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Urban travel patterns and safety among school children around Accra, Ghana

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ABSTRACT

Introduction: Urban transport and travel safety in African cities have not received enough attention in global research and policy. This paper contributes to this gap, by exploring how travel behaviours and patterns of school pupils between the ages of 6–15 years are exposed to risk of fatal injury around Accra, Ghana's capital.

Methods: The study adopted a case study design and multiple qualitative methods of data collection. A total of 370 pupils and their parents were randomly sampled and interviewed, using semi-structured questionnaires and interview guides. In addition, 53 teachers, officials of municipal departments of roads and transport, association of transport operators and other key informants were purposively sampled and interviewed, using interview guides. Finally, the daily journey, to and from school, of selected pupils were observed for a week along major routes and around school zones during peak hours.

Results: The study revealed that walking is still the dominant mode of travelling to and from school, adopted by 53.7% and 57.5% of pupils, respectively. This is because most of the pupils studied (48.6%) live within less than 1 km from their respective schools. Similar to other African cities, the main challenge associated with walking to school, in Accra is that, most pupils are neither accompanied nor protected by any adult. The situation is worsened by their risky travel behaviours such as jay walking, dropping off at areas not designated as bus stops; riding bicycles without helmets and playing while crossing the road after school hours.

Conclusion: The paper draws attention to traffic collisions and fatalities among basic school pupils in and around Accra. Particularly, the paper resonates the worsening trip-to-school behaviours of basic school pupils in African cities. Cities on the continent still provide unsafe, expensive and inefficient transport services. The paper calls for a re-examination of urban mobility and safety among school pupils; as an urgent urban transport policy issue in Africa cities.

1. Introduction

In 2017, the World Bank estimated that “out of the 1.35 million lives lost every year, 93% of them occur in developing countries” (World Bank, 2017). The World Health Organisation [WHO] (2018) has indicated that of the number of deaths worldwide annually, 50 million people get injured (Peden et al., 2004; WHO, 2018).

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Safety in urban transport and mobility has been seen as important in achieving the globally discussed and accepted goals for human development – the Sustainable Development Goals (SDGs: 2015–2030). Thus, the SDGs generate new momentum in ensuring that measures to protect the poorest and most vulnerable are a development priority. As a result, targets for road safety have been included in two goals: Goal 3 which is on health and Goal 11 which is on cities. The inclusion of these road safety targets is a recognition by the international development community that road traffic injuries need to be tackled. Therefore, the two SDGs present a new opportunity for tackling road safety and protecting children. In response to this global call to address travel safety among children, to and from school, this study explores the level of travel risks children are exposed to and how that is shaped by their travel patterns and behaviours.

In many African cities, travel safety has worsened in the last two decades. Till date, sustainable urban transport and travel safety in African cities remain elusive in terms of research and policy. Cities on the continent still provide unsafe, expensive and inefficient transport services. Thus, with only 2.8% of the world's motor vehicles, their road fatality share is almost four times greater (11.1%) (WHO, 2018). Thus, a sustainable, environmentally friendly and technologically innovative transport remains the key missing link in Africa's quest for safe and inclusive cities (United Nations, 2009; Haq and Schwela, 2012; Middleton, 2016). In response to this quest, some transportation research, especially those in sub-Saharan Africa has emphasised road infrastructure (Tatari et al., 2012; Wang et al., 2018) and ensuring efficient public transport systems (Poku-Boansi and Marsden, 2018; Poku-Boansi and Adarkwa, 2013; Abane, 2010).

In the last few years, some attention been drawn to urban transport fatalities, particularly among children. For instance, UNICEF (2015) estimated that the continent has the highest number of fatalities per 100,000 of children below 19 years (UNICEF, 2015). Citing the FIA foundation, the UNICEF estimates that 500 children lose their lives on the world's roads every day and of this number, many are killed on their journey to or from school. In addition to this high numbers of travel related deaths, UNICEF (2015) has also indicated that for every child that dies, another four are permanently disabled; while ten more are seriously injured. These findings have become more worrying because the journey by children to school is a regular activity and takes place during peak periods (Ipingbemi and Aiworo, 2013).

Other studies on travel safety among school children have highlighted: the long distances travelled by pupils to and from school; lack of child-friendly transport infrastructure and services, and uncomfortable travel times (Turner et al., 2003; Zeedyk et al., 2001; Ipingbemi and Aiworo, 2013; Li and Zhao, 2015). Porter et al. (2010) also highlight travel safety among adolescent girls to and from school – as a way of introducing gender dimensions into the debate on urban travel safety among children. In spite of these earlier researches, urban transport policy in African, has not adequately addressed the issue of travel safety among vulnerable residents, especially children within school going age. This is even more germane because of increasing road traffic collisions which continue to claim more young lives in cities of the developing world (Klaitman et al., 2018). For example, the WHO (2018) has suggested that road traffic injuries are the leading cause of deaths for children and young adults between 5 and 29 years. Of these injuries, about 93% occur in low- and middle-income countries where the travel environment is more hazardous (WHO, 2018).

The Ghanaian road traffic collisions and travel safety situation reflect the sub-Saharan African trend. For example, in 2012, 68% of all road collision fatalities in Ghana were in the category of pedestrian fatalities (National Road Safety Commission [NRSC], 2013). Most of these victims were pedestrians, street hawkers, children and other road users in urban areas. Again, in 2016, the Ministry of Transport estimated that road traffic collisions caused 2084 deaths and 10,433 injuries, with pedestrian fatalities constituting 39.5% of the figure recorded. In addition, it had been established earlier by Amoako et al. (2014, 235) that pedestrian activities and walking account for over 50% of daily urban trips in Ghana. This is similar to many African cities. For example, pedestrian activities and walking account for 81% of all trips in Dakar (Senegal), 70% in Addis Ababa (Ethiopia), 60% in Bamako (Mali) and Niamey (Niger), 47% in Nairobi (Kenya), and 42% in Ouagadougou (Burkina Faso) (World Bank, 2005). However, in all these cities pedestrian infrastructure and travel safety are yet to receive any major attention in terms research, policy and interventions.

In terms of travel safety among children, available statistics on urban Ghana raise concerns. For example, between 2014 and 2016, about 9% of casualties recorded in Ghanaian towns and cities involved children below age 16; and were mostly in schools with ages ranging between 6 and 15 years. Of the total number (5,722) of fatalities, 13.5% are children within school-going age. Again, a substantial proportion of the road traffic collisions occurred during school trip hours - 23.5% and 5.9% of road traffic collisions occurred between 2pm and 4pm and 6am–8am respectively (Ministry of Transport, 2016). Similarly, 27.8% and 6.6% of injuries occurred between 2pm and 4pm and 6am–8am respectively (Ministry of Transport, 2016). These periods coincide with the times during which children travel to and from school respectively. Again, it is further indicated that five out of the top 20 sites with the highest frequency of road collisions in the Greater Accra Region of Ghana had basic schools nearby. This emphasises the travel risks children are exposed to during their trips to and from school. As a result, safety issues among school children have become one of the major challenges confronting stakeholders in the public transport arena.

The problem of road safety in urban Ghana is exacerbated by existing transport challenges; including traffic congestions, poor infrastructure, inefficient transport services delivery (Obeng Atuah et al., 2016; Adarkwa and Poku-Boansi, 2011; Kwakye and Fouracre, 1998), and disregard for traffic laws and regulations (Oteng-Ababio and Agyemang, 2012), the use of unroadworthy vehicles (Adarkwa, 2003; Poku-Boansi, 2008), and poor and inadequate pedestrian facilities (Obeng Atuah et al., 2016; Amoako et al., 2014). Amoako et al. (2014) and Obeng Atuah et al. (2016) have indicated that the absence of adequate pedestrian crossing facilities, contributed to increases in pedestrian-vehicular collisions. Other researchers (e.g. Lasmini and Indriastuti, 2010; Takamine, 2004) and organisations such as the WHO (2018) have indicated that poor pedestrian safety records in urban areas coupled with insufficient attention given to the needs of vulnerable groups such as children, pregnant women, old and disabled people have increased pedestrian vulnerability in African cities.

Situated within the above challenges of urban travel safety among vulnerable groups, this paper explores the travel characteristics

and risks among children to and from school. In doing that, the paper responds broadly to an emerging debate about the lack of travel safety infrastructure for vulnerable road users in African cities. The central issue of long trips to and from school among children and adolescents, which is an emerging phenomenon in rapidly growing African cities is explored and the readiness of these cities to accommodate and regulate such trips is discussed. Using Accra, the capital of Ghana, the paper provides answers to the following critical questions: a. what are the journey to-and-from school characteristics in African cities? b. what are the trip patterns and travel behaviours among school children in urban areas in Africa? And c. how does trip patterns and travel behaviours shape travel safety among school children?

In providing answers to the questions above, the paper aims at re-directing the urban travel safety debate towards two conceptual frames. First is to draw attention to the changing trip patterns among children in emerging African cities and their deeper involvement in daily urban trips – which was not the case in the recent past. Secondly, the paper is to unveil the infrastructure and regulatory requirements for accommodating the emerging patterns of journey-to-school trips.

2. A review of urban trip patterns and travel safety in African cities

This study is situated within emerging understandings of urban growth patterns and changing characteristics of daily trips in African cities (Infrastructure Consortium for Africa (ICA), 2016; Obeng Atuah et al., 2016; Amoako et al., 2014). Cities in Africa are growing faster than in any other continent (UN Habitat, 2015a & b). It is also projected that 56% of Africa's population will be urban in 2050 (UN Habitat, 2015a, 16). This growth is characterized by rapid physical expansion, development of informal settlements and complex land use patterns. Closely associated with these spatial and demographic growth patterns are longer daily trips among urban residents. For instance, uncontrolled urban sprawl and poor transport systems limit urban access by creating long distances between origins and destinations which are difficult to cover using the existing systems (Haq and Schwela, 2012; Middleton, 2016). While daily trip distances have become longer, it must also be noted that substantial portions of urban trips are made through walking or failed public transport systems (ICA, 2016; Amoako et al., 2014; Poku-Boansi, 2008).

Unlike cities in the developed world, the emerging longer daily trips in African cities are challenged with poorly regulated and inefficient urban transport systems (United Nations, 2009; Haq and Schwela, 2012; Middleton, 2016). This is caused by poor quality of transport service and inadequate transport infrastructure. In cities where there are efficient public transport systems and improved infrastructure to support their operations, long daily trips are well managed with no or minimal safety issues (Litman and Fitzroy, 2010; Jacobsen, 2003). The case of African cities points to the contrary. The continent is challenged with poorly developed transport network systems; lack of modal coordination and inter-connectivity and inadequate investments in smart and innovative technologies (Gwilliam, 2011). These challenges have led to unsafe, expensive and inefficient transport services.

In the face of the above challenges, urban travel patterns in African cities are dominated by pedestrian, intermediate and non-motorised trips (Haq and Schwela, 2012). The safety of these trips has been a source of concern to researchers and practitioners alike. For example, in Ghana, as in many African countries, it has been established that 22% of those killed through road collisions are pedestrians (WHO, 2018; Galanis and Eliou, 2011) including school children. Using the case of urban Nigeria, Ipingbemi and Aiwoor (2013) indicated that 65% of pedestrian collisions involve children between 4 and 12 years, and mostly occur immediately before or after school. In Ghana, available statistics from the NRSC (2013) put the number of road fatalities at 2198; with the number of pedestrians involved increasing by 36% from 2121 in 2015 to 2961 in 2016. In addition, a total of 11,293 injuries were recorded within the period. Of the total number of crashes recorded in 2016, majority of them occurred along the major arterial roads which run through built up areas. A more disturbing picture is that child fatality increased by 40.2% from 286 in 2015 to 401 in 2016. This supports an earlier view that school children encounter difficulties in coping with traffic and are vulnerable to road traffic crashes (McPherson et al., 1998). The foregoing conceptualises travel risks and lack of safety among children on their daily trips, to and from school.

Firstly, it is established that average distances covered by children, to and from school, have increased over the last few decades, due to rapid urbanisation and changing land use patterns (Cobbinah et al., 2017). Urban transport literature in the last few decades have highlighted on several attributes of travel characteristics of school children. Scholars such as McDonald (2008), McMillan (2005) and D'Haese et al. (2011) have suggested that distance to school is a critical determinant in school children's travel analysis and that it has been increasing in growing cities. In addition, substantial parts of these trips are made by walking, using intermediate or non-motorised vehicles (Poku-Boansi, 2008). These expose most children to many and varied dangers during their trips to school. Again, it places a greater burden on parents who want to ensure the safety and wellbeing of their children. Even in cases where school authorities provide buses for daily school trips, there are no clear mechanisms for ensuring travel safety.

In the second conceptual view, there is continuously reduced transport service efficiency, safety and quality – dominated by the private sector and an almost failed state transport system. Available vehicles are not friendly to children and vulnerable users (Middleton, 2016). Infrastructure available is poor and not friendly to vulnerable pedestrians and children. They are not well coordinated and limited in technology. Heavy traffic volumes and exceeded speed limits put children and other vulnerable road users at greater risks (Bradshaw, 2001). There is growing recognition among urban and transport planners of the need to have efficient public transport systems that deal with the needs of the vulnerable especially children in cities of developing countries due to rapid growth, urbanisation and increasing travel needs (Cobbinah et al., 2017).

The third conceptual viewpoint highlights the reduced involvement of parents and guardians in the arrangement of daily trips to school. Due to the demands of existing urban livelihood patterns, there is less involvement of parents and guardians in children's daily trip to and from school. As a result, many parents have less control over decisions made about their children's travel mode to and from school (McMillan, 2005). In cases where parents or guardians cannot take their children to school, alternative arrangements are made.

These arrangements include joining school buses; going in state/public bus or rented taxis; walking long distances or using bicycles. Urban transport policies in most African cities do not seem to consider these important aspects of daily travel patterns. Hence travel safety among children, to and from school have been left in the hands of households, school authorities and the children themselves.

The three viewpoints above set the conceptual basis for analysing the trip patterns of school children and their associated travel safety issues. While children trips and travel safety form an important part of daily mobility in most Africa cities (Ipingbemi and Aiworo, 2013), very little has been done about the challenges associated with their changing trends (Obeng Atuah et al., 2016; Amoako et al., 2014). Emerging with their rapid growth of cities in Africa are changing trip patterns and travel safety among children. Using the conceptual contexts established above, this paper explores the travel patterns and safety among children in peri-urban Accra, Ghana.

3. Study settings and methodology

3.1. Study settings

The locational context of the study is Adentan Municipality, a peri-urban local government area, 10 km north-east of Accra, the capital of Ghana (See Fig. 1). It is situated on a total area of 98.3 km², with relatively low lying and undulating terrain, about 50 m above sea level (GSS, 2014a & b; Adentan Municipal Assembly [AdMA], 2013). As a rapidly growing peri-urban area, the municipality is strategically located along the major Accra – Aburi – Koforidua and the Accra - Dodowa road corridors, which are the main links from the capital to the Eastern and Volta regions of Ghana, respectively. Being major trunk roads receiving heavy daily traffic flows, the two arterials expose pedestrians to the danger of being knocked down by motorists. High traffic volumes and exceeding speed limits are critical transport and safety challenges in the municipal area.

Serving as one of the emerging residential areas to Accra, the municipality has grown in population and residential densities over the last decade. At an annual growth rate of 2.48%, the population of the municipality has increased from 78,215 in 2012 to 90,012 in 2017 (GHS, 2017; GSS, 2012). Out of this population, about 15% are indigenes, while 85% are urban residents who live in the municipality and work in Accra. The Municipality has 18 sub-urban communities that are rapidly urbanising, with 12 communities already exceeding Ghana’s 5000 urban population threshold (Cobbinah et al., 2017). According to Cobbinah et al. (2017), this growth has led to several physical development challenges, including multiple land sale by traditional institutions, land title acquisition

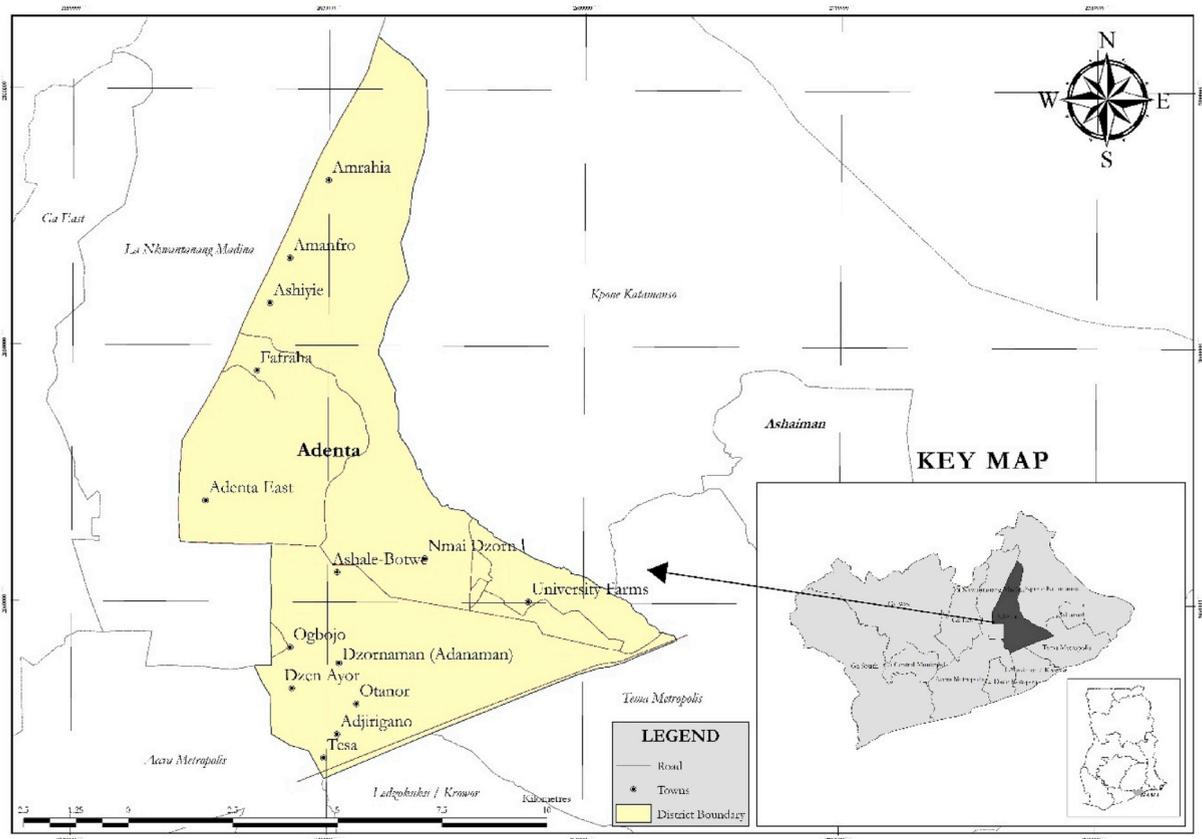


Fig. 1. Geographical location of the Adenta Municipality. Source: Ghana Statistical Service (2014a).

problems, and encroachment on road reservations and government lands (AdMA, 2013; Yankson et al., 2004) and its attendant evidence of poor accessibility in terms of street connectivity, motorability and mobility (Poku-Boansi and Adarkwa, 2015).

3.2. Approach and methods

The study adopted a case study of five basic schools in the Adentan Municipal Area (see Fig. 2). These schools (Ebenezer Primary School, Victory Presby School, Adenta Community School, Adenta Roman Catholic School and De Youngsters School) were purposively sampled due to their locations along major road corridors and high population of pupils. A case study approach was selected to give room for in-depth and real-life context (Yin, 2009, 17) study of children, their parents and all other stakeholders involved in the daily trips to and from school. For the study of an emerging phenomenon, such as urban travel safety among school children within the context of urban planning research in African cities, the case study approach is appropriate (Duminy et al., 2014).

Two groups of respondents were sampled and interviewed for the study. Firstly, data were collected from 370 pupils and their parents, randomly sampled from a total of 1,500, using semi-structured questionnaires and personal interviews. These respondents were to answer questions on the reason(s) for their selection of school, mode of transport to school; challenges of commuting; level of travel safety; and exposure to risks of collision. Secondly, through semi-structured interviews, data were collected from 53 officials and relevant key informants, who were purposively sampled, due to their depth of knowledge about the issue under investigation. These were made up of officials of the Municipal Education Directorate (3); authorities of the schools under study (6); school drivers (3); taxi drivers (12); drivers of public buses carrying pupils to the schools (22); officials of the Department of Urban Roads (1); Municipal Transport Department (2); Ghana Road Safety Commission (2); and Motor Traffic and Transport Unit of Ghana Police Service (2). Among several other issues, the second group of respondents answered questions on the following: transport schedules and arrangements for pupils in the municipality, modal choices, preferences and major routes to school; traffic volumes and patterns; type of pedestrian safety infrastructure available; rates of road traffic collisions involving school children; and mechanisms for protecting school children.

The interviews were followed by a 5-day direct observation of school children along the main school routes and around the school premises during morning and evening peak hours, when students were reporting for and leaving school, respectively. This was to determine the behaviour of pupils and assess their levels of risk(s) during their trips to and from school. Key among the observed practices were speed limits to school; stopping and parking practices; availability of traffic assistants around school and at major pedestrian crossing. The data were collected over a 3-month period spanning between September and December 2016.

Data collected were in both quantitative and qualitative formats. The quantitative data were in the form of statistics of pupils and their parents; while the qualitative data were in the form of quotes from officials and key informants interviewed, written notes from interviews and direct observation; and photos taken during field observations. Statistical data were analysed using SPSS (version 16), through which simple means and proportions of responses were calculated. In contrast, qualitative data collected were analysed using theme and content analysis, using NVIVO 10 software programme. The NVIVO 10 software programme helped in the generation of themes, codes and categorisation of responses from interviews. In reporting, both qualitative and quantitative data were discussed using descriptive statistics and relevant quotations to support various assertions.

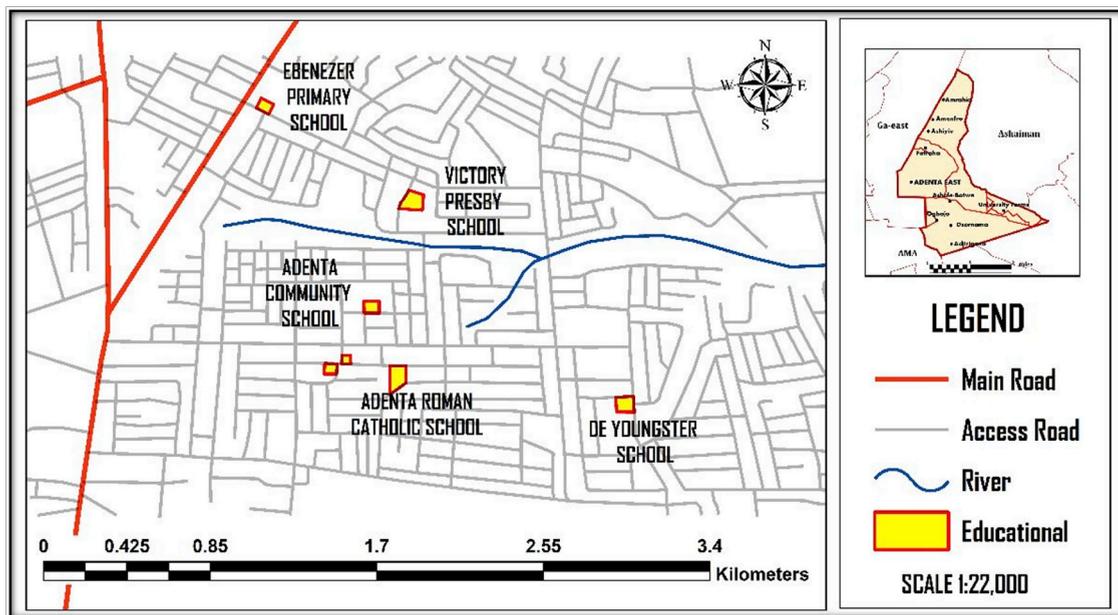


Fig. 2. Location of study schools in the Adenta Municipality.

4. Results and discussions

4.1. Type of school attended, trip distances and travel safety

The survey of school children and their parents revealed that, 62.5% and 37.5 of the children studied attended private and public (government owned) basic schools respectively. This reflected the general trend in the municipality as gathered from the Municipal Education Directorate. A report collected from the directorate revealed that most of the children in the Municipality attend private schools, an emerging trend in urban Ghana. At the municipal level, 58% of children within school-going-age attended private schools; while 42%, attend government-owned and managed basic schools. Two main reasons were mentioned by parents interviewed as justification for the choice of private schools for their children. Firstly, 55.7% of parents were of the opinion that children in private schools perform better than their counterparts on public schools while secondly, 54.3% indicated improved teaching and learning environments.

In all cases, their current schools were further from the location of their homes, and required daily commuting, using motorised transport or walking for longer distances. All the transfers of children recorded were from public basic schools to privately owned ones. This is primarily because the public schools studied were situated within residential neighbourhoods and are usually accessed by children within walking distances. Though publicly owned basic schools are free, they are largely perceived as low-performing, poorly supervised and inefficiently managed. In addition, most of these children of middle to high income parents travel over longer distances to and from the perceived high performing private basic schools. Hence, there are perceived relationships between the choices of private basic schools; distances travelled to and from school and performance of school children. While current statistics from the Ghana Education Service shows that the average private basic school performs better than public school in urban areas, it is difficult to connect distances and mode of travel to this assertion.

Most private basic schools are located close to main or access roads; and hence pose great danger for children crossing to and from school daily. The reason found for this locational challenge is that most private schools are not in areas originally planned for educational purposes. They are usually re-zoned from other uses such as residential and commercial. However, all the schools studied (both publicly and privately owned) were located along an access road or an alley (see Fig. 2). As result, there was the need for traffic wardens. Our field observation revealed that none of the schools studied had a designated traffic warden to help children, who cross roads to and from school. The private schools had gate-keepers who ensure proper parking and safety of children when they are on the schools' premises; while the publicly owned schools had neither a traffic warden nor gate-keeper. Consequently, children in these schools are always at risk of being knocked down during peak hours. Interviews with school authorities revealed that, parents and guardians have been informed that it is their responsibility to ensure the safety of their children until they get to the school compound. The view of a parent (who drives her children and picks them up daily) on the issue is illustrated below:

"...every time I come to the school in the morning to drop my children or to pick them in the afternoon, you find other children trying to cross the road without any assistance. I sometimes have to stop other drivers to allow them to cross. I always get scared and I have informed the school authorities and also tabled this in one of our Parent Teachers Association's meetings, but I think nothing has been done yet" Parent #1

From the view expressed above, parents who drive their children to school are not as apprehensive about their travel safety as they are about their safety around the school during "drop off" and "pick up" times. For these parents, the daily dangers school children are exposed to, are observed. Pupils have difficulties trying to cross the road in front of their schools and this exposes them to danger.

4.2. Mode of transport and travel arrangements to and from school

The average distance covered to and from school, ranges from less than a kilometre to over 5 km with majority of school children (48.6%) travelling less than a kilometre to and from school (see Fig. 3). From Figs. 3 and 25.4% cover a distance between 1 km and

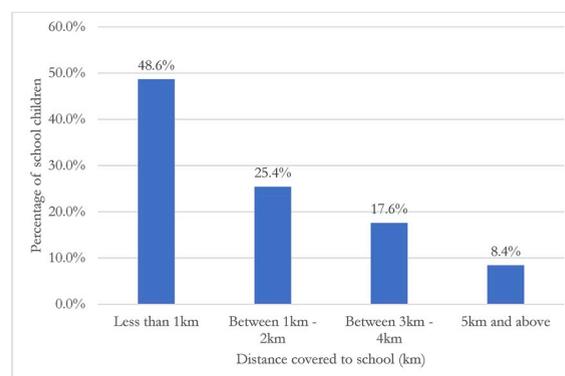


Fig. 3. Distance to and from school.
Source: Field Survey, 2016.

2 km while 17.6% and 8.4% cover distances between 3 km and 4 km and 5 km and above to school respectively. Safety among school children along roads and around their school premises in urban areas is a concern to many parents and guardians. Most of these parents belong to the working class and travel long distances between their homes, their children’s school and work places in limited time. Due to traffic congestion along most urban roads, parents are in a rush during peak hours to and from the children’s school. These rush periods created by parents, is a key travel safety issue children face on daily basis.

The distances covered to and from the schools, as presented in Fig. 3, reflect their proximity to the neighbourhoods of the children studied. Over 70% (74%) of children live within 2 km of their schools. This could be seen as a positive sign, if the children travel with safe and secured transport modes; accompanied by the parents or designated teachers/adults. This was not the case. Fig. 4 presents data on the modes of travel used by these school children to and from school. From Fig. 4, walking is the dominant mode of travelling to and from school, with 63.7% and 65.5% of respondents indicating their choice of this mode to and from school respectively. The use of public transport modes and school bus had 18.3% and 4.9% of respondents respectively to school whilst minibus use (16.1%) and school bus use (5.2%) are used as travel mode from school. Private cars used as a travel mode to school was 7.4% for those travelling to school and 7.1% for those travelling back from school. From Fig. 4, it can be argued that the higher proportion of school children walking to and from school exposes them to the danger of being knocked down when crossing the road especially because of the absence of pedestrian facilities along the major arterials in the Municipality.

Two-thirds of children who walk to and from school are unaccompanied. It was revealed that both parents of these children are actively employed and cannot accompany them to school every morning. This phenomenon is very dangerous and exposes the children to danger due to their limited capacity to evaluate risk. The 46.3% and 42.5% of children who use motorised transport to and from school respectively travel in the company of others. However, nothing is done to ensure their safety during the trips; except in cases where they travel with their parents or guardians in private cars. This formed only 12.4% and 11.7% to and from school respectively (see Fig. 4). This finding is important because, parents and guardians have a higher stake among all the stakeholders in ensuring that their kids arrive in school safely and return same. In doing so, these parents go through every length to ensure that the daily trips of their children are incident free. From the field interview, 35.8% of parents indicated that they take direct responsibility of their children’s trip to and from school, by driving them whilst others (12.6%), indicated that they rely on friends who have vehicles to drop off and pick up their kids in and from school respectively. However, due to pressure of getting to work early and the growing traffic congestion problems in the Adenta Municipality (Poku-Boansi and Adarkwa, 2015), most of such parents (50.1%) resort to hiring public transport operators to convey their children to school. These formed 8.3% and 6.8% of children to and from school respectively, in shared taxis; and 2.4% and 2.7% in hired taxis (see Fig. 4).

Discussions with an official of one of the schools revealed a major concern which they have been bringing to the notice of parents, but not much has been done:

...some of the commercial drivers, because of their desire to make more money which is seen in the number of passengers they can carry in a day or the number of trips they can make, drive these school children very fast by ignoring the approved speed limit of 50km/hr thereby putting the lives of the children at risk. In some instances, these drivers drop off the kids at the entrance of the school thus endangering the lives of the school children from other vehicles ... School Official #1

The assertion of the official of the school was confirmed by a parent who had this to say:

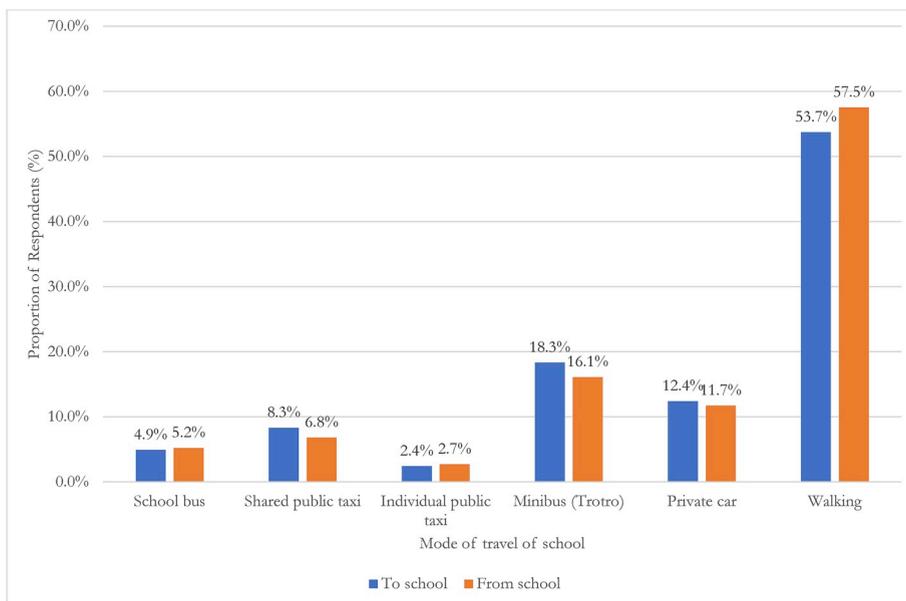


Fig. 4. Mode of travel and from school. Source: Field Survey, 2016.

“I arranged with a taxi driver to drop and pick up my kids from school. However, I decided to stop the practice because my last child (7 years) was knocked down by another taxi driver who was in a hurry to drop some other kids in school, injuring my boy. It was a nightmare for me. This happened because the driver I hired dropped them (my kids) at the entrance of the school as he was in a hurry to pick another passenger to town. I have now decided to do it myself even though it’s very stressful at times. It’s a worthy sacrifice I must make just for the safety of my kids”Parent #2

School authorities as stakeholders also have a role to play in the transportation of their pupils to and from school by procuring buses to carry its pupils. Interviews with school authorities indicated that parents are charged either weekly or monthly fees to enable their children to use the school buses. These fees range from GHS 150 to GHS 250 per child per term. In instances where the schools do not have a bus of their own, they resort to the hiring of commercial vehicles to assist the school children get to and from school, especially during the morning and evening rush hours. These commercial vehicles charge a bit more (usually between GHS 50 and GHS 100) than what schools with their own buses charge each pupil.

4.3. Behaviour of school children along roads to and from school

Results of the 3-day field observation indicated that a greater number of the children (36 out of 50) representing 72% were exposed to risk of being knocked down by a vehicle due to the behaviour they exhibited. Of this number, it was observed that 41.7% either played while crossing the road or walking along it (see Fig. 5 for details). Over 27% of the school children were observed crossing the road at unauthorised or undesignated points. This behaviour of the school children was primarily driven by the absence of designated crossing facility, a phenomenon Obeng Atuah et al., 2016 have suggested is a major cause of pedestrian fatalities and casualties in urban Ghana. Crossing without observing traffic from both directions and walking on the carriageway with back facing on-coming vehicles were the two other behaviours observed during the site visits. These observations point to the continued neglect of all stakeholders of children’s travel safety to and from school. Coupled with the absence of pedestrian infrastructure and weak enforcement of traffic regulations, travel risks among children to and from school in the study areas appears real.

4.4. Relationship between travel behaviour and the level of risk to collision

In establishing relationships between observed travel behaviours of school children and their exposure to risks of road traffic collisions, parents were asked to indicate if their children had reported any incidence of travel risk in the last 12 months. This survey revealed that 60.8% of parents had travel risks reported to them; while 27% had not been told of any risks in the last year. The remaining 12.2% indicated that they do not remember. For parents whose children had reported cases of travel risks, 48.9% reported

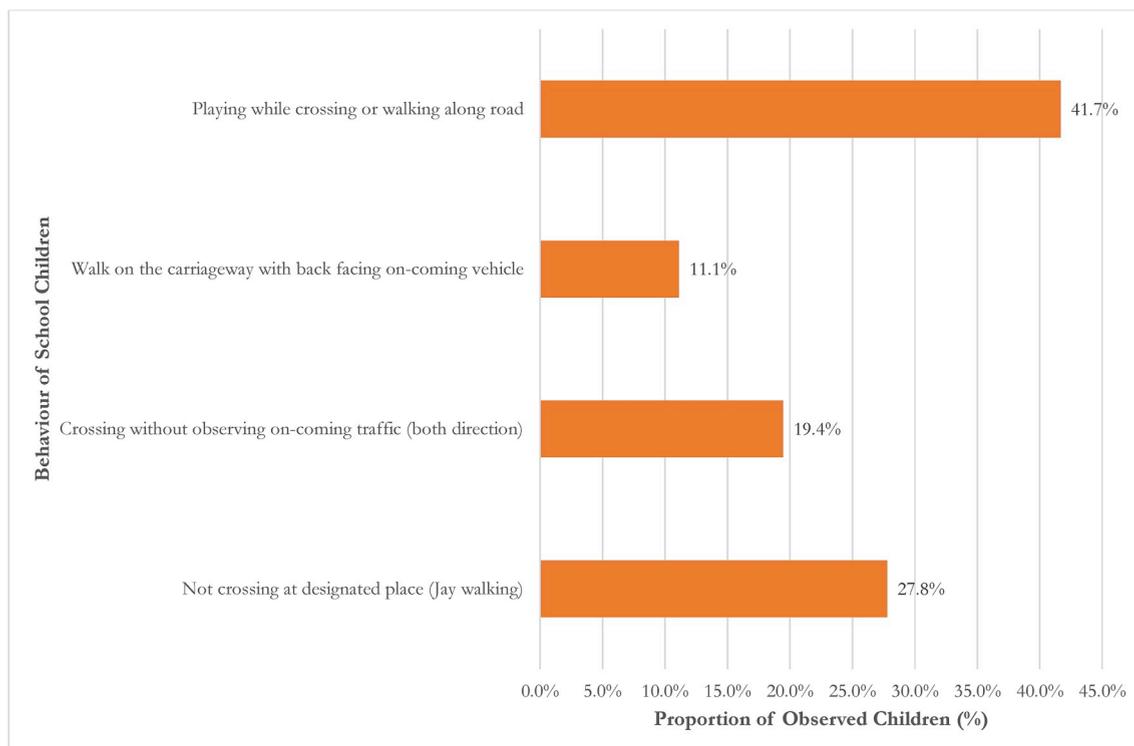


Fig. 5. Behaviour of school children along road. Source: Field observation, 2016.

overloaded vehicle/bus, 30.2% reported excessive speeding, 12% reported near-collision incidences; while the remaining 8.9% indicated that the vehicles on which they were travelling broke down in the middle of the road.

The high proportion of respondents highlighting overloading of vehicle is a worrying phenomenon and can be attributed to the weak enforcement of the Road Traffic Act of 2004 (Act 683). The Act 683 seeks to provide the most important information about Ghana's traffic laws, enforcement and the expected behaviour of drivers on the road. Discussions with an officer of the Motor Traffic and Transport Department (MTTD) of the Ghana Police Service revealed that some school buses that ply the roads in the Adenta Municipality defy most of the road traffic regulations thus risking the safety and wellbeing of the school children on board.

According to the officer, some school bus drivers overload their buses with the excuse that the school children are kids and that two can sit on a chair. As a result of the overloading, some children stick their heads out through the windows of moving buses, thus exposing them to risk of fatal injury. These practices have resulted in the MTTD issuing several warnings to management of drivers of school buses to desist from overloading and to take particular interest in the safety of their pupils. During an interview with the Municipal Commanding Officer of the MTTD he stated that:

“Every vehicle has a maximum number of passengers it is supposed to carry, and this applies to school buses as well. If the school bus has been registered to take 23 passengers, for instance, it should carry just that number of school children. You cannot go beyond that limit with the simple reason that the passengers are children. It is an offence.” ... MTTD Official #1

The incidence of overloading contravenes Regulation 137 of the Road Traffic Regulation, which states that “a person who drives a taxi, omnibus or other passenger-carrying vehicles shall not carry a number of persons that exceed the number of persons determined by the Licensing Authority to be carried by that vehicle and stated in the vehicle registration documents”. Compounding the situation is that these buses are in poor condition (Poku-Boansi and Adarkwa, 2013; Poku-Boansi, 2008). For example, Poku-Boansi (2008) has suggested that the average age of most of the vehicles used for public transport operations was 13 years and with some as old as 30 years. Discussions with some drivers of school buses revealed an average of 15 years (from date of manufacturing). Despite the age of the buses used, there is the absence of proper maintenance regime thus making some of these vehicles' road unworthy. The Quick News Ghana reported on its website on the 8th of April 2016 of a collision involving over 100 school children of the Ministry of Health Basic School, injuring most of the children on board. The cause of the collision according to the Police was overloading and break failure (see Fig. 6).

Results from the field survey indicate that all parental respondents indicate that the disregard of traffic regulations can be blamed on the weak enforcement on the part of the MTTD which has the mandate of enforcing the Road Traffic regulations. They have suggested that some police officers who are supposed to ensure compliance allegedly take money from drivers who flout the rules and regulations spelt out in the Road Traffic Act thereby putting the lives of their children in danger. Despite this concern however, an official of the MTTD had a contrary view as illustrated below:

... It is unfair to blame the police for the indiscipline on our roads. In as much as I agree that there are bad officers, there are equally bad and indiscipline road users including pedestrian who do not respect the traffic regulations look, the police cannot be everywhere to ensure that school children are safe. I believe it is a collective responsibility starting from the parents and school authorities. We as police are doing our best by arresting offending drivers and we will continue to do so, together with educational campaign ...” MTTD Official #2

The above points to the complexities of roles to be played by all key stakeholders in child travel safety to and from school, including parents, school authorities, vehicle operators/drivers, institutions for enforcing traffic laws and regulations; and the children themselves. There are no clear provisions and interventions in Ghana's urban transport and mobility policy to ensure the safety of children on their way to and from school. Though there are many traffic rules and regulations governing urban travel safety for all citizens –



Fig. 6. School bus involved in an accident.

Source: www.quicknewsgh.com, 2017.

motorists, road users and pedestrians, many of them are either ignored and/or not enforced by the relevant agencies. In some cases, enforcements are impeded by corrupt practices of officials involved.

5. Conclusion

Using the case of peri-urban Accra, Ghana, this paper points to a changing trend of daily journey to and from school among basic school pupils. Walking still remains the dominant trip mode to and from school, adopted by 53.7% and 57.5% respectively. This is because most of the school children (48.6%) live within less than 1 km from the school. This reflects the peri-urban nature of the area, which serves as the residential area for Accra and hence most basic schools are within the neighbourhood. This reflects the case of many emerging cities in African countries (Ipingbemi and Aiworo, 2013). In a study by Ipingbemi and Aiworo (2013) in urban Nigeria, it was revealed that over 65% of school children walked to and from school due to short distances. Similar to other African cities, the key challenge with walking, in a rapidly emerging city, like Accra is that, most school children are neither accompanied nor protected by any adult. Children are therefore exposed to road traffic collisions and fatalities.

An important inference from the finding above is the proximity of basic schools in the study area; while parents are increasingly getting engaged by the economic activities. Thus, while rapid urbanisation gets more parents out-of-home employment opportunities; basic schools are getting closer to children. However, two thirds of the over 55% of children walking to school are unaccompanied. Travel safety among substantial proportion of these children are not protected from road traffic collisions and other forms of fatalities.

Aside walking to and from school, a wide arrange of transport arrangements are made by parents for their children; while the schools also have buses to convey some of the children. These were found to be at the convenience of parents and school authorities, and not for the travel safety of children. For instance, only 12.4% and 11.7% of pupils were driven in private cars to and from school respectively. The rest of the children in addition to walking, were exposed to all kinds of travel risks. The use of unreliable and inefficiently managed public transport systems has become a disincentive to the increasing transport quality needs of school children. As the incidence of road collision in urban Ghana solidified over the years, the travel needs of school children have witnessed a growing trend.

Findings from this study show that travel to school poses difficulties for stakeholders partly because of the non-adherence to traffic regulations, use of poor quality vehicles, poor pedestrian facilities and behaviour of school children when crossing the road. While transport planning authorities in Ghana focused on the development of transport infrastructure and improving accessibility in residential neighbourhoods, results from stakeholders in terms of how efficient and safe school children are portrays a dire scenario. This calls for increased efforts in public sensitization in schools for school children and school authorities by the National Road Safety Commission. This sensitization programmes must expose school children to how to cross the road and some basic road signs, the dos and don'ts on the roads by school children.

To conclude, this study has revealed that various behaviour of school children and the roles parents play in meeting the transportation needs of school children in the Adenta Municipality. The paper concludes that even though the travel needs of school children is growing and coupled with increasing traffic challenges in urban Ghana, parents and school authorities cannot ignore the safety needs of school children because of the children's limited capacity to evaluate risk. This therefore calls for an all-inclusive approach and the promotion of safety among school children in Ghana and other cities in African.

In ensuring the travel safety of children and other vulnerable groups in urban Africa in general; and Ghana in particular, transport and mobility policies should look at four key entry points – service, infrastructure, enforcement and child-friendly interventions. Firstly, urban transport policy should look the range and quality of transport services delivered. As was revealed by this study, there are a wide range of urban transport services, provided largely by the private sector. These are less regulated, expensive, inefficient and usually not friendly to vulnerable groups. It is important that urban transport and mobility policies in African cities critically address the inadequacies in transport service delivery. Secondly, it was found by this study that there are few or no transport infrastructure for children and vulnerable groups in the study area. This is the case for many African cities as was found by Amoako et al. (2014). In areas where there are infrastructure for pedestrians and other vulnerable groups, they are provided as add-ons to existing networks. In most cases, infrastructure for pedestrian safety are either not provided or where provided, they are disregarded by motorists or other road users. This makes a case for the third entry point; which as enforcement of traffic laws and regulations. There are several traffic laws and regulations which seek to ensure the safety of all citizens. Relevant institutions must be resourced and empowered to enforce these laws and regulations. Finally, in responding to the gaps in travel safety among children, efforts should be made to prioritize children in transport service delivery, infrastructure provision and enforcement of traffic laws.

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References

- Abane, M.A., 2010. Travel behaviour in Ghana: empirical observations from four metropolitan areas. *J. Transp. Geogr.* 189–376.
- Adarkwa, K.K., 2003. *Dusty Roads, Rickety Trotros and Survival - Understanding the Nexus between Road Transport Investments and Poverty Reduction in Ghana*. Professorial Inaugural Lecture. Kwame Nkrumah University of Science and Technology Kumasi University Printing Press, Kumasi.
- Adarkwa, K.K., Poku-Boansi, M., 2011. Rising vehicle ownership, road way challenges, and traffic congestion in Kumasi. In: Adarkwa, K.K. (Ed.), *The Future of the Tree: Managing the Growth and Development of Kumasi*. Kumasi. University Press, pp. 128–152.
- Adenta Municipal Assembly (AdMA), 2013. *Medium Term Municipal Development Plan, 2010-2013*. AdMA, Adenta, Accra.

- Amoako, C., Cobbinah, P.B., Niminga-Beka, R., 2014. Urban infrastructure design and pedestrian safety in the Kumasi central business district, Ghana. *J. Transp. Saf. Secur.* 6 (3), 235–256. <https://doi.org/10.1080/19439962.2013.861887>.
- Bradshaw, Ruth, 2001. School children's travel. *Geography* 86 (1), 77–78.
- Cobbinah, Patrick B., Poku-Boansi, Michael, Adarkwa, Kwasi Kwafa, 2017. Develop first, make amends later: accessibility within residential neighbourhoods in Ghana. *J. Hous. Built Environ.* <https://doi.org/10.1007/s10901-017-9544-7>.
- Duminy, J., Watson, V., Odendaal, N., 2014. In: Duminy, J., Andreasen, J., Lerise, F., Odendaal, N., Watson, V. (Eds.), *Introduction in Planning and the Case Study Method in Africa*, pp. 1–20.
- D'Haese, S., De Meester, F., De Bourdeaudhuij, I., Deforche, B., Cardon, G., 2011. Criterion distances and environmental correlates of active commuting to school in children. *Int. J. Behav. Nutr. Phys. Act.* 8, 88.
- Galanis, A., Eliou, N., 2011. Evaluation of the pedestrian infrastructure using walkability indicators. *WSEAS Trans. Environ. Dev.* 7, 385–394.
- Ghana Health Service (GHS), 2017. *The Health Sector in Ghana: Facts and Figures*. GHS, Accra.
- Ghana Statistical Service (GSS), 2012. *2010 Population and Housing Census. Summary Report of Final Results*. Ghana Statistical Service, Accra.
- Ghana Statistical Service (GSS), 2014. *2010 Population and Housing Census. District Analytical Report*. Ghana Statistical Service, Adenta Municipality (Accra).
- Ghana Statistical Service (GSS), 2014. *2010 Population and Housing Census: District Analytical Report*. Ghana Statistical Service, Accra Metropolitan Area (Accra).
- William, K., 2011. *Africa's Transport Infrastructure: Mainstreaming Maintenance and Management*. The World Bank, Washington DC.
- Hag, G., Schwela, D., 2012. *Transport and Environment in Sub-Saharan Africa*. The TEST Network, South Africa. www.afritest.net.
- Infrastructure Consortium for Africa (ICA), 2016. *Urban Transport in Sub-Saharan Africa - Diagnostic Study & Project Development and Investment Pipeline*. ICA, Abidjan.
- Ipingbemi, O., Aiworo, A.B., 2013. Journey to school, safety and security of school children in Benin City, Nigeria. *Transp. Res. Part F* 19, 77–84 (2013).
- Jacobson, P.L., 2003. Safety in numbers: more walkers and bicyclists, safer walking and bicycling. *Inj. Prev.* 9 (3), 205–209.
- Klaitman, S.S., Solomonov, E., Yaloz, A., Biswas, S., 2018. The incidence of road traffic crashes among young people aged 15–20 Years: differences in behavior, lifestyle and sociodemographic indices in the Galilee and the Golan. *Front. Public Health* 6, 202. <https://doi.org/10.3389/fpubh.2018.00202>.
- Kwakye, E.A., Fouracre, P.R., 1998. Urban transport policy reform in Ghana. In: Paper Presented at CODATU VIII Conference, Cape Town.
- Lasmini, A., Indriastuti, A.K., 2010. Optimisation of safe pedestrian facilities and traffic management, a case study of Malang, Indonesia. *J. Econ. Eng.* 4, 8–14.
- Li, S., Zhao, P., 2015. The determinants of commuting mode choice among school children in Beijing. *J. Transp. Geogr.* 46, 112–121. <https://doi.org/10.1016/j.jtrangeo.2015.06.010>.
- Litman, T., Fitzroy, S., 2010. *Safe Travels: Evaluating Mobility Management Traffic Safety Impacts*. Victoria Transport Policy Institute, Victoria.
- McDonald, Noreen, 2008. Children's mode choice for the school trip: the role of distance and school location in walking to school. *Transportation* 35, 23–35. <https://doi.org/10.1007/s11116-007-9135-7>.
- McMillan, T.E., 2005. Urban form and a child's trip to school: the current literature and a framework for future research. *J. Plan. Lit.* <http://doi.org/10.1177/0885412204274173>.
- McPherson, M., Arango, P., Fox, H., Lauver, C., McManus, M., Newacheck, P.W., et al., 1998. A new definition of children with special health care needs. *Pediatrics* 102, 137–140.
- Middleton, L., 2016. *Freedom to Move: Transportation in African Cities, Policy Brief 06*. African Urban Research Initiative.
- Ministry of Transport, 2016. *Road Traffic Accidents in Ghana: Statistics 2016. Final Report* (Accra: Ghana).
- National Road Safety Commission (NRSC), 2013. *Road Traffic Accidents in Ghana Statistics 2012. Final Report*. NRSC, Accra.
- Obeng-Atuah, D., Poku-Boansi, M., Cobbinah, P.B., 2016. Pedestrian crossing in urban Ghana: safety implications. *J. Transp. Health*. <https://doi.org/10.1016/j.jth.2016.06.007>.
- Oteng-Ababio, Martin, Agyemang, Ernest, 2012. Virtue out of necessity? Urbanisation, urban growth and Okada services in Accra, Ghana. *J. Geogr. Geol.* 4 (1). <https://doi.org/10.5539/jgg.v4i1p148>.
- Peden, M., Scurfield, R., Sleet, D., Mohan, D., Hyder, A.A., Jarawan, E., Mathers, C., 2004. *World Report on Road Traffic Injury Prevention*. World Health Organization, Geneva.
- Poku-Boansi, M., 2008. *Determinant of Urban Transport Services Pricing in Ghana: A Case Study of the Kumasi Metropolitan Area* (PhD Thesis), Board of Postgraduate Studies, Kwame Nkrumah University of Science and Technology, KNUST, Kumasi Ghana.
- Poku-Boansi, M., Adarkwa, K.K., 2013. The determinants of demand for public transport services in Kumasi, Ghana. *J. Sci. Technol.* 33 (3).
- Poku-Boansi, M., Adarkwa, K., 2015. Determinants of residential location in the Adenta municipality, Ghana. *GeoJournal* 1–13. <https://doi.org/10.1007/s10708-015-9665-z>.
- Poku-Boansi, M., Marsden, G., 2018. Bus rapid transit systems as a governance reform project. *J. Transp. Geogr.* 70, 193–202. <https://doi.org/10.1016/j.jtrangeo.2018.06.005>.
- Porter, B.E., Bliss, J.P., Sleet, D.A., 2010. Human factors in injury control. *Am. J. Lifestyle Med.* 4 (1), 90–97.
- Takamine, Y., 2004. *Infrastructure Services and Social Inclusion of Persons with Disabilities and Older Persons in East Asia and the Pacific*. University of Ryukyuu, Ryukyuu, Japan (Nishihara, Japan).
- Tatari, A., Gholamreza, K., Yadollahi, A., Milad, R., 2012. Investigation transportation infrastructure in developing countries. *Int. J. Chem. Environ. Biol. Sci.* 1 (1) (2013) ISSN 2320–4087.
- Turner, B.L., Kasperson, R.E., Matson, P.A., McCarthy, J.J., Corell, R.W., Christensen, L., Eckley, N., Kasperson, J.X., Luers, A., Martello, M.L., Polsky, C., Pulsipher, A., Schiller, A., 2003. A framework for vulnerability analysis in sustainability science. *Proc. Natl. Acad. Sci.* 100 (14), 8074–8079. www.pnas.org/cgi/doi/10.1073/pnas.1231335100.
- UN Habitat, 2015. *Towards an African Urban Agenda*. UN-Habitat and UNECA, Nairobi & Addis Ababa.
- UN Habitat, 2015. *Sustainable Urban Development in Africa*. UN Habitat, Nairobi.
- UNICEF, 2015. *Safe to learn: safe journeys to school are a child's right*. at. <http://www.fiafoundation.org/media/45780/safe-to-learn-report.pdf>. (Accessed 15 August 2018).
- United Nations, 2009. *The transport situation in Africa*. In: Sixth Session of the Committee on Trade, Regional Cooperation and Integration 13–15 October 2009, Addis Ababa, Ethiopia.
- Wang, L., Xue, X., Zhao, Z., Wang, Z., 2018. The impacts of transportation infrastructure on sustainable development: emerging trends and challenges. *Int. J. Environ. Res. Public Health* 15 (6), 1172. <https://doi.org/10.3390/ijerph15061172>.
- World Bank, 2005. *Non-motorized Transport in African Cities: Lessons from Experience in Kenya and Tanzania*, Sub-Saharan Africa Transport Policy Program. SSATP Working Paper, No. 80. <http://www4.worldbank.org/afr/ssatp/Resources/SSATPWorkingPapers/ssatpwp80.pdf>.
- World Bank, 2017. *The High Toll of Traffic Injuries: Unacceptable and Preventable*. <https://www.worldbank.org/en/programs/global-road-safety-facility/publication/the-high-toll-of-traffic-injuries-unacceptable-and-preventable>. (Accessed 19 September 2019).
- World Health Organisation, 2018. *Global Status Report on Road Safety 2018*. Author, Geneva, Switzerland.
- Yankson, W.K., Kofie, R.Y., Moller-Jenson, L., 2004. *Monitoring Urban Growth: Urbanisation of the Fringe Areas of Accra* (Working Paper).
- Yin, R.K., 2009. *Case Study Research: Design and Methods*. Sage, Thousand Oaks.
- Zedyk, M.S., Wallace, L., Carcary, W., Jones, K., Larter, K., 2001. Children and road safety: increasing knowledge does not improve behaviour. *Br. J. Educ. Psychol.* 71, 573–594.