ANALYSIS OF FOOTPATH SERVICE QUALITY FROM BIJOY SARANI TO NEW MARKET

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A thesis submitted to the Department of Civil Engineering in partial fulfillment for the degree of Bachelor of Science in Civil Engineering.

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Section: 15B
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DECLARATION

It is hereby declared that this thesis/project or any part of it has not been submitted elsewhere for the award of any degree or diploma.

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Dedicated

to

"Our Honorable Parents"

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We would like to give our heartiest thanks to Almighty Allah, the most merciful and the most beneficent.

ABSTRACT

As a Bangladeshi most of the people of this country want to live in the Dhaka city to lead their life better than village life. Dhaka is the capital of Bangladesh and its population is increasing day by day. Walking is the most popular and important transport system. Maximum people use this mood to go a short distance and sometimes cover the long distances. In this study the Analysis of footpath quality, safety and security of a root from Bijaoy sarani to Newmarket of Dhaka city have been evaluated. In this study six study points of Bijaoy sarani to Newmarket area selected for collecting qualitative and quantitative data. This work is conducted over about 300 people at 6 points; the surrounding area of conductionis around 100 meters from every approach. Spending 4 hours/day we have got data from reconnaissance survey, demographic survey, and questionnaire survey for data analysis. This work was continued for almost eighteen days. The questionnaire survey has been categorized into five ratings (i.e., 1, 2, 3, 4&5) which indicates very poor, poor, medium, good, and very good respectively. Demographic survey has been performed based on age, gender, education, occupation, monthly income, purposes of using footpath. The maximum age value 26-40 years is 36% with 70% male and 30% female. Maximum are secondary educated 50%; income level of most of the people 10,000 to 25,000 tk. and 34% are below 10,000 tk. They uses footpath about 2 hours in a day. Width of the footpath is medium 53.33% commented. Overall footpath facilities 46%, attractiveness 60% is also medium. Safety and security is unsafe at night and safe at daylight though some violent work occurs. Among 300 responders a large number of people 62% said that the footpath quality of this area is medium and some people of them 8% are satisfied with the quality of footpath but 30% people say that footpath quality of this area is low and they are very unsatisfied.

Table of Contents

LIST OF FIGURES

LIST OF TABLES

CHAPTER-1

INTRODUCTION

1.1 Background of the Study

The world population has increased six times and the urban population has multiplied 100 times in the past 200 years, and by 2050 seventy percent of the world's population, that is, about 6.3 billion people, will live in the world's major urban areas[M. R. Islam-2018] In addition, if in the twentieth century the development and vitality criterion of a city was the wide-open public green space and wide appropriate footpaths, in the present century areas and urban footpath networks are one of the most important spaces of leisure and the obvious evidence of the use of engineering design knowledge in the process of the development of cities(Rahmati and Kashi 2019). Different types of problems are arising due to lack of effective footpath. According to WHO each year, more than 270 000 pedestrians lose their lives on the world's roads. Many leave their homes as they would on any given day – to school, work, places of worship, and homes of friends – never to return. Globally, pedestrians constitute 22% of all road deaths, and in some countries this proportion is as high as two thirds. Millions more people are injured in traffic-related crashes while walking, some of whom become permanently disabled. These incidents cause much suffering and grief as well as economic hardship for families and loved ones (Pedestrian Safety2004). Bangladesh is a South Asian country with a significant road safety concern. Of all reported traffic collisions between 1998 and 2004, 44% (11,061 cases) involved at least one pedestrian. Among all the pedestrian crashes, 39% occurred in urban areas and about 62% pedestrian crashes in urban areas occurred in Dhaka City. These pedestrian crashes accounted for about 71% of all the fatal crashes occurring Dhaka City. The majority (67%) of the pedestrian crashesand pedestrian casualties (66%) of Dhaka City occurred on road links of Dhaka City (Pervaz 2018). Population density in Dhaka city is over 2400 per square kilo meter in the city area. Being the capital, Dhaka is one of the least motorized cities in the world. About 60% of trips are on foot while almost half of the remaining trips are on non-motorized vehicles (Shafiqul and Mannan et.al). In Dhaka, nearly 50% of the people are walking dependent, both for economic and efficiency reasons. Also, 77% of traffic accident fatalities are pedestrians and 50% of these fatalities involve buses (World Bank Report, 2009). The objective of this article is to identify the quality of footpath; pedestrian's safety and the satisfaction of people about footpath are discussed elaborately.

1.2 Research Objectives and Overview

Population density in cities like Dhaka and Chattogram is daunting. According to the World Bank data, Dhaka's population density per square kilometers is above 45,000, which is the densest in the world. In the absence of a comprehensive, affordable, and efficient mass transportation system, and for a host of other positive and negative reasons, a lot of urban people rely on walking to commute to work. Research shows that within the Dhaka City Corporation (DCC) area, 19 percent of primary trips are made on foot, whereas in the greater Dhaka Metropolitan Area (excluding DCC), it is 37.2 percent. In fact, Dhaka's footpaths are not only at the epicenter of the capital's urban challenges but also cause many of them. With the exception of some affluent areas and the Parliament zone, footpaths are mostly "anti- pedestrian" (same in Chattogram), as they typically turn into wild frontiers of "informal" economies and all types of clandestine encroachment. Footpaths are occupied by vendors and tea stalls, makeshift shops and construction sites, and a host of other malpractices. Footpaths sometimes simply don't exist along roads or are dangerously interrupted by open drains, traps for orthopedic journeys to hospitals. Sometimes they are too high and unfriendly to people with disabilities. Under current conditions, footpaths in Dhaka and other cities are unlikely to foster a positive pedestrian culture. In Dhaka city walking is an unpleasant experience. Streets are often overcrowded; footpaths are narrow, and roads are difficult to cross. In many areas there are not enough places to sit, inadequate protection from the weather and footpaths are so crowded that pedestrian are forced into the road. As part of the Study a comprehensive assessment has been carried out to identify individual problems and problem areas.

Among different kinks of aim most important objectives of the study is given below:

- ✓ To identify the quality of footpath.
- ✓ To determine the satisfaction of people about footpath.
- ✓ To determine pedestrian's safety in existing footpath areas.

1.3 Organization of the thesis

In this chapter we have discussed about all chapter with a short view. These are given below;

Chapter 1: Introduction and Objective. This chapter provides the background and motivations of the research. The overall objectives and expected outcomes are also described in this chapter.

Chapter 2: Literature Review. This chapter reviews the footpath and road quality and safety related works of different researcher of different times and countries.

Chapter 3: Methodology. In this chapter the methodology and approach to complete thesis is discussed. Different survey and data collection included in this chapter.

Chapter 4: Results and Discussion. This chapter describes the results of different survey with different chart or figure.

Chapter 5: Conclusions and Future Work. This chapter summarizes the conclusions and major contributions of this study and provides recommendations for future studies.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Dhaka city is one of the most populated town of Bangladesh which has a population more than 8.5 million and density more than 24,000 per km² with the area of 306 square km (According to Wikipedia). In Dhaka city walking on street is very risky where absence of footpath. Though where footpath is present there different types of problems are occurred. So here we need to study on footpath in Dhaka city.

2.2 Literature review

Kelly et al. (2011) compared among three methods for assessing the walkability of the pedestrian environment and found the pedestrian attributes i.e., pavement cleanliness, safe crossing places, good connectivity and sense of security, and concluded that the walking experience is affected by the cumulative impact of multiple interactions (both positive and negative) as people walk in the pedestrian environment (C. E. Kelly, M. R. Tight, F. C. Hodgson, and M. W. 2011)

Hoque et al. identified some characteristics of pedestrian crashes in five major arterial roads inDhaka city. These roads were selected using the Accident Frequency Method in MAAP. Theyfound several serious safety problems with the engineering design as well as inappropriate driver and pedestrian behaviors. The major safety problem as follows Inadequate Footpaths *and Sidewalks,* Hazardous Pedestrian Crossing , Lack of Adequate Pedestrian Sidewalks , *Inadequate* Road Maintenance and safety reviews , Inadequate Traffic Control and Enforcement , Lack of Bus Bay and Dangerous Passengers Behaviors , Under Utilization of Overpass , Lack of adequate meridian barrier, Inadequate Median Barriers .They suggested several strategies to reduce the safety problems of pedestrian such as Provision of user friendlyfootpath, Control of haphazard parking, Installation and enhancement of pedestrian crossings, Installation of pedestrian refuges, Provision of designated bus stops, Separate signal phase, Provision of user friend signal, Separation of vehicular and pedestrian traffic, Provision of delineation, Access Control. They also suggested that more research on the factors contributing to pedestrian collisions and the effectiveness of initiatives are needed to tackle the pedestrian safety problems and improve road safety (Hoque Tanvir, Fahim Tanvir Hossain, and Ibne Idris2016).

Daniel et al. developed a model named FOOT-LOS (footpath level of service) to evaluate the level of service. They considered three categories factor i.e., physical, location and user attributes. Then they developed the model which provided a basis for the measurement a LOS for pedestrian footpath. The development of the model involved an iterative process that included testing and refinement. The FOOT-LOS model included seven contributory factors, i.e., pedestrian flow, traffic volume, footpath width, road width, vehicle speed, percentage of surface damage and number of obstructions. Multiple linear regression analysis was applied to relate pedestrian rating with these factors. For this purpose, five assumptions were made, i.e., the relationship between the independent and dependent variables were assumed to be linear, the variables were assumed to be normal, there was little or no multi collinearity in the data, there was little or no autocorrelation in the data and the error terms along the regression line were equal or homoscedastic. They reported FOOT-LOS model is not only provides a methodology for determining LOS (level of service) but also determine the factor which contributes mainly for pedestrian LOS. The FOOT-LOS model can ultimately be used to determine the numeric rating of the level of service. Alternatively, the scores can be translated to letter grades ranging from A (excellent) to F (poor) (Daniel et al. 2016).

Mahmud et al. evaluated pedestrian safety problem, existing facilities and required strategies in the context of Bangladesh in Dhaka city. For this research they select some regions as study area. Then they collect different types of data such as number of pedestrians in particular route, purpose of walking in street and their percentage, pedestrian accident in particular route with percentage of accident. They also identify the limitations and deficiency of existing pedestrian facilities in Dhaka city such as road side dustbin, vehicle on the zebra crossing, uncontrolled pedestrian crossing, open slab of drain under footpath. They gave the preventing measure on this issue. They also evaluate the causes of pedestrian generation and finally proposed that should take steps to improve the pedestrian safety. They didn't propose any idea on pedestrian level of service in this city (Mahmud, Hossian, and Professors, n.d.).

Advani et al. developed an index (footpath score based on type of obstruction-FOSTO) using analytical hierarchy process (AHP). To develop an index for evaluating walking facilities in an area, complete footpath inventory has been prepared. To prepare footpath inventory; a continuous video capturing the left half (approximately) portion of the road has been collected. Information collected for preparing footpath inventory includes the chainage, presence of footpath, width of footpath if footpath exists, observed walkability, obstruction type, etc. Video files have been played at very low

speed to capture the details of footpath/road for each meterlength of footpath. Then categorized into three categories based on how easy or difficult is to remove them as group1 (obstructions like garbage, tree leaves, potholes and personal gardening), group2(parked vehicles and hawkers), group3(Constructed urinals, trees and poles). All obstruction types as well as other contributing factors i.e., height of footpath and number of ups/downs required per length of 100 meter have been considered for evaluation and based on these an index has been developed to assign a score value for different conditionsof footpath. This index has been developed using the Analytic hierarchy process (AHP). Theyevaluated the footpath conditions and ranging from 1 to 100. They proposed that index is usefulfor future planning and improvement (Advani, Parida, and Parida 2017).

Nazir et al. looked upon the difficulties of pedestrian flow. They embedded photographic technology for a field study on the favor of pedestrian flow characteristics. They recommended speeding flow density development on finding out the slow rate of speed of at that area. A hugenumber of sidewalk users' needs the provision of walk facilities such as exclusive walkways or footpaths on the road for their safe movement. Pedestrians walk differently on different typesof walking facilities. The research works on pedestrian's flow characteristics were started from about four decades ago. The walking speed of pedestrians is prime importance in a study of function, design and provision of pedestrian facilities. Walking speeds are governed not only by the width of the facility but also by age and gender. The age was judged from the face valueof the pedestrian. (Nazir et al. 2012)

on the other hand, Shahi et al. also investigated on behavior of pedestrian on road crossing onbasis of traffic perimeter & to modalized well pedestrian behavior for pedestrian safety they also recommended special designed pedestrian for drivers for suitable PLOS. The main objective of this research is to trace out the pedestrian safety condition in Area and thus recommend appropriate measures to be implemented in order to enhance the pedestrian safety.In this study pedestrians should be targeted through educational and public information awareness campaigns to deter pedestrians from engaging in risky behavior. Such programs arerecommended to apply through mass media and should be directed toward young pedestrians,male pedestrians, educated pedestrians who take more risk to cease their waiting time. (Shahi2013)

2.3 Summary

Many researcher have been performed their research on footpath quality and pedestrian safety and attractiveness of footpath. In every study pedestrian safety and pedestrian facilities have been highlighted. Researchers tried their best for quality ensures, safety issue, safe movement of pedestrian onfootpath.

In this study we select an area of Dhaka city which is Nilthek to Bijoy sarani which divided into six points. We select this study to reveal the actual condition of the footpaths in this area, develop a concession point to ameliorate the existing condition and offer a framework which will be applicable in any city of the developing countries throughout the world.

CHAPTRE 3

METHODOLOGY

3.1 Introduction

In this chapter the methodology discussed elaborately. There is an outline of the methodology that was followed in the study which provides information of the participants, that is, who the participants were and how they were sampled. In section 3.2 the methodology overview is discussed and then 3.2.1 the selection of the study area along with a brief discussion about those areas is discussed. Work details will discuss in section no 3.2.2. In section 3.2.3 a reconnaissance survey was conducted for finding out the working steps and methodology. In section 3.2.4, 3.2.5, 3.2.6 outlines the methodology of demographic survey, road condition survey and questioner survey respectively. Finally, this chapter is summarized in section 3.3.

3.2 Methodology Overview

To understand the whole methodology a flow chart given below:

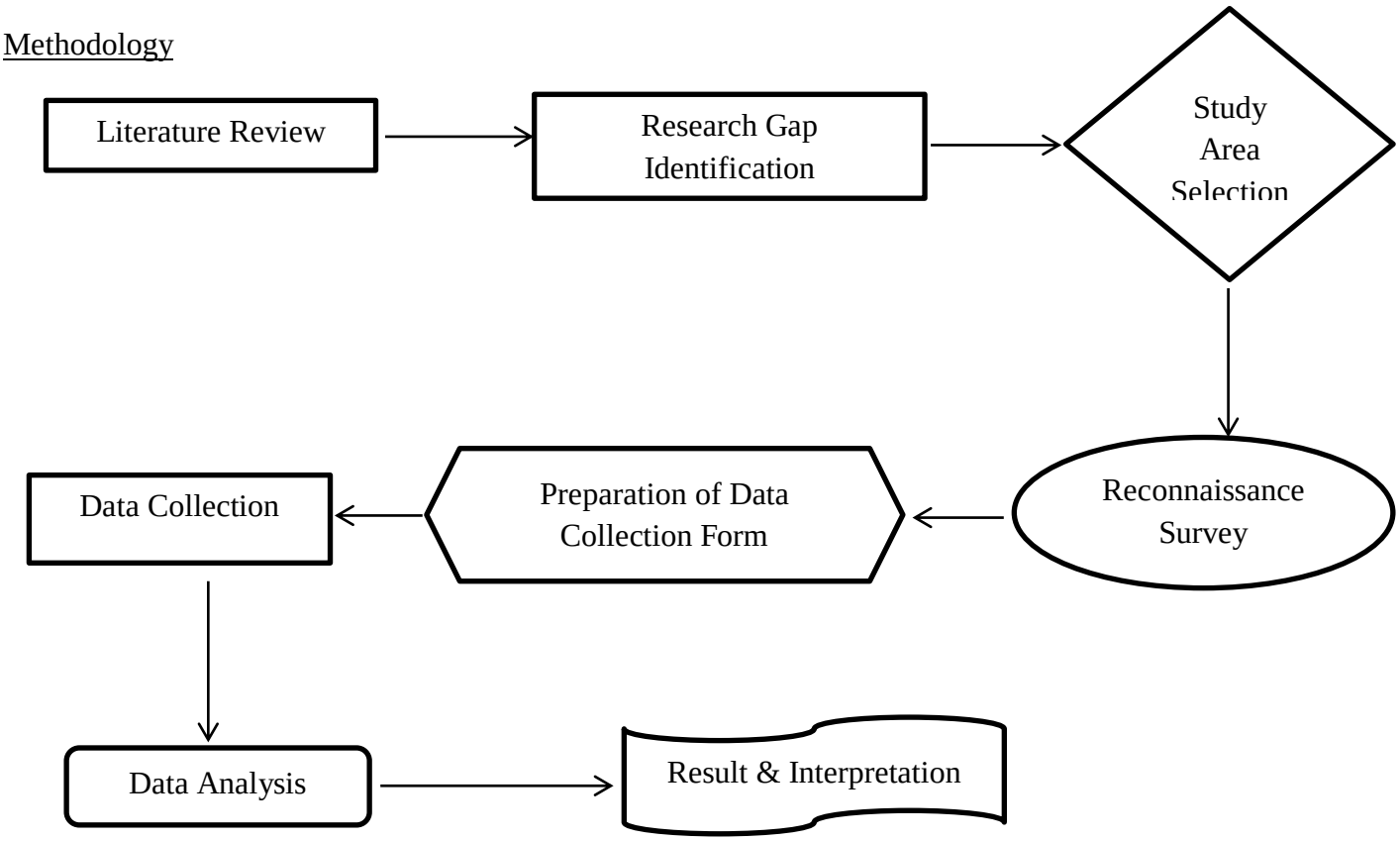

Figure 3-1. Methodology flow chart

3.2.1 Study Area

Dhaka is the capital of Bangladesh. There are many governments, non- government buildings and various industrial buildings. Dhaka is located in central Bangladesh at **23°42′N & 90°22′E**, on the eastern banks of the Buriganga River. The city covers a total area of 306.38 square kilo metres (118.29 sq mi). In 2011, male to female ratio for Dhaka was 103.9 males per 100 females. Male to female ratio of Dhaka fell gradually from 108.3 males per 100 females in 1991 to 103.9 males per 100 females in 2011. In this City we choose a part which is Bijoysarani to Newmarket.

Figure 3-2. Dhaka city google view map

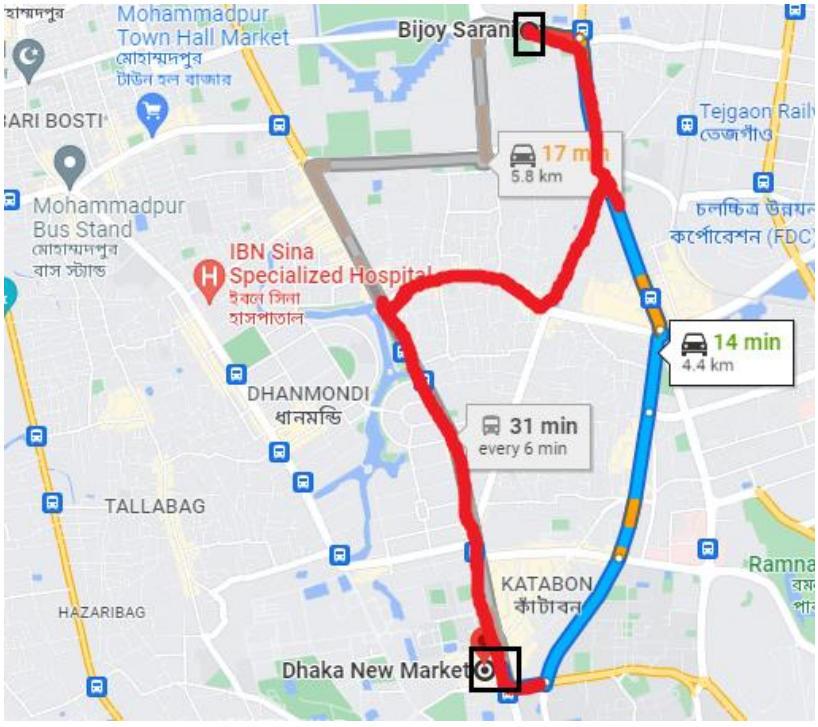

Figure 3-3. Bijoysarani to Newmarket google view map

In this Study 6 points are selected of Dhaka city. This 6 points are given below:

1. Farmgate Point
2. Khamarbari Goal Chottor Point
3. Bijoy Sarani Point
4. Green Road Panthapath Point
5. Dhanmodi Lake-32 Point
6. Newmarket Point.

Farmgate Point

Farmgate is the most vital and busy point it is situated nearby to Tejturi Bazar, and close to Tejkunipara at coordinates of 23°45'27.8"N 90°23'22.3"E. It is a busy point because beside this point there are many markets, educational institutions and medical stores are situated. So everyday many peoples of different ages, different occupations are moving through this place. But footpath condition of this study is not well enough due to various illegal structures and street hawkers occupied this area. Intensity of moving rate of pedestrians in this area is so high.

Figure 3-4. Google map view of Farmgate

Khamarbari Goal Chottor Point

Khamarbari is an important place, which located at Coordinates: 23°45'34"N 90°23'3"E. Where located some important institutions as like1.head office:- Bangladesh Bureau of Statistics,2.Matsha & Pashu Sampad Bhawan &3.Bangladesh Krishi Unnayan Corporation.4.Bangladesh Krishi Biponon Ministry. Khamar bari Goal Chottor is important to go different important places of Dhaka city. Footpath quality of this place is about well and clear.

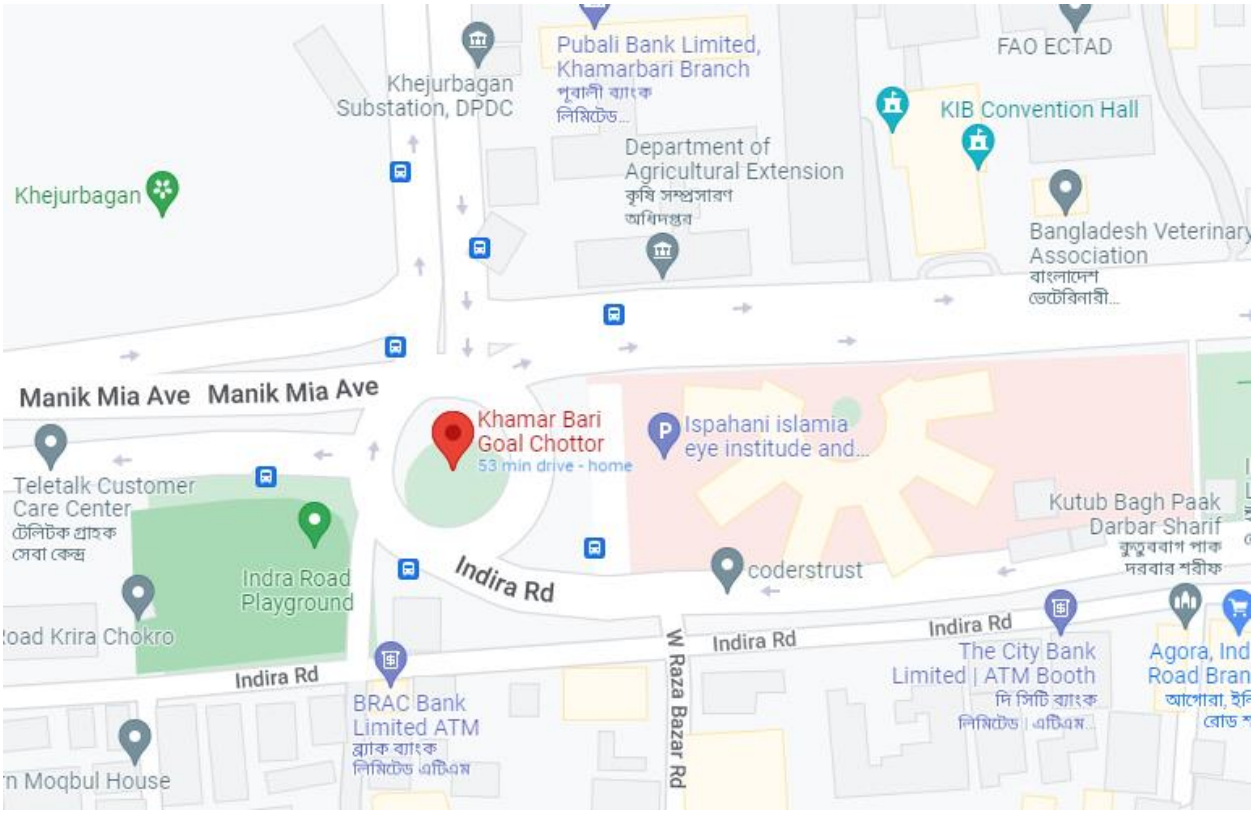

Figure 3-5. Google map view of Khamar Bari Goal Chottor

Bijoy Sarani Point

Bijoy Sarani is a main road in Dhaka city. From Farmgate, in the middle of the old airport, is connected horizontally to Rokeya Sarani from the Sony Rangs building to the farm house. A busy road, with a mural at one end and a fighter jet stationed at the other end. The Bhasani Novo Theater is located on one side. It is locate at coordinates 23°45'36.4"N 90°21'41.3"E. Here footpath are quality is high and attractive.

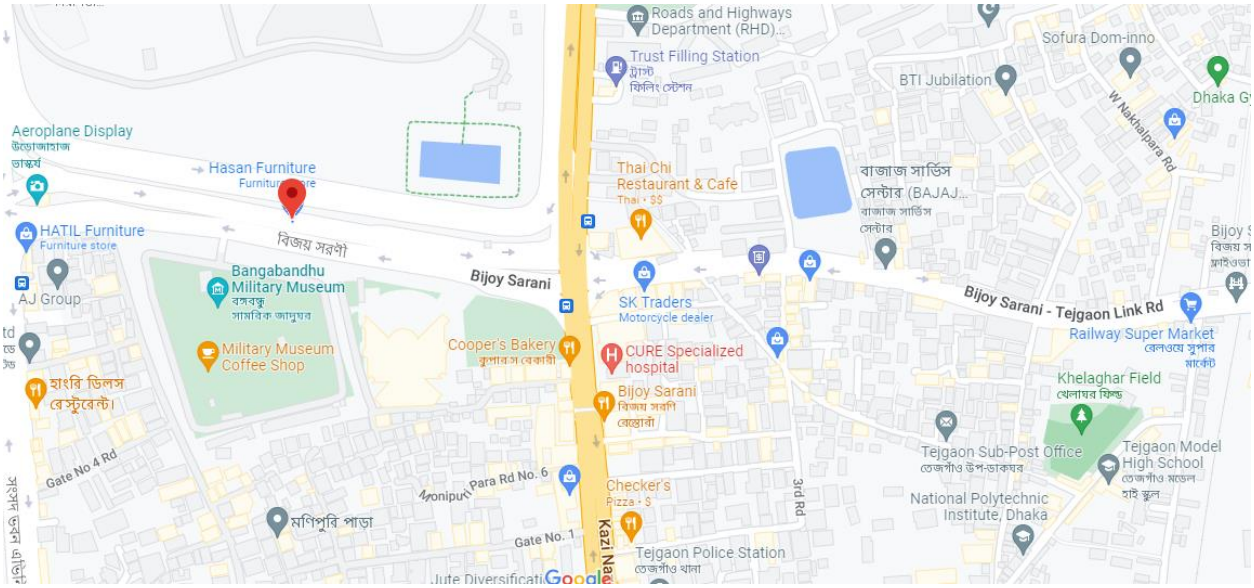

Figure 3-6. Google map view of Khamar Bari Goal Chottor

Green Road – Panthapath Point

Green Road Pantapath is an important east west road in Karwan Bazar area of Dhaka city, the capital of Bangladesh. It connects Tongi Diversion road, Mymenshing Road and Mirpur Road. It is home to one of South Asia's largest shopping centers, Bashundhara City. It is situated at Coordinates of 23°45'00.1"N 90°23'12.8"E. It is a crowded place and pedestrians are move to and fro for different work. The overall footpath quality is not so good here.

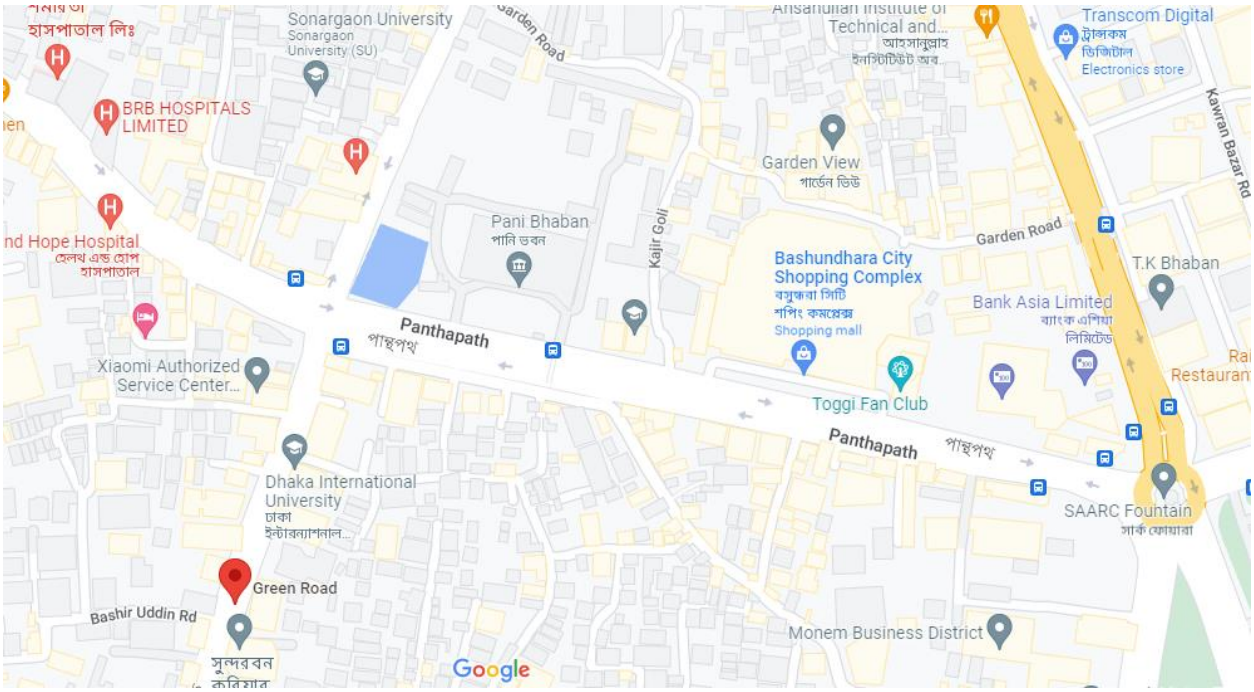

Figure 3.7- Google map view of Green Road – Panthapath

Dhanmondi Lake-32 Point

Dhanmondi Lake-32 is a lake located in the Dhanmondi residential area in Dhaka, at the coordinates of 23°45'13.0"N 90°22'27.2"E Bangladesh. The lake was originally a dead channel of the Karwan Bazar River, and was connected to the Turag River. The lake is partially connected with the Begunbari Canal. In 1956, Dhanmondi was developed as a residential area. Here is footpath is about well or medium.

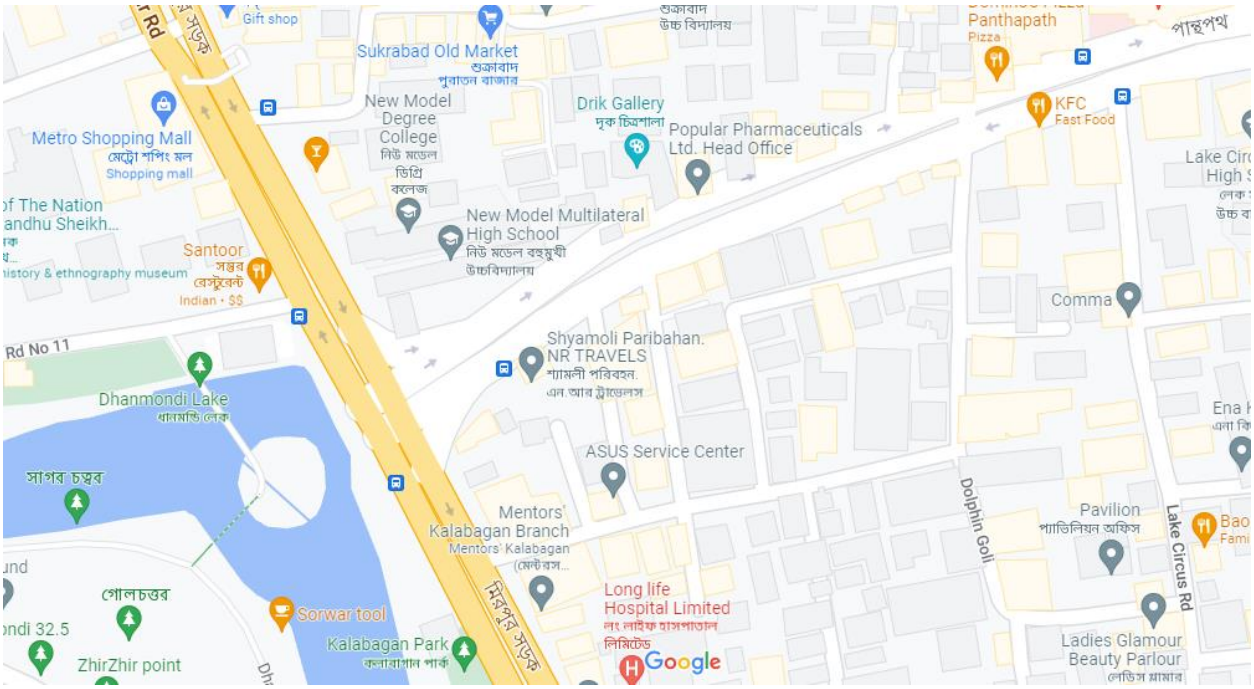

Figure 3-8. Google map view of Dhanmondi Lake-32

Newmarket Point

Newmarket is one of crowded place of Dhaka. It is situated at coordinates of 23°43'57.7"N 90°23'10.5"E. It is famous for different educational institutions and also for book marke. So everyday many peoples of different ages, different occupations are moving through this place. But footpath condition of this study is not well enough due to various illegal structures and street hawkers occupied this area. Intensity of moving rate of pedestrians in this area is so high.

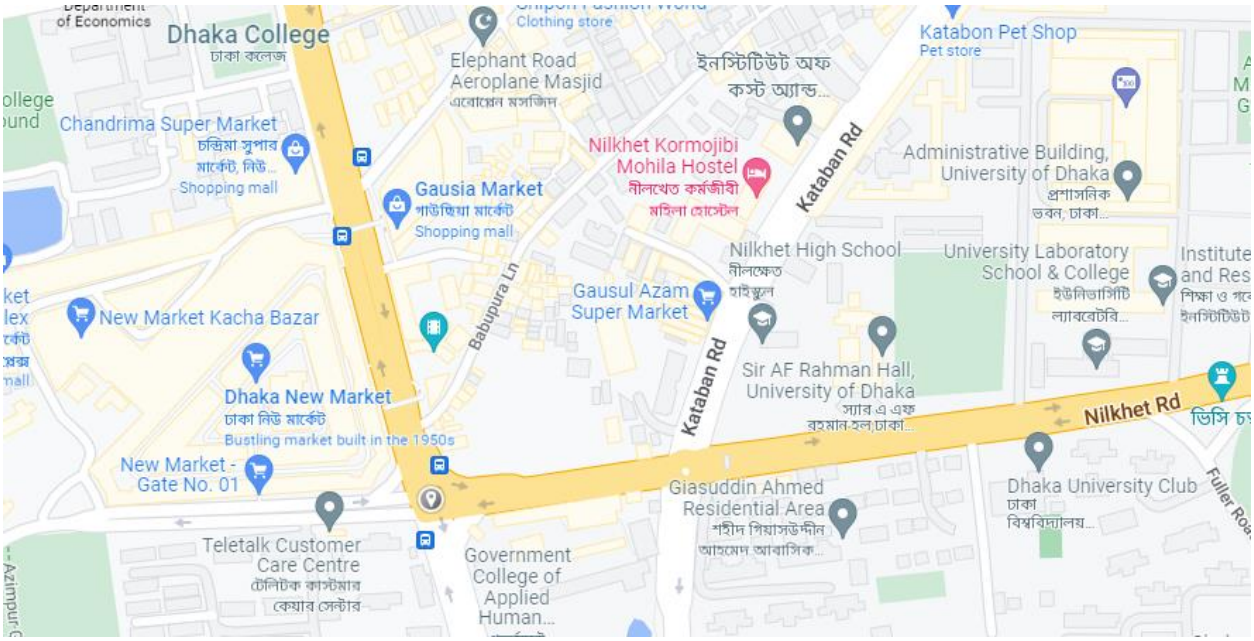

Figure 3-9. Google map view of Newmarket

3.2.2 Work details

This work is conducted over about 300 people at 6 points (Farmgate Point, Khamarbari Goal Chottor Point, Bijoy Sarani Point, Green Road Panthapath Point, Dhanmodi Lake-32 Point, Nilkhet Mor Point) the surrounding area of conduction is around 100 meters from every approach. Spending 4 hours/day we have got data from reconnaissance survey, demographic survey, and questionnaire survey for data analysis. This work was continued for almost eighteen days where a selected point Six days are taken to perform reconnaissance survey , six days for demographic survey and also six days for questionnaire survey.

Point	Date	Time
1.Farmgate	22/03/2020	7.30 AM to 9.30 AM 4.00 PM to 6.00 PM
2.Khamarbari	23/11/2020	7.00 AM to 9.00 AM. 3.30 P.M. to 5.30 P.M.
3. Bijoyarani	24/11/2020	7.00 A.M to 9.00 A.M 4.30 P.M to 6.30 P.M
4.Green Road	25/11/2020	8.00 A.M to 10.00 A.M 7.00 P.M to 9.00 P.M
5.Dhanmondi	26/11/2020	8.30 AM to 10.30 AM 7.00 PM to 9.00 PM
6.Newmarket	27/12/2020	8.00 AM to 10.00 AM. 4.30 P.M. to 5.30 P.M.

3.2.3 Reconnaissance survey

A part of Dhaka city Bijoy sarani to New market is selected as our study area then a reconnaissance survey was conducted to decide the working steps and methodology. At first for this survey we are visited all the six major points to visualize the field condition and decide how the surveys will be conducted. From all of the six points we collected data with approach that we considered every point as a center of circle with a radius of 100 meter. Different age with different quality of people such as consideration of occupation or other activity we selected pedestrian to collect our data. In short time of six day we conducted Reconnaissance survey when sometimes travelled by motor bike and maximum time by walking through footpath.

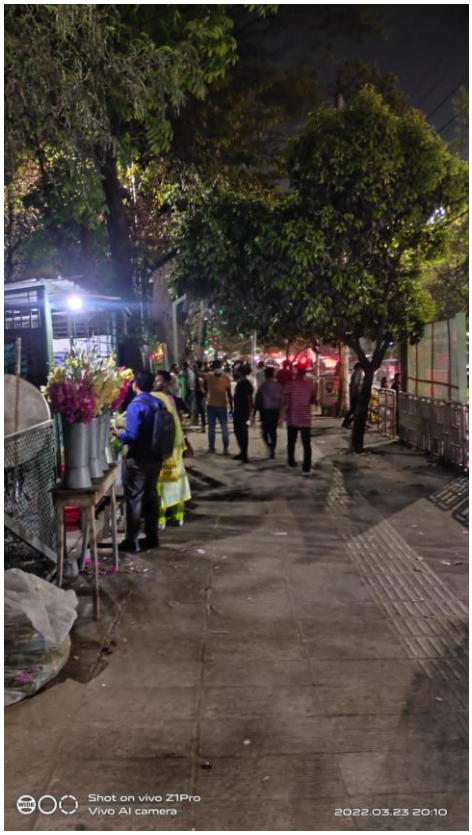

Figure 3-10. During reconnaissance survey

3.2.4 Demographic survey

In this survey we collected background information of those people who agreed to response and help us by answering our questions about footpath. In this survey we also collect data of responders by asking question such as your age, education, occupation, income level, and some other. In this survey we founded variety of information of with variety of age, occupation and also different income level with different educational level or illiterate.

Figure 3-11. During demographic survey

3.2.5 Footpath Condition survey

In this survey footpath condition of this root of Dhaka city is measured. We collected footpath condition data with variety of categories. The selected points around 100m we collected footpath condition data physically. From Bijoysarani to New market we also observed total area by motor bike for looking the footpath condition.

Figure 3-12. During footpath condition survey

3.2.6 Questionnaire survey

In this survey we collect data from those people who response us and helped us by answering questions. It was conducted due to hold an idea about footpath facilities, carriage wayfacilities, transit facilities and overall facilities and other. This questionnaire survey was conducted on different kinds of people by asking them questions and rating the answers between 1-5 which indicates the condition of roads and footpath very poor, poor, medium, good, very good respectively. Responders given rating for different categories by their thinking.

Figure 3-13. During questionnaire survey

3.3 Summary

We described all the six studied areas and presented their schematic layout . The six points also have been described separately. Reconnaissance survey was conducted to decide the working procedure and has been described. The study area was briefly described in the section of selection of study area. Demographic survey has been conducted due to hold an idea and to gain background information about the pedestrians of those area. Footpath condition survey has been conducted dueto know the present conditions of footpath. Then finally, the questionnaire survey has beenconducted due to find out the quality of footpath according to the rating from 1 to 5. However, in the next chapter, all these collected data and their detailed analysis have been presented with relevant explanations and rationale justification.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

Dhaka is the capital of Bangladesh and covers a total area of 306.38 square kilo meters (118.29 sq mi) with a population of 8.5 million or above. In 2011, male to female ratio for Dhaka was 103.9 males per 100 females. Male to female ratio of Dhaka fell gradually from 108.3 males per 100 females in 1991 to 103.9 males per 100 females in 2011. Dhaka has a literacy rate of 83% (Wikipedia).

4.2 Demographic Survey

Age

The pie chart shows the age distribution of the responded and their corresponding percentage. Data analysis reveals that pedestrians from 26 to 40 years range use footpath mostlyand their percentage is 36%. This is basically the day labor, business man, service holder, and the working-class people. A significant number of students and some private job holders are included in thispercent, whose age range is 15-25 years is 27%. Also, a few pedestrian's percentage has been observed for the people age below 15 years range and that is 12%. This basically represents the primary school going students. This survey also shows that about 3% of people above 60 years range use footpath. They basically use footpath for their essential necessities i.e. marketing, medicine etc. Also they use footpath for their daily jogging.

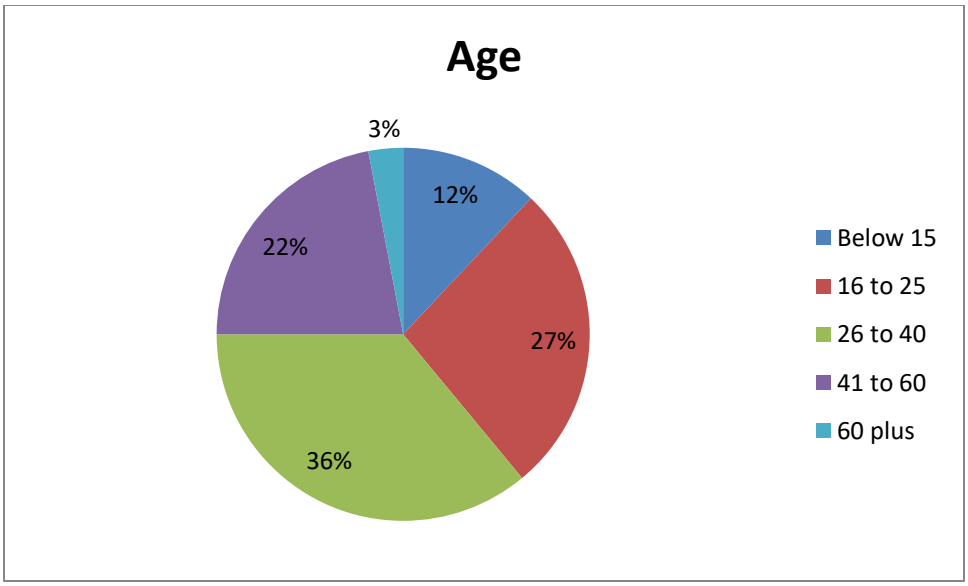

Figure 4-1. Age of responders

Gender

Collected data from the survey shows that footpath is used by 70% male and 30% female for various purposes every day. This implies that men are using footpath at a higher proportion compared to women. Because every man has to go outside every day for working purpose andhas to use footpath. And a significant percent of female comparison to male uses footpath for working purposes every day. Most of them are student and private job holder.

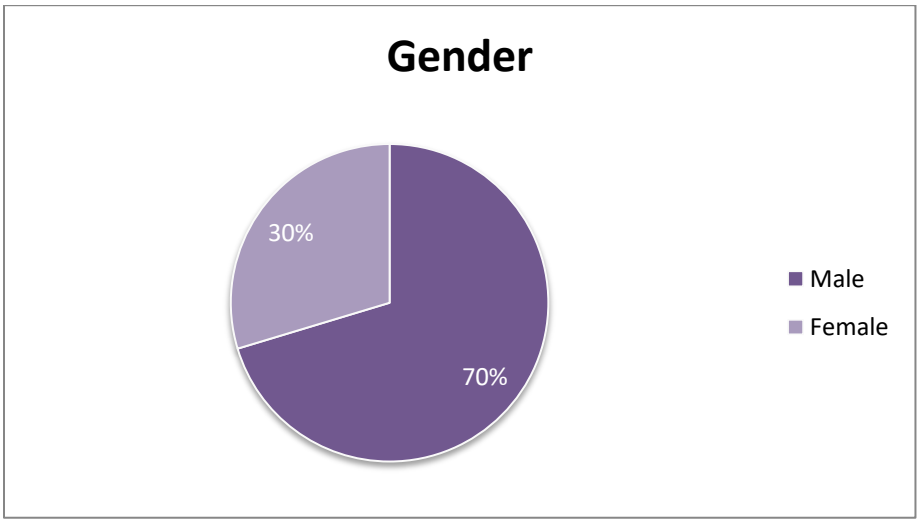

Figure 4-2. Gender of responders

Occupation

From the chart, it shows that about 38% people are service holder. Because most of the people of this city area are works for different kind of private job or work. A number of people are day laborer which is 18%. About 12% of people are students. Also, it shows that about 11% people are garments worker and 13% people are businessman. Also, it shows that about 8% people are government job holder.

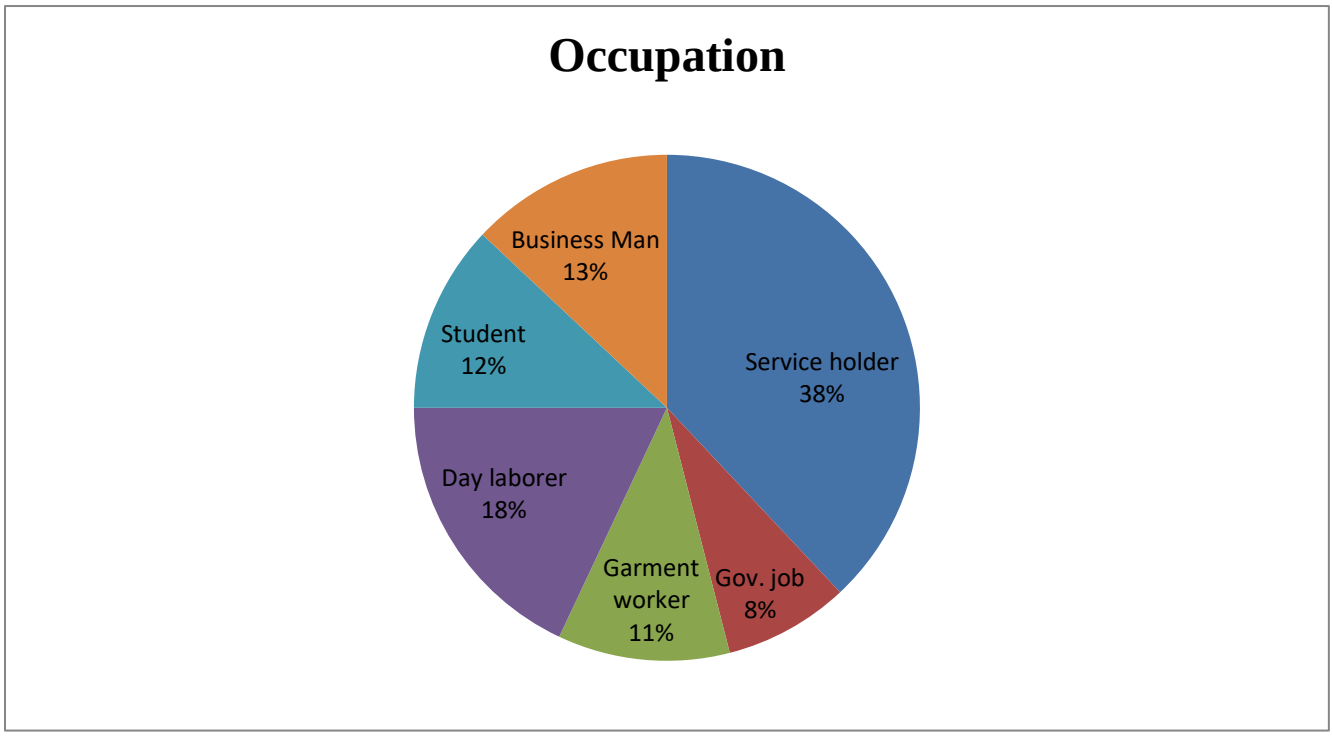

Figure 4-3. Occupation of responders

Monthly Income Level

This pie chart shows that the maximum people's monthly income level is below 10,000 taka and the percent is 40%. Also, it shows that about 34% people lives here whose monthly income level is between 10001-25000 tk. Basically this people are shopkeeper and garments workers and other officials who are experienced. About 13% people are job holder whose income level is between 25001-50000 tk. About 10% people whose income level is 50001-100,000 taka and maximum of them are businessman. About 3% of people are high qualified job holder and big businessman whose monthly income level is more which is 1 lakh plus.

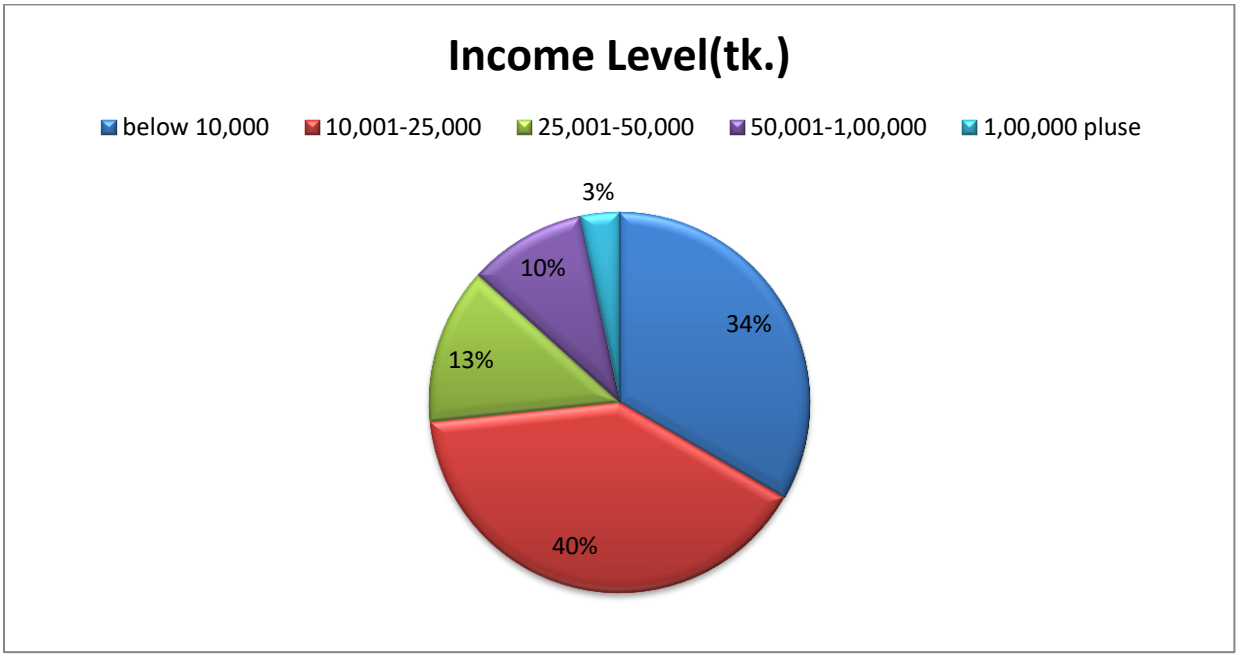

Figure 4-4. Monthly income level of responders

Education

The pie chart shows that the footpath is used by 50% of secondary educated people, 27% of primary educated people normally for going to educational institutions. Also 13% of highly educated people & 10% illiterate people for working & other various purposes every day. This implies that a large number of secondary educated people are using footpath.

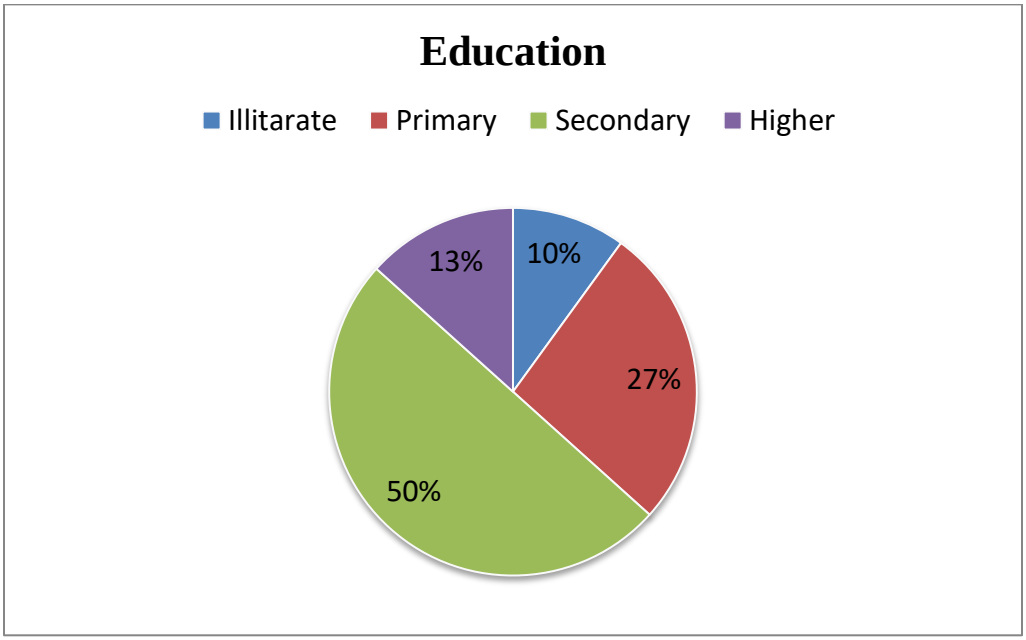

Figure 4-5. Education level of responders

Purpose of Using Footpath

This Figure shows an interesting observation regarding the number of pedestrians in the termsof the purpose of using the footpath. The number of pedestrians is passing through footpath for working place at a rate of 60%. On the other hand, several pedestrians are passing through the footpath from working place to another place 7% and 13% home to another place a day. It also shows that 10% of people using footpath for the purpose of work to home.

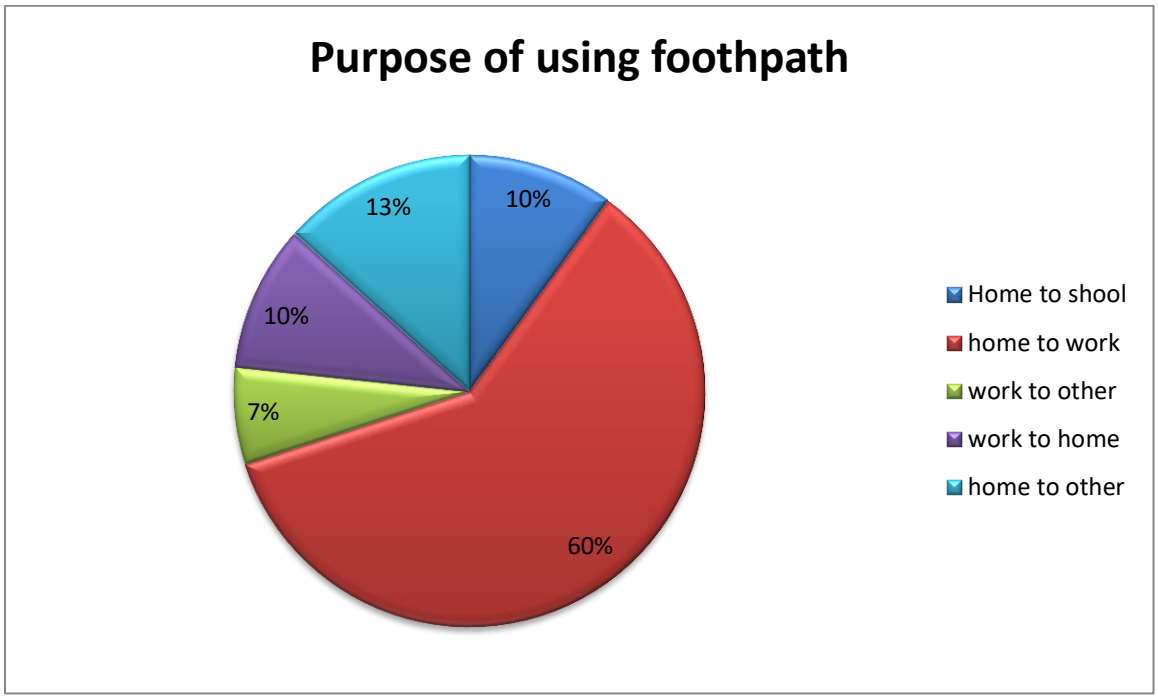

Figure 4-6. Purpose of using footpath

Number of Movement

This Figure shows an observation regarding the number of pedestrians in the terms offrequency of movement. The number of pedestrians is walking 1-2 times a day at a rate of 75%. On the other hand, several pedestrians are passing through the footpath 3-4 times a day at the rate of 18%. Less number of pedestrians is passing through the footpath 5 plus timesa day at the rate of 7%. This implies that garment workers, day laborer's, vendors are passingthrough the footpath 1-2 times. On the other hand, the pedestrian movement of service holdersand other job holders is really low.

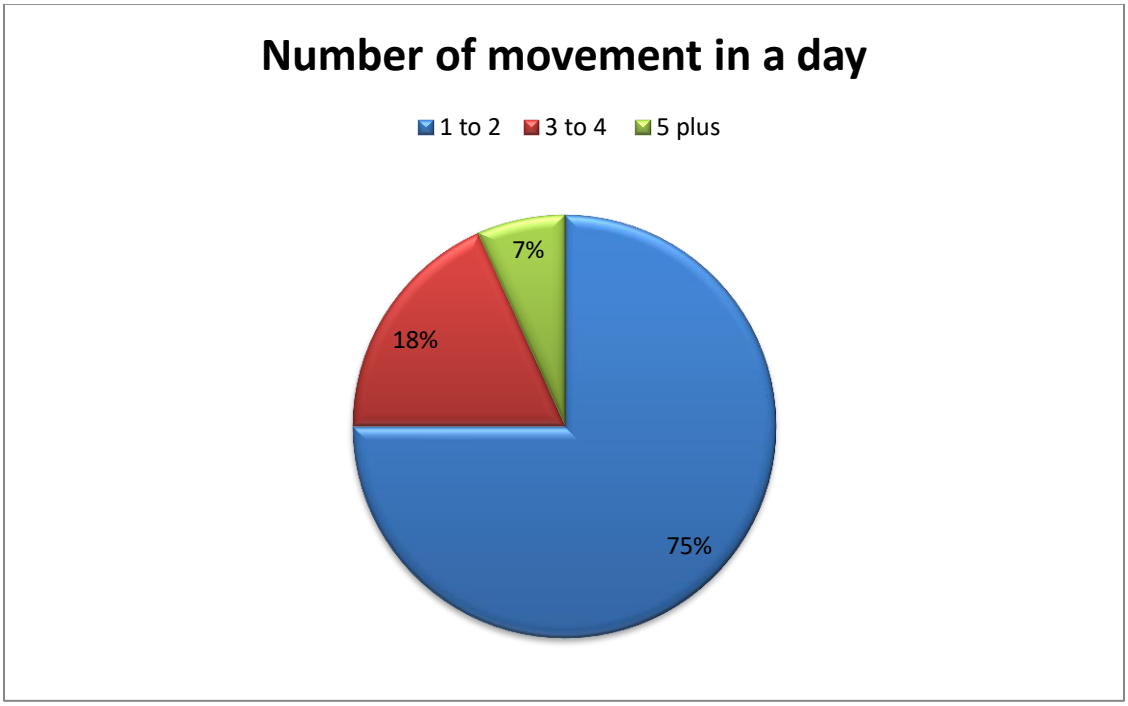

Figure 4-7. Number of movement in a day

Average Time of Using Footpath

The number of pedestrians is walking through footpath for 1 hour at a rate of 33% and 2 hour 38%. On the other hand, several pedestrians are passing through the footpath 3 hour a day at the rate of 21%. Those people pass more than 3 hours in footpath mainly they are street hawker, vendor, footpath related businessman etc.

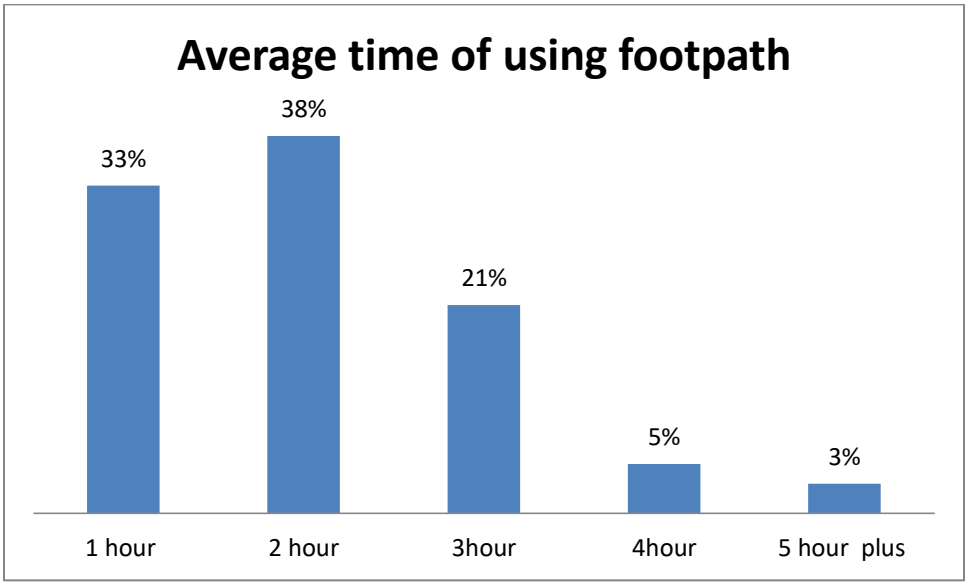

Figure 4-8. Average time of using footpath

Quality Comment

This chart shows that 30% people say that footpath quality of this area is low. Also a large number of people said that medium which is 62% and some people 8% are satisfied with the quality of this areas footpath they commented high as like foreign country.

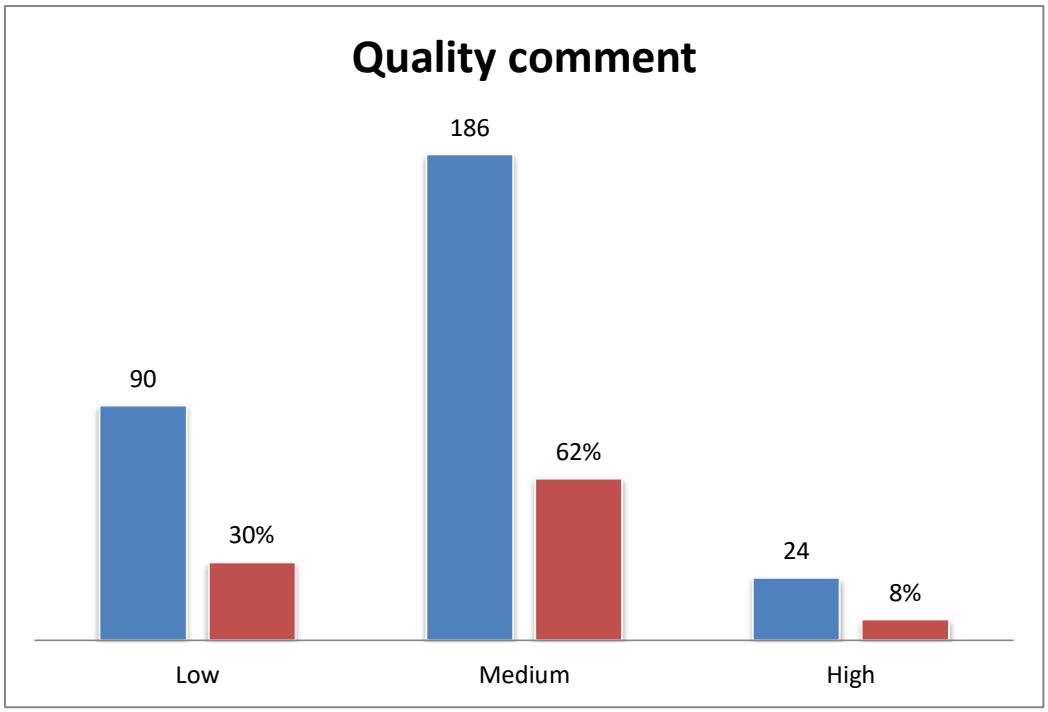

Figure 4-9. Quality comment

Width of footpath

Width of footpath is different at different points. Here width of footpath categorized into three categories. Which are narrow (1-4 ft.), medium (5-7ft.), wide (8-12 or above). From the selected area six points value are evaluated below:

Bijoysarani

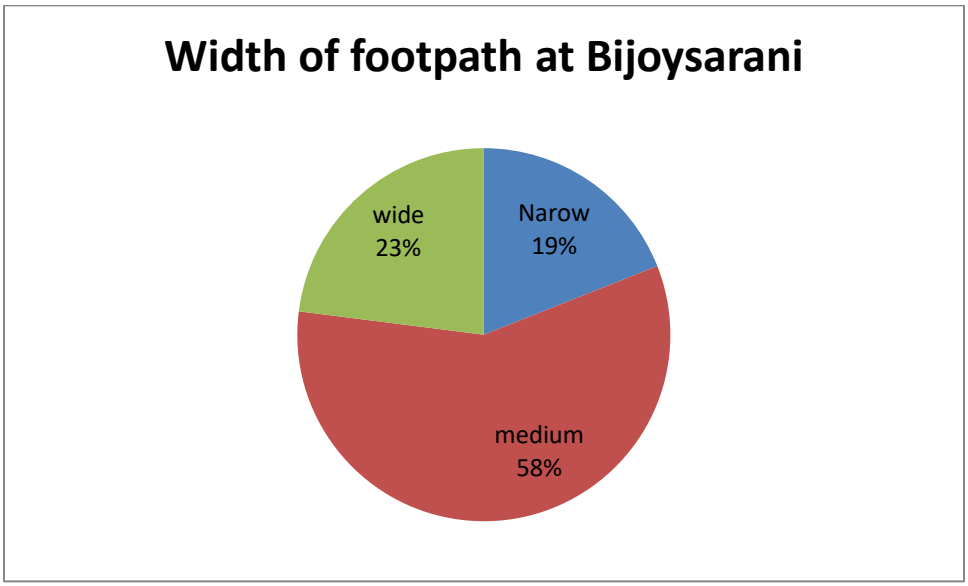

Figure 4-10. Width of footpath at Bijoysarani

Khamarbari

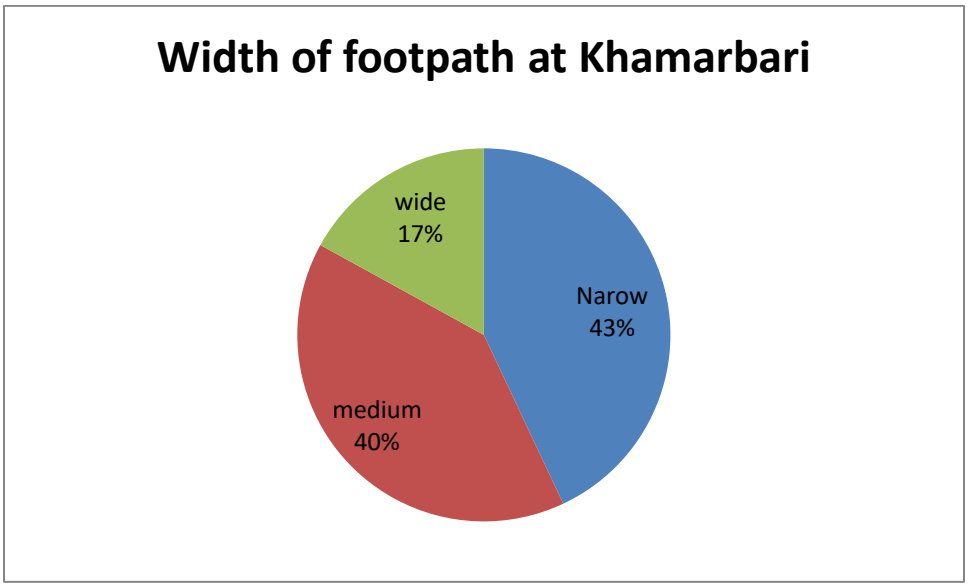

Figure 4-11. Width of footpath at Khamarbari

Farmgate

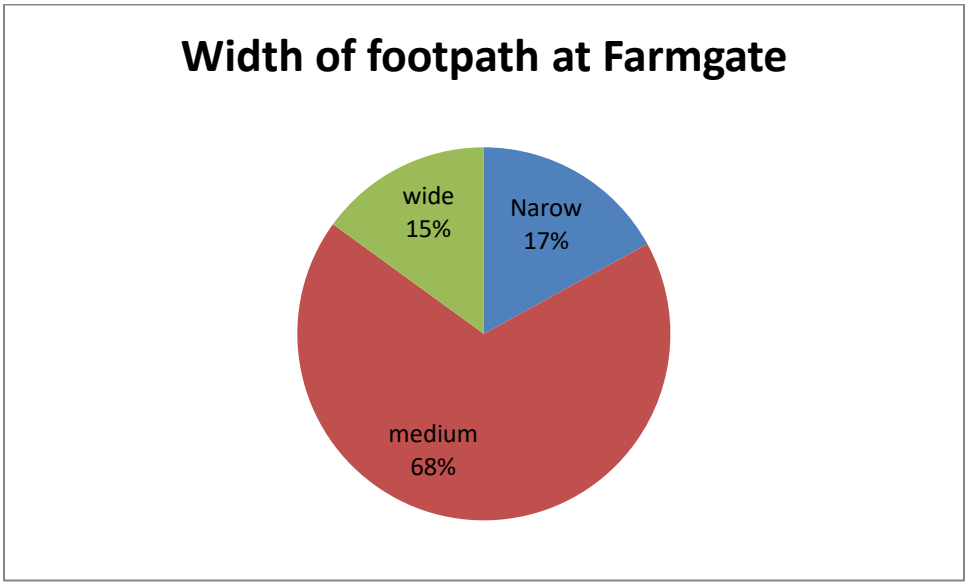

Figure 4-12. Width of footpath at Farmgate

Panthapath

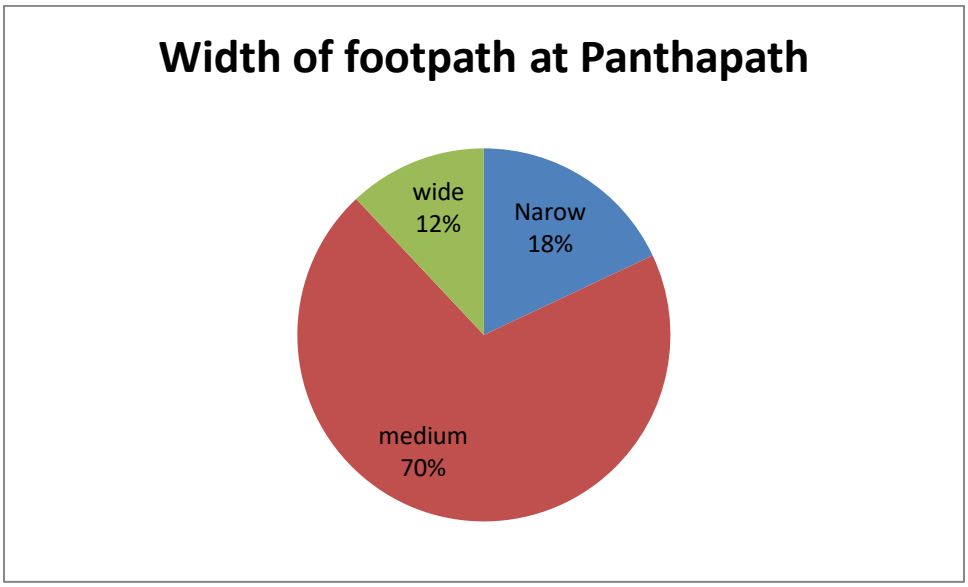

Figure 4-13. Width of footpath at Panthapath

Dhanmondi lake-32

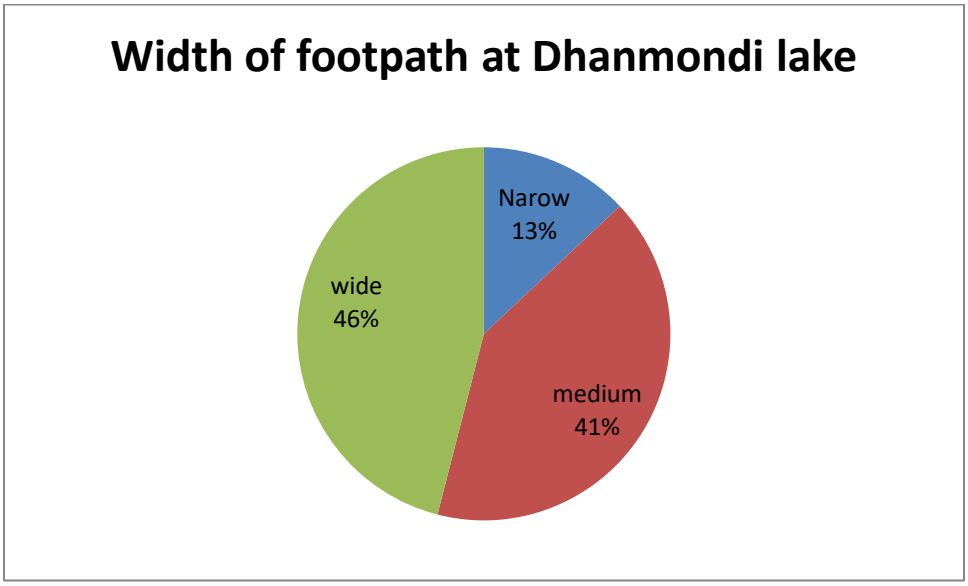

Figure 4-14. Width of footpath at Dhanmondilake Newmarket

Newmarket

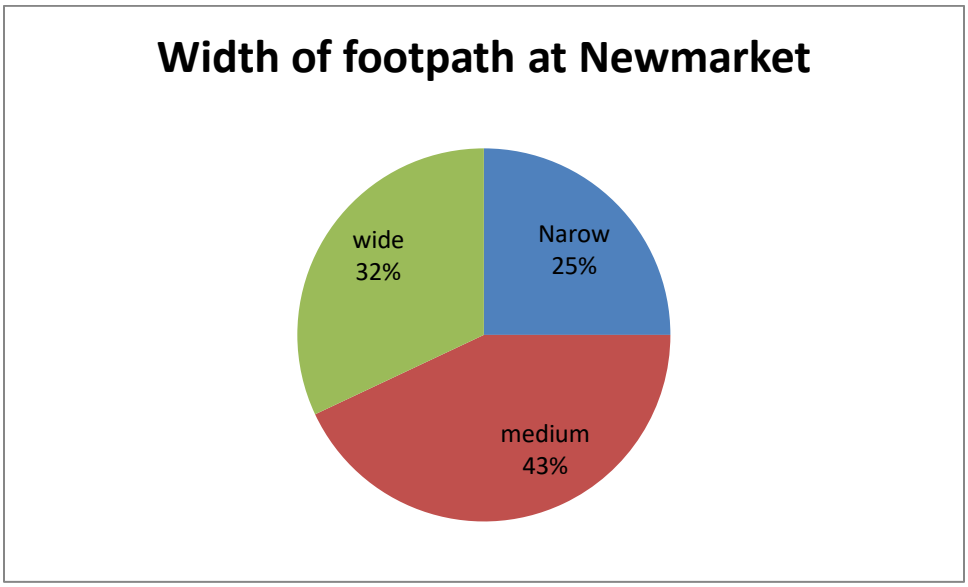

Figure 4-15. Width of footpath at Newmarket

Overall width of footpath

From collected data it shows that width of footpath is considered as medium by 53.33% people where 22.50% people say it is narrow and 24.17% people said wide. Because of the range medium and narrow people are not so satisfied about footpath width.

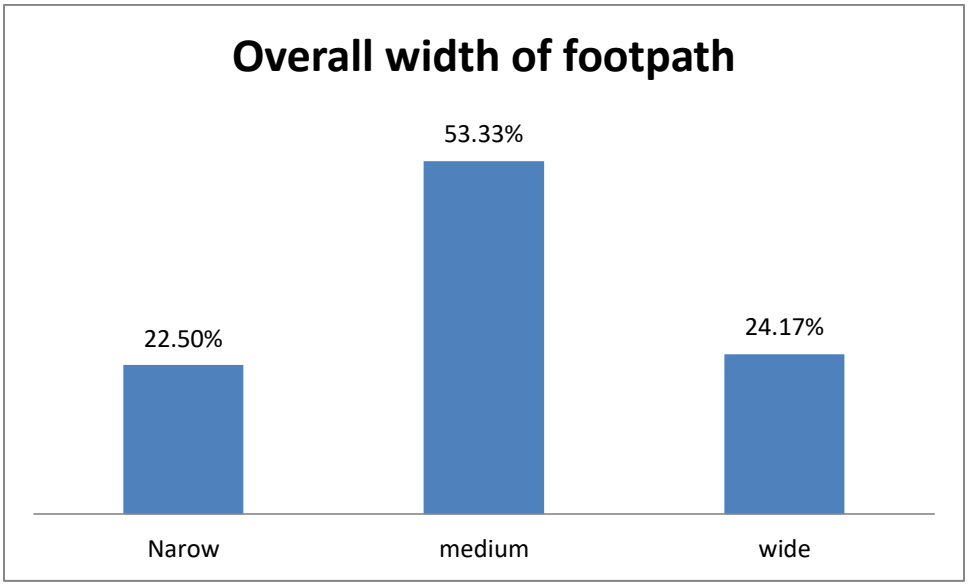

Figure 4-16. Overall width of footpath

Surface condition

This chart shows that maximum value 33.33% is medium. Because of footpath surface condition is not so good enough in this area. Also for this reason 26.67% is poor. 23.33% said good and 6.67% very good for ceramic tiles surface. Here 10% very poor because surface condition is not enough good as eastern country.

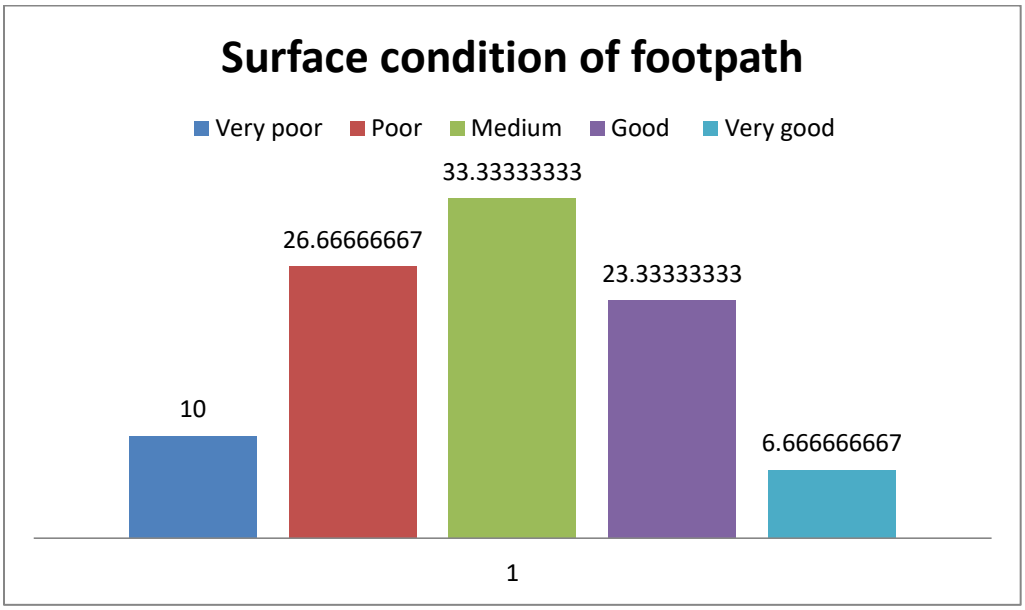

Figure 4-17. Surface condition of footpath

Illegal infrastructures and vending activities

From collected data figure shows that illegal infrastructures on footpath is around good and medium. Values are 1.67% very poor, 23.33% poor, 35% medium, 38.33% good & 1.67% very good respectively. Very poor condition indicates there is a lot of illegal infrastructures and vending activities on footpath. In different places we have seen illegal infrastructures such as shop, building part etc.

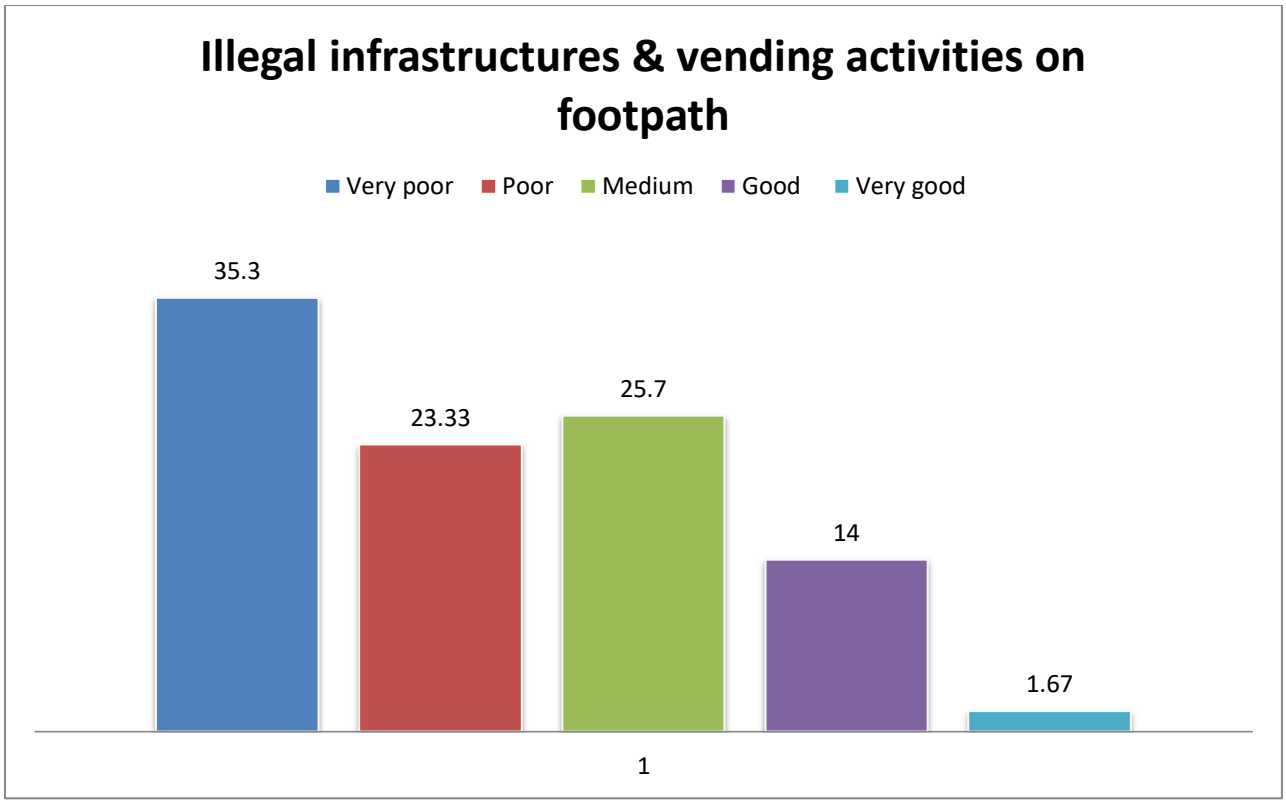

Figure 4-18. Illegal infrastructure on footpath

Height of sidewalks

Height of side walk is an important part of footpath. It helps to prevent flooding in rainy season and also helps to prevent accident. In this chart it shows that height of side walk is medium which is 50% A number of pedestrian said it is poor 26.67% and 11% very poor. Also 10% said good and 2.33% very good. In this area of study in some places height of side walk is good enough and other places is medium but some places is too low or down.

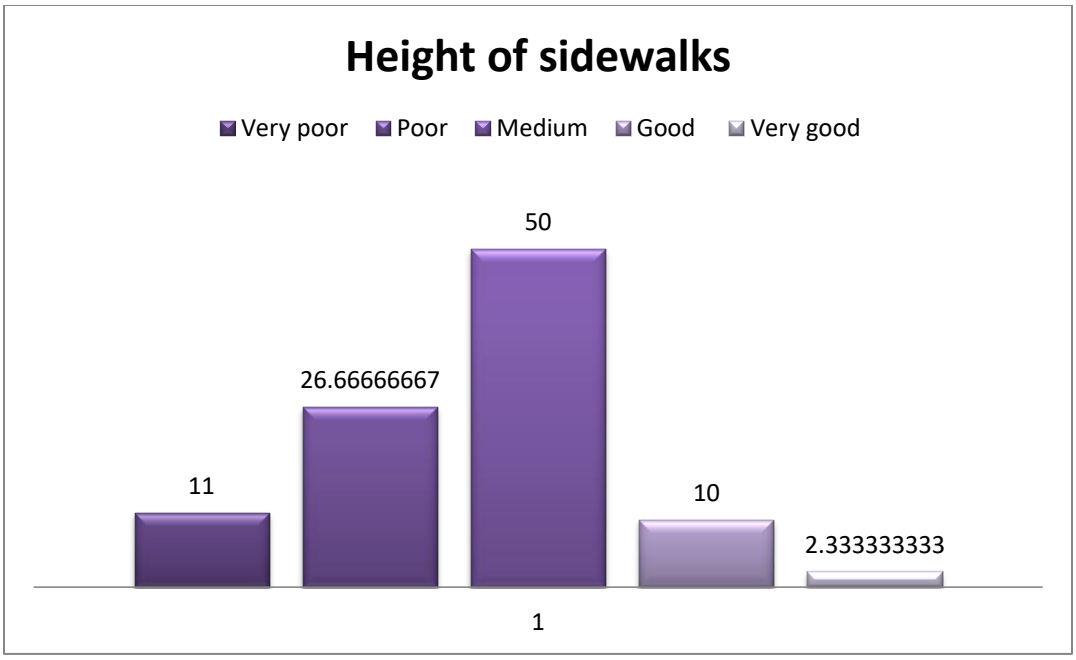

Figure 4-19. Height of side walks

Women Safety

Most of the pedestrian said that women safety is not enough in this area especially at night.
At night 47% times women are unsafe and 38% times less safe. Women are safe at daylight but some violent activities occur at day such as eve teasing and other.

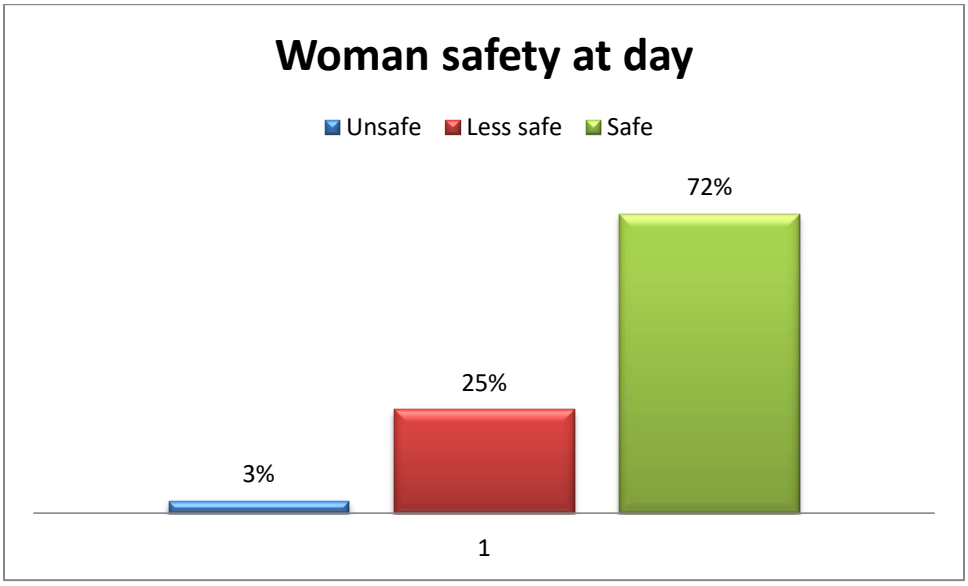

Figure 4-20. Women safety at day

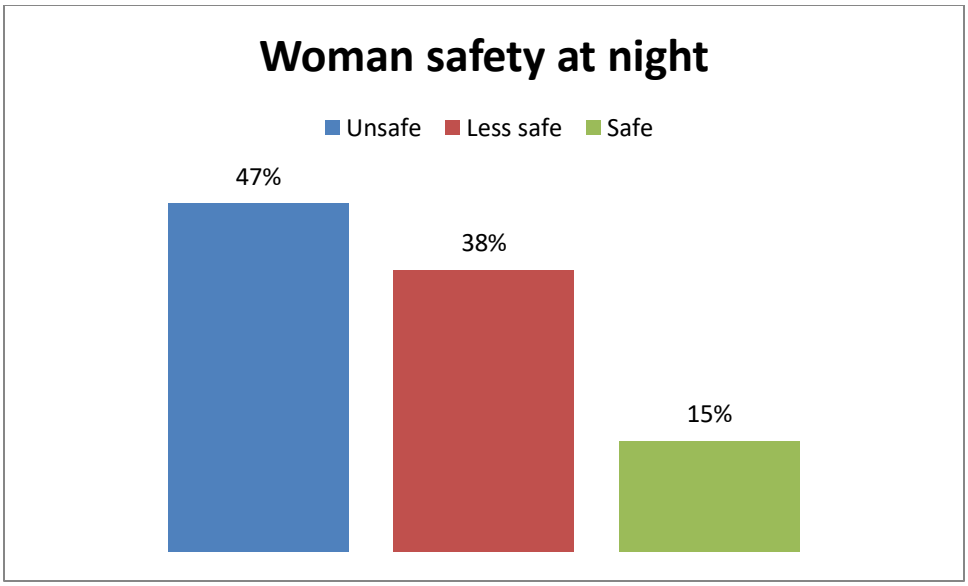

Figure 4-21. Women safety at night

Accessibility

This chart shows that accessibility is maximum 63% medium, 15.67% poor, 8.67% very poor, 10.67% good and 2% very good. In this area accessibility is medium because in maximum places fence is absent.

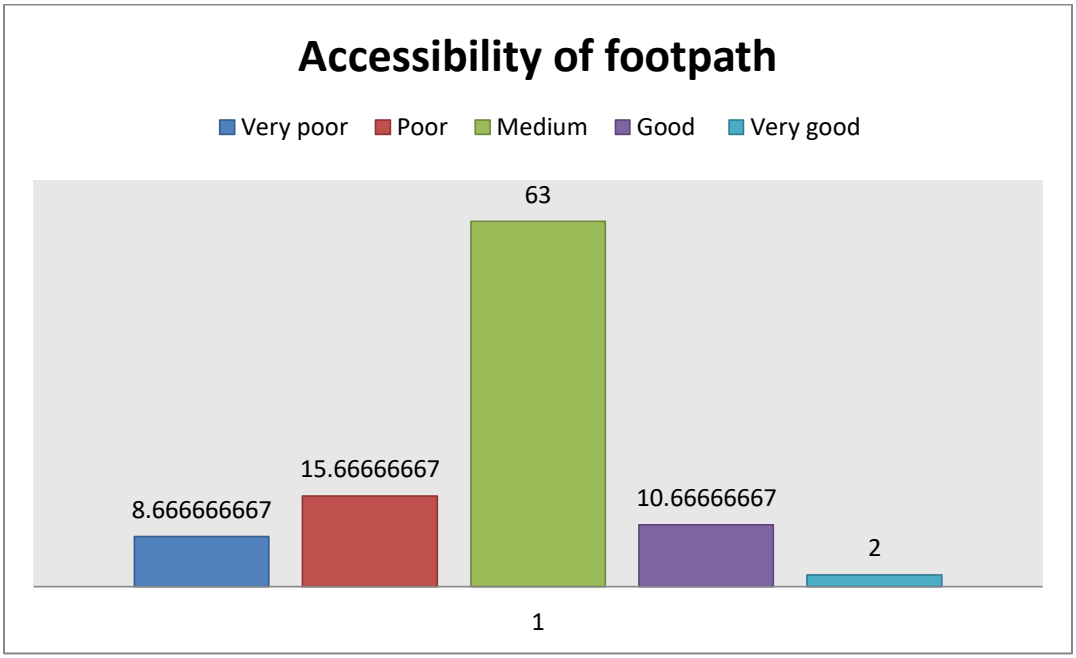

Figure 4-22. Accessibility of footpath

Drainage facilities

A drainage facility is an important part of footpath. In this chart it shows that 41% is given rating 3 or medium, 11.33% good or 4 and 1% was very good or 5. In this area drainage facility is available but not enough. For this reason 20% given rating as very poor or 1 and 26.67% as poor or 2.

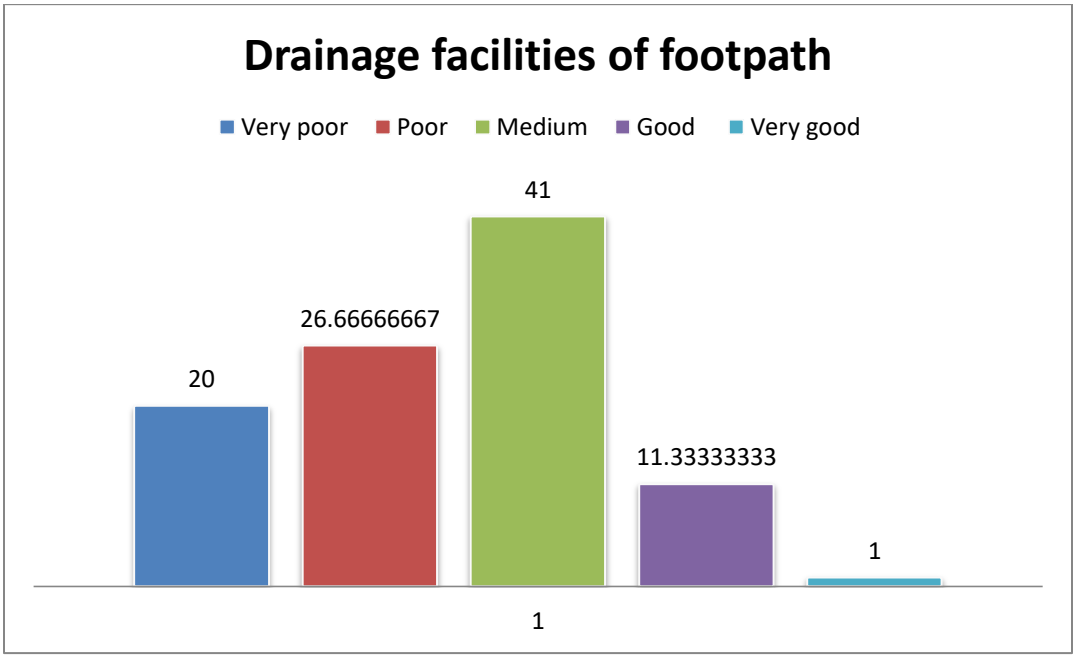

Figure 4-23. Drainage facilities of footpath

Cleanliness level

The gathering waste or garbage on or beside footpath is a common seen in this area some where it is so clean such as Bijoysarani. 41% people said that it is poor and 15.67% is very poor, it indicates in this area footpath is not enough clean. 34.33% rated as good or 4 and 3% very good or 5 because they are satisfied with the cleanliness level.

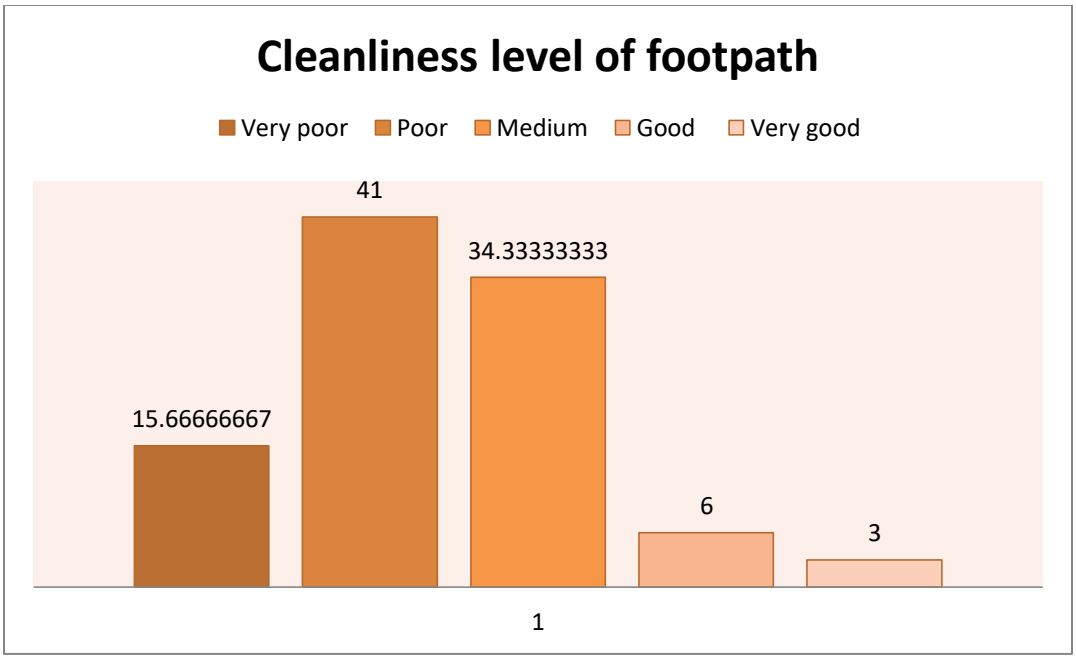

Figure 4-24. Cleanliness level of footpath

Lighting facilities

From collected data chart shows that 50% is good, 6% very good and 26.67% medium because lighting facilities in this area is god enough though some place is dark because lack of proper steps of authority. It shows also 13.33% is poor and 4% is very poor. People think that lighting facilities not like developed country such as Singapore, Qatar, Canada and America.

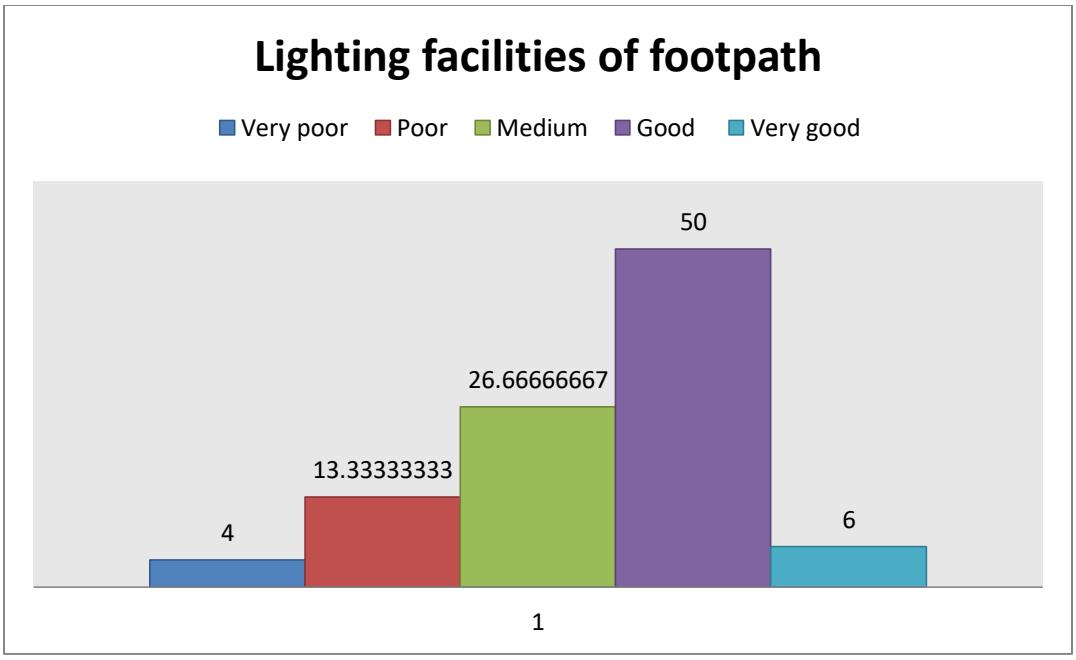

Figure 4-25. Lighting facilities of footpath

Security from robbery

From collected data it shows that security from robbery is safe 60% but some violent work occurs such as pocket cutting. Security from robbery is in unsafe and less condition at night. People Compare this area to other area this areas is comparatively safe.

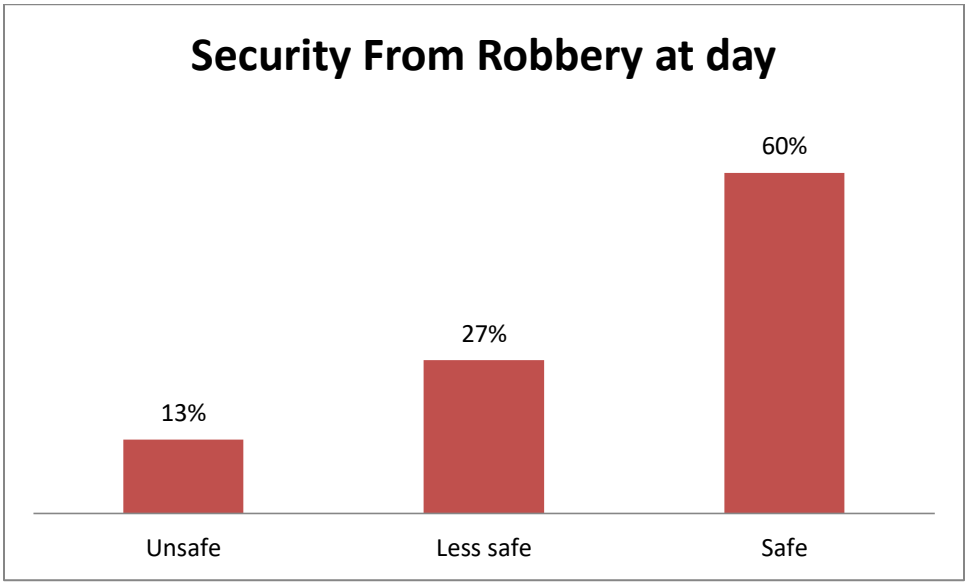

Figure 4-26. Security from robbery on footpath at day

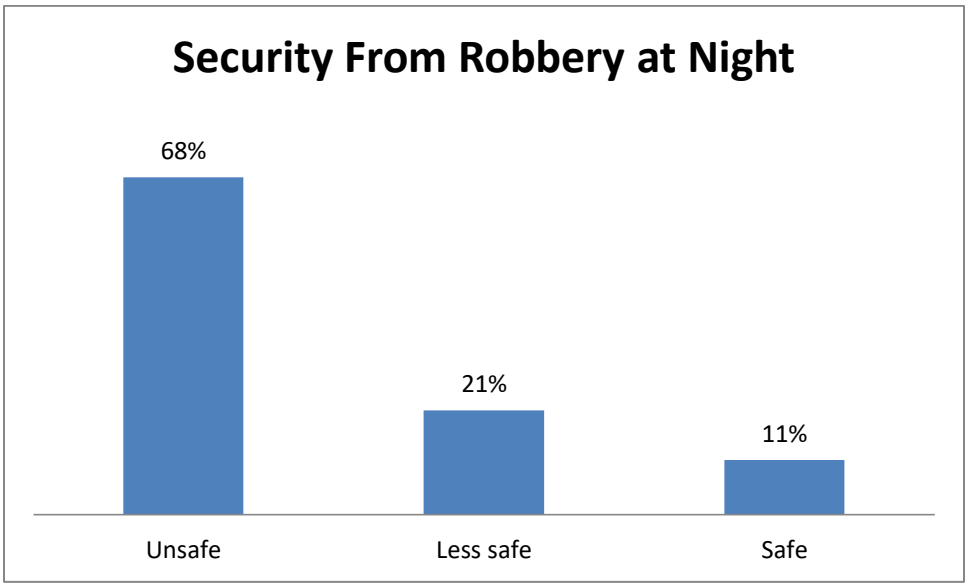

Figure 4-27. Security from robbery on footpath at night

Movement of bicycles

Movement of bicycle creates problem for pedestrian. In this chart shows that78% people say yes, which indicate they see bicycle on footpath.

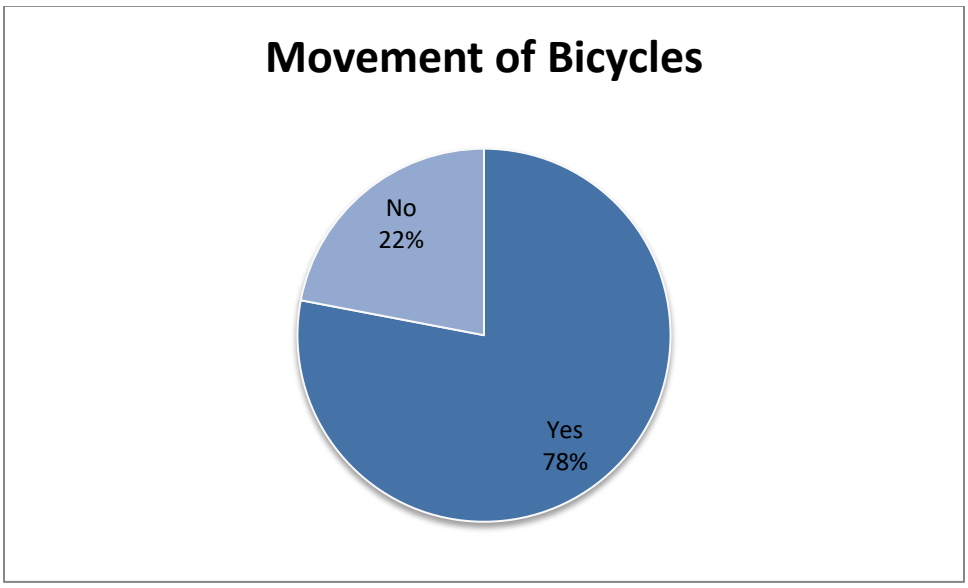

Figure 4-28. Movement of bicycles on footpath

Movement of motorcycles

Movement of motorcycle is a common problem for pedestrian in this area. In this chart shows that 96% people saw the movement of motor cycle on footpath in their daily pedestrian life and they want to see the awareness of bikers and also want helps from traffic police.

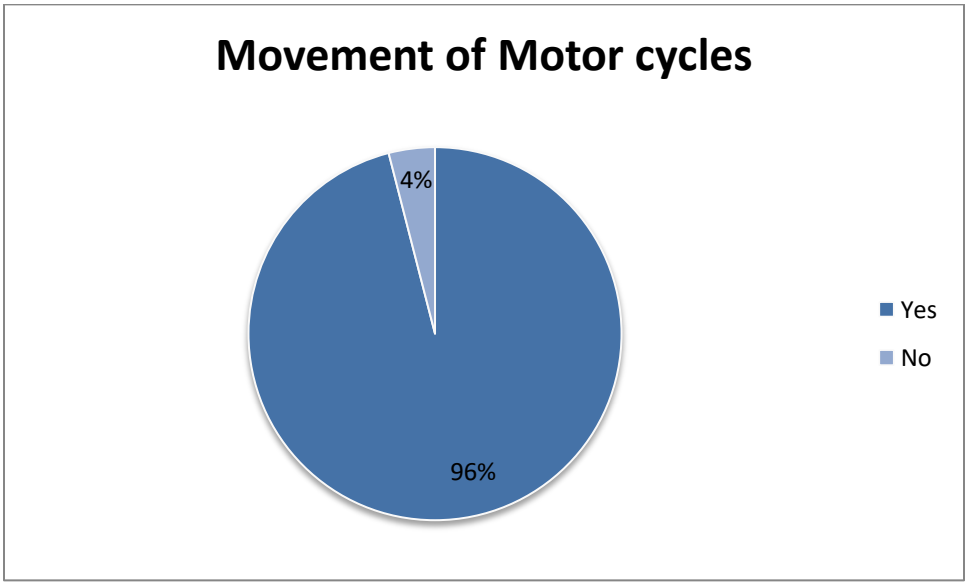

Figure 4-29. Movement of motor cycles on footpath

Overall attractiveness

Overall attractiveness of footpath in this area is about medium because of 60% rating is medium and 20.67% is poor and 6% is very poor. In some point of this are the attractiveness is too high for the rating 5% good and 1.33% very good.

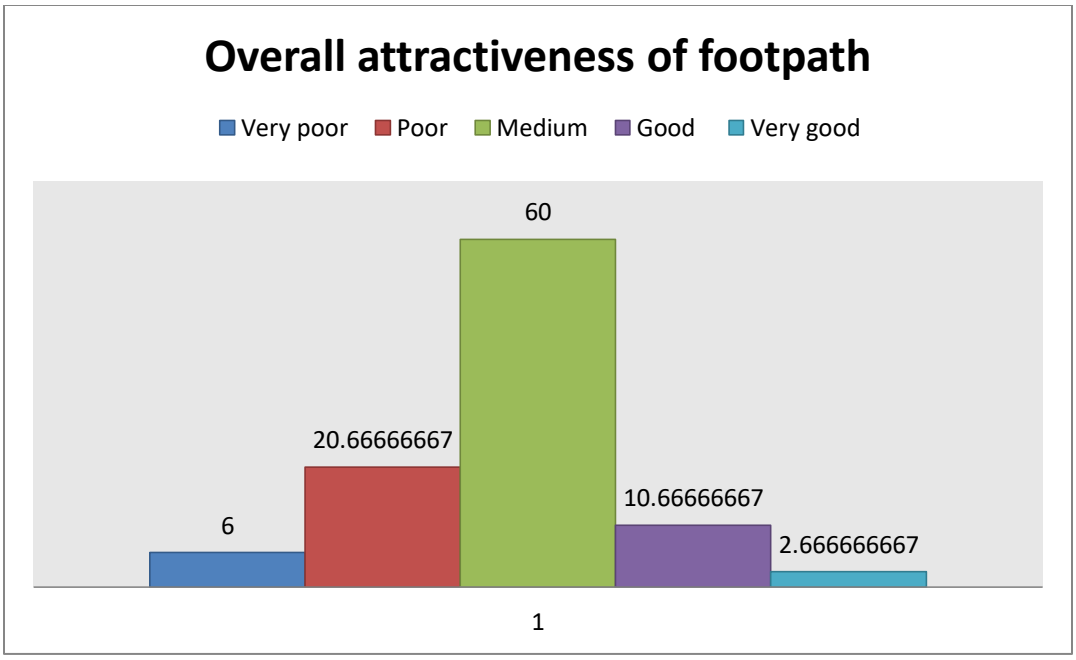

Figure 4-30. Overall attractiveness of footpath

Overall footpath facilities

From collected data it shows that the overall footpath facilities is 46% medium, 26% poor and 6% is very poor. It indicates the overall facilities of footpath in this area are close to good or medium. It also shows 18% pedestrian rated good and 4% pedestrian are satisfied with footpath facilities with the rating of very good.

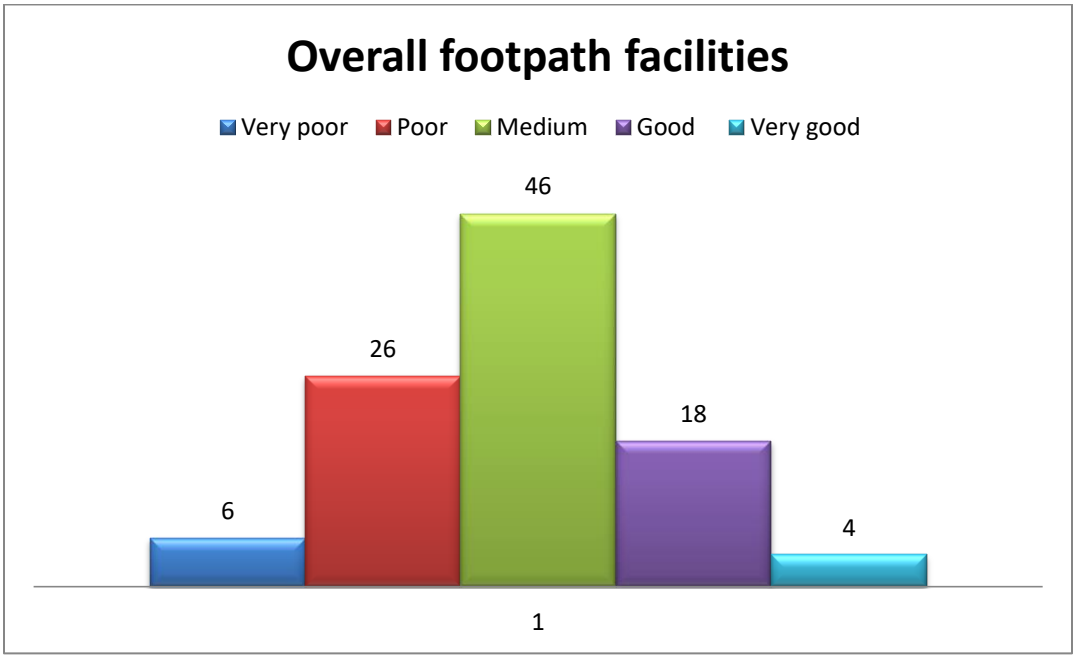

Figure 4-31. Overall footpath facilities

4.3 Summary

Dhaka is the capital of Bangladesh. Dhaka city is the densest city of Bangladesh. In this chapter we collect different type of data such background information of responders and also collect various quality data of footpath. From all category of data collection we have seen that maximum age value 26-40 years is 36% with 70% male and 30% female. Maximum are secondary educated 50%; income level of most of the people 10,000 to 25,000 tk. and 34% are below 10,000 tk. They uses footpath about 2 hours in a day. Width of the footpath is medium 53.33% commented. Overall footpath facilities 46%, attractiveness 60% is also medium. Women safety is unsafe at night and 72% safe at day.

CHAPTER 5

CONCLUSIONS AND FUTURE WORKS

5.1 Conclusions

Dhaka is the capital of Bangladesh, Where lives various categories of people. Dhaka city is one of the most populated town of Bangladesh which has a population more than 8.5 million and density more than 24,000 per km² with the area of 306 square km. As part of the Study a comprehensive assessment has been carried out to identify individual problems and problem areas.

In this study we are select an area of Dhaka city which is Nilthek to Bijoy sarani which divided into six points. We select this study to reveal the actual condition of the footpaths in this area, develop a concession point to ameliorate the existing condition and offer a framework which will be applicable in any city of the developing countries throughout the world.

Selected six points are Farmgate, Khamarbari Goal Chottor, Bijoy Sarani, Green Road-Panthapath, Dhanmondi lake-32, Newmarkwt. We collect data from each point by an approach starts to collecting data from the center of the point with around 100m radius. We collect data from pedestrian from this area of different age, gender, occupation, education and others. By different types of survey we collect data with different approach. Sometimes walking through the footpath, sometimes make observation by motorcycle. In the part of questionnaire survey we collect data by asking footpath related questions. In some part we takes a rating data by them with evaluating five categories of rating i.e.1-Very Poor ,2-Poor, 3-Medium 4-Good 5- Very Good. By this rating we calculate eighteen categories of footpath quality.

From all category of data collection we have seen that maximum age value 26-40 years is 36% with 70% male and 30% female. Maximum are secondary educated 50%; income level of most of the people 10,000 to 25,000 tk. and 34% are below 10,000 tk. They uses footpath about 2 hours in a day. Width of the footpath is medium 44% commented. Surface condition of footpath is relatively medium or poor 33% and 27% respectively. In several points illegal infrastructure is seen and its condition is 38% good and 35% medium. Height of side walk, accessibility of footpath, drainage facilities are medium rating. Cleanliness level is poor 41% and it indicates this study area is not enough clean. Security from robbery and women safety at night is unsafe and less but safe at daylight though some violent work occurs. Overall footpath facilities 46%, attractiveness 60% is

also medium. The quality comment of pedestrian was collected as low, medium, high quality where low 30%, medium 62% and high 8%.

Overall conclude as follows…

From the analysis pedestrian safety and security is not up to the mark.

The average rating of footpath facilities is medium condition.

Attractiveness of footpath in this area is also medium condition.

5.2 Limitations and Recommendations for Future Works

In this study there are some limitations. We collect data from each point by an approach starts to collecting data from the center of the point with around 100m radius. If we could collect data from the whole area then the result will be more appropriate. If it will be performed whole country, then it will be knownabout footpath of Bangladesh. If it will be performed in developing country like Bangladesh, then it is easy to compare with other developing country to Bangladesh. It will more accurate if we include more factors with our eighteen factors and five rating .The time we consumed on collecting data of our study is not sufficient this type of study. We can also use some electronics devices for collecting data or survey.

The width of footpath at Farmgate, Panthapath, and Newmarket point are narrow. It needs to improve as wide more in future. There is no height of footpath at Bijoy Sarani, Farmgate, Newmarket. So, provide a footpath height along these roads. It also needs to improve height of footpath at these points. There are many barriers on footpath in every point. So early needs to provide a free passageway for pedestrian. Cleanliness level is poor condition at all points so take necessary steps to clean footpath through of this city corporation. Surface condition is also in medium condition at all points so take as steps to improve it. There so many vending activities, bicycle and motorcycle in all points are seen so need to improve this situation by taken steps city corporation authority. Safety and security condition in this study area is not so strong so it needs to be developing by law laying agencies.

5.3 Scope for future study

Analysis of footpath is an important part of urban area. Proper investigation may provide access to achieve, learn and bring change in overall footpath qualities. This study will helpful for some future work, which are given below:

a) By using this result we could make a plan to improve the footpath quality.
b) By using this data the footpath condition of the whole city can be measured.
c) It can be helpful for increasing the women safety and security of this area.
d) This study will helpful for broadly analysis about overall footpath facilities and quality of the whole city.

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APENDIX

DEMOGRAPHICS DATA COLLECTION FORM

(FOOTHPATH)

Date:..... Location Name:.....

- Name of Passersby:

- Age: ☐

- Gender: Male ☐ Female ☐

- Occupation:

Student	Day laborer	Garments Worker	Service holder	Business man	Others

- Income Level (Tk. per month):

‹10,000	10,001-25,000	25,001-50,000	50,001-1,00,000	1,00,000+

- Education:

Illiterate	Primary Educated	Secondary Educated	Higher Educated

- Purpose of Using footpath:

Home to School	Home to Work	Work to Other	Work to Home	Home to other

- Number of movement in a day: 1-2 times ☐ 3-4 times ☐ 5+ times ☐

- Average Time of Using Footpath:

1 hour	2 hour	3 hour	4 hour	5 hour +

- Quality Comment ☐

Low ☐ Medium ☐ High ☐

QUALITY SURVEY OF FOOTPATH

Date:..... Location Name:.....

FACILITIES OF FOOTPATH					
Serial no.	Variables	Significance of variables	Rating	Occupied rating	Qualitative rating
01	Width of footpath	Capacity of footpath to fulfill flow of pedestrian.	N, M,W		
02	Surface condition	Footpath surface is rough or smooth.	1-5		
03	Illegal infrastructures	Presence of illegal structure or building materials on footpath.	1-5		
04	Height of sidewalks	Comfort level of pedestrians to ascend to the sidewalk	1-5		
05	Woman Safety	Footpath is safe from any kind of accident or sexual harassment.	US, LS, S		
06	Accessibility	Obstruction-free entrance and	1-5		

		movement over footpath.			
07	Drainage facilities	The arrangements necessary to drain the surface water from sidewalk.	1-5		
08	Cleanliness level	The action of gathering of domestic waste or other garbage on or beside footpath.	1-5		
9	Lighting facilities	The presence of adequate streetlights with desired intensity.	1-5		
10	Security from robbery	The economical standard of the surrounding environment, necessary lighting facilities, and the presence of law-enforcing agencies	US, LS,S		
11	Movement of bicycles	The undesirable movement of bicycles over sidewalks.	Yes No		
12	Movement of motorcycles	The undesirable movement of motorcycles over sidewalks.	Yes No		
13	Overall attractiveness		1-5		
14	Overall footpath facilities		1-5		

Sample calculation:

Collect all ratings in data sheet then calculate

Width of footpath

Total very poor quality = sum of same rating

= 20

Total poor quality = sum of same rating

= 100

Total medium quality = sum of same rating

= 130

Total good quality = sum of same rating

= 40

Total very good quality = sum of same rating

= 10

$$\text{Percentage of very poor rating} = \frac{\text{Sum of same rating} * 100}{\text{Sum of responders}}$$

$$= \frac{20 * 100}{300}$$

=6.67%

Same as all ratings are

Percentage of poor rating = 33.33

Percentage of medium rating = 43.33

Percentage of good rating = 13.33

Percentage of very good rating = 3.33

All calculations and charts made by excel program 2010.

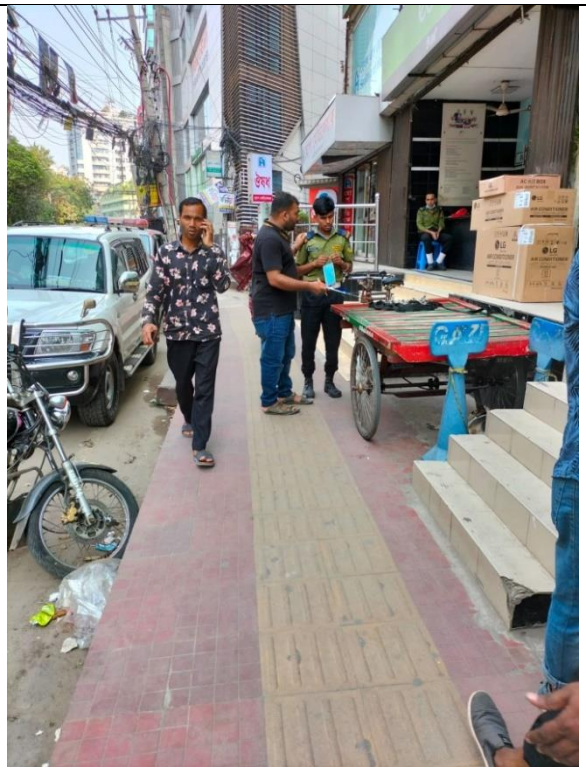
Some Photos

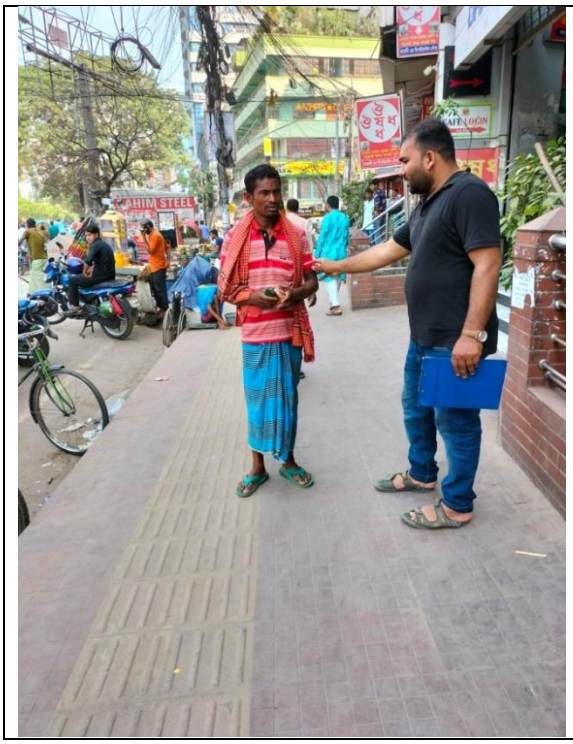

Shot on vivo Z1Pro
Vivo AI camera
2022.03.23 19:29


Shot on vivo Z1Pro
Vivo AI camera


Shot on vivo Z1Pro
Vivo AI camera
2022.03.23 19:59


Shot on vivo Z1Pro
Vivo AI camera
2022.03.23 19:37




RAHIM STEEL