September 2012 was 99.1% (National Communication Authority, 2012). Cellular phone is undoubtedly ubiquitous.

Epidemiological studies (McEvoy *et al*., 2005; Redelmeir & Tibshiran, 1997) have established that, use of cellular phones by motorists while in traffic elevates the risk of road traffic crashes (RTCs) by four-fold comparable with driving with blood alcohol content beyond the legal limit. In a recent naturalist study, Strayer *et al.* (2011) observed 1700 motorists as they approached a residential intersection with four-way stops signs. Of these, motorists who were using a cell phone were more than ten-fold more likely to involve in statutory stopping violations at the intersection compared with those not using a cellular phone. Again, in a driving simulator study (Strayer *et al.,* 2011), it was observed that motorists who were engaged in cellular phone

conversation while behind the steering wheel, exhibited slower reaction times to the driving environment, as well as difficulty in maintaining traffic lane positions, compared with motorists who were not engaged in cellular phone driving. All three studies provide converging evidence that, phone-distracted driving leads to impairments in driving.

RTCs are one of the leading causes of premature deaths globally, accounting for approximately 1.3 million fatalities and 50 million injuries globally. Over 95% of these deaths and injuries occur in low-and-middle income countries. The cost to countries, many of which already struggle with economic development, may be as much as 1-2% of their gross national product (Peden *et al*., 2004).

Phone driving is a substantial source of RTCs. In the U.S., for instance, the National Safety Council estimated that approximately 25% of all RTCs in 2008 involved talking on the cellular phone, accounting for 645,000 injuries (National Safety Council, 2009; as cited in National Safety Council White Paper, 2010). Similarly, in the Netherlands, the use of mobile phones while driving was responsible for 8.3% of the total number of fatalities and injured victims in 2004 (SWOV Fact sheet, 2010; as cited in World Health Organization, 2011). Again, on 24th July, 2013, Spain experienced her worst train disaster in 40 years when a passenger train travelling from Madrid to Ferrol, with 222 people aboard, derailed claiming 79 lives with 140 injuries. Post crash analysis revealed that, the train operator got distracted by a phone conversation prior to the crash (BBC, 2013).

In light of the safety concerns associated with phone driving, some countries have step up traffic safety efforts, by enacting legislations prohibiting this secondary driving activity. Most of the time, the proscription is particularly directed at hand-held cellular phones. There is, however, mounting evidence that, hands-free phoning has no significant advantage compared with hand-held phoning as both have the same impairment profiles (Strayer *et al*., 2011). In all, 142 countries, representing 93% of the world's population, have laws prohibiting use of hand-held phones, while only 34 countries prohibit use of hands-free phones (World Health Organization, 2013).

Ghana joined the proscription in July 2012, with the enactment of the Road Traffic Regulation, LI 2180 (2012), prohibiting all forms of cellular phones use by motorists while in traffic. In spite of this proscription, very little is known about its actual prevalence. This study therefore aimed to determine the incidence of cellular phone use among motorists in the Sekondi-Takoradi Metropolis, the Western regional capital, the economic hub of Ghana. This result will provide a template for the National Road Safety Commission (NRSC) and other key stakeholder institutions in engineering innovative road safety interventions and for trend analysis.

2. Methodology

Roadside observation survey was employed in this study, as it captures cellular phone use in the real world settings. It thus has high validity compared with say, self-reported studies, which is more prone to biases, as it relies on the integrity of the respondent.

A detailed road map of the study area was obtained and stratified into three areas: the central business district (CBD), outside the CBD, and outskirts of town. The object essentially was to assess motorist cellular phone use characteristics across these distinct strata. Observation sites were selected, ensuring that, they were fairly distributed across the study area. The essence of which was to obtain a representative picture of motorist cellular phone use across the various strata in the study area. Traffic light locations served as a guide in the selection process, as they are fairly distributed in the metropolis. The actual observation sites, however, were selected further away from the traffic lights, in order to register motorist phone use in traffic flow condition, as motorist phone use elevates RTCs only under traffic flow conditions, but not while stationary. In all, 13 observation sites were selected.

Vehicles included in the survey were taxis, buses, minibuses, trucks, and private cars, save that of security operatives and vehicles with tinted windows. This exemption enjoyed by the security personnel was provided by the traffic regulation (LI 2180, 2012). The tinted glasses obscure reliable data collection.

Observational survey was conducted on Wednesday in November, 2012. Since good lighting was essential for reliable data collection, observation was made during the day, from 7:00 am - 6:00 pm. Synchronized observations were made in the morning and afternoon peak and non-peak traffic times, to capture motorist cellular phone 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 8:00 am-9:00 am and 4:30 pm-5:30 pm respectively, and the corresponding non-peak periods were 10:00 am -11:00 am and 2:00 pm-3:00pm.

In order to avoid doctoring the collected data, unobstructed but covert observations of motorist phone use were made at the various observation sites. Only handheld and hands-free phone uses were observed. The observers employed only visual detection techniques in the data collection process. These well-trained observers, thus, conscientiously screened vehicles, for motorist phone use. In the data collection process, only vehicles in traffic moving conditions, were observed. This is essentially, because, motorist phone use is a threat to traffic safety only in traffic flow condition. At each site, observation session lasted for 60 minutes. Each observation site was served for a period of 4-hours, resulting in a total of 52-hours for the entire exercise.

2.1 Data Analysis

The *Statistical Package for the Social Sciences (SPSS), version 16.0,* was employed in all data analysis in this study. Binary logistic regression was carried out to assess driver susceptibility in using cellular phone in traffic. The independent variables (or predictors) used in the model were driver gender, time of day, vehicle type, location, and front-seat occupancy. A 95% confidence interval (C.I) was used in the regression analysis, to assess the statistical significance of the predictors to the model. In addition, frequency tables and cross-tabulations were generated for analysis. Chi-square test also assisted in the assessing statistical significance in this respect.

3. Results

3.1 Characteristics of Observation Survey

In the roadside survey, 9868 motorists in total were registered during the 52-hour observation. Of these, male motorists were the overwhelming majority (95.5%). Details are shown in Table 1. Majority of the motorists were operating taxis (39.2%). The rest were 31.2% (3077) private cars, 16.9% (1667) minibuses, 2.8% (276) buses, and 9.9% (975) trucks.

Table 1: Gender and vehicle characteristics of the observation survey

Descriptor	Number	Percent
Gender		
Male	9421	95.5
Female	447	4.5
Total	9868	100
Vehicle type		
Private car	3077	31.2
Taxi	3873	39.2
Minibus	1667	16.9
Bus	276	2.8
Truck	975	9.9

Source: From Author's field study, 2012

3.2 Motorist Cellular phone use rate

During the 13 site observations, carried out in November 2012, 9868 motorists were observed in total. Of these, 2.6% (260) were surreptitiously observed using cellular phone while driving. The predominant cellular phone activity was hand-held phoning, with (2.26%) of the motorists involved (Table 2).

Table 2: Motorist Phone use activities

Phone Activity	No. of Motorists	Percent (%)
Handheld	223	2.26
Headset	37	0.37
Total	260	2.6

Source: From Author's field study, 2012

3.3 Cellular phone use and Gender

In the study, a greater proportion of female motorists (6.0%) were observed using cellular phones in traffic compared with male motorists (2.5%), though male motorists were the overwhelming majority (Table 3). From Table 4, the odds of female motorists using cellular phone in traffic were 24.4% higher (OR=1.244; p=0.319) than the odds of male motorists using cellular phone in traffic. It was, however, not statistically significant.

3.4 Relationship between phone use and Front-seat occupancy

In the study, a strong significant statistical association was found between motorist phone use in traffic and the presence of a passenger in the front seats. From Table 4, the odds of motorists using cellular phones without a front-seat passenger was approximately 80% (OR= 1.797; p<0.001) higher compared with the odds of driving with a front-seat occupant. That is, motorists were more likely to use cell phone when the front-passenger seating position was unoccupied.

3.5 Cellular phone use and vehicle types

Motorist cellular phone in traffic differed significantly among vehicle types. Table 3 shows that, motorists of private cars (5.0%) were predominantly involved in cellular phone use in traffic compared with the other types. This was followed by truck drivers (2.7%), bus drivers (1.8%), taxis drivers (1.4%), and minibuses drivers (1.3%). The binary logistic regression analysis revealed that, phone driving was significantly associated with vehicle type. As shown in Table 4, private car drivers were approximately thrice as much likely to engage in phone driving compared with taxi drivers (OR(1/OR)=3.413; p<0.001), minibus drivers (OR(1/OR)=3.086;p<0.001), and bus drivers (OR=2.618;p=0.037). Similarly, private car motorists were 60.5% more likely (OR (1/OR) =1.605; p=0.033) to use cellular phones while in traffic compared with truck drivers. In general, private car drivers were more likely to engage in phone-distracted driving compared with motorists of

other vehicle types.

Table 3: Cellular Phone use among Motorists in the Sekondi-Takoradi Metropolis

Descriptor	No. using cellular phones	No. observed	Usage Rate (%)
All Motorists	260	9868	2.6
Gender			
Male	233	9421	2.5
Female	27	447	6.0
Vehicle type			
Private car	154	3077	5.0
Taxi	53	3873	1.4
Minibus	22	1667	1.3
Bus	5	276	1.8
Truck	26	975	2.7
Time of Day			
8:00am-9:00am	46	2331	2.0
10:00am-11:00am	50	2368	2.1
2:00am-3:00pm	74	2452	3.0
4:30am-5:30pm	90	2717	3.3
Location			
CBD	87	3714	2.3
Outside the CBD	71	2220	3.2
Outskirts of town	102	3934	2.6
Total	260	9868	2.6

Source: From Author's field study, 2012

3.6 Cellular phone use by Time of day

There was a consistent temporal trend associated with motorist cellular phone use in traffic during the day, with cellular phone use higher in the afternoon compared with the morning hours. Cellular phone use increased from the morning peak-period (8:00 am-9:00 am) to the afternoon peak-period (4:30pm-5:30pm). From Table 3, phone use increased from 2.0% in the early morning to 2.1% in the late morning, and then 3.0% in the afternoon to 3.3% in the late afternoon. The odds of motorists using cellular phones during the late afternoon (4:30pm-5:30pm) were approximately twice as compared with the morning observation times (8:00am-9:00am; OR(1/OR)=1.613, p=0.010) and (10:00am-11:00am; OR(1/OR)= 1.513, p=0.023). In the same vein, the odds of motorists using cellular phone in the late afternoon (4:30 pm-5:30 pm) were approximately 3.4% more likely (OR=1.034; p=0.832) in comparison with the afternoon's non-rush hour (2:00pm-3:00pm), but this was not statistically significant.

3.7 Cellular phone use as a function of Location

As indicated in Table 4, motorists were 0.8% more likely (OR= 1.008; p=0.960) to engage in phone driving in the Central Business District (CBD) compared with areas outskirts of town, though not statistically significant. Similarly, they were approximately 18% more likely (OR= 1.179; p=0.301) to phones in areas outside the CBD compared with areas outskirts of town, likewise not statistically significant.

Table 4: Binary Logistic regression results of cellular phone use in the Sekondi-Takoradi Metropolis

	B	S. E	Wald	df	P-value	OR	95% C.I. for OR	
							Lower	Upper
Driver Gender								
Male	-.218	.219	.994	1	.319	.804	.523	1.235
Female (reference)								
Vehicle type			64.745	4	.000			
Taxi	-1.226	.170	52.085	1	.000	.293	.210	.409
Minibus	-1.126	.238	22.304	1	.000	.324	.203	.518
Bus	-.962	.462	4.345	1	.037	.382	.155	.944
Truck	-.474	.222	4.558	1	.033	.623	.403	.962
Private car (reference)								
Location			1.257	2	.533			
CBD	.008	.155	.002	1	.960	1.008	.743	1.367
Outside the CBD	.164	.159	1.068	1	.301	1.179	.863	1.610
Outskirts of town(reference)								
Time of day			10.768	3	.013			
8:00-9:00 am	-.478	.187	6.541	1	.011	.620	.430	.894
10:00-11:00 am	-.414	.182	5.150	1	.023	.661	.462	.945
2:00-3:00 pm	-.034	.161	.045	1	.832	.967	.706	1.324
4:30-5:30 pm (reference)								
Front-seat occupancy								
Absent	.586	.133	19.354	1	.000	1.797	1.384	2.333
Present (reference)								
Constant	-2.964	.254	135.963	1	.000	.052		

CBD=Central Business District, OR = Odds Ratios, C.I= Confidence Interval

Source: From Author's field study, 2012

4. Discussions

The cellular phone, though a recent invention of the latter part of the 20th century, it is now ubiquitous because of its relatively cheaper cost and increased attractiveness. Cellular phone ubiquity thus has a huge impact on our socio-economic life.

It is useful for motorists to carry cellular phones with them while driving. A growing body of evidence, however, suggests that it is essential that they are not used, as the distraction caused elevates the risk of RTCs. In light of this, many countries, including Ghana, have enacted traffic regulations, outlawing phone driving.

Regardless of the proscription, phone driving is a significant traffic safety challenge in Ghana. Of the 9868 motorists observed, 2.6% of them were actively using cellular phones during the daytime in traffic, in the Sekondi-Takoradi Metropolis. This infraction may stem from ignorance of the risks associated with the use of the mobile device in traffic, and an epitome of laxity in the enforcement of traffic regulations in Ghana.

The phone use rate of 2.6% in the Sekondi-Takoradi Metropolis is relatively higher than the 2.2% registered in England (Sullman, 2012), 1.87% recorded at traffic lights in Wellington, New Zealand (Drury *et al*., 2012), and 1.27% in Queluz, Portugal (Godinho, n.d), but it is significantly lower than 3.63% in Kerman, Iran (Asgharabad *et al.*, 2013), 3.1% in North Carolina (Reinfurt *et al.,* 2001), and 4.7% and 6.8% in two Minnesota studies in the USA (Eby & Vivoda, 2011) in similar observation studies. It is palpable that, the ubiquity of cellular phone ownership is a potential threat to traffic safety in both developed and developing countries.

Phone-distracted motorists, have difficulty maintaining traffic lane positions (Strayer *et al.,* 2011), and this present a significant traffic risk to the motorist in question and other road users. Pedestrians are the most

vulnerable, particularly on single carriageways, as they have no protection, as compared with other road users. Phone-distracted driving in the Sekondi-Takoradi is therefore a worrying development, as pedestrians form a substantial proportion of the road traffic mix in Ghana.

Cellular phone use in traffic was influenced by gender. Female motorists were more likely to be involved in phone driving compared with their male counterparts. This observation is consistent with previous studies (National Highway Traffic Safety Administration, 2011; Center for Road Safety, 2010; Burns *et al*., 2008). This phenomenon is uncustomary of female motorists, as they have statistically been touted as safer motorists. The disparity may probably be due to the extent of emotional attachment to the mobile device. Emotional commitements determine the intensity of cell phone usage (Hans, 2006). Women use the mobile phone for lengthy talks about personal and emotional matters. Men, in contrast, make shorter calls dedicated more frequently for instrumental purposes such as for coordinating meeting times and places (Kunz Heim, 2003; Mante and Piris, 2002; as cited in Hans, 2006). The cellular phone is thus an indespensable tool in the life of women, as they are more emtionally involved with the mobile device compared with men. This addiction, may explain the penchant of female motorists to indulge in this insipient risky driving behaviour.

Private car motorists were more involved in phone-distracted driving compared with other motorists. These species of motorists are most often better educated (Iribhogbe & Osime, 2008) and hence play very pivotal roles in their various professions. Since communication is critical to the success of any business entity, these persons are most often, are in incessant touch with their business associates or colleague workers. They even do so while on the go, oblivious of the safety implications, by using their vehicles as mobile offices, as the mobile telephony offer them the luxury of either initiating or receiving communications without any physical limitation. Business related calls have been found to be predominant among motorists, particularly private car motorists (Brusque *et al.*, 2008; as cited in Asgharabad *et al.,* 2013). This in-traffic business related calls patently have positive impact on efficiency and productivity.

Inasmuch as unfettered communication is central to economic growth, it is equally critical that, it is not done at the detriment of public safety. Motorists should be educated and encouraged to adopt prudent, selective, and responsible use of the mobile device while in traffic. For instance, motorists could pull up safely on the shoulder of a road, to either receive or initiate communication if the need be. This responsible driving behaviour will, among others, improve road safety.

In agreement with earlier studies (Taylor *et al*., 2003; Reinfurt *et al*, 2001), phone-distracted driving was more pronounced in the late afternoon, compared with the mornings in the Sekondi-Takoradi Metropolis. This observation may be influenced by perceived risk of detection for illegal road user behaviour by Police officers, at this time of the day. High risk perception of detection for irresponsible driving behaviour, has been identified as one of the key factors for positively modifying road user behaviour and thereby encouraging compliance with traffic regulations (Zaal, 1994). In Ghana, enforcement activities are highly visible in the mornings compared with the afternoons, with heavy Police presence. With high visibility of Police officers, motorists are apprehensive of being sanctioned for illegal driving behaviour, and therefore, they do well to comply with all traffic regulations at this time of the day.

Undoubtedly, encouraging compliance with traffic safety regulation with high Police officer visibility, has enormous benefits, it is however transient. In order to ensure appreciable compliance level at all times, well planned and adequately resourced comprehensive programmes of pubilc education and information campaigns, alongside the rolloing out of strict enforcement regime, must be pursued over a long period of time to register a more sustainable perceived risk of detection for irresponsible road user behaviour.

Responsible driving was associated with front-seat occupancy. Motorists were more likely to use cellular phones while driving while there was no front seat passenger. This is consistence with earlier study (Reinfurt *et al*, 2001). Though no causality can be inferred from this statistical relationship, it suggests that, motorits are more likely to be responsible while a front-passenger is present and vice versa. There is mounting evidence that, front-seat occupancy, has significant impact on driver behaviour. An adult fron-seat passenger, prevents risky driving behaviour (Orsi *et al.,* 2013), and hence reduces crash risk (Reuda-Domingo *et al*., 2004;Vollrath *et al*, 2002; as cited in Strayer *et al*., 2011). With the front seat passenger seated next to the driver, both of them share in the awareness of the driving environment. A rear seat passenger, in contrast, does not have the benefit of this driving condition, as he/she is secluded from what is happening ahead, on the roadway. Front-passengers thus have high risk perceptions compared with rear-seated occupants. By virtue of their relatively high risk perceptions, front-seat occupants do not hesitate to alert motorists of potential hazards or admonish them for risky manoeuvres on the roadway. In addition, they help them to navigate, operate the radio or other communications devices, and even take over the driving if the motorist is tired or otherwise impaired (Orsi *et al*., 2013; Strayer *et al*., 2011). The passenger, thus, serves as another pair of eyes in the operation of the motor vehicle, and this significantly reduces risky driving behavior. This may partly explain the relatively low motorist cellular phone use while the front seat was unoccupied.

The positive effect of the adult passenger on driving behavior, suggests that, though enforcement is an

inseparable component of any road safety policy, compliance can be achieved without necessarily Police involvement. It is therefore critical that, education and publicity programmes should be expanded to bring on-board passengers, to aid in the crusade against phone driving, and other illegal and irresponsible driving behaviors. After all, the success of any traffic regulation is not dependent on the number of infringements, but the number of observable compliance in the driving environment. The finitude of Police enforcements makes this approach more favourable, given that the passenger is likely to be with the motorist every step of the way.

5. Conclusion

Motorist cellular phone use in traffic is significantly, a burgeoning traffic safety concern in the Sekondi-Takoradi Metropolis, despites its proscription. This presents traffic safety challenge to other road users, particularly pedestrians, who form a substantial proportion of the road traffic mix in the Sekondi-Takoradi Metropolis.

6. Recommendations

i. The National Road Safety Commission should take advantage of the relationship between motorists and passengers to modify motorist behavior while operating a motor vehicle.
ii. Efforts should be directed at encouraging motorists to adopt responsible of cellular phones while operating motor vehicles, alongside the rolling out of strict and sustainable enforcement regime to encourage responsible driving.

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