

An Explorative Study on Office Going Bicycle Users of Dhaka City

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Abstract

With age old practice of using bicycle in rural areas of Bangladesh, bicycle has been evolved as a transport option for urban dwellers. It has been used for recreational and non-recreational purposes, like commuting, shopping etc. This number is growing day by day. Studying cyclists' socio-demographic and economic profile is important to identify the groups inclined to use cycle for commuting. This paper discusses about the socio-economic characteristics and problems of office going bicycle users in Dhaka city. For this study, six commercial areas of Dhaka city (Motijheel, Old Dhaka, Gulshan-Banani, Karwan Bazar, Mohakhali and Mirpur) are selected as study area. With 95% confidence interval 300 respondents were surveyed. Cyclists are mainly from low and medium income groups with an average age 28. After 2009, the number of cyclists got drastic increase, particularly high income groups are found more interested. Safety issue, parking space scarcity and not having bicycle lane are the highest complained problems of cyclists. This study provides a ground of baseline data for future researchers as there is no previous study done on this topic.

Introduction

The non-motorized vehicles (NMV) are most efficient modes of scarce road space than private motor vehicles (Hoque, 2008:82). One of the major NMVs all over the world is bicycle. The potential benefit of bicycles usually lies from the flexibility, easy availability and lower cost. Both cycles and rickshaws are available for door to door services and are very flexible serving neighborhoods where road width is too narrow to accommodate larger modes of transport. It is ideal for short and medium length trips. Both bicycles and rickshaws occupy less road and parking space than the other available modes (Hoque, 2008:82).

Bicycle is a useful and environment friendly transport which plays an important role as access for commuting in developed countries. In Bangladesh, 51.8% vehicles are non-motorized vehicle (Hoque, 2008:84). In the past, bicycle was used for commuting to school and to office mostly in rural areas. Now a day, many people willingly commute to offices and their work places in bicycle. It also helps diminishing motorized vehicle trips with their negative externalities (Heredia et al., 2014: 01). To be punctual in workplace, to keep transport expenses in control or to be health conscious, cycle is a suitable mode for

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different classes of people specially office goers nowadays. However, there is a scarcity of previously done researches on the office going bicycle users of Dhaka city (Hoque, 2008:82). The information on socio-economic background of the cyclists of Dhaka city will support further studies and policy practices on the issue. Considering this importance, the study has been undertaken.

Objectives of the Study

In recent years, Dhaka city is experiencing an increase of cyclists for different purposes including recreation, commuting and many more. Income, age, family structure, educational status, occupation are some socio-economic factors, which are found functional upon bicycle using. In order to conduct the research fruitfully, one of the objectives has been set to investigate the socio economic characteristics of the office going bicycle users in Dhaka city. The other objective is to explore the problems faced by the cyclists.

Literature Review

A number of journals, reports and papers have been reviewed on the topic related to bicycle and other NMT users and specially the factors that influence bicycle using. These studies helped a lot for setting the parameters for this research

Demographic characteristics of the trip makers are stronger predictors of walking and bicycling choice than built-environment factors (Cervero and Duncan, 2003:04). The most important socio-demographic variables that influence travel behavior include age, household composition, income, gender, educational qualification, ownership of vehicle etc. (Curtis and Perkins, 2016:07).

Age is one of the most important personal characteristics that affect cycle using (Dill, 2003:1828; Rietveld and Daniel, 2004:532; Sener et al., 2009:63). According to Goldsmith (1992:18), "A rather intuitive pattern emerges with respect to age and frequency of bicycling: it declines". Cyclists generally tend to be middle aged (Moudon et al., 2005:129). Age is negatively correlated with bicycling (Pucher et al., 1999:05; Zacharias, 2005:335) and with increasing, persons tend to cycle less (Martens, 2012:08). Surveys administered by the Maryland National Capital Park and Planning Commission and in Davis, California, found that 81 percent and 84 percent respectively, of bicycle commuters were under age 36 (Lott et al., 1977:30). With respect to age, people ages 25 to 45 years rode more than those ages 18 to 21 years. Men and younger adults (those younger than 55) cycled more and were more likely to want to cycle more (Moudon et al., 2005:253). However, according to de Geus (2007:124), and Kitamura *et al.* (1997:143), age is not a significant factor.

Men are more likely to bicycle than women (Pucher, J., C. Komanoff, and P. Schimek 1999:629), which is a common thing in most countries, but there is an exception in China and Vietnam (World Bank, 2003:126). Gender is a significant variable for bicycle modeling (Pucher and Buehler, 2008:499). Seattle study by Moudon et al. (2005:253) found that cycling increased for white, middle-aged, and male respondents while Feng,

(2016:92) with their order logit and Probit models showed that gender (female) has a positive effect with the willingness of cycling.

There is conflicting evidence on the correlation of bicycling with income (Pucher et al., 1999:647), National Bicycling and Walking Study, (1992:15). At an aggregate level, having a high income results in less cycling (Pucher et al., 1999:628; 647). Dill and Voros (2007:12) find a positive connection between income and commuting by bicycle, suggesting that people who earn more tend to cycle more often. But they have no effect on route preferences (Stinson and Bhat, 2005:08). Income is significant for bicycle (Dill and Voros, 2007:13). However, Parkin et al. (2008:103) concludes that in England and Wales, there is a link between lower incomes and a lower bicycle share for commuting. Witlox and Tindemans (2004:37), Plaut (2005:350), Schwanen and Mokhtarian (2005:95) and Guo et al. (2007:09) report a negative relationship between cycling and income; while according to Dill and Carr (2003:122), Zacharias (2005:331) and Moudon et al. (2005:257), income has no significant effect. Groups in danger of transport poverty use the bicycle more intensively (Martens, 2012:25).

Having a high social status and having a young family reduces the probability of cycling (Ryley, 2006:371). Logistic regression analysis on the people of North West Adelaide found that relative to the lowest Socio-economic status (SES) areas, the likelihood of bicycle use was 1.0 times, 2.3 times and 1.4 times higher for the second, third and highest SES areas respectively (Sugiyama, Paquet, Coffey, Howard and Daneil, 2014:e51). Women and Students have a positive effect with the willingness of cycling (Feng, 2016:93).

Along with all these factors of education, marital status (Fu and Farber, 2017:38), car ownership, not having a car (Feng, 2016:92), work site location (Dill and Voros, 2007:16), number of children in family, work in favour of cycling (Pinjari et al., 2008:24).

Methodology

In order to fulfill the objectives of the study, the whole study has been conducted following an orderly step by step process. A number of journals, reports and papers related to the context of the bicycle user's socio-economic characteristics from both Bangladesh and other countries were reviewed. Though there are a number of government reports on transportation, particularly transport of Dhaka, the issues of bicycle users are quite insufficient in those studies. Two objectives have been fixed to conduct the study effectively. According to Adnan and Rahman (2009) and Hossain and Athoi (2015), six areas of Dhaka North and South City Corporations have been identified as the core functional areas of the city. These are: Motijheel, Old Dhaka, Gulshan- Banani, Karwan Bazar, Mohakhali and Mirpur. These areas are selected as study area for this study.

For collecting the socio-economic data as well as travel data, questionnaire survey was conducted in the offices of those six core areas. Respondents were only who travel minimum five days weekly. The offices were selected by random stratified sampling method. For socio economic information, data of age, occupation, education, family member, monthly household income, number of cycle in household, number of cycle user in household, year of adopting cycle as regular mode was collected. Questionnaire

had some questions on problems that cyclists face while cycling along with information on the availability of parking facility, safety in road, availability of repair shops etc.

At 5.62% confidence interval and 95% confidence level (for the unknown population), total sample size was determined to be 300. The data and information collected from the questionnaire survey was inputted in SPSS and then the data was processed and analyzed using statistical tools and models. The frequency and other distributions have been also shown by using Excel. Based on the findings from the questionnaire survey, some relevant proposals have been formulated to facilitate the bicycle users and improve their existing condition regarding travel pattern.

Socio-Economic Characteristics of the Bicycle Users

The socio-economic condition of the bicycle users have been considered in order to identify the composition of their age, educational qualifications, occupation, average monthly household income etc.

Age of the Respondents

The average age of the respondents is around 28 years. The major portion of the bicycle users are in the age group of 26 to 30, which stands almost 34% of the total respondents. Aged from 21 to 25 and 31 to 35 lie the most prior after the previous range. It is also seen that the people aged above 50 are the least percentage for using bicycle (Table 5.1). In fact, it can be said that the middle aged group of people are more interested to take bicycle for their daily commuting to offices in Dhaka city.

Table 1: Age wise distribution of cycle users

Age group	Frequency
15-20	13
21-25	61
26-30	103
31-35	74
36-40	29
41-50	14
above 50	6
Total	300

Again it is seen that the highest percentage of people aged above 50 largely from Motijheel area, who commute daily for office purpose (Figure 1). This aged group of respondents were also found in Karwan Bazar and in Old Dhaka. The younger aged bicycle users are high in percentage in Gulshan Banani area. In Karwan Bazar and in Mohakhali, there is almost an equal combination of all aged group of cycle users.

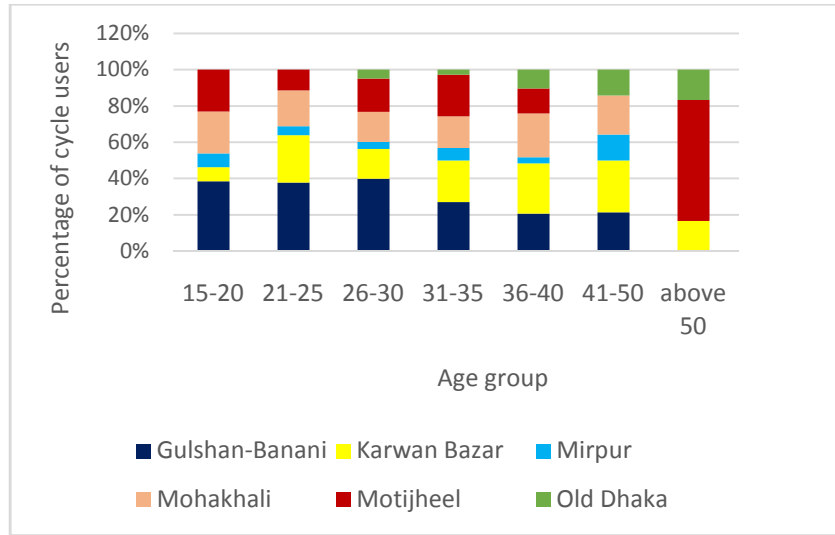


Figure 1: Age wise percentage of cycle users in different areas

Educational Qualifications of the Bicycle Users

While observing their educational qualification, it is noticed that the undergraduated and the postgraduated people jointly hold almost the half (51% collectively) of the total respondents. It is really a great significance that the higher degree holders are becoming more interested to travel in bicycle in the present days. From Figure 2, it is observed that the undergraduated and post graduated employees mainly have office in Gulshan-Banani area.

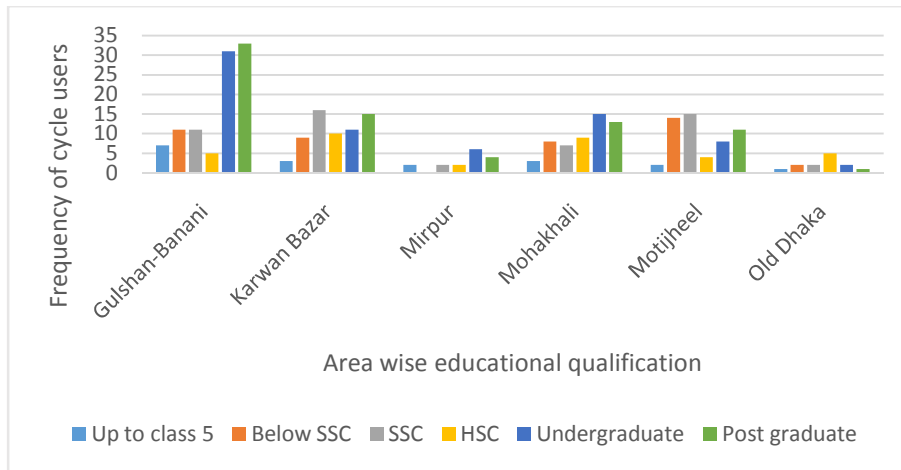


Figure 2: Educational qualification wise user frequency in different area

Occupation of the Bicycle Users

The major portion of the respondents are the private service holders whereas only eight persons out of 300 are the government service holders. Some of them have also been

found to continue their education along with their jobs (Table 2). As most of the government offices have own transport for their employees, most of them commute to their offices by those office transports. For this reason, the major portion of the respondents are from private services.

Table 2: Occupation of the respondents

Occupation	Government service	Private service	Student
Frequency	8	292	67

Monthly Household Income of the Bicycle Users

The major portion (combinedly 156 out of 300 respondents) of the cycle users have less than Taka 15000 and from Taka 15000 to Taka 25000 monthly income. However, a good number of people (22%) have been listed whose monthly household income is above BDT 45000. Again, it is seen that the highest number of people who earn 15000 to 25000 taka per month lies for the office employers of Karwan Bazar. People earning above 65000 taka are found in all six areas but the highest number lies in Gulshan-Banani (Table 3).

Table 3: Income wise frequency of cycle users in different areas

Place	less than 15000	15000-25000	25000-35000	35000-45000	45000-65000	above 65000	Total
Gulshan-Banani	22	19	18	12	14	13	98
Karwan Bazar	10	31	7	8	4	4	64
Mirpur	2	3	4	1	4	2	16
Mohakhali	21	7	12	4	5	6	55
Motijheel	16	17	8	1	7	5	54
Old Dhaka	1	8	2		1	1	13
Total	72	85	51	26	35	31	300

Trend of Adopting Bicycle

For commuting to workplace cycle has been emerged as an easy and soft mode for different classes of people. People have started to choose cycle more for their own punctual performance. Usually, office trips require strict timing of arrival. In current transport system of Dhaka city office goers find other mode uncertain where cycle is a very well performing mode to maintain schedule as it is affected little by the congestion. The number of cyclists is increasing day by day. From Figure 3, the significant increase of number of people starting cycling as a regular mode for office trip is clearly seen from 2000-03. From 2007 the steeper positive slope indicates the greater increase which continued till 2016. This study was conducted in June 2017, so the data for the year 2017 is incomplete.

Again the gradual increase of cyclists is not also uniform in all core areas. From Table 5, we can see the highest increase of cyclists occurred in 2010 to 2014 over all areas. Mirpur, Motijheel, Old Dhaka has a constant increase over the years. Cyclists in Gulshan-Banani and Kawran Bazar area seem to have an increase from 2010. Mohakhali also had a radical increase in last 4-5 years (Table 5).

Table 5: Area wise bicycle adopting years

Adopting year	Gulshan-Banani	Karwan Bazar	Mirpur	Mohakhali	motijheel	Old Dhaka	Grand Total
1980-1982						1	1
1989-1991		1				1	2
1992-1994		2					2
1995-1997		1	1		2	1	5
1998-2000	1	3		1	6	1	12
2001-2003	4	3	1	1	2		11
2004-2006	4	1	1	2	4	3	15
2007-2009	9	3	3	2	2	3	22
2010-2012	21	11	6	8	15	1	62
2013-2016	49	36	4	32	22	1	144
>2016	10	3		9	1	1	24
Grand Total	98	64	16	55	54	13	300

Ownership of Bicycle

It is seen that 257 out of 300 respondents (86%) own one bicycle where only two respondents have three bicycles in their family. 13% of the respondents have two bicycles in their family. It has also been found that more than one cycle is owned mostly by the low and lower middle income (BDT up to 35000 per month) groups.

Number of Family Member

The major frequency of bicycle is used by the lower and middle income people. This income groups mainly have 5 to 6 members in their family. The higher income groups (monthly income BDT 45000 and above) who use bicycle have mainly less family members.

However, statistical test reveals that there is significant relationship between income and the number of family members ($p = 0.01$, or $p < 0.05$) (Table 6). The negative value of correlation denotes that there is an opposite direction of change between income and the number of family members which symbolizes that with the greater number of family member, the income decreases. Again it has a weak relation between these two factors as the value (0.148) is less than 0.3.

Table 6: Correlation between number of family members and income

		Family_member	Income
Spearman's rho	Family_member	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	300
	income	Correlation Coefficient	-.148*
		Sig. (2-tailed)	.010
		N	300

*. Correlation is significant at the 0.05 level (2-tailed).

Identification of the Problem Faced by the Bicycle Users

This section describes the problems faced by bicycle users in Dhaka. It provides the scenario to work for the policy makers.

Absence of Separate Cycle Lane

The major portion (168 out of 300) of the respondents pointed that having no designated lane in road for cyclist creates the main problem. Those who recommended for cycle lane, 37% are undergraduate and 40% are postgraduate. The rough attitudes and reckless driving of the speedy vehicle’s driver make cyclists feel insecure in the busy roads. Most of those drivers often break the traffic rules and hit the cyclists all on a sudden. This happens mainly because not having any separated designated lane. 30 respondents were extremely bothered with this traffic law violating tendency that they specially mentioned it (Figure 4)

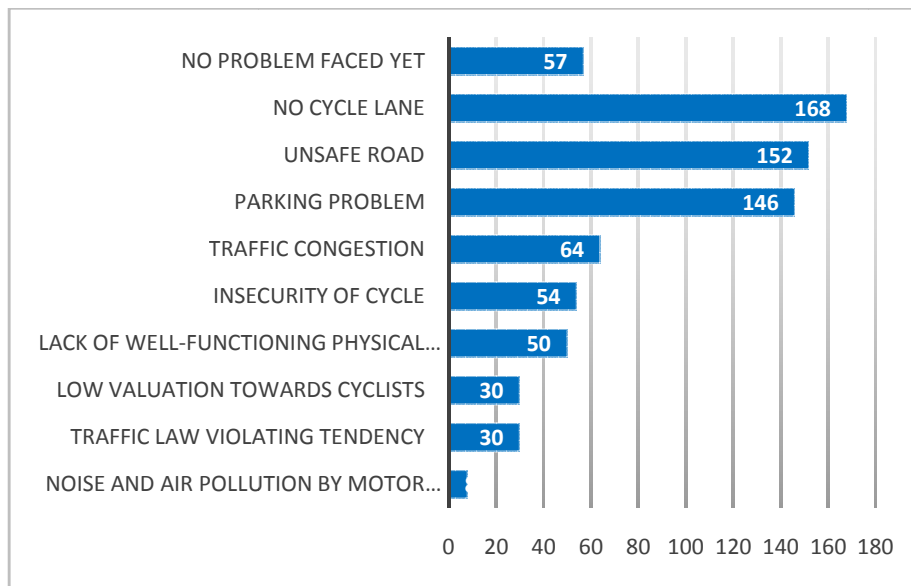


Figure 4: Problems faced by the bicycle users

Safety Context

Current multimode traffic composition in Dhaka city along with its law violating practice make feel the cyclists unsafe. It is not just a mere feeling, rather a significant amount of accident is occurring.

Reckless Traffic Flow

Because of speedy vehicles and having no designated lane for the cyclists, the bicycle users feel unsafe in many cases on road. From the concern of the respondents, it is seen that half (cumulatively 50%) of the respondents feel either partially safe (37%) or totally unsafe (13%) in the roads of Dhaka city. Here “partially safe” denotes that the respondent feel unsafe in particular roads or particular risky intersections. Besides, one feels safe not from all types of vehicles and so he by himself remains conscious and maintains own safety while cycling.

When asked about the reasons for feeling unsafe in roads, the higher percentage of respondents indicated bus, rickshaw and CNG that create problem against their smooth riding in the bicycle (Table 7). The speedy vehicle drivers do not give proper valuation to the cyclists in the road. Lane changing behavior is frequent among rickshaw pullers, which sometime causes minor and major accidents. Pedestrians are a group who do not cause unsafe situation directly, but is an important issue. Pedestrian are found leaving footpath and walking by sideway which is informally used by cyclists. Often pedestrian are found in mobile conversation and paying no heed to cycle’s ringing bell.

Table 7: Modes responsible to cause unsafe feeling of cyclists in road

Mode	Number of respondent marked unsafe	Percentage within the total response on safety issue (152)
Bus	50	32.89%
Rickshaw	48	31.58%
CNG	46	30.26%
Car	34	22.37%
Motorbike	32	21.05%
Pedestrian	20	13.16%
Leguna	12	7.89%
Truck	10	6.58%

Accidents Faced by the Bicycle Users

Almost one fourth of the total respondents (25%) have faced accidents in the last six months while riding their bicycles. In India, this rate is 20%-32% (Tiwari and Jain, 2008:61). Some of them had experienced even severe accidents and had been hospitalized while most of the respondents were slightly injured. However, those (75% respondents) who have not faced any kind of accidents in the last six months in time of riding their bicycles are seen to be almost equal percentage of all age groups. But the respondents who have experienced accidents are seen to be higher for aged above 50. Aged group from 36 to 40 has faced severe accidents than other aged groups. It is observed that the younger bicycle users faced very little accidents in time of riding their bicycles (Figure 5).

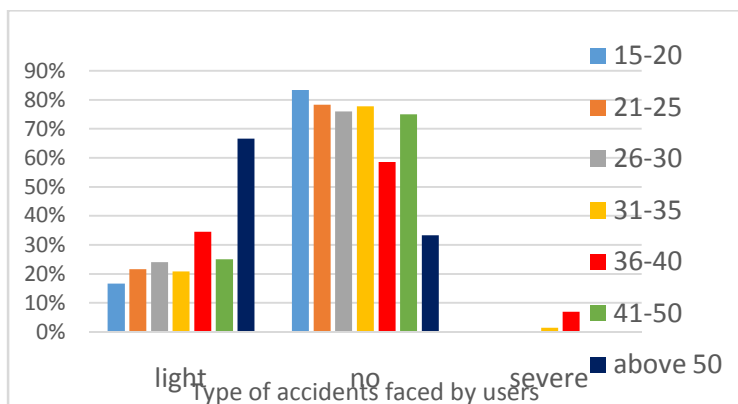


Figure 5: Accidents faced by different age groups of the bicycle users

Inadequate Parking Facility

Another major problem faced by cyclists is the parking provision. Moreover, for inadequate parking facility, cyclists have to choose other modes in availing other city services, like shopping, ATM, station etc. A significant portion (146 out of 300) indicated it as a problem.

Parking provision influences the decision of buying cycle and using cycle for particular destination. Table 8 shows the availability of bicycle parking at home and workplace in different areas of Dhaka. Around 81% houses have parking facility. In Mohakhali and Gulshan-Banani, the parking provision is higher than other areas (74% and 78% respectively) but not satisfactory.

Table 8: Availability of parking at home and workplace

Core area	Total response	Parking available at home	Parking available at workplace
Gulshan-Banani	91	75	68
Karwan Bazar	55	42	37
Mirpur	6	5	5
Mohakhali	52	42	41
Motijheel	9	7	4
Old Dhaka	13	12	8
Total	226	183	163
Total (%)		80.97%	72.12%

For the lack of parking provision, cyclists feel unsafe about thievery of cycling. Around 46% (136 out of 294) people said they are not safe from thieves. Among the social causes, one valid cause for this is less amount of secured parking facility.

Lack of Proper Physical Feature

Cyclists as a persistent road users also need some favorable physical features and their good quality. Roadside parking facility is a common cycle infrastructure that is little practiced in Dhaka city. For the lack of locking facility in roadside places and other structures, cyclists do not feel safe (46%) about their cycle. 63 respondents feel unsafe and 73 feel partially safe (Figure 6). Here “partially safe” denotes that he by himself remain careful and/or has managed an expensive secure lock but still has fear of stealing. A considerable portion (28%) of the respondents has said that they usually cannot find bicycle repair shop in the city in time of their need.

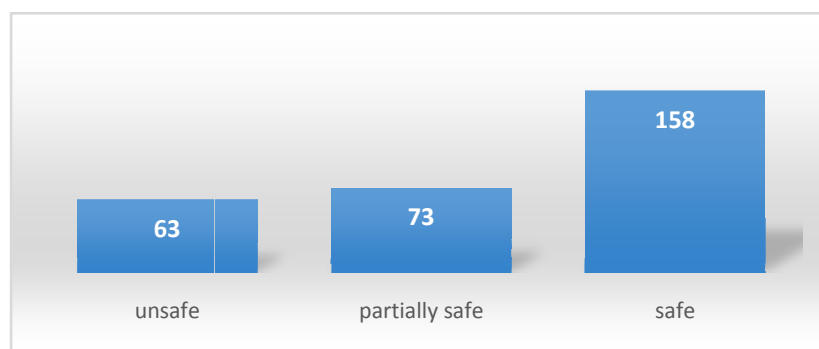


Figure 6: Feeling of safety

27 respondents suffered from the poor condition of road. The excavated roads cause water logging of which cyclists are the severe sufferer. Rainy season is the most unfavorable season for cyclists for the bad condition of road. Many roads have no road lights, which is necessary for NMTs like cycle. Another cycle infrastructure is “foot rest” which is popular in many cycle friendly cities. It is an object on which cyclists take rest placing their feet on and installed roadside spaces.

Other Problems Experienced by Cyclists

There are many social problems faced by cyclists. Many respondents have said that they are low valued by many drivers of other speedy vehicles by their attitudes. They remain inferior in road. Parking facility for motorbike, car, micro are common, but nobody thinks about cycle parking in their structures. In case of roadside parking, cyclists are often insulted and more than any other parked motorbike or car. These also make them decide for not taking bicycle in all those places, where they can leave their cycle with security. Going everywhere with cycle is not welcomed or taken normally yet. People have a preset calculation about anyone’s vehicle ownership and income class where cycle still remains in lower tier.

Recommendations

In response to the problem faced by the bicycle users and their expectations, there are some recommendations for the improvement of the overall situations in the context of Dhaka city. The recommendations are related to both the physical and establishment of law related approaches. So keeping the need of the users and the capacity of the service providers in mind, the recommendations have been set accordingly. This

recommendations may be helpful if further studies are taken to improve the situation regarding bicycle and broadly for the non-motorized vehicle in the context of Bangladesh.

Increasing Safety

While travelling in the busy roads of Dhaka city, the main concerns of the bicycle users are for the overall safety related issues. Almost 56% (168 out of 300) respondents who suffer from this, possess an intense desire and need for a designated lane on the roads for the cyclists. Traffic safety and air pollution due to increasing vehicle flows are two important “push” factors reducing the use of bicycle for commuting (Zhao, 2013:1035) In accordance with this context, necessary steps should be taken for fixing some space in the corner of the roads as the designated lane for the bicycle users. At first, this can be introduced in the busy main roads of the city. The main roads which are connected with the core commercial areas can be taken as the pilot project for introducing such initiatives.

Imposing Policy

In order to ensure overall safety of the bicycle users in the busy roads, it is a vital task to impose related policy and rules over all the commuters on the roads. The speedy vehicles will strictly have to be controlled so that they do not change lane all on a sudden and hit the non-motorized users.

Ensuring Security

Many bicycle users have admitted that they sometimes avoid taking their bicycle for lack of security. 14% respondents have said that they face a great problem for not having parking facilities in all places. So for ensuring utmost security, parking facilities should be provided in required places, like besides shops, markets, parks, ATM booths etc.

Infrastructure Development

Overall, infrastructure should be developed for the ultimate betterment of the bicycle users. Unavailability of service and repair shops causes great problem to the cyclists. So adequate number of bicycle repair shops have to be provided for the better maintenance in time of needs. Insufficient road lighting is a vital cause for occurring accidents. So, sufficient road light should be provided for avoiding such occurrences. It has been found that some people feel tiresome to commute in bicycle in the roads of Dhaka city. To overcome this problem, foot resters can be made in the bicycle lane for making it comfortable for the cyclists while riding.

Road Condition

Improvement of road condition of Dhaka city is a must for the smooth movement of the vehicles. The light vehicles like bicycle face more difficulties to ply on the roads with bad condition. So at first the busy roads that are mainly connected with the core areas should be improved first to facilitate all.

Bicycle Planning Considerations

To encourage cycling for utilitarian purposes, the network of bicycle routes must be interconnected and have a layout that affords direct trajectories, as the practical range of utilitarian cycling trips is limited to about 5 km. In our country, bicycle should be

included broadly in national planning.

Conclusion

This study seeks to identify the socio-economic characteristics of bicycle users. There is an immense scope for the decision makers and related authorities, transport planners, transport engineers and other stakeholders to develop the existing condition of the bicycle users by providing services in the roads and other places for mitigating their sufferings. Again, as this is an explorative study ever done upon the office going bicycle user groups, this can be used as a baseline data for undertaking further research in the future.

It was not possible to conduct the survey in all the areas of Dhaka city. Attempting to collect data equally from six core commercial areas, the availability of employees among them who commute to offices in bicycle have been found very low in Old Dhaka and Mirpur. That is why, more respondents have been surveyed from the Gulshan-Banani, Karwan Bazar, Mohakhali and Motijheel areas, where office going bicycle users are frequent in order to complete total 300 survey.

While cycling is a fairly popular form of recreation in many countries, its use for non-recreational purposes in most cities can be seen as a mode of urban transport for regular commuting to different places which is really a positive indication for the betterment of both user and the environment. Now a day, it is observed that people of all income groups in Dhaka city are observed to adopt bicycle especially for commuting to offices as a daily transport mode. Though their travel pattern is in somewhat related to their socio-economic condition, yet they face some common problems while riding cycle on the roads of Dhaka city. Increasing non-recreational bicycle use beyond the current low levels is likely to require a sustained, coordinated support involving a number of stakeholders. So it is really very important to impose some strategies and to provide necessary infrastructural amenities for the smooth movement of the cyclists. In this context, the government along with the policy makers of Bangladesh should also come forward to take necessary steps for developing the present condition of the bicycle users in the city and consequently to encourage the non-users to adopt bicycle for the larger impact on the environment. For taking these future initiatives, this research would be a helpful database to know the current scenario of the office going bicycle users of Dhaka city.

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