WHY ABSENCE OF BICYCLING IN DHAKA CITY? MEASURES AND POLICIES TO PROMOTE IT

M. SHAFIQ-UR RAHMAN & K. NAHRIN
Department of Urban & Regional Planning, Jahangirnagar University, Bangladesh
shafiq_urp@yahoo.com and kasphi_buet98@yahoo.com
S. SHUMI
SusTrans Bangladesg, Bangladesh
shumi_urp@yahoo.com

ABSTRACT RÉSUMÉ

Dhaka is one of the least motorized cities in the world with approximately 30 motorized vehicles per 1000 population. The majority of people depend on non-motorized means of transport and affordable public transport services. Almost 600,000 rickshaws, three-wheeler NMT, playing in the city streets comprise over 60% of vehicles. Though buses are the cheapest form of public transport, they are inadequate in numbers and mostly overcrowded, not accessible for many people. As a result, majority of the people depend on walking and NMT for travel. However, despite the high dependency on NMT, cycling is almost absent in the city streets. In the 1950s and earlier, the bicycle was a major component of the city's transport system particularly among students, teachers and the younger generation of middle or lower income group people. There have been no provisions made on highways or streets for bicycle paths or crossings thereby increasing the danger to these vulnerable road users. Now a days bicycles are almost absent in the city streets which could dramatically improve the mobility of the city.
Based on the secondary information, the study explores the trip making contribution of different mode in Dhaka city. Questionnaire interview of young adults had been conducted at households of selected residential areas to investigate the reasons for not cycling. City streets were also observed to find the situation of supporting infrastructure service facilities for cycling. This paper has been initiated to come up with the major constraints for cycling and provide some policy measures to promote cycling. Transport policy of the city should be directed towards the environmental sustainability and affordability.

1. INTRODUCTION

Dhaka, the capital of Bangladesh, is one of the fastest growing cities in the world with highest population density. Current 12 million population of the city is projected to be 16 million by 2015 and expected to be nearly 24 million by the year 2021 (Rahman, 2006). For the increasing population the transportation system is not enough and the demand is increasing day by day. Though the transport system of Dhaka city is diverse consisting of motorized transport (bus, micro bus, car, auto-rickshaw, taxi, motor cycle etc.) and non-motorized transport (rickshaw, bicycle, van, push cart etc.) (JU Planning Review, 2005). Dhaka city comprises high volume of mixed traffic where congestion and air pollution reached the extreme limit. Dhaka city has become increasingly difficult to live in and to work in largely because it is difficult to move around. The problem of traffic congestion and uncontrolled vehicular emission make life miserable for the city dwellers causing threat to health and economic loss as well (The Jahangirnagar Review, 2004). To solve these acute problems, effective measures in transport should be taken immediately. In this condition, the non-motorized-transport (NMT) could play a major role to improve transport situation. Transport system of Dhaka is predominantly road based where NMT (mainly rickshaw) has a substantial share. Bicycles are considerably under-used and less than 5% of the

households have bicycles in Dhaka (Karim, et. al. 1998). Greater use of bicycles would bring social, environmental and economic benefits including healthier and safer community, and social equity. Investment in bicycle transport is a 'no regrets' option that is justified on health, environmental and economic grounds and will enhance sustainability of the transport system. Thus, it is needed to be promoted. However, for many years bicycles have been a marginalized mode in transport planning and urban design in Dhaka city.

Due to high density, land use character and geographical extent of the metropolitan Dhaka, NMT is the predominant mode of transport. Though buses are the cheapest form of public transport, they are inadequate in numbers and mostly over crowded, not accessible for many people. As a result, majority of the people depend on walking and NMT for travel. Walking and NMT comprise more than 60% of the total trips or almost 40% of passenger km travelled. Despite of intense dependency on NMT, bicycling is almost absent in the city streets. The statistical data on bicycle ownership in Dhaka metropolitan area are not known. In the 1950s and earlier, the bicycle was a major component of the city transport particularly among students, teachers, and the younger generation of middle and lower income group people. However, bicycle is rarely observed in the streets of Dhaka now a days.
Bicycles have a critical role in moving toward sustainable transport. It is an accessible, low cost, non-polluting and healthy mode of travel. To improve health, reduce greenhouse gas emissions and dependence on fuel consumption, the share of trips made by bicycle should be increased significantly through effective promotion, planning and infrastructure provision. Currently a small share of personal trips is made by bicycle; but the potential is much greater. The developed countries are promoting NMT to reduce the dependence on fuel consumption. So, it is the time to realize the experience of the developed countries for promoting cycling; which could dramatically reduce travel time, travel cost and thus increase productivity and improve mobility. The paper aims to find out the causes of high dependence on NMT and walking as major transport mode; the reasons for absence of cycling; and providing some policy measures to promote bicycling.

2. JUSTIFACATION OF THE STUDY

Cycling is a major transport mode in many cities in Europe where a high-quality transport system exists. Short-distance trips are generally accessible by bicycle for all age groups.

The lowest rate of bicycle ownership in Australia is at Sydney, almost 30% (Australia Cycling, 2004). There are roads where automobile is banned and only NMT are allowed in the Netherlands, Portland of USA. Ironically a small portion of people in Dhaka city own a bicycle and it is almost invisible in the streets. Knowing the projected population of Dhaka city by the year 2021, a high increase of travel demand is realized in future. Only motorized vehicles would not able to meet the future trip demands. Public buses or mass transport might be the most effective transport to address the increased travel demand. Bicycle could be the viable alternative mode for the city.

Various statistics reveals that the portion of middle-income and lower-income group people is much larger who are very much interested to ride bicycle. Provide bicycle lane, safety and security, and encourage people using bicycling could promote cycling and cutback dependency on motorized vehicle. Bicycle possesses some benefits, as illustrated below:

2.1. Importance of Bicycling as a Transport Mode

Cycling has attracted increasing international attention as an environmentally friendly mode of transport, since the bicycle does not pollute or create noise. Instead of car use cycling in urban areas could contribute to less energy consumption from travel and reduced congestion. Increased cycling could be a promising way to contribute in reduction of greenhouse and other emissions (NPPC, 2004). Cycling provides following benefits (Todd Litman, 2004):

- Achieve inter-modal links with transit;
- Create safe and effective links between neighbourhoods;
- Reduce complex and costly parking problems;
- Incorporate greenway development, urban redevelopment and resource preservation;
- Energy conservation;
- Consumer cost savings;
- Reduce traffic congestion;
- Reduce crash risk to other road users;
- Improve mobility options for non-drivers.
- Increase health and fitness;
- Reduce air and noise pollution;
- Support strategic development objectives;
- Create more liveable community;
- Improve public realm and increase social cohesion; and

2.1.1 Economic Benefits

Bicycling does not consume petroleum products and does not pollute environment like the motorized transport. It is the most efficient means of independent travel for people with low income. Bicycling gives mobility at an affordable cost to all people. It is an excellent form of exercise to reduce health-care expenses.

2.1.2 Environmental Benefits

- Now-a-days environmental pollution is very dangerous threat for major cities. Environmental pollution could be classified into three categories; i.e. air pollution, noise pollution, and water pollution. Increasing different types of motorized vehicles in Dhaka city emit huge amount of carbon oxides that causes degradation of air quality and contribute noise pollution whilst bicycle does not emit any emission.

2.1.3 Human Health Benefits

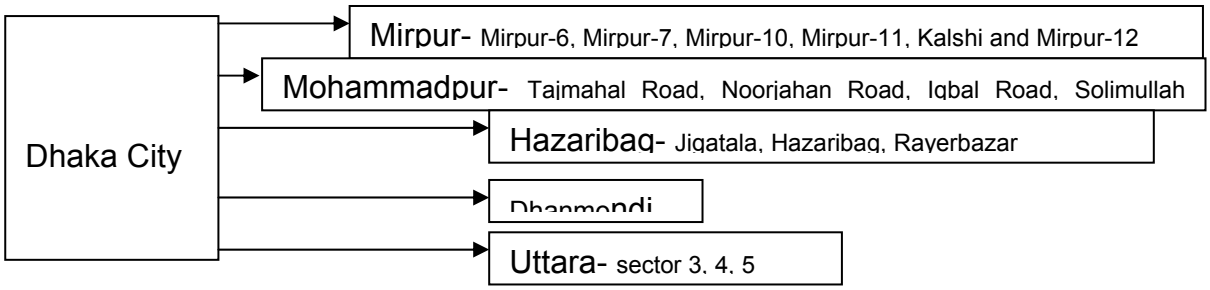
Bicycling is an excellent form of exercise which has positive impact on physical and mental health. As environmental aspects and human health aspects are interrelated, environmental pollution affects on human health negatively. However, bicycle has no negative impact on human health. Moreover, it has some encouraging impact on human health. A research conducted among 48 male reveals that 24 of them were asked to run or bicycling and other 24 persons were asked for taking rest for 50 minutes. After 50 minutes high range of “Canabinedos” have found who are advised for running or cycling, it makes their body fresh because of going out “Canabinedos” (The Daily Janakantha, 26 February, 2007).

2.1.4 Social and Community Benefits

There are also social benefits derived from bicycling, as this form of recreation and transportation offer opportunities for personal interaction which are less available when travelling by motor vehicles. Social interaction allows people to communicate with one another and helps to build a sense of community. Bicycling can help to improve the character of a community for recreation, culture, quality of life and community pride (Cambridge, 2000).

3. METHODOLOGY OF THE STUDY

For thoroughly study some sample locations of Dhaka city has been taken as case study. The sample locations are given below:



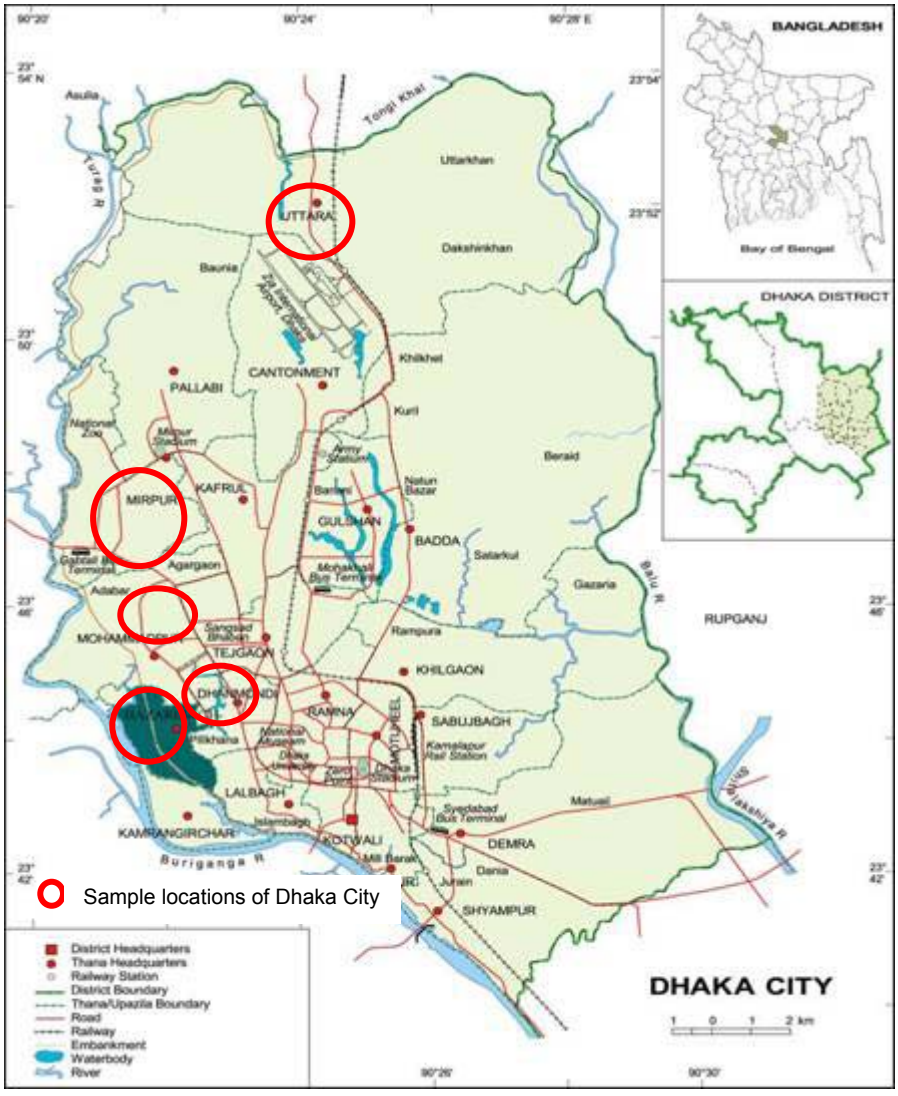


Figure1 - The sample locations of the study area

Five sample locations were selected in Dhaka city for the research. Questionnaire survey on cyclists and household members were conducted in these sample locations to gather primary data. For household survey random sampling and convenience sampling method were adopted for the household survey and cyclist interview respectively.

4. EXISTING TRANSPORT SYSTEM IN DHAKA CITY

Dhaka is one of the least motorized cities in the world with approximately 30 motorized vehicles per 1000 population (Rahman, 2006; ITLS, 2006). Rickshaws playing in the city streets comprise over 60% of total vehicles. In terms of number of trips, almost 60% of the 8.5 million weekday person trips are walk trips, 19.2% use the manually pedalled cycle rickshaw, 1.4% use auto rickshaw (motorized three wheelers), 9.2% travel by bus, 3.1% by private car, and the remaining about 7.7% by various other moods. In terms of passenger km. travelled, the share of buses is 30.6%, and those of cycle rickshaw and walking are 21.7% and 17.7% respectively (World Bank Report, 1998).

Table 1- Trip share by different mode

Mode	Estimated number of trips	Percentage	Estimated average trip time
Auto rickshaw	121542	1.42	45
Bus	787028	9.19	54
Car	266243	3.11	25
Motor cycle	129761	1.51	22
Rickshaw	1646064	19.21	26
Bicycle	76737	0.90	22
Tempo	93582	1.09	51
Train	2752	0.03	118
Walk	5159007	60.22	15
Water	284634	3.32	50

Source: Dhaka Urban Transport Project, 1999.

A World Bank study (Table 1) shows that almost 60% of the trips composed by pedestrians and 19.21% use rickshaw and the rest use different modes of transports. Only the small percentage of people use cars, buses etc. but the total street system is designed for this small group.

Table 2 - Road use by different type of vehicle

Type	16 hours for 6 intersections	Proportion
Truck	4.520	1.9%
Oil tanker	.434	0.2%
Bus	4.994	2.1%
Mini bus/micro bus	14.360	6.2%
Tempo	9.904	4.2%
Car/Jeep/Wagon	19.550	8.4%
Auto rickshaw	42.622	18.3%
Motor cycle	4.382	1.9%
Rickshaw	422.052	52.3%
Bicycle	3.045	1.3%
Rickshaw van	6.668	2.9%
Pushcart	0.834	0.4%

Source: Dhaka Urban Transport Project, 1999.

Table 2 reveals NMT is used as a major transport mode where Rickshaw is used 52.3%. This indicates the clue that proportion of bicycle in Dhaka city is only 1.3%; which is almost insignificant.

Information collected from the sample locations give the present status of cycling in Dhaka city presented below.

4.1. Socio-economic Conditions

4.1.1. Dhanmondi

In Dhanmondi area it is found that 16-25, 26-35 and 36-45 years group occupy bicycle about 24%, 23% and 16% respectively. In general, these young groups are physically capable to cycling and make more trips. Majority of the respondents are within the income range of Tk. 20000-30000 with Masters and under graduate level of education. Around 38% of the residents are student; who could be the potential main user of bicycle.

There are 39% people who have vehicles and among them 18% of the vehicle owners have bicycle. However, only 2% of people in Dhanmondi area use bicycle as their trip. The maximum trip distance ranges 1.1 to 2 km and weekly costs of travel ranges Tk. 301-400 for the majority. The waiting time for public transport trip is 1-3 hrs for the majority.

4.1.2. Uttara

Among 36-45 age group is highest and education of 57% people is graduation in Uttara area. A large number of residents are student where the dependency ratio is 2.58. About 80% of the household income is above Tk. 30,000 where almost 50% people are capable for bicycling.

Around 50% of trip distance is below 5 km and the purpose of 53% trips is education, shopping and recreation. Only 2% people use bicycle and 32% people use rickshaw which shows the dependency on NMT which can be replaced by bicycle. The average travel distance of rickshaw is 2-5 km and travel time is 10 minutes. There are about 43% people of this area have experience of cycling.

4.1.3. Mohammadpur

Trip purpose varies according to income group as high income group trip for recreation purpose where income group for work, using bicycle low. Rickshaw comprises the highest modal share of 49% and bus comprises 25%. Along with this the modal share of car (6%), walking (5%) and cycling (3%) are relatively very insignificant.

4.1.4. Mirpur

Almost 80% of the total cyclists belong to the age group of 16 to 35 years. It means that the minimum energy needed for bicycling is huge and that's why the people give up cycling after a specific age. The significant portion is Student 38.79%. Avg. weekly travel time per person 204.18 minutes, weekly waiting time per person 23.35 minutes, Average weekly travel cost per person is Tk. 144.52. Around 20.93% the residents have experience of cycling of which only 2.33% still continue cycling. The leading group of bicyclists is literate where only 9.3% of them are illiterate.

4.1.5. Hazaribagh, Jigatola and Rayerbazar

Below Tk. 5000 income group people live more in Hazaribagh; Tk. 5000-10000 income level people live more in Jigatola; and the income level of maximum population of entire area is Tk. 5001-10000. The household income of maximum cyclist (60%) is less than Tk 5000. The age of maximum cyclists is 26-35 years. The cyclists who travel less distance (<5 km), they are usual cyclist.

4.2. Socio-economic Conditions

The infrastructural facilities are not satisfactory for cycling in Dhaka city because of the hazardous road network and mixed traffic. Road width, footpath, curbs are not sufficient and risky for cyclist. There has been no provision of any infrastructural facilities or specific lane for cycling.

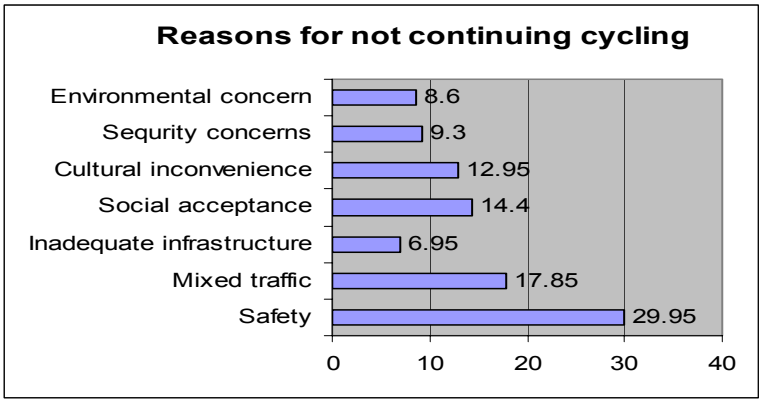
4.3. Cycling Experience

From the sample study the average cycling experience is 36.8433% in Dhaka city. The rest of the people have no experience of cycling.

4.3.1. Reasons behind Not Continuing Cycling

The continuation of cycling practice is lower in number. From the study it is seen that safety and the mixed traffic flow are the major causes for not continuing cycling.

Figure 2 – Reasons for not continue cycling

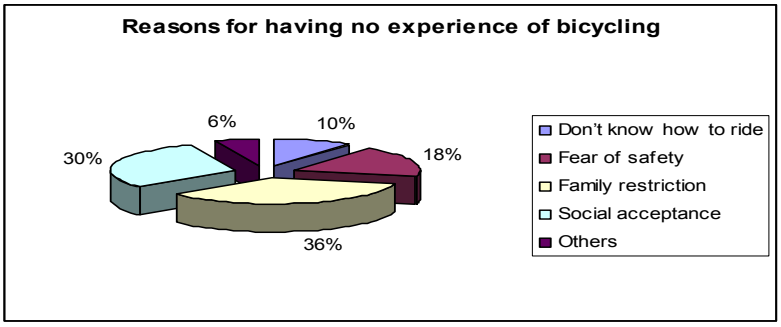


Source: Field Survey, 2007

4.3.2. Reasons for Having No Experience of Cycling

The table shows the main reason of having no experience cycling are family restrictions, social acceptance and fear of safety.

Figure 3 – Reasons for having no experience of cycling



Source: Field Survey, 2007

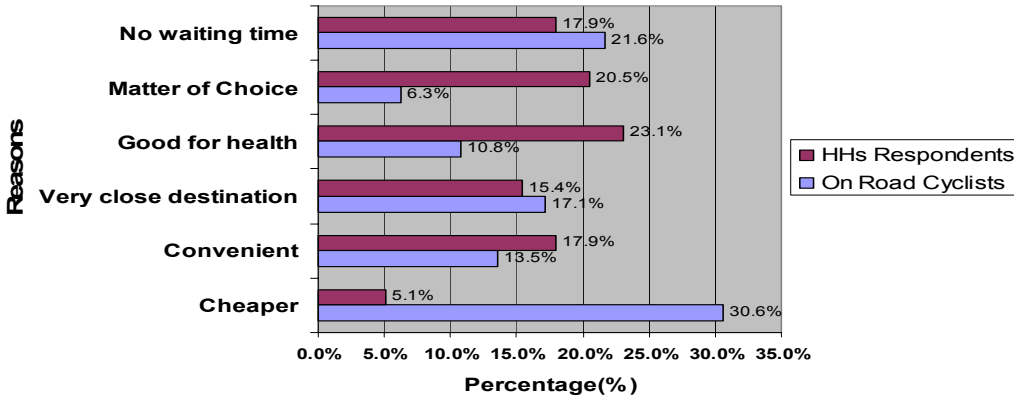
4.4. Income Level of Cyclist

Income level Tk. 3001-6000 is for the majority of cyclists indicate that the lower middle income people mainly use bicycle.

4.5. Reasons for Using Bicycle

The main reason for using bicycle is that it is cheaper than any other travel mode. It has no waiting time including other significant factors.

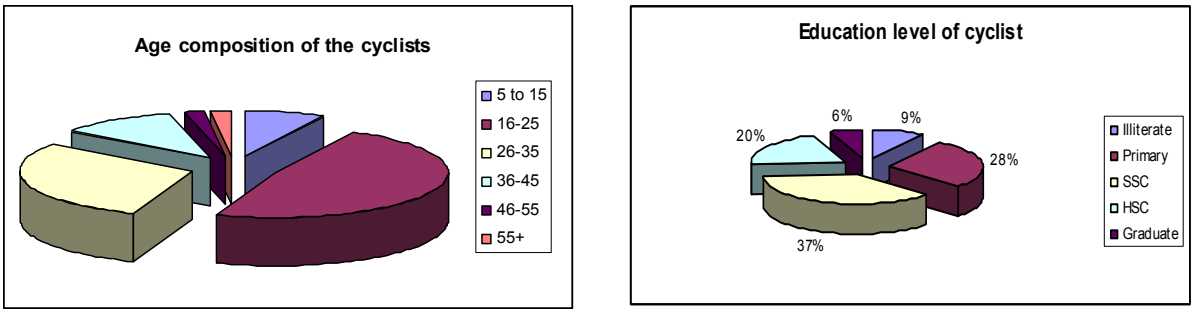
Figure 4 – Reasons for using bicycle



Source: Field Survey, 2007

4.6. Age Structure and Education Level of Cyclists

Figure 5 – Age composition and education level of cyclists



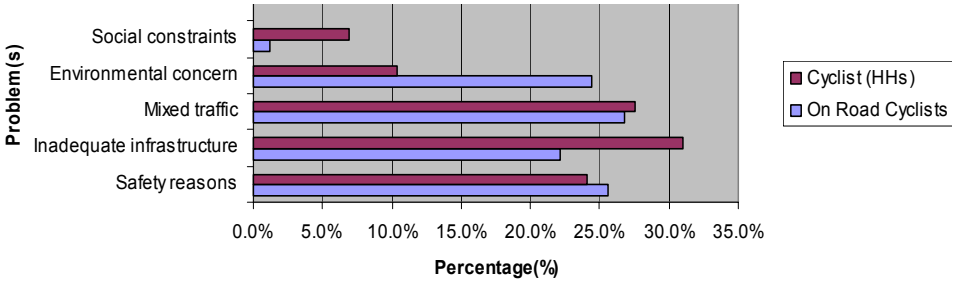
Source: Field Survey, 2007.

Figure 4 shows that 16-25 years age group and education level SSC is the dominant among the bicycle users. So the awareness should increase to influence of this group more for cycling and the range of cycling through the other age group.

4.7. Usual Problems faced During Cycling

Figure 5 shows the inadequate infrastructure, mixed traffic and safety reasons are the main problems for cyclists which are also responsible for reducing cycling in Dhaka city.

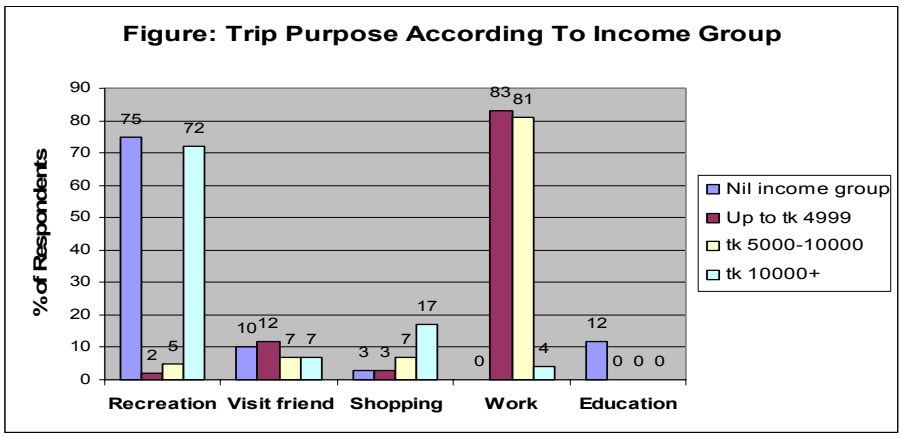
Figure 6 – Problems faced by cyclists while cycling



Source: Field Survey, 2007.

It could be concluded that the cycling in Dhaka city is lower in percentage. Though there has lots of potentials and advantages of using cycle there has lots of constraint in cycling and having no experience in cycling. So, the absence of cycling in Dhaka city is observed for very obvious reasons.

Figure 7



Source: Field Survey, 2007.

Information reveals that the people of income group Tk. 10,000 or more use cycle mainly for recreational purpose whereas the lower middle income group use for work-trip being the cheapest and time maintaining factors.

4.8. Problems Identified for Absence of Cycling

The major problems and challenges which are responsible for absence of cycling in Dhaka city have been identified. The major problems and challenges in Dhaka city are:

- Cycling is dangerous and inconvenient;
- Lack of proper cycling facilities, like separate bicycle lane and lighting facilities;
- Due to lack of proper parking facilities, people feel unsafe to park cycles at any location and parking at road sides and other places create congestion too;
- Traffic congestion also a barrier for smooth cycling;
- Inefficient road intersection design and management;
- Bicycle purchasing cost is beyond the ability of most of the lower income people;
- Social and family restrictions play a vital role in cycling for young adults and female.

5. CHALLENGES TO PROMOTE CYCLING

5.1. Problems Identified for Absence of Cycling

Promoting bicycle in Dhaka city will be a great challenge. The major challenges are as follows:

- Financial Constraints: Since cycling is relatively a minor measure in urban travel policy issues, it is difficult for the governments to allocate large part of their budget to promote cycling. The amount spent for cycling is very limited. The governments always have higher priorities such as development of public transport facilities.
- Institutional Barriers: Cycling policies have a variety of objectives which involve many actors. Lack of co-ordination, both horizontally and vertically, can cause biased policy planning and implementation problems. Also, lack of national-level commitment, leaving responsibility for cycling policy exclusively at the level of local authorities, can cause lack of impetus to promote cycling, inadequate financial and other resources, unequal development among cities, and an incomplete inter-urban network.

- Safety Concerns: Safety concerns (both real and perceived) are often cited as a key barrier to promote cycling as a means of travel. The vulnerability of cyclists as they interface with motorized transport on roadways arises from chaotic traffic conditions, driver behavior that does not consider the place of the cyclist on the road space, and lack of understanding on the part of both cyclists and individual car drivers as to how to conduct themselves in shared traffic conditions.
- Insufficient Understanding of Technical Issues: Better engineering can improve cycling conditions by making cycling infrastructure network safer, more convenient, and more complete. Measures of advanced stop lines for cyclists at traffic signals, one-way streets with contra-flow cycle lanes, rumble devices for traffic calming, and soon. However, technical understanding of cycling infrastructure issues is not always adequate and guidance documents to share technical information are not always available to traffic planners. Consequently, design is often flawed or cycle infrastructure is of poor quality leading to conflicting interfaces between cyclists, car drivers and pedestrians. Further, there is often a lack of continuity of networks and road junction design that can endanger cyclists.
- Scarcity of Road Space: Scarcity of road space is cited as a common challenge for developing cycling infrastructure in many cities, especially in Bangladesh. Combined with scarcity of financial resources, the constraint makes it difficult to provide adequate cycling infrastructure. In addition, there is often resistance to giving more space to bicycle use – this is a persistent problem necessitating the arrival at compromise among the parties involved.
- Lack of Public Awareness: Although the benefits of cycling as a mode of transport for short distances are gaining wide recognition, cycling is still perceived in our country only as a sport, leisure, or children's activity.

6. BICYCLE PLANNING

6.1. Site and Services for Cyclists

Cycling demands some site and services that will make the cycling system efficient, convenient and comfortable. Site and services can be classified into four major parts; develop cycling network, paths for cycling, road safety, and end of trip facilities.

6.1.1. Bicycle network criteria

The needs of bicycle network and their requirements for an efficient and usable transport network can be grouped in five key principals: directness, continuity, safety, comfort, access to destination, and timely implementation.

6.1.2. Design principles of bicycle network

Bicycle network design demands the following principles:

- Proximity;
- Security or safety;
- Access and comfort;
- Attractiveness; and
- Complementary facilities.

6.1.3. Design objectives for bicycle network

A network approach is recommended in order to create an efficient system of facilities to best serve the cycling. The following outlines are the key design objectives related to network provision:

- Reduce encounters between bicycle riders and fast moving traffic;
- Reduce the speed difference between bicycle riders and other motorized modes;
- Treat every crossing by a cycle facility of a street as an intersection;
- Treat all bicycle facilities as serious transport facilities;
- Design for efficiency and comfort as well as safety to suit a wide range of users;
- Function and priority;
- Road and bike path function;
- Priority for pedestrians and cyclists.

6.2. Policy measures

Cycling is being celebrated by the planners, landscape architects and civil engineers for its great advantages. Cycling policy at national level has major implications for local authorities. The main points of cycling policy should include:

- Suppress cycling use;
- Need for a change in perception on the importance of cycling;
- Need to discourage car or other transport use except walking and cycling for short distance trips;
- Encouraged local governments to increase spending on cycling to improve safety and convenience.

Germany, the Netherlands, USA, UK, Australia has issued its National Transport Policy. To indicate the priority of cycling, US government stated "It is federal transportation policy to promote the increased use of bicycling, and encourage planners and engineers to accommodate bicycle and pedestrian needs in designing transportation facilities for urban and suburban areas" (US Transport Policy, pp100).
European Commission (EC), on 3 June 2005, at Velocity Conference in Dublin announced that cycling would be promoted to keep the environment clean. EC announced three agenda: funding programs, improving road safety, and informing decision makers and working with others.

6.2.1. Transportation policy for bicycle in Dhaka City

Dhaka Integrated Transportation Study (DITS) strongly supported use of bicycle as an alternative to motorized travel and replacement of rickshaw. In this context, the recommendations were:

- Expansion of credit schemes for bicycle purchasing;
- Promotion of bicycle use among students through bank credit or grant; and
- Encouraging NGO’s working in urban sector for encouraging bicycle use.

The research proposed several policy measures to promote bicycle in Dhaka city. The suggested policy measures are as follows:

- Providing supporting infrastructure facilities for cycling by
    - Provision of separate lane for cycling and other NMTs
    - Introducing an integrated, effective and safe cycling network connecting public transport.
    - Providing cycle stands at several points.
    - Provision of an appropriate information (on-road and published) and traffic signing at designated points.
    - Improved accessibility by providing useful street pattern in newly growing areas.

- Improving safety and security for bicycle riders through
    - Developing and implementing behavioural initiatives that improve cyclist safety through school level campaign, such as programs to provide helmet wearing by cyclists, and general compliance with road rules.
    - Monitor and report on crashes involving cyclists, identifying type, number, frequency, location and severity of crashes through appropriate institutional framework.
    - Support initiatives, including reduced speed limits that will support safer cycling by reducing motor vehicle speeds.

- Ensure environmental suitability by
    - Making the road environment comfortable for cycling through reducing air and noise pollution;
    - Keeping the road surface clean to avoid solid waste through maintaining the municipal cleaning activities regularly;
    - Providing more trees and open space for shading the cycle route and produce fresh air.

- Reducing congestion/car use
    - Reducing congestion through imposing restriction on car use;
    - Car use to be reduced by increasing taxation on purchasing, road use charge, parking charge etc.
    - Traffic management system and ban illegal vehicles.

- Improved coordination among the concerned agencies
    - Effective coordination among related government and non-government authorities;
    - A coordinating authority need to establish mechanisms for effective coordination and facilitate the strategy implementation for this area.

- Integration of cycling and public transport through
    - Providing bike-lane along the roads having wide footpaths and near public transport stoppage;
    - Providing public transport stoppage (bus counter) within the cycle's catchments area (around 5 km radius);
    - Develop and disseminate quality information on integrating bicycles and public transport.

- Campaign for strengthening the role of bicycles as a means of transport by
    - Campaign through TV, radio and other media to establish the image of bicycle as an effective means of travel;
    - Public campaign in school, college and universities;
    - Discourage the use of fuel consuming and pollutant emitting vehicles through strict regulations and awareness building.

- Providing quality network of bicycle routes
    - Providing local bicycle network and integrate these with national level transport network and infrastructure facilities;
    - Managing and maintaining regional and local bicycle networks and provide effective information for the users;
    - Strategic land-use planning to improve bicycle amenities.

- Develop and maintenance of infrastructure for cycling through
  - Continuous monitoring and maintenance should be ensured;
  - Jurisdiction of concerned authority should be clearly defined.

- Reducing cycle theft by
  - Social awareness building program;
  - The security of proposed cycle stands;
  - Security accessories could be added with the bicycle (like, alarm, lock etc.).

- Integrated planning among the planning authorities should be maintained with high care.

7. CONCLUSIONS

It is always difficult to change human behaviour certainly from long-term traditional trend. On the other hand it will not be so convenient to take any planning approach and enforce people to act accordingly which will contradict with the contemporary social modes. For sustainable rapid urban transportation system, these are necessary to reduce the increasing pressure on the existing public transportation modes, minimize travel time and waiting time, reduce high environmental pollution level due to motorized transportation. Thus, despite having the potentialities of promoting cycling in Dhaka city, it will take time to start bicycling extensively. Several government and non-government institutions and their intense intervention at policy and planning level will play a major role in opening up the new horizon of bicycling as an NMT in Dhaka city.

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