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ANALYSIS OF SCHOOL TRIPS IN DHAKA CITY: A CASE STUDY ON PRIMARY SCHOOL STUDENTS

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ABSTRACT

Travel pattern and mobility of school children is often different than the overall pattern of city dwellers or adults. However, this topic is not well researched by academia or professionals in Bangladesh. Nevertheless, often it is claimed that school trips on private cars is one of the major causes of congestion in Dhaka city. This research provides an overview of travel pattern of school students in Dhaka and suggests how to overcome their major mobility constraints. Four hundred and twenty students from 21 different primary schools were interviewed using a pre-determined questionnaire and analysed to fulfil the research aim. It was found that the majority of students walk and a significant portion travel with an escort (adult family member) by car or rickshaw whilst cycling is very limited. Findings of this research may help to improve overall mobility and travel experience of school students.

KEYWORDS: School, Children, Travel pattern, Access, Preference

1. INTRODUCTION

Traffic congestion and transportation-related environmental pollution are the important problems in many developing countries (Le and Trinh, 2016), and Bangladesh is also not an exception. Traffic and transport situation in Bangladesh is very chaotic and often characterized as underdeveloped and inadequate infrastructure provision, lack of discipline and poor traffic management, severe safety problems and a widening gap between demand and supply. Dhaka city is the main administrative, political, economic and academic centre of Bangladesh. However, traffic congestion and delay is one of the major problems of the city. Congestion is a common phenomenon in the streets of Dhaka and the situation becomes worst in peak hours (e.g. opening and closing time of office and educational institutions). The average hourly speed of vehicles in Dhaka's street now-a-days become only 7 km per hour (Siddique, 2017). Furthermore, recently Dhaka has ranked the 2nd worst city of the world in terms of liveability index (EIU, 2015).

School related traffic has become a major source of congestion in many parts of the developing world (Choudhury et al. 2012). Furthermore, driving to school increases congestion (BMA 1987; Hillman, 1993; Rowland et al. 2003). A large number of schools are located in the central part of Dhaka city which pulls a significant number of traffic during morning and afternoon peak hours. Though car ownership rate and car's contribution in modal share is very low (Rahman, 2011), a considerable number of school students in Dhaka city travel on cars (Choudhury et al. 2012). Consequently, during school starting and closing time, a large number of personal cars are

seen in the roads of Dhaka which often create congestion surrounding the school areas. School trips led to increasing trip generation and traffic congestion in Dhaka city during school hours (Sultana, nd; Esrar, 1993). Moreover, school children have different travel needs and every day they do face various travel problems during their school trips. Furthermore, school children are one of the most vulnerable groups at risk of traffic accidents globally (Morris et al. 2001). Therefore, as Yarlagadda and Srinivasan (2008) argued, factors influencing children's travel mode to school need to be examined to expand benefits from policies and programs.

In recent years, mode choice behaviour for students has drawn much attention of researchers (Le and Trinh, 2016). There have been several studies (e.g. Buliung et al. 2011; Choudhury et al. 2012; Curtis et al. 2015; Kerr et al. 2006; Le and Trinh, 2016; Lin and Chang, 2009; McDonald, 2007; McDonald, 2008; McDonald et al. 2010; McMillan, 2007; McMillan et al. 2006; Mitra et al. 2010; Rhoulac, 2005; Rowland et al. 2003; Wilson et al. 2010; Vovsha and Petersen, 2005; Yarlagadda and Srinivasan, 2007) focusing on travel mode choice for school trips and different aspects of students' travel pattern. However, with a few exceptions, almost all these studies are done in developed countries. This is not surprising as the transport professionals or city authorities in most developing countries often fail to provide high priority or importance on children's school travel. For instance, on this topic only a very small number of studies (Ahmed, 2016; Choudhury et al. 2012; Haque et al. 2013; Islam, 2015) are available on Bangladesh contexts. Despite school children are the most vulnerable groups (Morris et al. 2001), school trips do not get special attention in transport planning in Bangladesh. Moreover, though gender is a factor that influences modal choice for school trips (Ahmed, 2016), it is often neglected in the policy making and planning in Bangladesh. Exploring travel pattern of school children in Dhaka city may help to understand the existing condition and the factors that influence modal choice of school trips. This understanding may guide the planning needs as well as help to propose some guidelines for improving experience of school travel in Dhaka.

2. OBJECTIVES

The purpose of this paper is to explore the existing travel pattern of school children in Dhaka city and what are the major problems of school trips. The paper also explores what are the factors that influence modal choice of school trips. However, factors such as location of the school, parent's profession, availability of travel mode are not considered in this research. The scope is limited to only primary school students. Therefore, students of high school and college/university are beyond the scope of this research. School transport services managed and operated by the school itself is also beyond the scope of this research.

3. REVIEW OF RELEVANT LITERATURE

Built environment or urban form does have influence on children's school travel (McMillan, 2007; Mitra et al. 2010; Curtis et al, 2015; Lin and Chang, 2009). McMillan (2007) claimed that the urban form is important but not the sole factor that influences school travel mode choice; other factors such as perceptions of neighbourhood safety and traffic safety, household transportation options, and social/cultural norms may be equally important. Similar to this, Lin and Chang (2009) showed with Taipei's example that high shade-tree density and high sidewalk coverage encourage children to walk to school independently, whilst large block sizes and

increased intersection numbers discourage to walk to school independently. They further argued that although high building density and diversified mode option encourage children to travel home after school by walking or bus, block size and road width discourage children for doing so. Nevertheless, McMillan (2007) claimed that the urban form is an influential factor in non-motorized travel behaviour. Furthermore, school travel mode choice is significantly affected by neighbourhood environmental characteristics and parental concerns (Kerr et al. 2006).

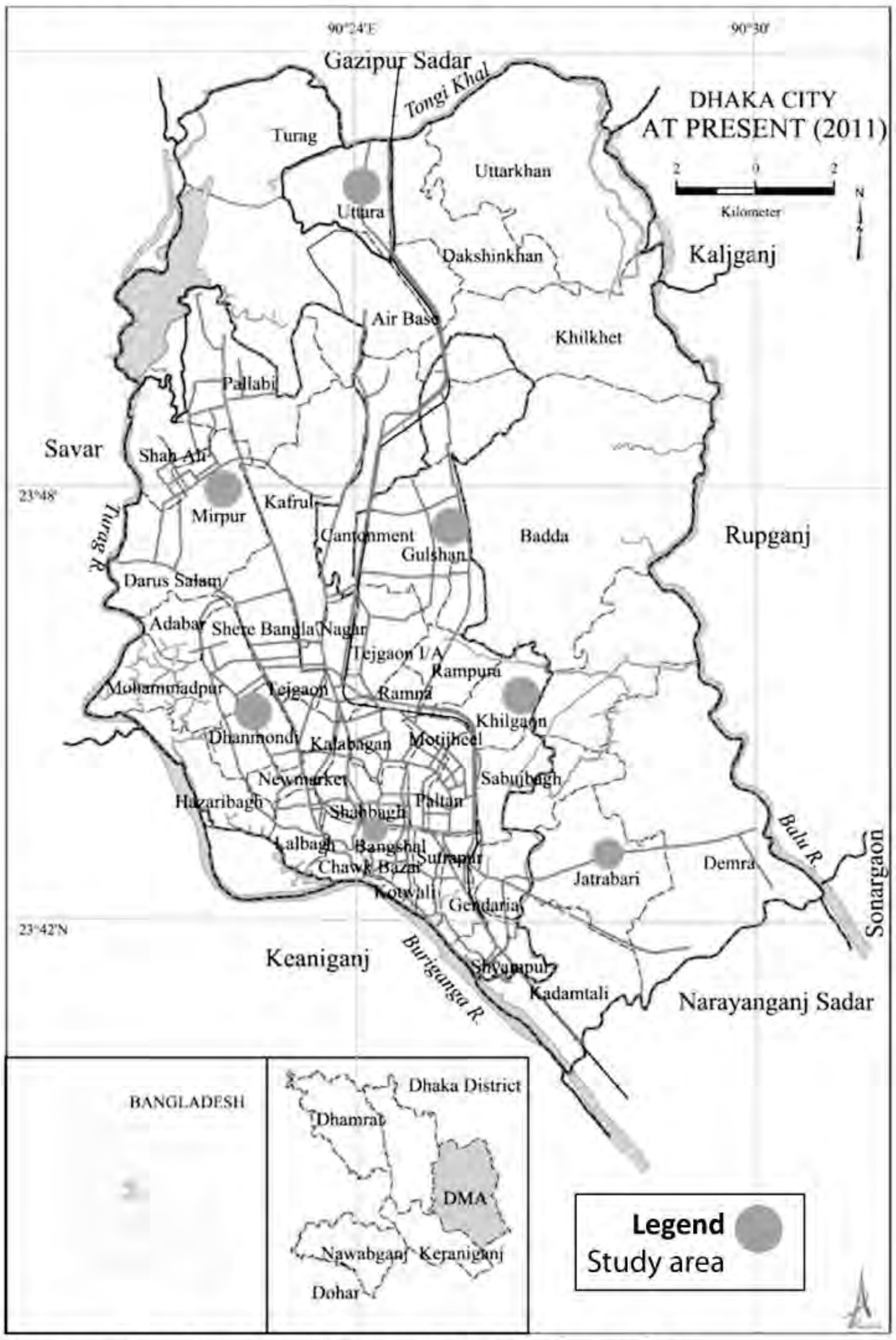
If the child do not travel to school alone, the characteristics of parents or caregivers might be important for mode choice of school trips. Almost 85% parents of primary school children in the London boroughs of Camden and Islington are worried about traffic danger and abduction (Rowland et al. 2003); therefore, it is likely that the majority of primary school students travel to and from school with parents or caregivers. Wilson et al. (2010) found that children's commute mode differ by school type, parents' income, and race. Using the 2000 San Francisco Bay Area Travel Survey (BATS) data, Yarlagadda and Srinivasan (2008) claimed that the characteristics of child (e.g. age, gender, and ethnicity) and employment and work flexibility characteristics of the parents have strong impacts on the mode choice decisions for school trips; however, the impacts of some of these attributes on the choice of mode 'to school' are different from the corresponding impacts on the choice of mode 'from school'. Similarly, McDonald (2018) showed that young children with mothers who commute to work in the morning are less likely to walk or bike to school after controlling for individual, household, and neighbourhood factors. Weather, convenience, and trip chaining are primary reasons reported by Canadian parents/caregivers for continued driving for school trips (Buliung et al. 2011). McDonald et al. (2010) analyzed the association between parental perceptions of the social environment and walking and biking to school and found that higher levels of parent-perceived child-centered social control are associated with more walking and biking to school.

Nevertheless, travel distance between home and school might be the crucial factor because students may walk only if the distance is short and convenient to walk. Yarlagadda and Srinivasan (2008) found travel distance between home and school is strongly and negatively correlated with the choice of walking to and from school, with the impact being stronger for walking 'to school'. Similarly, McDonald (2007) showed that walking to school is very sensitive to travel time. Mitra et al. (2010) found in Toronto the distance between the residence and school have the strongest correlation with mode choice. Le and Trinh (2016) used socioeconomic characteristics (e.g. gender, age, educational level, motorcycle ownership, migrant status), mode-specific factors (comfort, convenience, safety), trip characteristics (e.g. travel time, travel cost, distance), and psychological factors (e.g. awareness, attitudes, social norms) as the explanatory variables for investigating mode choice behaviour of students.

4. METHODOLOGY

Multistage sampling method was applied for data collection. Seven case study locations in Dhaka city were identified and selected on the basis of spatial pattern so that they represent the whole city. Seven selected areas are: Uttara, Gulshan-Bonani, Jatrabari, Dhanmondi, Mirpur, Khilgao-Basabo and Old Dhaka (as seen in Figure 1). The list of schools for each of these areas

were prepared and categorized into three groups: government primary school, non-government primary school; and English medium school. One school for each type, thus three schools, from each of the locations were identified. Thus, a total 21 primary schools were selected and 20 respondents from each of the selected school were considered for the interview.



Source: Banglapedia, 2011; modified by the authors

Figure 1: Map of Dhaka city showing seven study locations

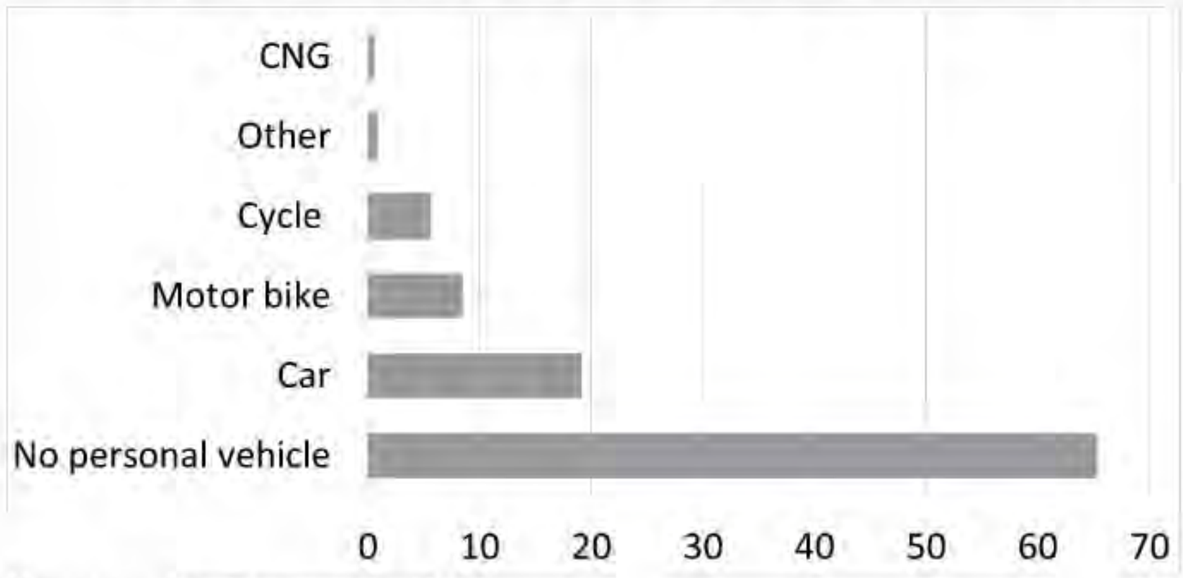
A total 420 interviews were conducted at school premise, either before or after the school, using a pre-determined structured questionnaire. The questionnaire had questions relevant to personal information, school trips, school transport service (if available), usual mode for school trips and household information. The respondents are either guardians or students of primary school. Exploratory data analysis technique was followed and the collected data were analyzed using Microsoft Excel and SPSS software.

5. TRAVEL PATTERN OF SCHOOL CHILDREN IN DHAKA CITY

This section discusses on the demographic profile of the respondents, existing travel pattern and school trips of the students, and factors that influence modal choice of school children.

5.1. Demographic profile of the respondents

Among the total 420 respondents, almost 87% are students and the remaining 13% are guardians. In terms of age group, 8% are below 8 years, 60% are in 9-12 years and 32% are over 13 years. Among the respondents, only 39% are female and 61% are male. About 39% of the respondents belong to lower- and lower-middle income groups (household monthly income is up to Tk 30,000 per month) and 30% in middle-income group (Tk 30,000 to 100,000) whilst only 10% fall in higher income (Tk 100,000+) groups and only 6% have monthly income below Tk 10,000.



Source: Field survey, 2017

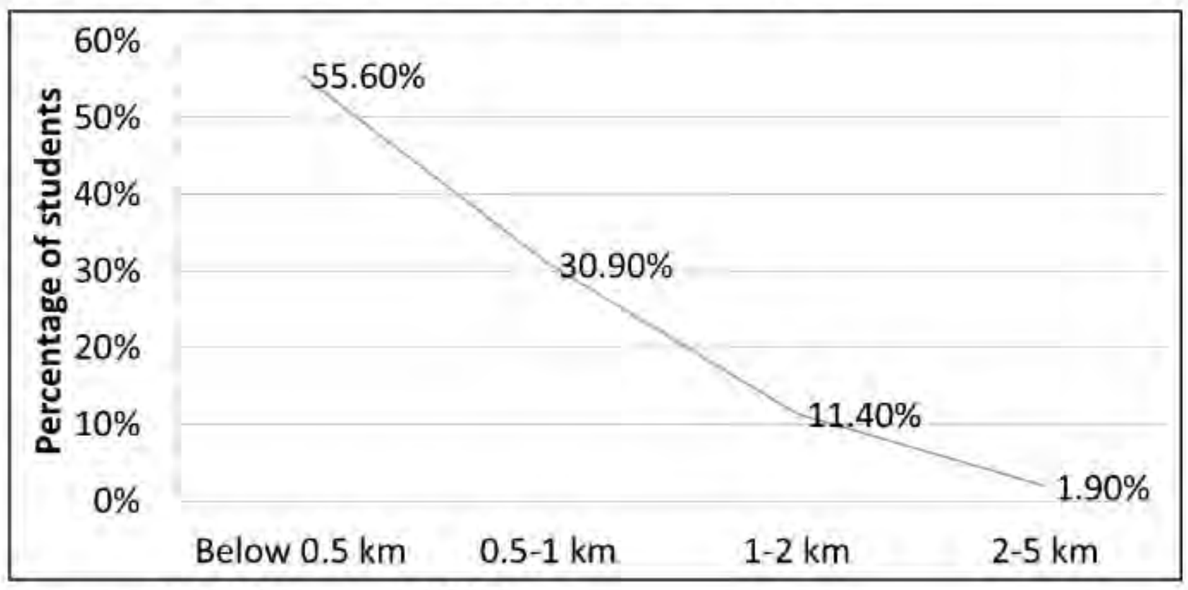
Figure 2: Respondent's household ownership of vehicles

Figure 2 shows almost 65% of the respondents have no personal vehicle owned by the family whilst 8.5% have motorbike and 19% have car. However, despite having car ownership of 19% of the respondents, only 2% of them usually use their car for the school trips.

5.2. Usual school trips in Dhaka

Usual school trips for a student in Dhaka are 12 trips per week as there is only a day weekend. Only exception is a few English-medium schools where weekend is for two days. Data from the sample respondents revel that the respondents' average total trips (including non-school trips) per week is 18. Students usually use different range of travel modes for school trips. The majority (56.5%) do walk to/from school whilst about 18.5% use car and 17.5% use rickshaws for school trips. This information is very different than the findings of Choudhury et al (2012) where they found travel mode for more than half of the school trips in Dhanmondia area of Dhaka are cars and about a third are rickshaws. Use of school bus, cycling and public buses are very low; only 2.5%, 1.8%, and 1.5% respectively. The majority do walk for school trips might be attributed due to short distance – probably the school (as it is primary level) is situated within the neighbourhood or walking distance. The distance of school trips, as shown in Figure 3, reveals the prevailing claim is somewhat correct: 55.6% of the trips are less than 500 m. However, 11.5% trips are longer than 1 km but within 2 km whilst only about 2% trips are over 2 km (but less than 5 km). In terms of gender, usually there is no significant difference in using a particular travel mode for school trips. However, it was found that the female respondents are

frequently using rickshaws for school trips whilst male respondents are more likely to use bicycle or public buses. This is similar to the findings of McMillan et al. (2006) where (with a different geographical location and socio-economic contexts than Dhaka) they found girls are 40% less likely to walk or bike to school compared to boys.



Source: Field survey, 2017

Figure 3: Distance of school trips

Students do not need to pay any fare if they use household vehicle or walk or cycle for school trips. If they use school bus, need to pay either daily or weekly/monthly basis. This should be noted that a very few students in Dhaka do use school bus services. For instance, only 2.5% of the respondents used or using school bus. This low number of using school bus is probably because the existing school bus services in Dhaka city is available only in one route (e.g. Mirpur to Azimpur via Asadgate). Students using rickshaws or auto-rickshaws or buses spend for a trip on average Tk 25; usually it is Tk 5-20 on bus, Tk 25-80 on rickshaw, and Tk 80-150 on auto-rickshaw or taxi.

Students of the higher income groups, having a family owned car, usually use a car for school trips. However, private cars for school trips significantly contribute in creating congestions surrounding the school particularly during the school opening and closing hours. While using the private car for a school trip, it is hardly shared with other students. Data reveal that among the car users almost 84% do not share the car with others during school trips. Choudhury et al (2012) also gave similar result - around 72% of the students do not carpool or share rides.

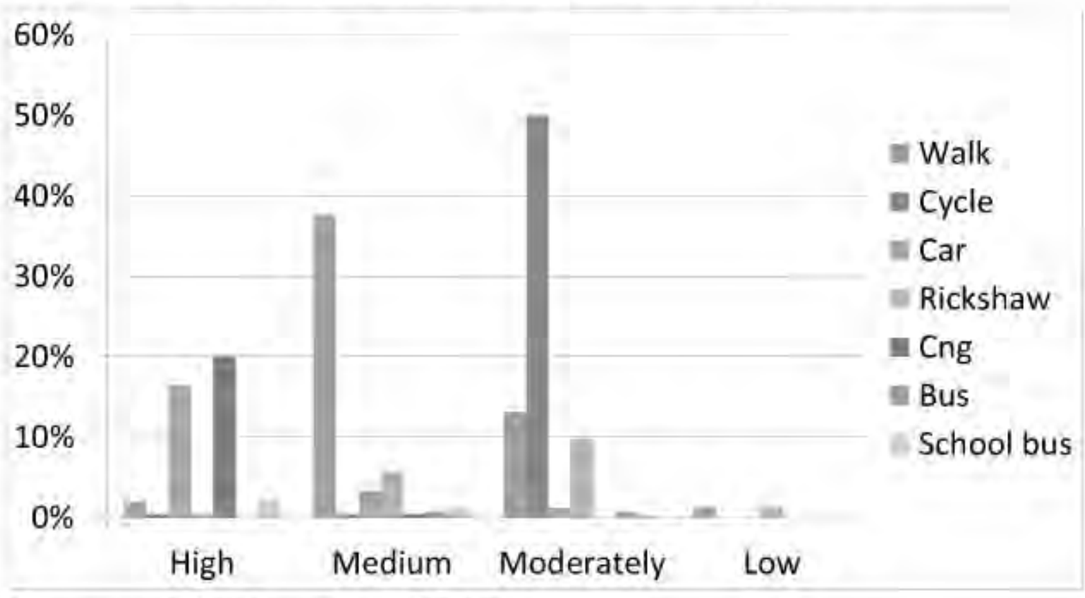
5.3. School transport service

Only in a few schools (particularly English-medium schools) they have their own transport services for students. The service is rather expensive, monthly average cost Tk 1,000. A few of the private schools also provide transport services for students by school bus or school van. School van is relatively cheaper and accessible by middle or lower-middle income groups. Of the 21 sample/studied schools, only five of them have own transport services and only 12% of their total student population use the service. One of the main reasons why the majority are not using school transport services are: having personal car or parents' safety/security concerns as the child would travel alone in a school van and therefore unwillingness. As already mentioned earlier, a major portion of trips are short, that means who are living close to school, they could walk that distance and therefore they do not need the school transport services.

Nevertheless, in January 2011, Bangladesh Road Transport Corporation (BRTC) introduced a school bus service for the students. The purpose of the scheme was to discourage private car usage for school trips and thus reducing congestion around schools in peak hours. In route Mirpur 12 to Azimpur, only 14 buses were deployed (now only 2 of them are now operating) to serve more than 26 schools with a charge of Tk 5 for students and Tk 10 for guardians per trip. However, the service is not successful to attract students and due to other problems. Currently the service is available in the morning (at 6:00 am and 10:00 am) and afternoon (at 12:00 pm and 4:00 pm) for return trip.

5.4. Comfort level of existing modes for school trips

Comfort level of the travel mode is one of the important factors that influence modal choice. Comfort level of the existing transport mode usage varies from person to person according to their modal usage. For instance, students who use car or others who use school bus or walk have mentioned that their respective mode is very comfortable. Students usually prefer a mode for their school trips which is in general comfortable. However, different mode users have different experience of comfort level for school trips as shown in Figure 4.



Source: Field survey, 2017

Figure 4: Comfort level of different travel modes

Table 1: The share of modal use according to comfort level (in percentage)

	Walk	Cycle	Car	Rickshaw	CNG	Bus	School bus	Others	Total
Very comfortable	8.8	2.2	75.8	2.2	1.1	0	9.9	0	100
Comfortable	75.2	1.0	6.7	11.4	1.0	1.4	2.4	1	100
Moderately comfortable	51.4	1.9	4.7	38.3	0	2.8	0.9	0	100
Uncomfortable	50	0	0	50	0	0	0	0	100

Source: Field survey, 2017

Only 18% students feel very comfortable (of them 75% use car, 10% school bus and 9% walk) whilst 52.5% feel comfortable (of them 72% walk and 11.5% use rickshaws) with their existing mode of school trips. On the other hand, around 25.5% students feel moderately comfortable and only 3.5% feel uncomfortable about their existing mode of school trips.

5.5. Problems of school trips

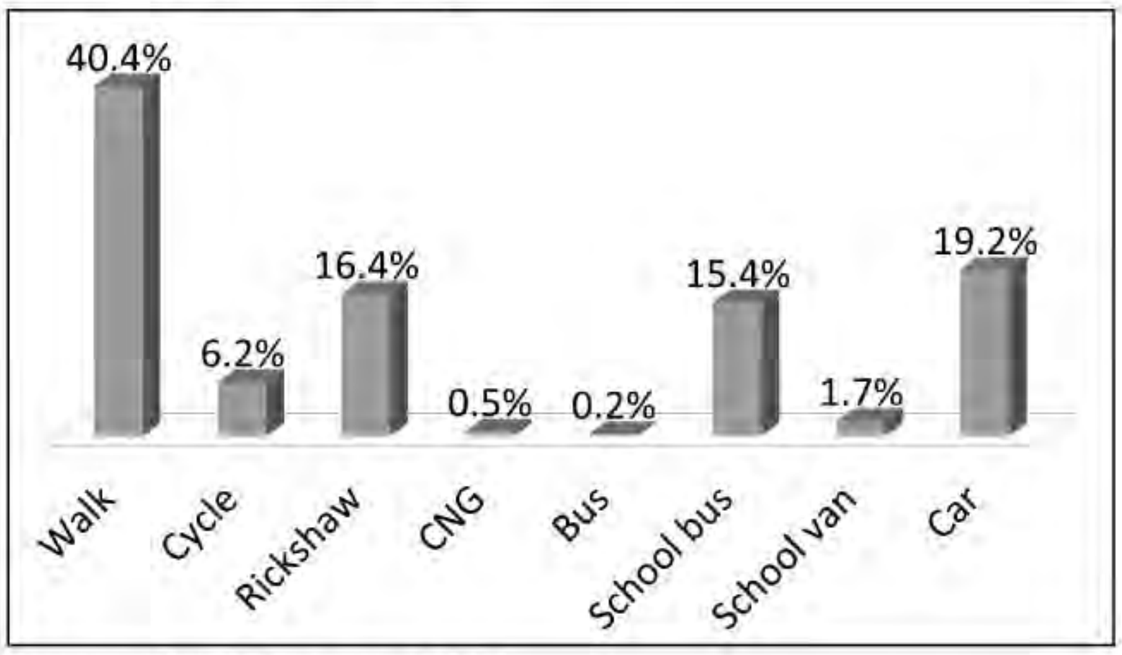
The data from sample respondents reveal that almost 60% students usually face problems during their school trips. The most common problems reported are:

- Traffic jam and resulted delay;
- Non walking facilities or where available very poor quality;
- Unsafe for pedestrian road crossing;
- Road blockage and dust due to construction works;
- Noise and air pollution; and
- Feeling of insecurity.

Due to excessive traffic jam on roads, students' journey time to and from school usually takes longer. Therefore, except walking students who use other modes are sometimes late in school. As the road construction and different development works in Dhaka city are carried out throughout the year, these often hamper traffic flows and convenient movement of pedestrians. Random use of horns and fumes of vehicles hamper the mind and body adversely. The children are mostly affected by noise and air pollution. In many roads there is no pedestrian facility. Even if some pedestrian facilities are available in few locations, they are not well developed or properly maintained. For instance, footpaths are often occupied with street hawkers, various construction materials or garbage and thus not suitable for convenient pedestrian movements. Moreover, drivers' disrespect to conventional traffic rules and unavailability of pedestrian rod crossing (e.g. Zebra crossing, foot over-bridge) facilities make road crossing very hard and unsafe for children. Furthermore, due to social problems like sexual harassment, hijacking, kidnapping etc. both the students and their guardians often feel unsafe in Dhaka's roads.

5.6. User's preferable mode for school trips

The students were asked which particular mode they would like or prefer for their school trips. It was found that the students' preference is influenced by their perception toward those modes - usually prefer the travel mode most what they are currently using for school trips. This indicates, students have an inertial preference for their current mode of travel. Rhoulac (2005) and Choudhury et al (2012) also had similar findings in their studies of school trips. Figure 7 shows their preferable mode for school trips.



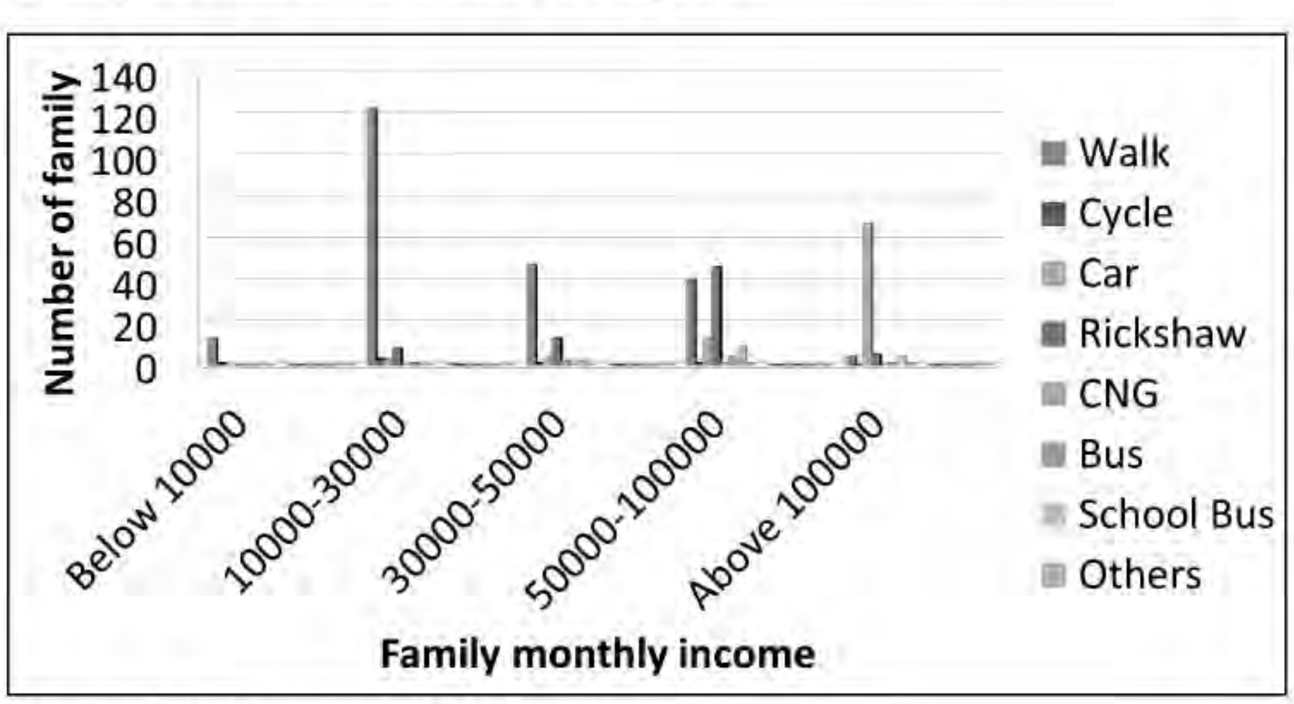
Source: Field survey, 2017

Figure 7: Preferable mode for school trip (percentage of respondents)

Almost half (40.5%) of the respondents prefer walking and only 19% prefer car for school trips. Some 16.5% mentioned they would prefer rickshaws and 15.5% would prefer school bus for their school trips. It is interesting that a significant portion mentioned they would prefer bicycle and school bus (6.2% and 15.5% respectively) for school trips even though at present the contribution of bicycle and school bus for school trips are very low. Proportion of the respondents mentioned rickshaw and walk as the preferable mode are less than the number mentioned their current travel mode. This indicates, those who are now using rickshaw or walking to/from school would prefer to switch on bicycle or school bus for their school trips.

6. FACTORS INFLUENCE MODE CHOICE FOR SCHOOL TRIPS

Different factors do influence modal choice for school trips. For example, socioeconomic factors (e.g. gender, age, household income and car ownership) and trip character (e.g. trip distance, availability of travel mode and school transport, travel cost and time). Data reveal that girls are less likely to prefer walking or bicycling while they are more likely to use rickshaws to travel to/from school. In the contrary, boys prefer walking or school bus more than other modes. Yarlagadda and Srinivasan (2007) and McDonald (2008) also found school travel mode choice is affected by socioeconomic factors such as child's age, gender, ethnicity as well as parents' employment and work flexibility. Students' use of different mode for school trips is shown by different income groups of the households in Figure 5.



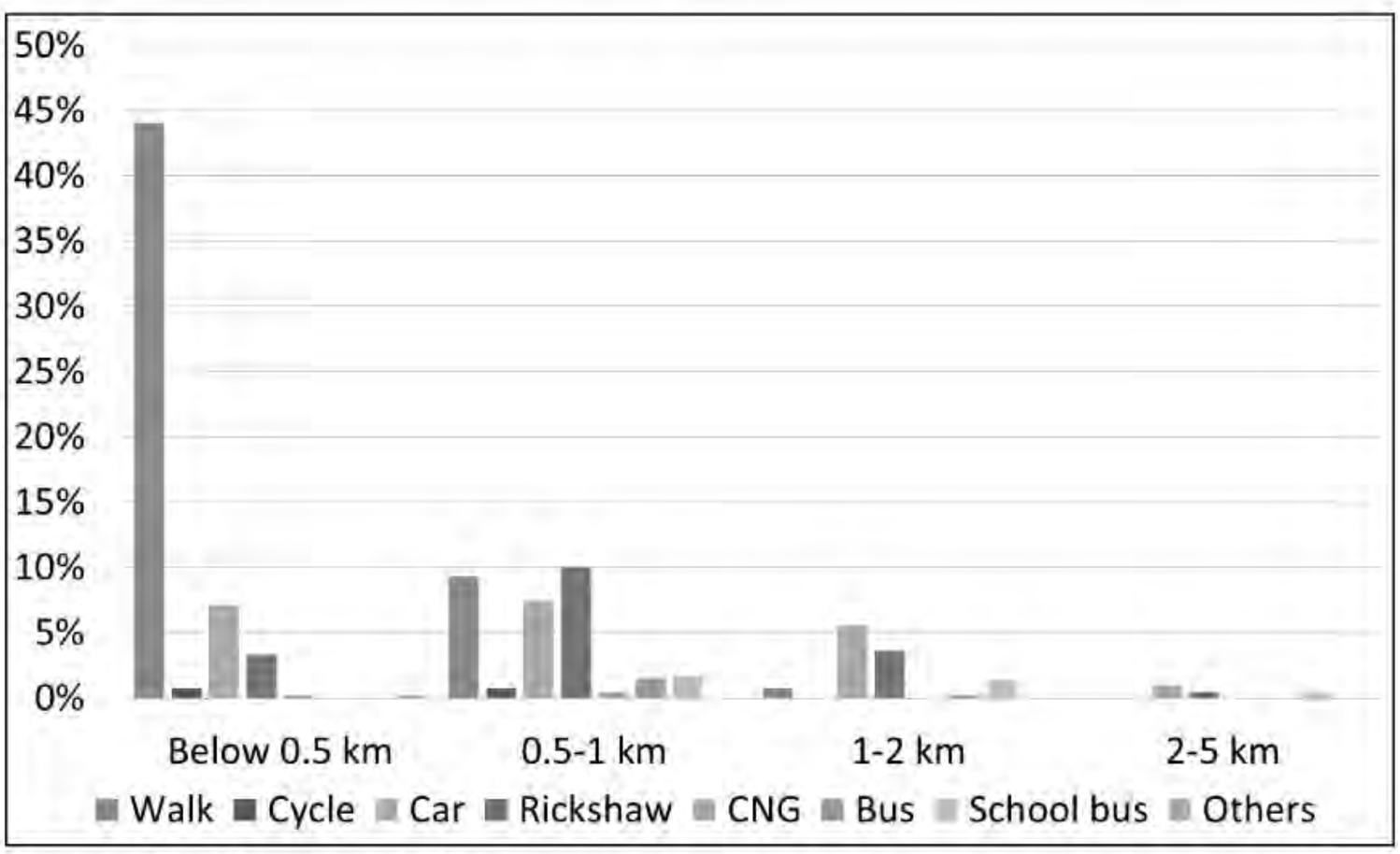
Source: Field survey, 2017

Figure 5: Modal choice by household income

Age is another important factor that influences modal choice of students. The respondents were classified into three age groups: below 8 years, 9-12 years, and over 13 years group. Almost 47.5% of the respondents of age group below 8 years use car whilst 34% walk and 16% use rickshaws for school trips. They usually do not use bicycle and bus or school bus service. However, in age group 9-12 years it was found that they mostly prefer walking (about 57%) whilst car and rickshaws are reported by 22% and 13% respectively.

It is worth mentioning that the survey data reveal the respondents having household monthly income less than Tk 10,000 mostly walk for school trips and all of them are the students of government primary schools. Respondents of the income group Tk 10,000-30,000 (29.5% of the total) also usually walk for school trips and a few of them use rickshaws. Similarly, in income group Tk 30,000-50,000 also students usually prefer walking and rickshaws for school trips; for instance, 3.1% use rickshaws and around 11% do walk for school trips. On the other hand, in income group Tk 50,000-100,000 there is a significant change or variation in travel mode usage for school trips. In this income group, use of car and rickshaws for school trips have increased – only 3.1% use car and around 11% use rickshaws. Use of school bus also increased in this group. In the income group over Tk 100,000 it was found that the majority of the students mostly use car for their school trips.

The distance to school from home is also an important factor for choosing a particular travel mode. Therefore, modal choice may change with the changes of travel distance. Usually students could travel to or from school on foot if the school is located close to home. For a distance of less than 0.5 km of school trips, about 44% of the respondents walk whilst 7% use car and 3.5% use rickshaws. This clearly reveals that even though the distance is very short (e.g. less than half of a km) and possible to walk, a considerable number of students use car for their school trips. When the distance of school trips is longer (e.g. 1-2 km), the majority of students usually travel by rickshaws and car.



Source: Field survey, 2017

Figure 6: Modal variation with travel distance

Sample data show that only 17% of the respondents travel alone whilst the rest 83% travel accompanied with parents or guardians during school trips. Students are often escorted or accompanied by guardians or others during school trips mainly for their safety concerns. The students who are accompanied or escorted to/from school, only 30.5% of them travel with parents whilst about 46% travel with their classmates and the remaining 33.5% travel with some

others people such as driver, caretaker etc. Thus, the travelling companion and the person who is accompanied with the student is an important factor for choosing different travel modes. Vovsha and Petersen (2005) also found similar results - factors such as the escort's gender and the children's age contribute significantly in the decision to escort.

6.1. Ranking of the factors

The factors that influence the students' travel mode choice for school trips were ranked according to the respondent's perception. Significant level of correlation between usual travel mode and the factors (e.g. gender, age, travel distance, travel time, travel cost, comfort level, monthly income of the household, vehicle ownership, and student escort) were calculated using the statistical bivariate correlation method (two-tailed and Pearson test of significance). Significance value 0.50 or above represents strong relation with variables and the decease of this value, the significance becomes weaker.

The calculation shows that mode choice has strong correlation with three factors. There is a strong correlation between mode choice and travel time (0.56) and ranked first. This is consistent with the study of Mahmud and Rabbani (2012) where they found travel time for both car and bus appears the most important determinants of mode choice in Dhaka city as well as McDonald (2007) where he found walking to school is very sensitive to travel time.

Correlation with travel distance and household income also found strong (0.54 and 0.52 respectively) and ranked as the second and third influencing factors respectively. Some other factors that have influence on mode choice for school trips are: student's escort (0.26), travel cost (0.23), household vehicle ownership (0.15) and age of student (0.02). However, comfort level and gender has negative significance in mode choice; therefore, these factors have no influence in choosing travel mode for school trips.

7. SUGGESTIONS

Based on the analysis and findings discussed in previous sections, this study suggests following guidelines for reducing primary school students' problems associated with their school trips.

Safe walking for school

Safe walking for school trips need to be ensured for school children. To do this, improving city-wide pedestrian network with appropriate pedestrian facilities are needed. Even though a major portion of the students usually walk (and also prefer walking) for their school trips, the pedestrian facilities of the city are very poor. Moreover, a major portion of school trips are for short distance which could be walked easily if walking facilities are available. However, footpaths are not provided in many roads of Dhaka and where provided these are either narrow or occupied by traders or other non-pedestrian activities and no crossing facilities for pedestrians (Rahman, 2013). As a result, walking in Dhaka is not safe and convenient and particularly for children it is very difficult. Therefore, adequate footpaths need to be provided, particularly on major roads, with appropriate pedestrian facilities as well as improving the conditions of the sidewalk network. Footpaths should have smooth and non-slippery surface, cracks should be

repaired, crosswalks and crossing guards should be added, plantation for providing shade from heat of sun and provision of enough lighting during night.

There is a scope to introduce 'walking school bus' program for safe walking of students. Such program is widely used in the UK for promoting safe walking to school. In this program the group of children (termed as 'bus') walk to school along a set route with adequate supervision; at least one adult (termed as 'driver') in front and an adult (termed as 'conductor') in the end of the bus who brings students from the gate of their house (Islam, 2015). Usually the interested parents of the students are registered with the group and the routes are selected in such way that all the interested students can join the program easily. The students whose school is located within a walking distance could join in 'walking school bus' and several routes could be identified to serve the majority of students.

Reducing car use

Car use for school trips need to be reduced. Even though the cars serve a small portion of school trips, cars are the main contributor of congestion as well as noise and air pollution. Moreover, major portion of the car trips for school in Dhaka are for a very short distance (but longer travel time due to congestions) which could be travelled by walking or cycling. Therefore, for school trips there is a need to encourage parents for reducing car use. Moreover, the parents should be informed that regular walking and cycling do provide many benefits (both physical and mental health) and car is not a sustainable option for travel. The government and school authority could arrange different awareness and advocacy programs for parents aiming to reduce car use for school trips. The use of school travel plans (STP) helps reducing car use for school trips (Rowland et al. 2003); therefore, the STP could be prepared.

A parking restriction policy is required for the reducing car use. On-street car parking in front of the school and in roads surrounding the school should be prohibited and strict enforcement should be ensured. Only a drop-off and pick-up facility could be provided in front (at gate) of the school. Car sharing should be encouraged so that 3-4 students residing in same area could use a single car for school trips. Nevertheless, a very limited number of parking could be provided inside the school compound with a very high parking charge. Along with restricting cars, provision of walking and cycling as well as improved bus services (if possible, school bus services) should be provided. Mahmud and Rabbani (2012) also suggested that for Dhaka city program aiming at reducing congestion during peak time should focus on substantial increase in the cost of private transport and provision of faster and reliable and comfortable public transport services.

School bus service

Improving bus service facilities is an effective way to reduce car use. Therefore, public transport system of the city needs to be improved. Choudhury et al (2012) claims it is established in literature (e.g. Vigne, 2007; Campbell and Wang, 2008) that introducing school buses could help in curbing school traffic related congestion. A large portion of students who are now using cars or other modes for their school trips may shift to school bus if proper routes are selected and the adequate number of buses is provided with improved facilities.

A large portion of the respondents mentioned that they would be interested in using school bus service if it is available with proper facilities. Therefore, school bus services could be provided in major routes with higher demand. As the existing school vans are not comfortable for the students, they could be replaced with school minibus. Many respondents mentioned that the fare of school bus should be affordable, in bus always there should have presence of at least one teacher or responsible person from, and cell phone facility so that if needed the parents could contact with children and driver or teacher. An aggressive awareness program should be introduced to change students' inertial preference of a mode. Choudhury et al (2012) claimed that inertial preference for a mode can be changed by convincing users by increasing awareness.

Ensure safety and security

Proper safety and security need to be ensured for the students so that they could travel to and from school without having any fear. Crosswalks are needed to ensure safety whilst crossing the road. Many respondents expressed a desire to have proper signage at major intersections as well as near the school for safe crossing of students. Drivers of the school buses should go through a rigorous assessment such as check of criminal records including child sexual abuse and incidents of driving with alcohol or drugs.

Policymakers in many countries, including the United States, United Kingdom, and Australia, have introduced safe routes to school programs to increase walking and biking to school through education, encouragement, and infrastructure improvements (McDonald et al. 2013). The school authority may take different initiatives for encouraging safe routes to school program. Urban form is an influential factor in non-motorized travel behaviour and therefore safe routes to school program is a possible intervention to change behaviour (McMillan, 2007; McDonald et al. 2013). Safe route to school should be designed to improve children's health by promoting walking and bicycling to school. This could be done by mapping out the safest routes that avoid busy intersections and thus encourage parents to make their children walk to school. Furthermore, the school authority could prepare school travel plan (STP) as well as create and implement Active School Transport (AST) action plans as Buliung et al (2011) claimed that a STP can expand a school's capacity to address transportation issues through mobilization of diverse community resources.

8. CONCLUSIONS

In recent years, there have been several studies focusing on travel mode choice for school trips. Available literature show that school related traffic has become a major source of congestion in many cities of developing countries and driving to school increases the congestion level significantly. The importance of mode choice for school trips is becoming increasingly apparent in the face of increased awareness and to develop a good transportation system for students. This paper was an attempt to explore the existing travel pattern of primary school children in Dhaka city, major problems of the school trips usually faced by students, and the important factors that influence modal choice of school trips in Dhaka.

The results show that though car ownership rate is very low in Dhaka, about 18.5% of the school trips are on car. The majority of the school trips are on foot and about 17.5% are on rickshaws whilst on school bus and on bicycle or public transport is very low. Trips on foot were found mostly for short distance such as less than 500 m. More than half of the students usually face different problems such as delay due to congestion, unavailability of pedestrian paths and crossing facilities, noise and dust problems during their school trips. However, the students have an inertial preference for their current mode of travel - the mode they are currently using they prefer most and mostly reported as comfortable mode. Though there was no significant difference in terms of gender for using any particular mode, the girls are more likely to use rickshaws and the boys are more likely to use bicycle or bus for school trips.

Different socioeconomic and demographic characteristics of the students strongly influence the travel pattern of school trips. For instance, students less than 8 years old usually do not use bicycle or bus; students belong to poor households mostly walk whilst from richer households use cars. For school trips, a considerable number of students use car even for a very short distance like below 500 m which is possible to walk. Almost 83% of the students are accompanied by their parents or guardians mainly for safety concerns. It was found that mode choice for school trips in Dhaka is strong correlated with travel time, travel distance, and household income. Student's escort, travel cost, household vehicle ownership, and age of the student also influence; however, comfort level and gender have no influence in mode choice for school trips in Dhaka.

Based on the findings, this paper suggests for provision of safe walking for school children, reducing car use for school trips, promoting school bus service, and ensuring safety and security for students to overcome the existing problems of primary school students associated with their school trips. The findings of this research may help the school authority as well as city authority, urban planners, and policymakers to understand the travel behaviour and trips characteristics of school students. This study provides an avenue for further research on discrete choice modelling and stated preference (SP) of mode choice for school trips.

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