A Study on the Mobility Pattern of Slum Dwellers in Dhaka, Bangladesh

Ayesha Siddika, Kazi Ehsanul Bari, and Md. Musleh Uddin Hasan

Abstract Dhaka is the capital and one of the oldest cities of Bangladesh, mostly renowned as the economic and business hub of the economy of the country. Transport studies on Dhaka, the capital and primate city of Bangladesh, do fairly reflect on the overall mobility scenario of the city. However, there is a paucity of literature on the subject for the four million people who live in slums. Furthermore, most of the extant gray literature contradicts itself, claiming that many slum people utilize rickshaws and other non-motorized vehicles. As a result, low-income people's mobility needs are frequently disregarded in transportation policies and programs. This study summarizes the findings of the movement pattern of inhabitants of four slums in Dhaka in order to make an empirical contribution in this area. The majority of slum inhabitants' routine excursions are for employment, with 58% taking place on foot, followed by rickshaws (12%), bicycles (6%), boats (7%), public buses (6%), and scooter/tempo (6%) (11%). Slum residents walk because they cannot afford to pay for transportation. They also visit their families on occasions, such as during festivals and other holidays. Gender differences in transport mode selection were observed. The most influential criteria for slum residents' mode choice behavior include household income, distance, trip cost, journey time, and so on.

Keywords Slum · Mobility · Vulnerability · Affordability · Mode Choice

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1 Introduction

Mobility for the poor and vulnerable groups is an essential precondition for achieving Sustainable Development Goals (SDG) in cities, especially in developing countries. A city with integrated modes of transportation is more likely to prosper as a center for trade, commerce, industry, education, tourism, and services. Most of the poor and low-income groups in society do not have adequate mobility options. In urban and transport planning and development, understanding and enhancing the mobility options of the poor are of significant importance. Asia has by far the highest number of city dwellers living in slums. South Asia faces the greatest problem, with half of the urban population living in slums [3]. This is no different for Dhaka, Bangladesh's capital. It is rare, if not nonexistent, to find studies addressing their mobility patterns. A few studies offer insight into low-income people's modal choice in general. Furthermore, several studies have shown that a large number of men in lower-income communities work as rickshaw pullers [2]. Based on such findings, some gray literature conceives that rickshaw is the main mode of transportation for the slum people—which is not only misleading but also contributes in targeting 'wrong' policy interventions for improving their mobility [8]. This study seeks to understand the mobility pattern—defined as accessibility to destination, reason and frequency of use, cost of using different modes, etc.—of the people living in slums in Dhaka. The study areas include four slums in four different parts of core Dhaka city, Dhaka North City Corporation (DNCC) and Dhaka South City Corporation (DSCC).

2 Literature Review

Dhaka, the capital of Bangladesh, is the largest city in the country. Contributing more than 30% of national GDP [1], Dhaka is unrivaled among Bangladeshi cities in terms of its economic, social, and political activities and opportunities. So, people migrate to Dhaka for better livelihood opportunities. Approximately 3.4 million people lived in five thousand slums of Dhaka city in 2005 [4]. These people constitute more than one-third of the total population and nearly all the low-income population of Dhaka.

As already stated, to the best of authors' knowledge, there is no literature on the mobility and modes used by these slum dwellers. Only few studies are found, which are on low-income people, in general. Fahmi et al. [5] studied the mobility of slum dwellers only in the case of their eviction from the slums, not in normal condition. They found that evicted slum dwellers most perform their outdoor activities by walking. Islam [7] and Nahiduzzaman [13] in their studies on the housing and integration of the slum dwellers have found that most of the inhabitants of slum and squatter settlements in the city prefer to go to their workplace on feet to save money. On the other hand, Mannan and Karim [11] found that people of low-income group of Dhaka city have higher propensity to choose bus to move around; as income level increases, people try to avoid bus and use rickshaw or tempo.

In contrast, JICA ([8], pp. 3–15 to 3–16) in the report on Dhaka Urban Transport Network Development Study shows that rickshaw is the most widely used transportation mode of the low-income households. This conclusion has also made the study 'biased' (as argued in Hasan and Davila 2018) toward investment intensive, heavy infrastructure requiring metro rail-based rapid transit solutions, but walking and non-motorized transport infrastructure development remained unduly addressed, if not overlooked. Gwilliam [6] and Mahendra [10] have also echoed similar concern in their studies on different other parts of the world. Unfortunately, empirical mobility studies focusing on the slum dwellers are also too few for other countries and context. In other parts of the world, mobility of slum dwellers is not in a very good condition. Several findings of different mobility-related studies of slum dwellers have been found in different secondary literatures.

Ram et al. [14] identified vans, cycles, metro cable, and BRT light as the main modes of transport of the slum dwellers of Delhi, India. The study has also suggested that mobility of slum dwellers should be considered while rehabilitating them. Salon and Gulyani [15] in their study have focused on the travel 'choices' of the urban poor who live in informal settlements in Nairobi, Kenya. This study has found that the slum residents walk practically everywhere they go and sometimes they cover a long distance by walking. The slums of Nairobi are relatively well connected by privately owned and operated transit vans and small buses called Matatus. The problem is not a lack of motorized transport options, and the slum residents are walking largely because they cannot afford the motorized options. Recently, the study of Kodransky and Lewenstein [9] has focused on the Rise of Shared Mobility in USA in order to increase the working efficiency of the low-income people.

3 Study Areas and Methodology

For selection of study areas, Dhaka city has been divided into four zones A, B, C, and D based on the density of slum clusters (Fig. 1). From each zone, a slum with sufficient number of population and household has been selected as study area. The slums selected from different zones are Kalshi slum, Mirpur (zone A), West Islambagh slum (zone B), Korail slum (zone C), and Sturapur slum (zone D). Table 1 shows the basic demographic and occupational profile of the people in the studied slums.

Out of the 27,000 households in the four slums, 384 were planned to be surveyed. However, during survey as 100 households had been surveyed at each slum, total sample size increased to 400. In this study, the information of all the household members was collected from the household head/representative. So the dataset represents the information of a total of 1382 slum dwellers.

A set of questions have been asked to determine the frequency of trips, duration of trip or travel time, modes of trip, travel cost of the respondents, presence of company during travel to ensure safety and comfort, spatial extent of mobility including influence zone and mode chain of slum dwellers, etc.

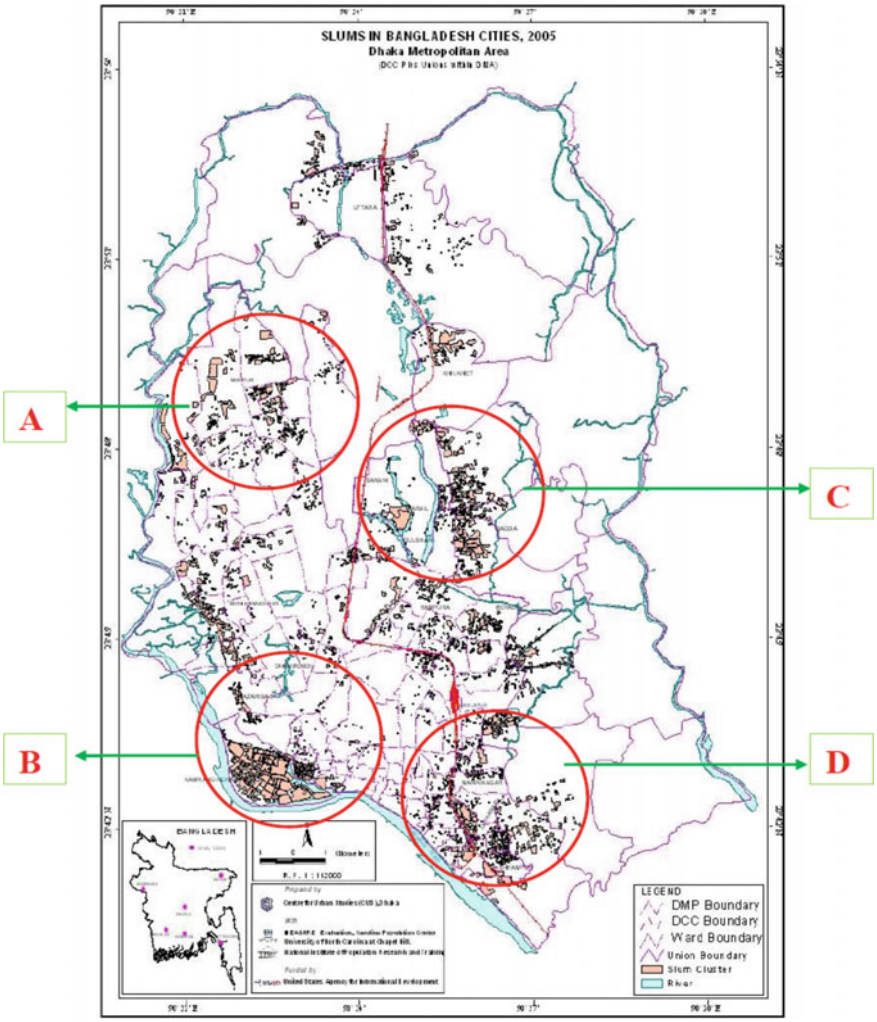

Fig. 1 Location of study area

Table 1 Demography of the study area

Name of slum	Number of households*	Population*	Average monthly income (BDT)**	Occupation
Kalshi	8500	42,500	5000–10,000	1.Rickshaw puller 2.Day laborer 3.Small business 4.House maid 5.Garments worker
West Islambagh	3000	15,000	5000–10,000	
Korail	14,480	80,000	10,000–15,000	
Sutrapur	1800	9000	5000–10,000	

Source * CUS et al. [4], ** Field Survey

4 Case Study Analysis

The following sub-sections put light on the modes used for traveling; duration, extent, frequency, and cost of the regular trips made by the slum dwellers. There is also a separate sub-section on the occasional trips made by the slum people.

4.1 Modal Share

About 60% slum dwellers live within walkable distance to their regular travel destinations. Preference of non-motorized vehicle is quite common among the slum dwellers. About 83% respondents use non-motorized transport, including walking, as their prime category of mode of regular travel, whereas only about 17% use motorized vehicle. About 58% respondents of slums prefer walking. The other dominant mode of regular travel is rickshaw (12%), tempo (11%), public bus (6%), bicycle (6%), and boat (7%).

The survey has found that the mode choice of respondents of the two slums of Old Dhaka (Sutrapur and West Islambagh slums) differs from the other two slums (Korail and Kalshi slum) (Fig. 2). The respondents of slums of Old Dhaka prefer walking as their prime mode. The study has found that about 67% respondents of West Islambagh slum prefer walking which is highest among the four slums. About 61% respondents of Sutrapur slum prefer walking which is the second highest among the four slums. The major difference is that the dwellers of Sutrapur and West Islambagh slums use boat as their prime mode which is because of the locational distribution of the slums. The location of Sutrapur slum is about one and half kilometer and West Islambagh slum is about half kilometer distance from the Buriganga River which influences their mode choice behavior. Though the respondents of Korail slum have to use boat to cross the Gulshan Lake, it is not considered as the prime mode of the respondent.

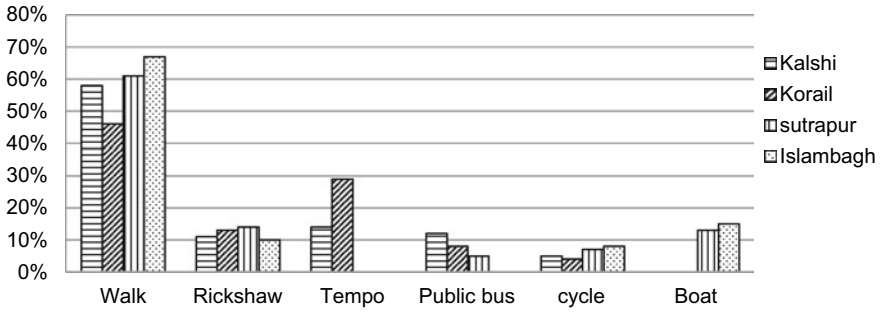

Fig. 2 Modal split of the slum dwellers of Dhaka city

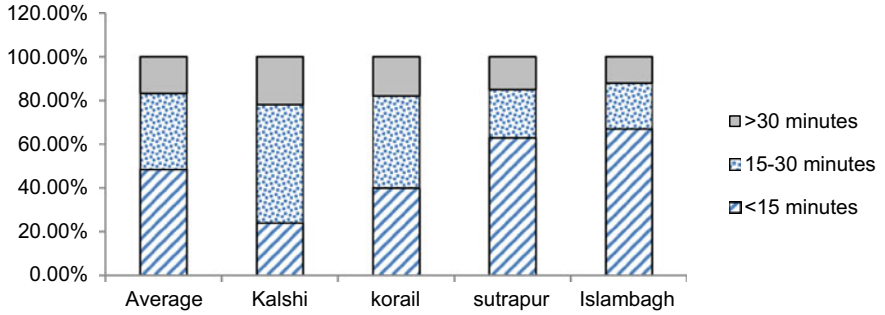

Fig. 3 Average travel time of slum dwellers of Dhaka

Rickshaw is the second most dominantly used mode of the slum dwellers. Some of the dwellers have rickshaw of their own. Besides, the absence of public transport in Old Dhaka influences the use of rickshaw as a regular mode of transport. Cycle is another preferable non-motorized mode of regular transportation the slum dwellers.

Use of public bus and other motorized vehicles is most common in Korail and Kalshi slums which is rare in Sutrapur and West Islambagh slums. Rather, the dwellers of Sutrapur and West Islambagh slums prefer non-motorized vehicle as their prime mode of travel. Slum dwellers also use tempo (one kind of local vehicle run by petrol) due to its availability in their locality and its reasonable cost.

4.2 Travel Time

Almost 49% of dwellers travel less than 15 min, 34% dwellers travel 15–30 min and 17% dwellers travel more than 30 min to reach their workplace (Fig. 3). Most of the slum dwellers prefer to reside adjacent to their working place which is the important reason behind their low travel time (less than 30 min).

It has been found that low travel time is more dominant in Sutrapur and West Islambagh slums because of having working place adjacent to their locality. The respondents of Korail and Kashi slum have more travel distance to cover than the others.

4.3 Spatial Extent of Mobility

Figure 4 shows that among the dwellers of Kalshi slum, a small number of dwellers have working trip within half kilometer distance, 16% have working trip of one km, 9% dwellers have to travel about 2 km, and another 75% have to travel more than two kilometers to reach their work places. Their working places are located mainly

in Mirpur 10, Mirpur 11, and Mirpur 12, Rupnagar, Gabtoli, and Technical area. The presence of Tejgaon Cantonment at the Northeast side of the slum creates a mobility barrier of the slum people (Fig. 5).

The major destinations of the respondents of Korail slum are in Gulshan, Banani, Mohakhali, and Tejgaon. About 25% respondents travel less than one kilometer, 65% travel up to 1 km, and about 10% respondents travel more than 1 km regularly to reach their workplaces. The map also shows that the respondents of Korail slum do not have any mobility barrier to move to their destinations.

Figure 6 shows that among the dwellers of Sutrapur slum, 20% dwellers have working trip within half kilometer distance, about 19% have working trip of one km, 48% dwellers have to travel about 1.5–2 km, and another 13% have to travel more than two kilometers to reach their work places. Their working places are located mainly in Paltan, Motijheel, DholaiKhal, Sutrapur, Gendaria, and Jatra Bari area.

Figure 7 shows the major destinations of the respondents of West Islambagh slum areas in East Islambagh, Lalbagh, Azimpur, New Market, Chak Bazar, Sadarghat, and Kamrangir Char. About 33% respondents travel less than one kilometer, 25%

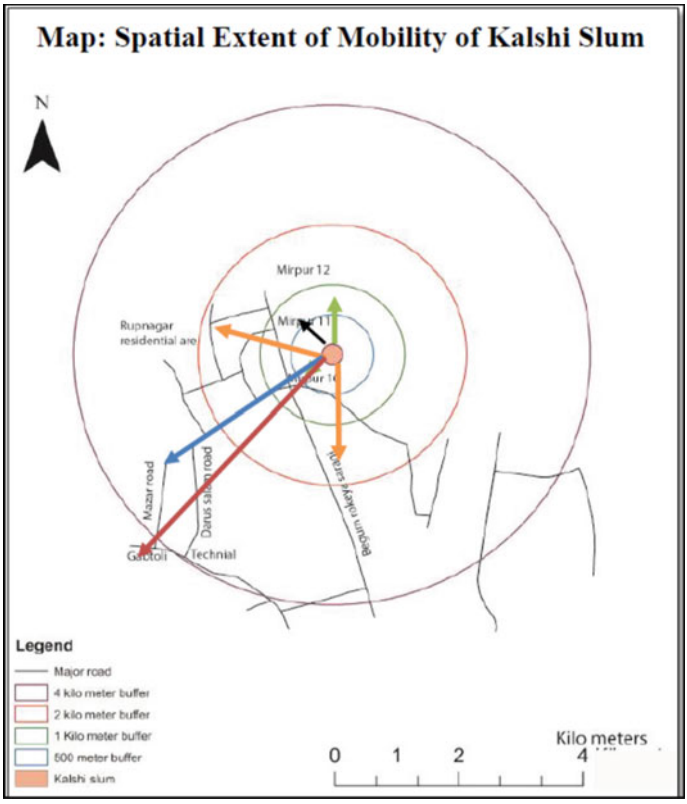

Fig. 4 Spatial extent of mobility (Kalshi slum)

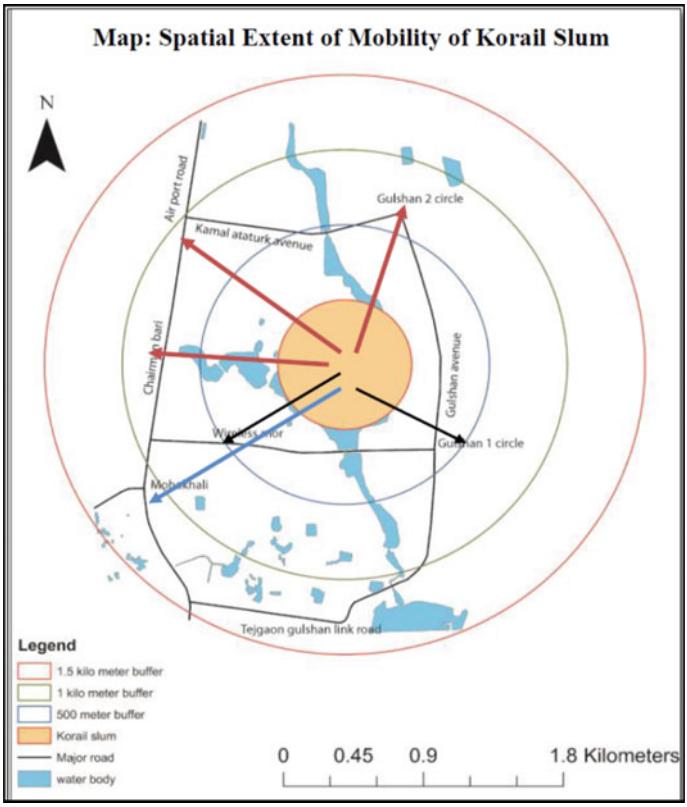

Fig. 5 Spatial extent of mobility (Korail slum)

travel up to 1 km, and about 52% respondents travel more than one to two km regularly to reach their workplaces. The study also reveals that the respondents of West Islambagh slum do not have any mobility barrier to move to their destination.

4.4 Frequency of Trips

Frequency of trips is also related with the travel time and travel cost. Those who have to pay the least travel cost and spend least travel time make frequent travel. Trip frequency also determines the availability of the service. Generally, two trips are generated for one activity (starting trip and return trip). The study has found that, on an average, the slum dwellers have to make highest four regular trips (Fig. 8).

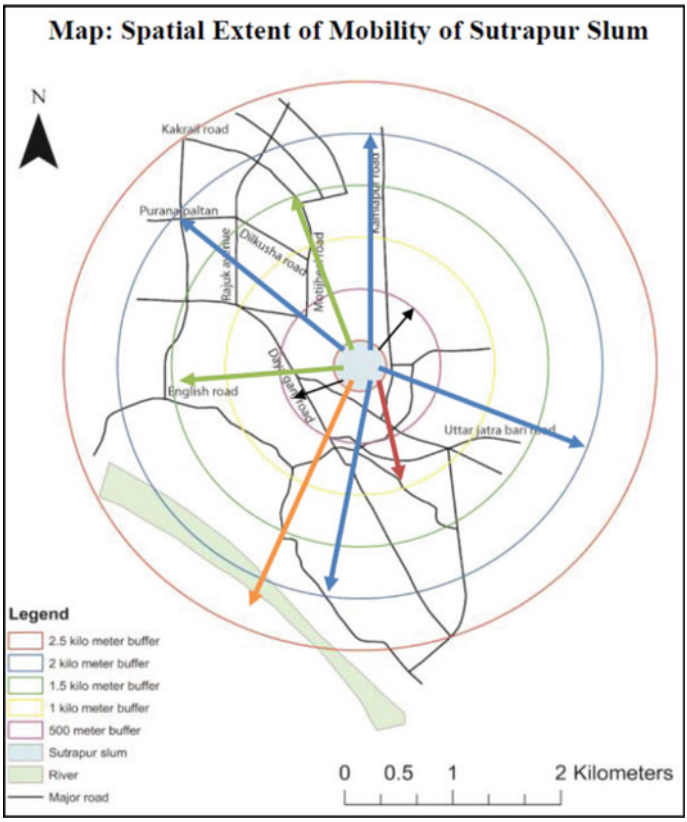

Fig. 6 Spatial extent of mobility (Sutrapur slum)

4.5 Trip Cost

Daily travel cost is directly related with the modal share of the slum dwellers. The study has found that most of the slum people prefer walking as their prime mode which tends to the zero-cost travel of majority of slum dwellers. About 64% people of these slums do not have to pay any monetary value as their travel cost. The study has also revealed that about 26% costs less than 15 taka and about 10% costs 15–30 taka on an average.

Figure 9 shows the regular travel cost scenario of the respondents of the four slums of the study area. As the number of walking trip is highest in Sutrapur and West Islambagh slums, the concentration of zero-cost travel is larger than the other two slums (Kalshi and Korail slums).

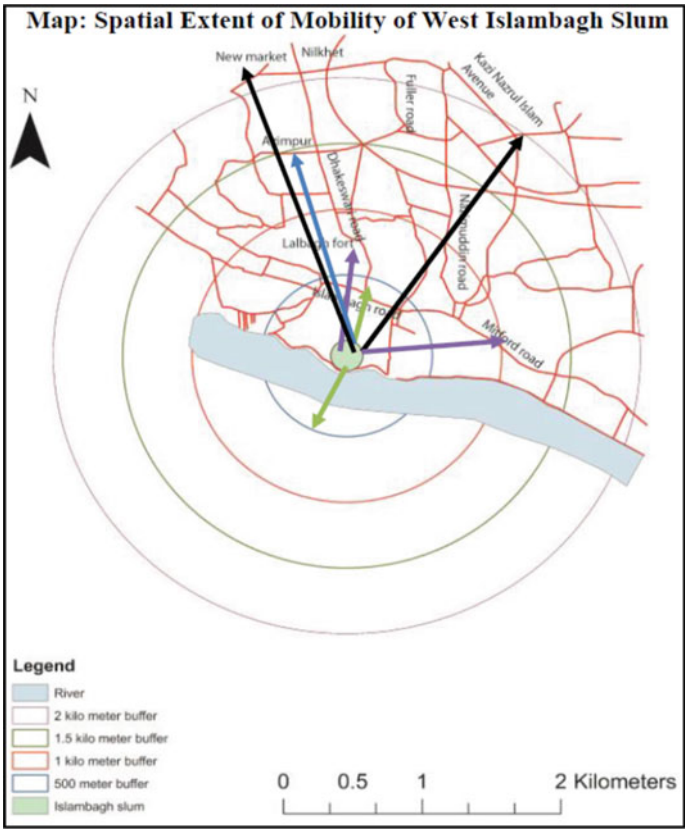

Fig. 7 Spatial extent of mobility (West Islambagh slum)

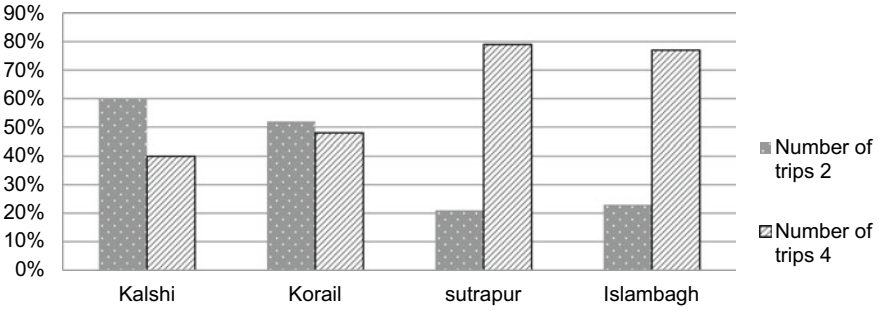

Fig. 8 Regular frequency of trips of slum dwellers

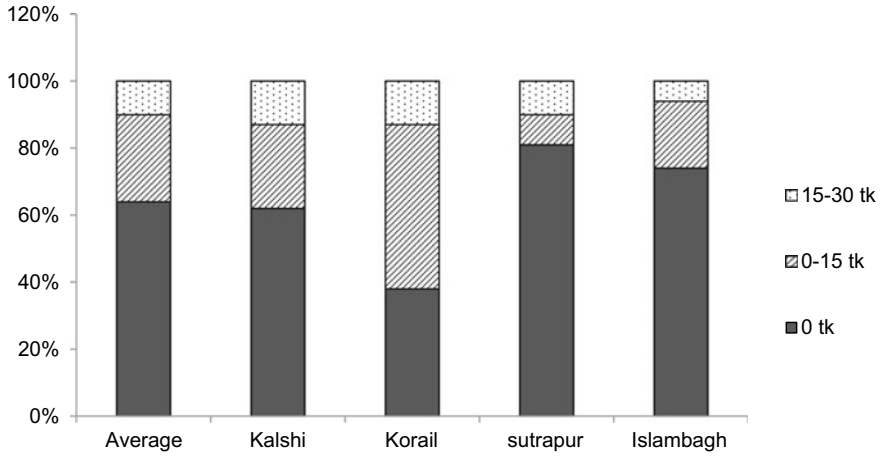

Fig. 9 Travel cost of slum dwellers of Dhaka city

4.6 Mode Chain and Number of Mode(s) per Trip

Mode chain has a relationship with travel cost. Travel cost increases with the increase in total number of mode present in the mode chain. Distance is also a dominant factor for increasing or decreasing number of mode chain. Long-distance travel has a longer mode chain than the short-distance travel (Fig. 10).

The figure above shows that the mode chain of respondents of Sutrapur and Kalshi slums lies between one and two modes, whereas some respondents of Korail and West Islambagh slums have three modes in their mode chain. As 23% respondents of Korail slum have three modes of their mode chain, the travel cost is comparatively high in case of this slum.

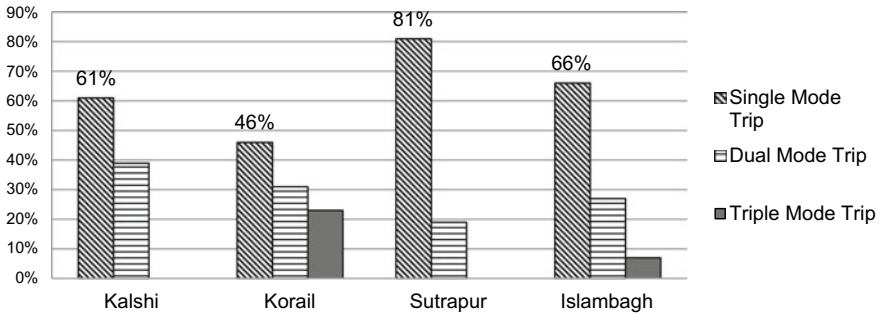

Fig. 10 Regular mode chain of slum dwellers of Dhaka city

4.7 Occasional Trip of the Slum Dwellers

It is found that the occasional trips are not only made for seasonal or temporary work but also for the purpose of visiting family members during religious festivals (i.e., Eid, Puja, Christmas etc.). The study has revealed that about 67% of the occasional trips are generated during yearly festivals like Eid Ul Fitr, Eid Ul Azha, Puja, etc. These yearly trips are made to go to villages to meet the near and dear ones during the festivals. These long-distant trips are made by bus, train, or launch. Among all the reasons, visiting family members is the second important reason. It is more dominant in case of the temporary migrants of slums. About 27% occasional trips of the slum dwellers are made for the reason of visiting family members who reside in their origin and other areas. The study has also found that about 6% slum dwellers of Dhaka city have made occasional trip for better earning opportunity. Availability of some seasonal employment opportunities outside the city encourages the slum dwellers to make occasional trip for additional earning. Better earning opportunities influence the slum dwellers to make occasional trip (Fig. 11).

About 64% respondents have occasional trip frequency of less than or equal to four, 24.5% respondents have occasional trip frequency of 4–8, 8.5% have occasional trip frequency of 8–12, and only 2% have occasional trip frequency of 12–16. The study has also revealed that 3% respondents of West Islambagh slum have occasional trip frequency in between 16 and 20. These respondents are mainly factory worker and they live in the slum without their family members. For that reason, they visit their family quite frequently.

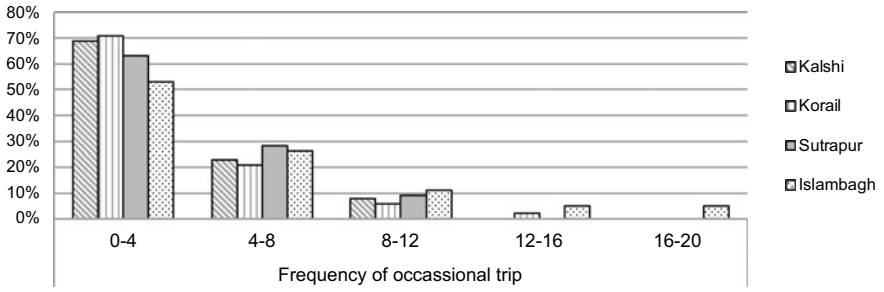

Fig. 11 Yearly frequency of occasional trip of slum dwellers

5 Major Findings and Conclusion

5.1 Results and Discussion

Mobility is a complex phenomenon and is influenced by a multitude of variables, including technology, spatial behavior, the configuration of networks, the emergence of policy organizations and institutions, regulatory systems, etc. The study on transport mobility of slum dwellers seeks to address the research gap and understand the mobility pattern of the slum dwellers in Dhaka city.

Majority of slum dwellers prefer walking (about 58%). Again about 60% respondents live within walkable distance. Most of the slum dwellers prefer to reside adjacent to their working place in order to save their travel time and travel cost. About 64% people of these slums do not have any travel cost. About 49% of respondent and their household members have travel time less than 15 min, and only 17% dwellers have to travel more than 30 min to reach their workplace. The mostly preferred mode of slum dwellers is walking (58%) and the second highest is rickshaw (12%).

Besides, mobility pattern is not always constant for all slums of Dhaka city due to locational distributions of the slums and availability of modes. Boat is considered as a prime mode for slum dwellers in Old Dhaka. Trip frequency of daily trip of the slum dwellers of Old Dhaka is also higher than the dwellers of Korail and Kalshi slums.

Mobility pattern also varies for men and women in the slums. Most of the women of the slums prefer walking and rickshaws as their prime mode of regular travel to their workplaces. For men, the two prime modes are walking and bus. Almost two-thirds of the females move in group—40% of them travel with their co-workers and rest with their neighbors and family members.

One of the major findings of the study is that the slum dwellers of the city do not have recreational trip, except the yearly long-distant trip to their villages to celebrate the biggest religious and social festivals. The study has found that the slum dwellers are more concerned with the monetary issue rather than safety issue. However, a few slum dwellers face problems of footpath: safety and comfort-related problems.

6 Conclusion

As is has been stated in the beginning that there is paucity of information regarding how really the slum dwellers move, where, how frequently, etc., measures to improve their mobility pattern are found either absent or targeted to a ‘wrong’ or least useful direction. This study has revealed that improvement of facilities and options for walking is fundamental for slum dwellers. Policies and legislations should encourage the factors those positively affect walking and should minimize the factors those affect negatively. Safety and comfort of travel should be ensured, particularly for women.

As regards issues for future research, it is felt that disaggregation of modal share by trip purpose, i.e., for work, education, health, and others will help to identify the preferable modes for various trip purposes and hence identify the areas where further intervention is required.

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