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Factors influencing school travel mode choice in Kumasi, Ghana

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Abstract

This paper provides an understanding of the travel modes choices of school children in the Kumasi Metropolis of Ghana. The changes in the morphology of the city, location of educational institutions and the transportation of school children is critical for the urban planning and transport sector; yet not adequately explored. Through a survey carried out in the metropolis in 2012, this study presents an analysis of the factors shaping school travel modes among school children in both private and public schools. In all 304 pupils were surveyed through quota sampling to know the differing modes used for the school travel in the metropolis and complemented with questionnaires to parents / guardians of the selected pupils. Findings from the study revealed that private school children relied extensively on motorised transport modes as compared to non-motorised modes in public schools; parental influence and level of spatial interaction were also identified as influential factors. The need for a concerted stakeholder policy strategy for a convenient, safe and effective transport was suggested as crucial for improving school based trips and educational improvement in the metropolis.

Keywords: School travel/trip; Transport modes; Kumasi

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1. Introduction

Increasingly, the growth of towns and cities and the change in lifestyles and preferences have made it possible for people to work at one location and live in another. One significant group within urban populations who have been largely affected by the trend are school children and students. Previously, most children used to live and attend school in the same neighbourhood. Most daily trips could be found in the neighbourhoods – and the predominant transport mode for most school travels was walking (McDonald, 2005). Nonetheless, the changing structure of cities among other things has effected changes in the transport modes choices of school children, as well as their travel behavioural patterns.

This shift in the trend from walking to motorized travel for the school journey has witnessed increased dependence on the car (Zwerts et al., 2009). Consequently, the transport modes choices of school children are affected as it is fundamentally dependent on that of the household (Garrad, 2009). Whatever choice made, however, "by the school child" or "for the school child", highly affects aspects of their school life – such as regularity to school, punctuality, activeness in class, ability to indulge in other activities after school and many more (Litman, 2003).

It is even more critical in Sub-Saharan Africa where transport (in terms of availability, quality and functionality) is generally considered as foundational to the development of the African continent (AU et al., 2005). Transport has been an imperative input into education in Africa – for "carriage of pupils, teachers and learning material supplies". Issues with regards to availability, costs, dependability and safety of transport mode, all affect school enrolment and attendance decisions directly (AU et al., 2005). In Africa, most children get to school by foot, in rural and urban areas alike. However this is more evident in rural areas, where children mostly trek long distances to school and even cross water bodies at times (AU et al., 2005).

In Ghana, there have equally been changes in the mobility of children to school due to similar issues as mentioned above. More so, rural areas are highly challenged with mobility of children to school. This is mainly because even though previous governments made efforts in ensuring that most communities have basic schools, children in most rural communities have to trek long distances to neighbouring communities to access higher level educational facilities – Junior High School (JHS) and Senior High School (SHS) (Porter, 2002). The story in the urban areas of Ghana is quite different. Howbeit, as urban areas spread out due to the demands of urbanization, human activity locations transcends their reference location or residence. This in effect has equally affected the mobility of children to school – in terms of the choice of mode to use.

Kumasi as a city has its own transport challenges that are militating against its growth and development. Due to urbanization, Kumasi has seen an influx of numerous schools. Means of getting to school includes school buses, public transport (trotro[1]), private cars, chartered taxis, walking and sometimes cycling. This study therefore seeks to understand the travel mode choices of school children and their underlying factors in a growing metropolis as Kumasi.

[1]Trotro is an affordable minibus used for short distance travel in the large cities in Ghana. The word 'tro' evolved from the local 'Ga' language meaning three pence, that is, the penny coins used in the Colonial Gold Coast, now Ghana. Buses were at the time charging three pence per trip, hence it was dubbed 'trotro'.

2. Overview of school children and travel mode decisions

The popular transport modes for school children in Africa and particularly Ghana include walking, cycling, school buses, public transport (mini-buses/'trotro') or private cars. However, it has been argued that the mobility of children is revealed in the fact that children's everyday mobility is to a larger extent kept under surveillance-by parents and school employees-through general traffic regulations (Fotel and Thomsen, 2004). One very common feature that affects children's mobility across Africa is that of the coverage of road safety issues in general and particularly children's road safety, given that accident rates in some African countries are among the highest in the world (Vasconcellos, 1997). Mobility can also be seen as a significant feature in many children's lives in Ghana. This is usually in the form of permanent and seasonal relocation associated with residential mobility, and more restricted daily mobility associated with household activities and with education (Porter and Blaufuss, 2002). This is further accentuated in the view that the daily mobility patterns of most children in Ghana tend to be included in the broader mobility patterns of female parents (Grieco et al., 1995).

In recent times, increasing attention is being paid to the analysis of factors contributing to the travel mode choice behaviour of children for the trips to and from school. This can be attributed to several factors including the socio-spatial morphology of cities, urbanisation and urban growth trends, behavioural patterns, location of services, among others. Certain themes are common and principally in harmony with respect to recent literature on travel mode choices among school children and their associated factors. Some of these factors are underlined by Sidharthan et al. (2011) and they include home-school proximity, household socio-economic attributes, neighbourhood built environment characteristics, and parental or caretaker perceptions of safety and vehicular traffic conditions on the path to and from school.

Distance between home and school is a critical factor affecting the choice of transport mode to school, especially with non-motorized modes (Frank and Co., 2008). Therefore the kind of mode choice is influenced by how close or farther away a child is to his/her school. Several studies have found distance to be one of the most significant factors in the choice of modes other than walking. Iranwan and Sumi (2011) revealed this with their Indonesia study that as distances increase between home and school 'walk – to – school' programs become ineffective but recommended 'cycle – to –school' programs as a better alternative. McDonald (2005) found out in a 1969 study that 45 percent of elementary school children in the U.S lived less than a mile (1.6km) from their schools; today fewer than 24 percent live within this distance. In effect, most children do not live within a walkable distance to their schools. This phenomenon explains why the use of school buses and shared rides (thus sharing of private cars with friends or taking commercial vehicles/buses with other people) have increased greatly; walking as a mode is only evident in school travels mostly less than three miles in developed economies (Frank and Co., 2008). Thus as distances increases the number of school children travelling with motorized modes of transport increases.

Again, most studies identify social attributes, such as income and automobile ownership as major contributing factors in differentiating transport mode choice (Schafer and Victor, 2000). Income is a vital limitation variable because it is associated with the number of vehicles a household may have, or the type of modes a household can afford, which directly informs the transport mode options available to the household.

Increase in disposable income contributes to making it easier for individuals to own a vehicle. Similar studies also revealed that increasing levels of car ownership, distance to school and mothers" employment outside the home and other social factors (Di Guiseppi et al., 1998; McDonald, 2007) make it easier for parents to drop off children at school (Di Guiseppi et al., 1998). A travel survey in U.K. in 1994 showed that 87 percent of students in households without cars, walked to school as compared to 36 percent of schoolchildren who walk to school in households with 2 or more cars with "same proximity or distance" to school (Bradshaw and Atkins, 1996).

Boarnet et al. (2005) in analysing the impact of the "Safe Routes to School program" initiated in California, found that sidewalk, crossing improvements, and traffic control enhancements, improved the chances of children switching to the use of walking and cycling modes of travel to school after the constructions of road improvements like the walkways. Similarly, Ewing et al. (2004) also noted that, street density and sidewalk connectivity are influential in facilitating walking to school. Also low density and sparse developments, were seen to make walking and cycling unattractive in both U.S and German cities; this is because of the resultant long distances between origin and destinations (Buehler, 2011). In contrast, higher densities which accommodate a mix of land uses offer shorter travel distances and encourages walking and cycling (Kenworthy, 2002). Hence, underscoring how neighbourhood characteristics affect travel decisions.

Parental perceptions of risk and safety have also been identified in the literature as influential in children's school travel. This is as a result of parental and caretaker perceptions on risk and safety of children, vehicular traffic conditions on the path to school, concerns about abduction and molestation (Di Guiseppi et al., 1998; Timperio et al., 2006). Other studies also report on how parental escorts have risen in the past decades throughout Europe (Björklid, 2002); most alluding to safety and risk considerations. Aside such influences as this and that of chauffeuring children around, parents have other means of monitoring the transport mode choices of children. Fotel and Thomsen (2004) term this as "Parents' remote control of children's mobility". This is done in two folds: remote control through technology in the form of mobile phones, and remote control through behavioural restrictions (for instance instructing children to use particular transport modes, certain routes and to cross particular roads in certain places).

There are other arguments in the literature that stress the role of non-technical factors such as attraction of a particular mode. In a study of Belgian school children, it was revealed that students viewed their choice for walking and cycling to school as an attractive activity and hence adopted it as their prime travel mode (Zwerts et al., 2010).

One element found in the literature that many studies acknowledge, but largely ignore or do not adequately account for is the spatial interaction effect that affects children's mode choice to and from school. Spatial interaction may occur in two possible ways: across spatial units (zones, neighbourhoods, areas, blocks) because units that are closer to one another share some common attributes, and across behavioural units (individuals, households) because units are closer to one another in space may share common attributes that affect the way they behave (Pont et al., 2009). In the context of children's school travel, a household's mode choice decision may also be influenced by the actions and choices of other households and individuals in the same spatial cluster (say a neighbourhood). For example, if parents find out that many

children in the neighbourhood walk to school, they may feel comfortable asking their own children to walk as well. The "Walking School Bus" initiative is in fact, founded on this principle of social interaction effects among households that are in close proximity of one another (Sidharthan et al., 2011).

3. Description of the study area

Kumasi is located in the transitional forest zone, about 270 km north of the national capital, Accra. The population as of 2010 was 2, 035, 064 (Ghana Statistical Services, 2012), and covers 254 square kilometres comprising 10 sub-metropolitan areas (KMA, 2011). The unique centrality of Kumasi as a traversing point from all parts of the country also makes it a special place for many to migrate to. It also houses several facilities such as health and education but for the purposes of the present study educational facilities will be elaborated

Education in the country is provided by both the state and the private sector. The system comprises Basic School, Senior High School (SHS), Vocational and Technical School, and Tertiary Institutions. The basic school consists of Pre-School, Primary and Junior High School (JHS). Basic educational system is further divided into Lower Primary, Upper Primary and Junior High School.

The metropolis has a total of 2325 educational institutions supporting the provision of these services. The breakdown of these institutions, based on it level and type of ownership, is presented in Table 1. The active involvement of players in the private sector in the provision of educational services has been attributed to the increasing demand for educational facilities in the metropolis. This enabling environment was initiated through the combined efforts of the KMA and other relevant public institutions within the metropolis.

Table 1. Educational Institutions in the Kumasi Metropolis based on Level and Type of Ownership

Type of School	Level of Educational Institution and Number of Facilities							
	Pre-school	Primary	JHS	SHS	Voc/Tech	Special School	Training college	Tertiary institutions
Public School	190	237	195	18	22	2	2	3
Private School	668	637	311	33	2	2	1	2
Total	858	874	506	51	24	4	3	5

Source: Metro Education Direcorate (2006 in KMA, 2011)

The residents in the metropolis depend heavily on road transport when it comes to internal trips. The modes used include; private cars, trotro, bicycles, motorbikes, buses and walking. The metropolis has a total road network of 1117 Km but much of it remains unpaved (KMA, 2011).

Kumasi as a city has its own transport challenges that militate against its growth and development. Kumasi has emerged into a commercial city, which therefore attracts a lot of activities and people. Some of the major challenges of transportation being traffic congestion due to the heavy car dependence, less supply of public transport in relation to the high demand for them and the ineffectiveness of the existing public transport system in the city. It is in this same environment that school children compete to find transportation to school.

Due to urbanization, Kumasi has seen an influx of numerous schools in the city. Unlike previous years where most children attended schools in their neighbourhoods, presently some pupils/students travel long distances to attend school. Factors like increased income levels, distance between home and school and preference can be sited for this occurrence. These factors have equally shaped the transport mode choices of school children. Means of getting to school presently include; school buses, public transport (trotro), private cars, taxis, walking and sometimes cycling.

Consequently, the choice of the travel modes of school children is mostly affected by this transportation environment and household travel patterns in the city. This study aims to understand the travel behaviour of school children, regarding the relationship between travel mode and the factors that might influence their choice a metropolis like Kumasi.

4. Research methods

The study examined the factors likely to influence the decision on mode choice for the school journey. Further to this, twenty schools were selected from the ten distinct school clusters in the sub – metropolitan area in Kumasi. Two schools were selected from each sub – metro, one public and one private, totaling twenty schools through random sampling. Three classes were then selected from the twenty schools to give sixty classes (from Primary to JHS). The school division as stated in section three of the report was applied for inclusiveness and convenience, one class was selected from each division (lower and upper primary and JHS). The selection of the Basic school level was also due to children at this level‘s inclination to commute from home to school as compared to the Senior High School level where most students live in residential accommodation on campus (Boarding facilities).

With respect to the individual selection of pupils for the interviews, a two-tier process was followed. The aim of the study was to first discover the modes used by pupils for the school journey. Research assistants and the teachers of the chosen classes assisted to tally the general responses into the various modes. In total 2215 responses were received from the sixty classes, which was kept separate, as it only served as basis to identify the present categories of modes utilised in the two school streams. Secondly, the quota sampling technique was adopted in grouping the various category of mode users for the school journey. The researchers adopted simple random sampling technique to select between one and four pupils from each quota (car users, trotro, taxis, walking, school bus and cycling) in the 60 classes for an in-depth interview (semi-structured). This totaled 304 as some quotas had limited numbers present. This figure was used for the analysis in this study. Questionnaires were also sent through the pupils of the selected classes in both

school type to their parents/guardians to find out the modes used for the school travel and the possible reasons for the choice. This was to complement the views of the school children.

This multi-sampling technique enabled the exploration of the case by understanding the differences school children's' transport mode had on their daily decision about school travel (Yin, 2003). The data collected was analysed with support of statistical charts to provide a better presentation of the field data within the purview of understanding travel mode choices and their relating factors among school pupils.

5. Results and discussion

5.1. Current modes of transport for school children

The modes used for the school travel within the metropolis include; private cars, trotro, taxi, walking, school buses and cycling among others. The survey revealed that 37 percent of school children travel to school by walking while 26 percent do so by "trotro" as indicated in Figure 1. The proportion of children who walk to school can be related to the 34.5 percent of children who attend community schools. This could be attributable to the fact that most community schools are within walking distance from the surrounding neighbourhoods. Also, the extensive use of "trotro" by people in urban areas like Kumasi is due to its high availability in most parts of the city and the relatively cheaper fares (the average transport cost recorded for "trotro" in the survey is GHc 0.90 (0.30 US dollars) per day.

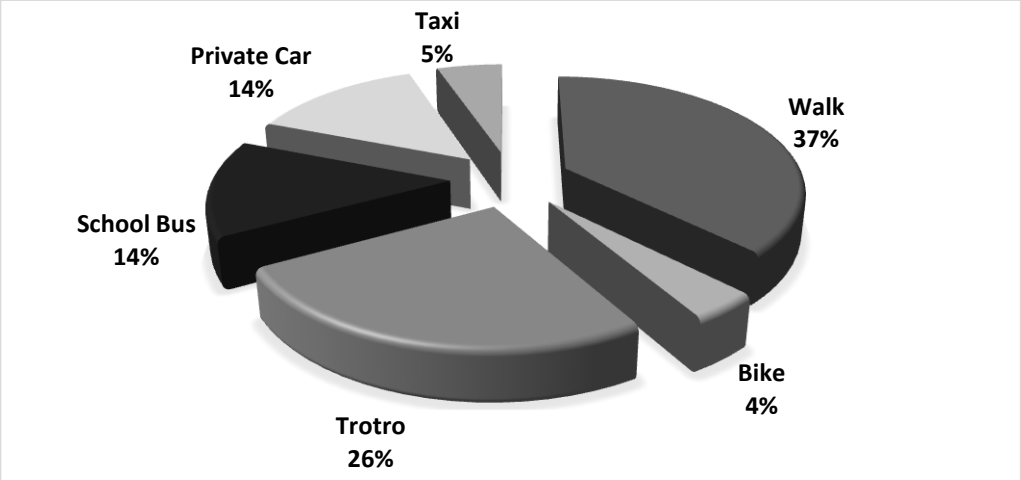

Figure 1. Present Modes of Transport for School Children in Kumasi (Source: Survey Data, 2012)

The emergence of school buses in the city has become a very prominent feature in the transport mode choices available for school travel. It constitutes 14 percent of school travels. The introduction of school buses has been led by private schools who are capitalising on the challenges of student transport as an

appeal to increase patronage of their schools. Moreover, most private schools are developed outside the city center where land may be available and hence dependent on bus systems in transporting school children. The rise in car ownership as identified by Adarkwa and Poku – Boansi (2011) in the city may be the reason for the 14 percent of private car trips for the school travel. Biking was one of the least travelling modes among school children during the survey. Several factors may account for this including safety, lack of cycling routes in the city and also technical issues in terms of planning and design where cycling as a sustainable mode of transport has not been explored.

5.2. Alternative modes of transport

With respect to travel decisions for school and educational purposes for school children in cities like Kumasi, it is possible that present modes are being utilized because of their availability but not for their quality, preference and convenience. In addition, given the option (without parental interference), school children might also opt for other alternative transport modes if they existed. To this end, the study also sought to identify the best alternative choice for school travel apart from what was currently being utilized. The results from the survey revealed significant differences from the data on the present modes of transport being used. Notable changes were observed in the modes for walking (a reduction from 37 to 7 percent), private car (an increase from 14 to 27 percent), school bus (from 14 to 26 percent), and cycling (an increase from 4 to 23 percent). Thus, children showed a high preference for private cars, school bus and cycling. The rationale for this could be attributed to their convenience, comfort and usability. The other factors associated with this trend are discussed in the next section.

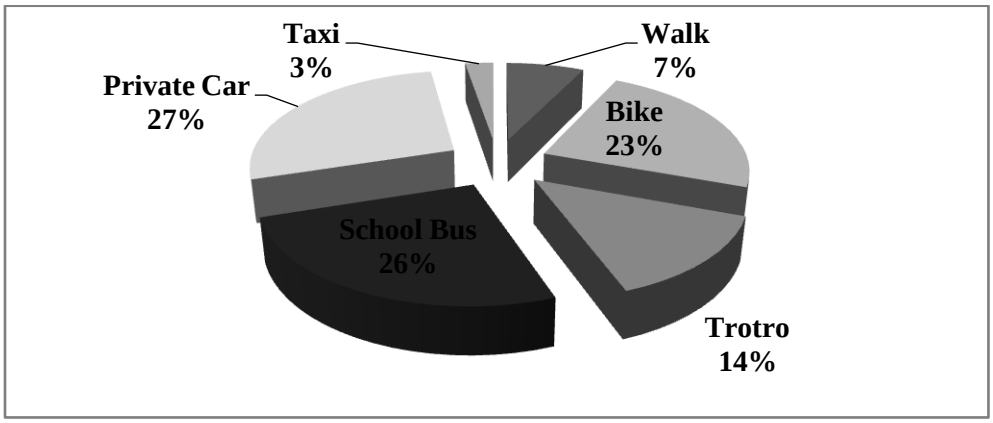

Figure 2. Alternative of Transport Modes of School Children in Kumasi (Source: Survey Data, 2012)

6. Selection mode and the influencing factors

In the foregoing discussions, it is apparent that the decision to adopt a particular mode for commuting from home to school, howbeit decided by parents or based on other related issues, does not emerge without

causalities or situations that shape them. Here, the study tries to elucidate some of the factors that shape the decision among pupils to use a particular travel mode instead of another. Hence, several factors were identified to influence current travel modes used by school children in the study area; these are parental influence, home – to – school proximity, household socio- economic attributes, risk and safety perception and level of spatial interaction between households. The factors are elaborated on to better understanding of the issue in the metropolis.

6.1. Parental influence

The study revealed significant control of parents over the travel mode choice of school children in the study. This may be the case because children within the basic education system are averagely aged less than 15 years old. Therefore, parents exercised important influences in the travel decisions of school children in the private schools than public schools, constituting 56 and 38 percent respectively as shown in Table 2. This situation is attributable to a couple of reasons: (i) the public schools are mostly community schools located within 0.8km from the neighbourhoods within the metropolis (ii) private schools are normally located outside the city centre, with distance averaging 5.3km. Thus, necessitating the need for parents of private school children to select from available modes deemed appropriate, safe and usable.

Situations were recorded of school children personally deciding on which travel modes to use; mostly among those in the public schools. This occurred among children who were more than 12 years old, mostly with shorter distances to school (about 1.5km) and within walking distance.

Table 2. Cross – Decision on mode choice in relation to Type of School

Responsibility for Decision on mode of transport	Type of School	
	Public school	Private school
By Myself	90 (62.5%)	70 (43.7%)
By Parents/Guardian	54 (37.5%)	90 (56.3%)
Total	144	160

Source: Survey Data, 2012

In effect, parents were acting as 'gatekeepers' or what could be described as parental remote control of children's mobility by Fotel and Thomsen (2004). This is nonetheless underpinned by concerns for risk and safety. Closely associated with the school children's travel is the parents own methods of travel to work and other daily activity locations. The study revealed that there was a high propensity for parents to select modes for children which were similar to what they daily utilized.

6.2. Home -to- school proximity

The distance from home to school among school children was a significant indicator in the travel mode choices in the survey. The distance involved in commuting therefore influenced which travel mode to select for school based trips. The survey showed marked differences in the choice of transport mode based on the location of the school in relation to the place of residence of the child. Children who attend schools within their communities mostly walk to school as 79 percent from Figure 3 illustrates this. Private school children, on the other hand utilised car-based trips to school as compared to public school children as evidence in Figure 3. This to a large extent may be as a result of the distance involved, location and also the presence of school buses in private schools. Indeed, the school bus system is a preserve of private schools in the Kumasi metropolis.

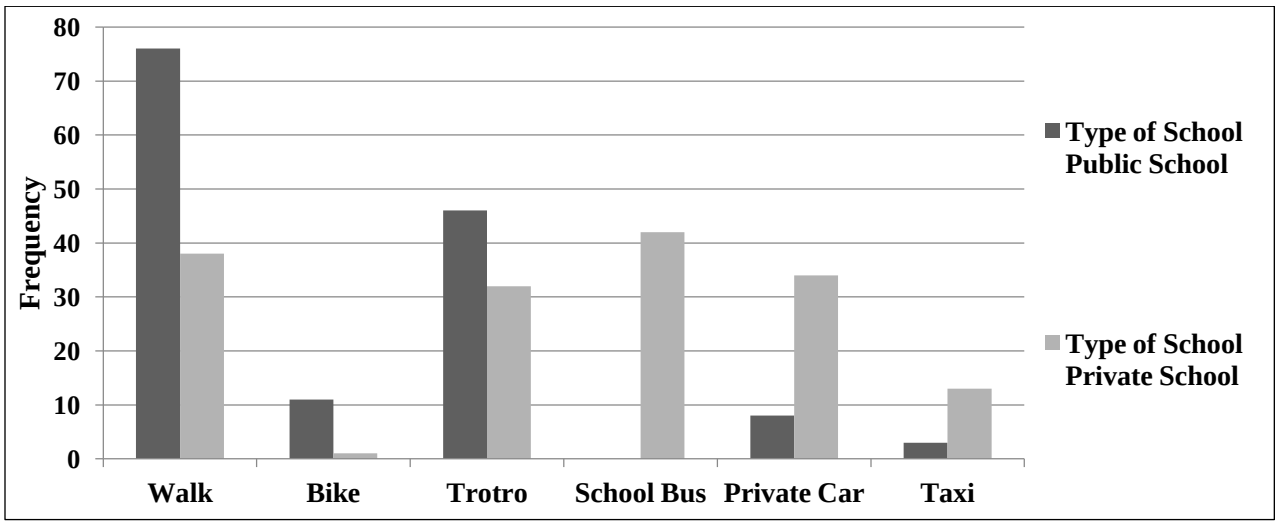

Figure 3. Relationship between Transport Mode Choices and Type of School (Source: Survey Data, 2012)

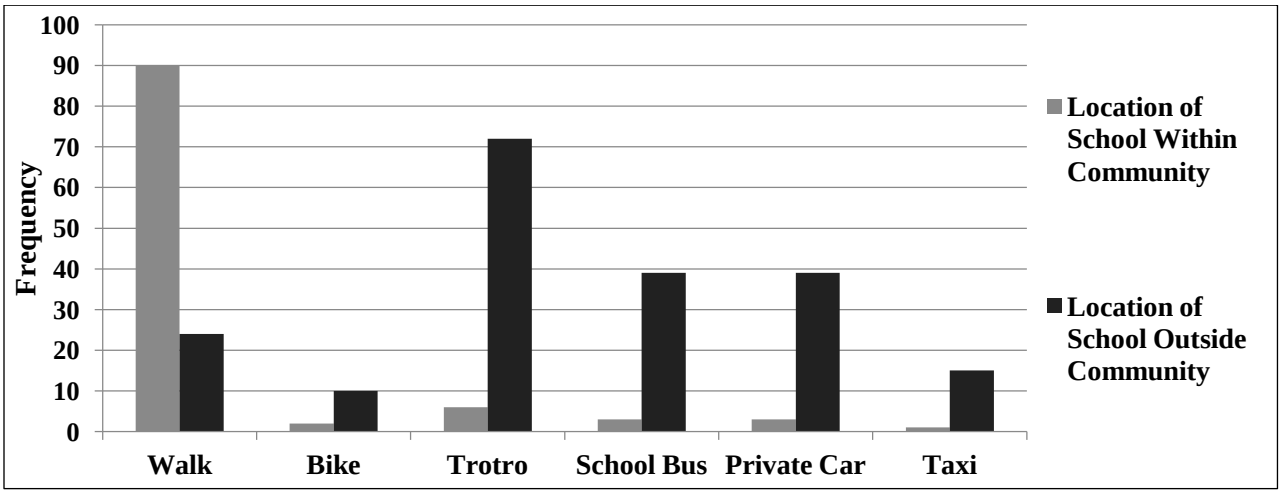

Figure 4. Relationship between Transport Mode Choices and Location of School (Source: Survey Data,2012)

One significant finding from the survey was that 34.6 percent of school children travel to other sub-metros in the metropolis to attend school, and 5.9 percent of school children who attend schools in the metropolis travel from outside the metropolis daily to school. This therefore implies that several of the school children originate their trips outside the city, with a recorded average distance of 14km. This normally occurs among school children in suburban and peripheral areas where educational facilities are of poor quality and much deprived and thus seek basic education elsewhere. School children depended a lot on car-based travel modes where schools were located outside their communities, as indicated in Figure 4. Those originating outside the metropolis relied mostly on the 'trotro' transport service.

6.3. Household socio-economic attributes

Parents of school children surveyed have certain socio- economic characteristics informing their travel mode choices. Family or parental economic status defines which travel mode is favoured. For instance, the availability and ownership of vehicles to a large extent determine the mode choice. From the study, the usage of private cars was recorded among school children whose parents owned a car. Car ownership in the metropolis and largely in Ghana is within the middle and upper class households. In a sub-metro like Nyhiaeso, 67 percent of the households owned a car and, thus 55 percent of school children in this neighbourhood travel to school by private car. In situations where the private car was not used, taxis and school buses were used because parents could afford. Their children are more likely to be in private schools as 35 percent of those who utilised private cars where in private schools as compared to 7 percent for public schools.

On the other hand, 63 percent of parents and 45 percent of school children asserted that the cost of taxis were too expensive and therefore not a travel mode they readily considered. The average fares for taxi and 'trotro' per day was GHc 2 and GHc 0.42 (0.42 and 0.14 US dollars) respectively. However, school bus fare was GH c 51 (0.17 US dollars) per day. Consequently, there was an extensive use of 'trotro' and the school bus service due to the affordability and availability in most parts of the city. This trend normally occurs in households within the low income and lower middle class with limited economic capacity to afford the expensive travel mode of private cars or taxis. This view is supported by (McMillan, 2007; McDonald, 2008) who argue that the unavailability of private cars in low income homes compel children to use active transport for the school journey. Hence, the social and economic status considerably influences the selection of particular mode of travel if cost is a defining element.

6.4. Risk and safety perception

Road accidents are predominant incidents in road transport in the Kumasi metropolis and Ghana and account for one of the top ten causes of death (Red Cross International, 2005). This effect has been one of the factors preventing cycling and walking as travel modes among school children. Ackaah (2010) revealed that 19 percent of child deaths were due to road accidents occurring from 2004 to 2008; and 79 percent of the children who died were pedestrians. During the survey, schoolchildren expressed that their parents have shown concern about how dangerous and unsafe it is for them to cycle to school. This is as a result of the

absence of cycle lanes. This situation compels cyclists to compete with motorist on the same lane creating conflicts which may lead to accidents. Safety concerns expressed includes fear of accidents especially with the use of motorised transport. The survey also indicated that 3.6 percent of the children interviewed have been involved in an accident on their way to school (these were mainly children using "trotro", bicycle, walking and private car).

In spite of the actual safety concerns, perceptions of safety also played critical role in the travel modes choices. For instance, one significant concern mentioned under safety, is in reference to the manner in which Private Schools' children get 'packed' such that they far exceed their design capacity. This is very dangerous and can be detrimental should an accident occur. Furthermore, 48 percent of parents who drop their children at school gave safety as a reason for the choice of mode. The aforementioned issues, to a large extent influence the decision on the choice of transport mode for the school travel in Kumasi.

6.5. Level of spatial interaction between households

Social interactions among different households within a particular neighbourhood are sometimes actualised spatially through trips which include school based trips. Within a particular neighbourhood, the travel behaviour of one household may to a large extent influence the decision of another especially in situations where there is a functional interaction among households. There are therefore some level of interaction that may be spatial or non-spatial that affects the collective decision of people in a neighbourhood to choose a particular mode of transport to school. Parents' decision on transport mode can be influenced by the mode choice of other children travelling to the same school as their children.

From the survey conducted in the various schools, it was observed that school children travel together from same neighbourhoods. Children who travel to school from long distance areas to schools like KNUST primary, Angel Educational and Armed Forces primary, mostly travel in the company of other children from their neighbourhood. In this case, the school bus or chartered taxis is preferred as it offers the children the opportunity to interact.

7. Inherent challenges of the selected modes

The various modes have diverse challenges with regard to their usage for the school travel in the metropolis these are explored in the next section.

7.1. Lateness, tiredness and stress

Based on the data gathered, a number of pupils mentioned some problems they encounter on the school journey. A cross tabulation of the problems mentioned and the type of transport mode used by schoolchildren revealed that 38% of the children using "trotro" , school bus or walking identified lateness, tiredness and stress as significant challenges on the school journey. This is because children have to spend long hours in traffic while travelling to school due to the heavy traffic congestion on various roads within the

city in the morning and evening peak hours. This a times make them very late for school, aside getting tired and stressed from the traffic congestion. The situation arises because there are no bus lanes to be utilized by public transport. Private school authorities also indicated that the sparse location of school children was an inhibiting factor as it took 90 minutes to pick pupils from within a 3km distance.

The issue of distance and time during travel is therefore closely associated with the problem of tiredness, stress and lateness. The problem is worsened as about 34.6 and 5.9 percent of school children travel to school from other sub-metros and outside the Kumasi metropolis respectively.

7.2. Problem with transport infrastructure and facilities

The availability and quality of transports facilities and services exerts significant influence on the ability of children to commute safely and conveniently to and from school. The study, however, revealed that 26 percent of the Schoolchildren interviewed had problems with the inadequacy and poor state of infrastructure and facilities in various parts of the metropolis. Observations during the survey showed such cases as, absence of bus stops and terminals, absence of sidewalks along several roads close to the schools surveyed, zebra crossing, cycle paths and, road signs on neighbourhood roads. The poor condition of the roads that has left several with drenches and potholes has also affected ease of movement across the metropolis.

7.3. Accidents and safety issues

One of the challenges that confronted children in the current travel modes have been occasional accidents during school trips. From the survey, 3.6 percent of the schoolchildren revealed that they have been involved in an accident on their way to school before. This could be due to over speeding or reckless driving by other motorists.

8. Possible suggestions for policy action

The mobility of school children, the travel modes selected and the underlying challenges presents important ramifications for action and policy innovation within the general planning and specifically transportation planning decisions in the Kumasi metropolis. Based on the emerging issues from the survey, of the travel mode choices of school children, the inherent problems encountered in utilising the different travel modes, this section presents suggestions for policy and planning considerations. These suggestions are however categorised under the various actors and their related responsibilities.

8.1. Public sector institutions and agencies

- There has been much talk about the new 'Urban Transport Project' which aims among other things to introduce rapid bus lanes for public transport. The results of the survey reinforce the need for this project and a reconsideration of it to integrate and design lanes for school buses to permit a faster, convenient and safe transportation of school children. This is necessary because it does not only support

an efficient transportation system but also provides an enabling environment for the educational institutions which are much dependent on the school bus system.

- In spite of all the acclaimed benefits of NMT in recent times, it was obvious from the study that much effort will be required to encourage it usage in the Kumasi metropolis to ensuring a safe, comfortable and efficient mobility of school children. In effect, modes such as cycling and walking need to be promoted and developed at both policy and behavioural levels of urban society in Kumasi. The two major non-motorised modes in the study are walking and cycling; but their usage was dangerous. This has therefore make its usage less convenient and unattractive. Consideration should be given to infrastructural facilities such as walkways and cycle lanes to enhance school based trips among children and also support the transport situation in the metropolis.
- The Walking School Bus: This strategy describes a situation where children walking to the same school from a community or neighbourhood walk from one gathering point to another, in order for other school children to join the walking group. By this, it makes the walking more fun and makes this group of school children receive much attention in relation to crossing of roads. This scenario would however require supervision from older children, parents or even community escorts.

8.2. Schools – school proprietors, school management, teachers

Given that most school buses pick children at designated locations and take them to the school compound make the mode attractive. However, the underlying mission has been a profit orientation from the bus system than functional accessibility and mobility of school children. Again there is a need to reschedule bus times and class start periods to provide enough room for school children travelling from distant locations. The running hours of the school buses must be studied carefully by the schoolchildren and parents, a more realistic, efficient and effective time schedule should be drawn for the schools' activities to enhance the teaching and learning process.

8.3. Households – parents and guardians

Based on the existence of a high level of spatial interaction in the neighbourhoods surveyed, car-pooling could be explored and practiced among parents of school children. Various households who live in common neighbourhoods, with access to private cars and children attending the same school or attending school in a same area in the city can practice car-pooling. This would be helpful in reducing the stress of school children travel to school, traffic on the streets and also cost efficient for parents and guardians.

9. Conclusion

The recent changes in the morphology and growth of the Kumasi Metropolis has meant the need to consider the location of basic services like education, critical users like school children and the connecting modes as transport to ensure, promote and enhance general urban efficiency. This paper uses descriptive analysis to identify the factors affecting school children's mode choice in Kumasi. The factors covered includes; parental

influence, home–to–school proximity ,household socio–economic attributes, risk and safety perception and level of spatial interaction between households. It was realized that different factors presented various effects in the school travel. Distance is revealed the most significant factor when home – to – school proximity is concerned. The different schools also presented differing results. The public schools were patronized mostly by children in the same community. On the other hand, private schools were mostly patronized by children from homes were cars were available and also related to parents travel schedules. Long distances to private schools, implies that school buses scheduling should be addressed to enhance effective teaching and learning. Furthermore, households living in close proximity can practice carpooling to save them time and financial resources. Walking and cycling are bound to increase if facilities that enhance their use are improved like sidewalks, zebra crossing and cycle lanes.

Fundamentally, there is a need for concerted effort among all relevant actors and stakeholders in ensuring a safe, convenient and effective transport for the school journey.

References

Ackaah, W. (2010), "Road traffic fatalities among Children in Ghana". Building and Road Research Institute, Kumasi, Ghana. http://www.pdfio.com/k-383792.html. Retrieved: 01/05/2012

Adarkwa, K.K. and Poku–Boansi, M. (2011), "Rising Vehicle Ownership, Roadway Challenges and Traffic Congestion in Kumasi" in Adarkwa, K.K. (ed), *Future of the Tree: Towards growth and development of Kumasi*. Kumasi, University Printing Press.

AU, UN, ADB, WB and EU (2005), Transport and the Millennium Development Goals in Africa, http://www.worldbank.org/transport Retrieved: 23/11/2011

Björklid, P. (2002), "Parental restrictions and children's independent mobility", paper presented at IAPS 17 ACoruña, 23-27 July, 2002 at the symposium on Children and Transport. The Stockholm Institute of Education, Department of Educational Research, Stockholm.

Boarnet, M.G., Anderson C.L., Day C., McMillan T.E., and Alfonzo M. (2005), "Evaluation of the California Safe Routes to School Legislation: Urban Form Changes and Children's Active Transport to School"*, American Journal of Preventive Medicine*, Vol. 28 (suppl 2), pp. 134-140.

Bradshaw, R., and Atkins, S. (1996), "The use of public transport for school journeys in London" paper presented at the proceedings of Seminar F: Public Transport Planning and Operations. European Transport Forum, Brunel University, England, 2-6 September 1996. Volume P405 http://trid.trb.org/view.aspx?id=575748 Retrieved: 24/11/2011

Buehler, R. (2011), "Determinants of Transport Mode Choice: A Comparison of Germany and the USA", *Journal of Transport Geography,* in press, Vol. 19. No. 4, pp 644-657

Di Giuseppi, C., Roberts, I., Li, L., and Allen, D. (1998), "Determinants of car travel on daily journeys to school: cross sectional survey of primary school children*", British Medical Journal*, Vol. 3, No.16, pp. 1426-1428.

Ewing, R., Schroer W. and Greene W. (2004), "School Location and Student Travel: Analysis of Factors Affecting Mode Choice", *Journal of the Transportation Research Board,* No. 1895, Transportation Research Board of the National Academies, Washington, D.C., 2004, pp. 55-63.

Fotel, T. and Thomsen, T.U. (2004), "The Surveillance of Children's Mobility", Surveillance and Society, Department of Social Sciences, Roskilde University, Denmark. http://www.surveillance-and-society.org Retrieved: 25/03/2012

Frank, L. and Company, Inc. (2008), "Youth Travel to School: Community Design Relationships with Mode Choice, Vehicle Emissions, and Healthy Body Weight", Final Report, U.S. Environmental Protection Agency, Washington, D.C. http://www.epa.gov/smartgrowth/pdf/youth_travel.pdf Retrieved: 10/02/2012

Garrard, J. (2009), "Active transport: Children and young people": An overview of recent evidence, Deakin University, Melbourne, Australia. http://www.vichealth.vic.gov.au Retrieved: 28/01/2012

Ghana Statistical Service (2012), 2010 Population and Housing Census of Ghana: Summary Report of Final Results, Accra, Ghana Statistical Service (GSS).

Grieco, M., Turner, J. and Kwakye, E. (1995), "A tale of two cultures: ethnicity and cycling behaviour in urban Ghana", *Transport Research Record 1441*, Washington DC.

Iranwan, M.Z. and Sumi, T. (2011), "Promoting Active Transport in Students' Travel Behaviour: A Case from Yogyakarta (Indonesia)", *Journal of Sustainable Development*, Vol. 4 No. 1.

Kenworthy, J. (2002), "A Global Perspective on Urban Transport: Shaping the future of urban settlements with rail-based public transport systems", Swiss Federal Railways (SFD), Bern, Switzerland.

KMA (2011), Metropolitan Medium Term Development Plan, 2010 – 2013. Accra: Government of Ghana, Ministry of Local Government, Rural Development and Environment.

Litman, T. (2003), Active Transportation Policy Issues; "National Roundtable on Active Transportation", Victoria Transport Policy Institute, Canada. http//www.vtpi.org/act_tran Retrieved: 24/11/2011

McDonald, N.C. (2005), "Children's Travel: Patterns and Influences", A dissertation submitted for PhD in City and Regional Planning; Graduate Division of the University of California, Berkeley.

McDonald, N.C. (2007), "Active Transportation to School: Trends Among U.S. Schoolchildren, 1969-2001", *American Journal of Preventive Medicine*, Vol. 32, pp. 509-516.

McDonald, N.C. (2008), "Critical factors for active transportation to school among low-income and minority student: Evidence from the 2001 national household travel survey", *American Journal of Preventive Medicine,* Vol. 32, pp. 509-516

McMillan, T.E. (2007), "The relative influence of urban form on a child's travel mode to school", *Transportation Research Part A*, Vol. 41, pp. 69-79.

Pont, K., Ziviani, J., Wadley, D., Bennett, S., and Abbott, R. (2009), "Environmental Correlates of Children's Active Transportation: A Systematic Literature Review". *Health & Place*. Vol. 15, No. 3, pp. 849-862.

Porter, G. (2002), "Living in a walking world: rural mobility and social equity issues in sub-Saharan Africa". *World Development Studies*. Vol 30, No. 2, pp. 285-300.

Porter, G. and Blaufuss, K. (2002), Children, transport and traffic in southern Ghana, University of Durham UK, Revised version of a paper presented at the international conference on Children, transport and traffic, Copenhagen, May 2-3, 2002. http//www.dur.ac.uk/child.mobility/ Retrieved: 23/02/2012

Red Cross International (2005) Road Safety is no Accident. http://www.redcross.int/EN/mag/magazine2005_2/4-9.html. Retrieved 13/10/2014

Schafer, A. and Victor, D.G. (2000), "The Future Mobility of the World Population". *Transportation Research Part A*. pp.171-205.

Sidharthan, R., Bhat, C.R., Pendyala, R.M. and Goulias, K.G. (2011), "A Model Of Children's School Travel Mode Choice Behaviour Accounting For Spatial And Social Interaction Effects". *Transportation Research Record*, Vol. 2213, pp. 78-86

Timperio, A., Ball, K., Salmon, J., Robers, R., Giles-Corti, B., Simmons D., Baur L.A., and Crawford, D. (2006), "Personal, Family, Social, and Environmental Correlates of Active Commuting to School"*, American Journal of Preventive Medicine,* Vol. 30, No. 1, pp. 45-51.

Vasconcellos, E.A. (1997), "Rural transport and access to education in developing countries: Policy issues", *Journal of Transport Geography*, Vol. 5 No. 2, pp. 127-136.

Yin, R. (2003), ''Case study research: Design and methods'' (3rd ed.), Thousand Oaks, CA: Sage.

Zwerts, E., Allaert, G., Janssens, D., Wets, G., and Witlox, F. (2010), "How Children View their Travel Behaviour: A Case Study from Flanders (Belgium)", *Journal of Transport Geography*, Vol. 18, No. 6, pp. 702-710.