Understanding demand and provision of eye care services among slum-dwellers in Dhaka, Bangladesh

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The team hopes that this report will prove helpful in the decision-making process at various levels.

EXECUTIVE SUMMARY

Background

The most recent WHO figures on the global magnitude and causes of visual impairments indicate that in 2010 there were 285 million visually impaired people, of which 39 million were blind. It is thought that 80% of all causes of visual impairment are either preventable or curable.

In low-income countries, limited awareness, availability, and affordability are often barriers to accessing eye care services. This can result in low uptake of eye care treatment, which is a challenge for many national programmes working to eliminate avoidable blindness in these countries. Specific barriers in each country or region need to be identified and alleviated in order to reach the overarching goal of the WHO global action plan 2014-2019 of providing universal access to comprehensive eye care services. In Bangladesh alone, it is estimated that 650,000 adults are blind predominantly due to cataracts and more than 4.6 million people experience visual impairment due to refractive error. Cataracts and refractive errors continue to be significant public health concerns, despite the fact that cost-effective interventions exist to treat these conditions.

Urban health is of growing interest given the rapid pace of urbanization globally. Bangladesh is no exception and projections show that the majority of the population will live in urban areas by 2039. Dhaka is already one of the most densely populated cities in the world and is set to become the world's third largest city by 2020. The Bangladesh National Survey of Blindness and Low Vision (2000) found that Dhaka had a relatively low prevalence of blindness compared to other administrative divisions of Bangladesh. Yet this figure is likely to conceal important variations in terms of the prevalence of visual impairment and access to eye care services in different population sub-groups. Various studies in Bangladesh show important intra-city health between slum and non-slum areas. This is of particular concern given that slum populations have three times overall city population growth rate.

Aim

The overall aim of this study is to better understand the demand and provision of eye care services in Dhaka with a specific focus on urban slum-dwelling communities.

Methods

We employed a mixed method approach, using both quantitative and qualitative methods including the following:

Mapping and assessment of eye care facilities

We used data collected by the International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) in 2013/14 as part of a project funded by the UK Department for International Development (DFID) to produce a geospatial and descriptive analysis of health care facilities in Dhaka City Corporation. GPS coordinates of 13,000 health facilities were recorded and detailed information was collected from a sample of 5,000 facilities. Data for all facilities delivering eye care services were extracted from the database for the purposes of this study.

Population-based survey and patient exit interviews

A cross-sectional survey of 1,600 randomly selected individuals aged 18 years and above was conducted in four selected slums in Dhaka using a multistage cluster sampling technique.

We also carried out patient exit interviews with 558 patients from five selected eye care facilities including a mix of public and NGO facilities. A systematic sampling technique was adopted and patients exiting selected facilities were chosen using a defined interval.

For both the survey and patient exit interviews, structured questionnaires were used to collect basic socio-demographic information; the respondents with past or present self-reported eye conditions were also questioned on their treatment-seeking behaviour and experience. A wealth index was derived for each respondent based on dwelling characteristics and ownership of durable assets using an equity measurement toolkit developed by the University of California, San Francisco (UCSF). Respondents' willingness to pay (WTP) for spectacles was also elicited as part of the interview using a contingent valuation approach. For respondents with no self-reported or diagnosed eye condition, uncorrected refractive error problems were simulated by asking survey respondents to wear ready-made spectacles with different corrective powers to blur their vision before proceeding with the WTP elicitation. A triple-bounded dichotomous choice elicitation format was adopted, using a sequence of yes or no questions to narrow down a respondent's WTP.

Actual spectacle transaction prices were also recorded for 356 patients exiting three selected NGO optical shops in NGO facilities targeting low-income patients in Dhaka.

Data capture was done using Android tablet devices with CSPro software and statistical analysis was carried out with STATA 12.1.

Individual and group qualitative interviews

The qualitative study guides were designed to explore in depth individual perspectives and experiences with regard to eye health and accessing eye care services. We used two different techniques to collect qualitative data: in-depth interviews (IDIs) and focus group discussions (FGDs).

The IDIs were conducted with 43 individuals purposely selected among the survey participants to ensure that males and females from different age groups were interviewed.

The FGDs were conducted with slum-dwellers who did not take part in the survey. Four separate groups were organized for men and women aged below and above 30 years. A total of 28 participants took part in FGDs with six to eight participants per group.

Qualitative interviews were audio recorded and field notes were taken during data collection. The data was then transcribed and translated by a team of transcribers. Deductive coding was done using *priori* codes based on the study objectives and interview guides. After completion of coding, a qualitative data matrix was developed and thematic analysis was performed.

Ethics approval

The study was approved by the Ethical Review Committee of James P Grant School of Public Health (JPGSPH), BRAC University, Bangladesh.

Key findings

Provision of eye care services

We recorded a total of 715 facilities providing eye care services in Dhaka City Corporation, including 23 specialized eye care facilities (3%), 412 general facilities or doctors providing eye care services (58%) and 280 stand-alone optical shops (39%). The vast majority of these facilities were operating as private for-profit (96%), with a small proportion of private non-for-profit (3%), and public facilities (1%). In terms of location, these facilities were not uniformly distributed across the city and tended to be concentrated around major crossroads or market places and in wards with the lowest proportion of slum areas. Although few facilities were directly located inside slum areas, a large share of slum-dwellers were living within a 1.5-mile radius of a ward with a high concentration of eye care facilities

(i.e. wards with > 20 facilities). Patient exit interviews in five selected eye care facilities in Dhaka show that the average travel time required to reach these facilities was three hours and 18 minutes; Dhaka residents reported spending considerably shorter time (57 minutes) and lower transport costs (BDT 104 or USD 1.35) compared to those from outside Dhaka (seven hours and 50 minutes; and BDT 963 or USD 12.5).

Socio-economic status of survey respondents

The mean age of slum-dwellers participating in the survey was 35 years (SD ± 13yrs) and 59% were female. The educational level was low with 40.5% of respondents reporting no formal education and 30.6% achieving primary education only. Participants' mean monthly income was BDT 5,244 (USD 67) for individuals and BDT 14,626 (USD 188) for households. Survey respondents were generally wealthier when compared to the general population in Bangladesh using the equity measurement tool developed by UCSF. According to the wealth index, based on dwelling characteristics and ownership of durable assets, the majority of survey respondents (61%) belonged to the wealthiest quintile of the population, with only 0.31% of survey respondents in the poorest wealth quintile.

Health-seeking behaviour

Almost half (49%) of survey respondents self-reported an eye problem at the time of the survey. The most common complaints were poor vision (61.5%); allergy or infection (43.7%) and watery eyes (27.6%). The majority (75.9%) reported doing nothing when first experiencing the problem. Those who eventually sought care did so from specialist practitioners in government, private or NGO hospitals (78.1%). Around 38% sought no care at all; the main reasons being financial constraints (45%), not taking the problem seriously (31%) and lack of time (16%). Women and those with formal education were more likely to seek care ($p<0.05$). Over 80% of those who received treatment completed it in full. The most frequent reason for non-compliance with treatment was financial constraint (50%). Only 15% of participants reported having eye care for free; 79% paid using their monthly income and 7% had to sell assets. Participants from the qualitative study pointed out that people's decisions on seeking care depended on whether the condition affected their functioning; whether they had enough knowledge about the potential consequences of eye diseases, and their past experiences of health care services. Those who expressed dissatisfaction with care complained about attitudes of health care providers and long waiting times.

Willingness to pay

We found that the mean WTP for a pair of spectacles was BDT 597 (USD 7.58), representing 11.3% and 4% of average individual and household monthly income respectively. This is approximately 1.5 times the daily wage for a low- or semi-skilled worker in Dhaka. Based on their stated preferences, 93% of respondents were willing to pay at least BDT 100 (USD 1.27) while 21.4% were willing to pay BDT 1100 (USD 13.97) or more. The main factors determining WTP for spectacles were age, gender, family income and education. Women were willing to spend BDT 134 (USD 1.70) less on average compared to men (p=0.00); individuals with primary education or higher were willing to pay BDT 155 (USD 1.97) more than those with no education (p=0.00). Respondents' WTP also increased by an average of BDT 134 (USD 1.70) per monthly income tranche of BDT 10.000 (USD 127), but decreased with age by BDT 36 (USD 0.05) for each additional year.

Conclusion

We investigated the provision and demand for eye care services in Dhaka by: i) mapping and assessing eye care facilities in Dhaka City Corporation; ii) exploring health-seeking behaviours and determinants and barriers to the uptake of eye care services among slum-dwellers, and iii) assessing their WTP for eye care services and the potential for cost recovery, taking refractive error correction with spectacles as a case study.

The study shows that eye care morbidities in Dhaka's slum population are high, and many slum-dwellers would benefit from accessible eye care services. The demand for services however is low and constrained by both individual and community factors, including: knowledge and education; direct and indirect costs of services and perception of treatment in the light of other competing needs. On the supply side, availability of eye care services seems to be less of an issue in Dhaka compared to other urban and rural areas in Bangladesh, but the distribution and lack of outreach services can potentially have an impact on access to eye care services for the poorest or most vulnerable members of the population by increasing the distance and cost to access services. It is also important to recognize the predominance of private providers in the delivery of urban eye care services given that almost all 715 eye care facilities identified in this study were private for-profit enterprises (96%).

Our study on WTP shows a potential for cost recovery and/or using a market-based approach in providing spectacles to slum-dwellers. Despite living in slum areas, study participants were willing and able to pay for a pair of spectacles. It is important, however, to take individual and household characteristics into account as these have an influence on WTP values and hence demand for services

at a given price. The capacity to pay for eye care services also varied greatly among slum-dwellers, and better mechanisms are needed to identify the poorest among them and facilitate their access to services.

The findings provide evidence base for future policy and programmes focusing on urban eye care in Bangladesh and identify questions for future research.

GLOSSARY OF TERMS

BNSB	Bangladesh National Society for Blinds
BRAC	Bangladesh Rural Advancement Committee
CHW	Community health worker
CVM	Contingent Valuation Method
CEHS	Centre for Equity and Health Systems
DCC	Dhaka City Corporation
DFID	Department for International Development (UK)
FGD	Focus group discussion
GIS	Geographical Information System
HNPP	Health Nutrition and Population Program
Icddr,b	International Centre for Diarrhoeal Disease Research, Bangladesh
IDI	In-depth interview
JPGSPH	James P Grant School of Public Health
NGO	Non-governmental organization
NIO	National Institute of Ophthalmology
RE	Refractive error
SS	Shasthya Shebika (term used to design community health volunteers in BRAC Health Programmes in Bangladesh.
UCSF	University of California San Francisco
VARD	Voluntary Association for Rural Development
WHO	World Health Organization
WTP	Willingness to pay

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1.0 INTRODUCTION

1.1 Background

According to the World Health Organization, there are an estimated 285 million visually impaired people in the world, including 39 million individuals who are blind and 246 million with low vision. About 90% of the world's visually impaired people live in low- and middle-income countries (Morone et al., 2012), and 80% of all visual impairment can be prevented or cured (WHO, 2014). Visual impairment and blindness constitute a major health concern in Bangladesh with an estimated 650,000 blind adults aged 30 years and above. Findings from the Bangladesh National Blindness and Low Vision Survey in 2000 showed that cataracts were the predominant cause of bilateral blindness, with cataracts and refractive errors being the main causes of low vision. Based on the prevalence of refractive error in Bangladesh, it is estimated that there are around 4.6 million adults and children with visual impairment due to refractive error and an even higher number of people would be expected to benefit from refractive error and low vision services (Dineen et al., 2003; MHFW and BNCB, 2000).

Both cataracts and refractive errors can be easily remedied using cost-effective interventions (Baltussen et al., 2004; Baltussen et al., 2009; Frick et al., 2009; Agarwal and Kumar, 2011; Baltussen and Smith, 2012). Studies on access to eye care services in developing countries show that lack of awareness, availability, accessibility and affordability of services constitute major barriers (Dandona et al., 2000; Kovai et al., 2007; Palagyi et al., 2008; Ntsoane and Oduntan, 2010; Mehari et al., 2013). This can result in low uptake of eye care services which represents a challenge for the elimination of avoidable blindness in Asia and Africa. Evidence exist that even when services are available, they are underused by potential beneficiaries. It is therefore important to identify the reasons for the low uptake of services and to implement appropriate strategies to address these issues (Fletcher et al., 1999). These observations seem also to apply to Bangladesh, where only 37.5% of respondents attended a public health facility for treatment of eye/skin/ear, nose and throat (ETN) diseases, while 25% of respondents sought treatment from traditional healers or did not seek treatment at all (Rahman, et al., 2011). Delay in seeking eye care services is an important cause of avoidable blindness, especially in cases where early detection and treatment would have prevented the patient from becoming blind (Ekpenyong and Ikpeme, 2009).

Urban health is attracting more and more attention now that the majority of human beings live in urban areas and this trend is set to continue with six in 10 people living in towns and cities by 2030 (WHO, 2010). Bangladesh is no exception and is undergoing a rapid urbanization process. While the rural population is expected to peak at 105 million people by 2016 and then decline, the urban population will increase by 15%, from its current level of 53 million people to 79.5 million in 2028. It is estimated that the majority of people in Bangladesh will live in urban areas by 2039 (UNDP, 2014). Dhaka is already one of the most densely populated cities in the world and projections show that it will be the world's third most crowded city by 2020 (Ahmed B., 2011). It is also estimated that the total population of Dhaka's slums more than doubled between 1996 and 2005, from 1.5 to 3.4 million people. The limited knowledge about slum settlement size, distribution and dynamics presents an enormous challenge for urban health (Gruebner, et al., 2014). The Bangladesh Urban Health Survey (2013) shows that about one third of the urban population lives in slums and these are growing twice as fast as the overall city population. Cities are also characterized by significant inequalities in health-related conditions. Despite the fact that intra-urban differentials narrowed for most health indicators between 2006 and 2013 as a result of concerted public, private and NGO efforts, disparities persist between slum and non-slum areas. For example, infant and under-five mortality rates continue to be twice as high in slums and child malnutrition persists. With regard to maternal health, only half of the women living in slums receive antenatal care from trained providers during pregnancies, The proportion of women delivering at health facilities is also significantly lower for women living in slums compared to women living in non-slums areas (NIPORT, 2013).

Although the Bangladesh National Survey of Blindness and Low Vision (2000) found that Dhaka had a relatively low prevalence for blindness (1.13%) compared to other administrative divisions in Bangladesh, urban health studies suggest that this figure may conceal important intra-urban differences between slum and non-slum dwelling populations. We propose to investigate the provision and demand for eye care services in Dhaka city by: i) mapping and assessing eye care facilities in Dhaka City Corporation; ii) exploring health-seeking behaviours, determinants and barriers to the uptake of eye care services among slum-dwellers; and iii) assessing their willingness to pay for eye care services and the potential for cost recovery, taking refractive error correction and spectacles as a case study.

1.2 Objectives

The overall aim of this research is to better understand the demand for and provision of eye care services in urban slum-dwelling communities in Dhaka by answering the following questions:

1. What types of facility are offering eye care services in the targeted areas? What are their characteristics?

2. What is the willingness-to-pay for refractive error services (spectacles)? What are the implications in terms of pricing and sustainability for eye care providers targeting slum-dwellers?

3. What is the community attitude and practice around eye care? What are the main reasons for consulting, where do patients go and why? What is the perceived advantage of each type of facility?

4. What are the main barriers to accessing eye care services in poor urban communities? Do eye care facilities targeting slum-dwelling communities deliver effective services to the poor?

2.0 METHODOLOGY

Based on the study's objectives, several different research approaches were adopted to answer the research questions as summarized in the table below:

Table 1: Methods and tools for research objectives

Objectives	Method	Tool
Mapping of eye care providers	GIS mapping and facility assessment	We analysed data collected by icddr,b in 2013/14. They recorded GIS coordinates of 13,000 health facilities in Dhaka City Corporation and collected detailed information for 5,000 of these facilities.
Socio-economic status of respondents	1. Household survey 2. Patient exit interviews	Socio-demographic questionnaire. Wealth status is estimated based on household's dwelling characteristics and ownership of durable assets. We used the same methodology as the equity measurement tool developed by UCSF. Also, data on total family income and individual income were collected.
Key factors influencing the decision-making process/health-seeking	1. Household survey	Structured questionnaire to determine prevalence of self-reported eye illnesses,

behaviour; knowledge of eye illness and eye care facilities; choice of eye treatment and health care provider; barriers and facilitators to eye care seeking	2. Qualitative interviews: Focus Group Discussion (FGD) and In-depth interview (IDI)	treatment-seeking behaviour for an eye problem. Quantitative data were supplemented by qualitative data collected through FGDs and IDIs.
Willingness-to-pay elicitation	1. Household survey 2. Patient exit interviews (from eye care facilities) 3. Patient exit interviews (from optic shop)	Contingent valuation method; choosing a triple-bounded elicitation format which consists in asking a sequence of discrete choice questions (i.e. with yes or no answers) that progressively narrows down the respondent's willingness to pay. This information was collected from both community and facility and then compared with spectacles sales data collected from optical shops.
Costs from patient perspective	Patient exit interviews	Structured questionnaire to determine out-of-pocket (direct) medical expenditures and indirect costs (i.e. transport).

Details about the methodology used for each component are provided here below.

2.1 GIS mapping and facility assessment

Data used for the eye care facility mapping and assessment was provided by the 'Mapping Urban Health Service Landscape' project, conducted by the Centre for Equity and Health System (CEHS) at icddr,b. The project's aim was to create dynamic and interactive Geographical Information System (GIS) maps for use by stakeholders involved in health service provision, planning and monitoring, as well as to discover the gaps and weaknesses in meeting the health needs of the population in Dhaka city, particularly the disadvantaged and vulnerable. The data was shared by mutual agreement between James P Grant School of Public Health and CEHS, icddr,b. Collection of GIS data and facility information is a resource-intensive and time-consuming task. In order to avoid replicating the exercise, we approached the icddr,b CEHS team, who agreed to share the urban mapping project database so that an analysis of eye care facilities could be undertaken. The methodology used by icddr,b for the mapping project is summarized below.

Dhaka City Corporation (DCC) is divided into two administrative units: Dhaka City Corporation North (DCCN) and Dhaka City Corporation South (DCCS). Firstly, the team completed the listing and mapping of City Corporation North followed by City Corporation South. The listing and mapping exercise commenced in Dhaka on 19 June 2013. During the initial phase, the team made a comprehensive listing of existing health care facilities. They collected existing maps (roads network, administrative boundaries, wards, etc.) and facilities' GPS coordinates from Dhaka City

Corporation offices. Afterwards, a list of NGO health facilities (both static and satellites) was compiled by contacting the NGO Affairs Bureau and the respective NGOs.

In a second phase, teams were deployed to visit a total of 18 wards to verify and update the information collected during the initial phase using transect walks, which consist of systematic walks along a defined path (transect) to explore a specific community or project area with local people. Each survey team consisted of two members with one tablet device. Using a customized application, the teams were responsible for collecting three data types: (1) Updating the roads network based on GPS tracking and field observations. New roads were added to the network and demolished roads were removed; (2) Ward boundaries were updated based on DCCN and DCCS base maps and field observations using Arc Map 10.1 software; (3) GPS coordinates and characteristics were recorded for each health facility, including type of facility, type of ownership (public/private-for-profit/private non-profit), services offered (including service hours and prices), human resources (including qualifications and training), etc. Data were collected using different approaches to ascertain the accuracy and completeness of the inventory, including signboard observation and conversations with proprietors and community members. Weekly meetings and fortnightly question and answer sessions were arranged for the entire team to maintain uninterrupted health facility listings. Each team had to submit daily work updates to the data management team, of which one member was specifically responsible for data collation and processing.

2.2 Measuring socio-economic status of the participants

Detailed socio-demographic and economic information about the target population was collected to better understand their socio-economic status. The data were collected in two ways. A household survey collected data on the socio-economic status of the low-income urban community. The same information was collected for patients receiving services from eye care facilities/optic shops through exit interviews. A detailed methodology of the household survey and exit interviews is presented within the methodology sections for the health-seeking behaviour and willingness-to-pay studies respectively.

In the household survey and facility exit interviews, a structured questionnaire was used to collect socio-demographic information, including age, gender, religion, marital status, education and

occupation of every family member as well as the chosen respondent. Economic information was collected in two ways: a) wealth status of the participants was estimated based on a household's dwelling characteristics and ownership of durable assets; b) individual income of the family members was taken (including the respondent's income) and total family income was calculated by summing up the income of all family members.

To estimate the wealth status of respondents, we used the equity measurement toolkit developed by University of California San Francisco (UCSF). This toolkit includes 33 questions on household dwelling characteristics as well as ownership of durable assets. Based on the responses to these questions, the study population can be divided into five wealth quintiles (each containing 20% of the population), where the first quintile represents the poorest group and the fifth quintile represents the wealthiest group. The advantage of using the equity measurement toolkit is that respondents in our sample can be compared to the rest of the population in Bangladesh in terms of wealth, since the questions and method used to calculate a wealth index are the same as the Demographic and Health Survey carried out in Bangladesh (DHS, 2011).

2.3 Health-seeking behaviour for eye illnesses

An explanatory mixed method approach was adopted to gather detailed knowledge regarding health-seeking behaviour for eye illnesses among poor urban communities in Dhaka city. The quantitative data was collected through a household survey and qualitative data was collected through focus group discussions (FGDs) and in-depth interviews (IDIs). The methodologies of the household survey and qualitative study are described below.

2.3.1 Household survey

The household survey was carried out in four slum areas within Dhaka City Corporation, including: i) Shabujbag, ii) Sattola, iii) Mirpur and iv) Mohammadpur. These slums were selected based on their proximity to a vision centre in order to study individual and community barriers and enablers to accessing eye care services, as well as to learn about the general eye care practices of the community. Another important factor in selecting these slums was their inclusion within BRAC's Health, Nutrition and Population Program (HNPP), where the programme's community health workers (CHWs) were instrumental in identifying and recruiting households and participants for this study.

A multi-stage sampling based on probability proportionate to size was adopted for the household survey. First, the list of BRAC HNPP CHWs working in these four locations was obtained. Based on the size and population of the slums, a number of CHWs from each area were randomly selected from the list. Thirteen CHWs were selected from Shabujbag (the largest slum), seven from Sattola (the smallest slum), 10 from Mirpur and 10 from Mohammadpur. Each CHW is responsible for 200 households. Then, from the household register of each selected Shasthya Shebika (women community volunteers in BRAC Bangladesh Health Programmes, SS), 40 households were randomly chosen, from which one member was randomly picked for interview. All site residents aged 18 years and above were eligible for inclusion in the survey. As no data on the prevalence of self-reported community eye illness were available, the estimated sample size was 400 for each slum (i.e. 1,600 in total, assuming a 50% prevalence of illness with a precision of 95% and compliance of 95%).

A structured questionnaire, divided into two sections, was used to collect the survey data. Questions in the first section were designed to collect socio-demographic and economic information about the respondents. The second part of the questionnaire asked respondents about their current or past eye conditions (in the month preceding the survey). These included questions on symptoms and duration, type of treatment sought and health care provider chosen, delays in seeking treatment, type of treatment given, source of payment for treatment, reason for non-compliance with treatment or for not seeking treatment, etc. Questions about exposure to eye health messaging and sources of information were also incorporated.

2.3.2 Qualitative study

After completion of the household survey, a qualitative study was conducted to explore in greater depth individual experiences and community perceptions regarding eye illnesses, as well as barriers and enablers in accessing eye care services. The qualitative study used two different techniques: i) in-depth interviews (IDIs), and ii) focus group discussions (FGDs)

A total of 43 survey participants were chosen for the in-depth interviews based on their age and gender. These criteria assumed that perception and experience regarding eye problems, as well as health-seeking behaviour, may vary between age groups and between men and women. Initially, it was planned to have an equal number of male and female participants from two age groups: (i) 30 years or younger, and (ii) older than 30 years. However, an even spread of male and female survey participants was not possible during the data collection period due to availability issues. Of those

participants above 30 years of age, 14 were male and 12 were female. Of those aged 30 years or less, seven were male and 10 were female.

Community members who did not take part in the survey participated in FGDs. Four FGDs were conducted in order to learn about community perception regarding eye illnesses within different age and gender categories, as well as the perceived barriers and enablers in accessing eye care services. The total number of participants in the FGDs was 28 (6 to 8 in each group). Participants were chosen for the FGDs based on their age and gender. For both men and women, one FGD was conducted among those aged 30 years or younger, and one among those aged above 30 years.

Qualitative interviews were conducted using specific interview guides for IDIs and FGDs covering different themes, such as perception of eye health and eye care, previous experience of eye care facilities, perceived and experienced barriers and enablers in accessing eye care services, perception of good eye care service.

2.4 Willingness to pay for eye glasses

2.4.1 Willingness-to-pay (WTP) elicitation method and format

To assess WTP for eye glasses and its determinants among slum-dwellers in Dhaka, we used a hypothetical or contingent valuation method (CVM), where individuals were asked to first consider a hypothetical scenario (i.e. a health condition/programme or intervention) before enquiring about their WTP using various elicitation techniques. CVM is often used in health economic evaluation to assess WTP, which is used as a measure of an individuals' perceived value of a health programme or intervention, which is then aggregated across all individuals. If individuals state a high (or low) WTP amount, then it is inferred that the demand for that specific health programme or intervention is high (or low).

In CVM, respondents are typically asked to consider goods or services that are not routinely available in the market. The first stage in WTP elicitation is the scenario description, which contains all the information relevant to the product or service being valued. In our case, respondents had typically little or no familiarity with using spectacles before the study. We decided to simulate blurred vision by asking respondents with normal vision to wear ready-made glasses with '+1D' or '+2D' corrective power for a few minutes before proceeding with the WTP elicitation.

Through this simulation exercise, respondents were able to experience visual impairment and stipulate their preferences in a more informed way.

Direct face-to-face interviews were conducted in order to assess WTP, which is generally considered as the 'gold standard' in CVM. The elicitation format refers to the style of questioning used to elicit WTP. We opted for triple-bounded dichotomous choice design, where a sequence of three 'yes/no' questions were used to narrow down respondents' WTP. The amounts offered are increased in case the respondent accepts a bid or it is reduced if the bid is rejected following a pre-determined algorithm (see figure 1):

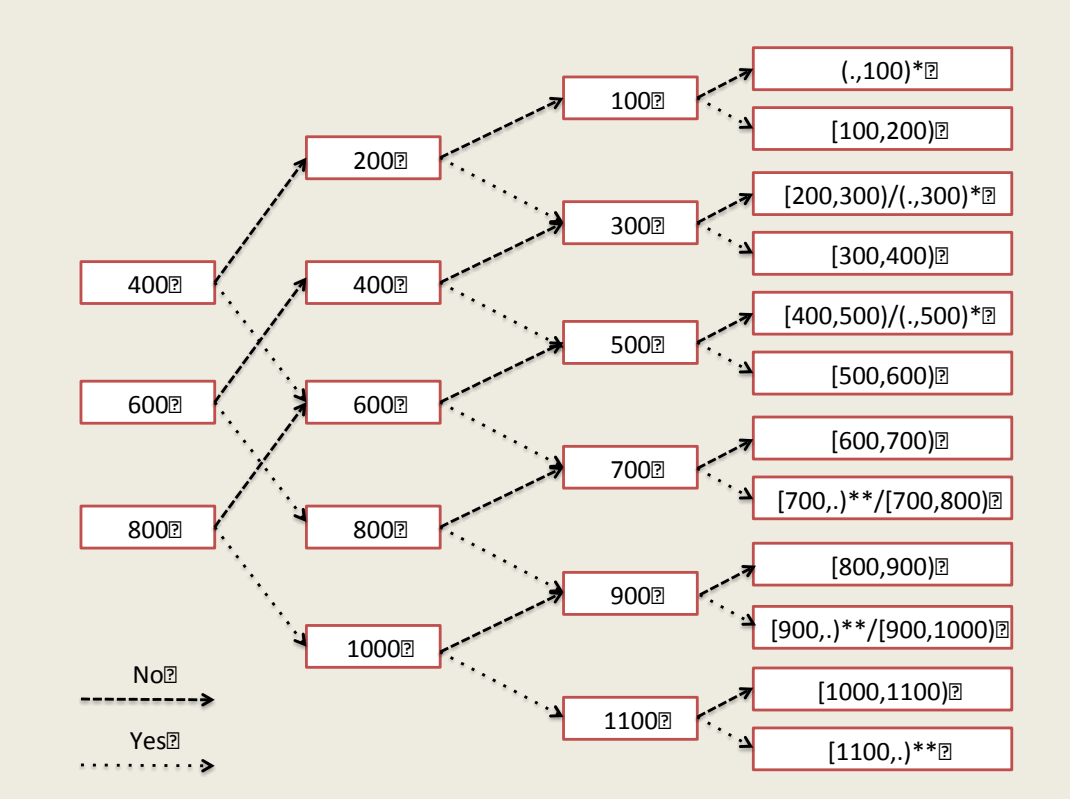


Figure 2: Schematic description of the choice experiments

In order to minimize any bias and ensure accurate/truthful answers, the respondents were reminded to take into account their capacity to pay by considering their own income and expenditure before responding to any bid. During the elicitation process, we also paid special attention to control for anchoring effects, where the final maximum WTP value can be influenced by the starting point used in the bidding algorithm. We controlled for this by varying the starting bid across respondents to establish if those who started at high bids gave significantly higher WTP

values compared to those who started at lower bids. We printed three different sets of questionnaires, where starting bids for the WTP elicitation varied (i.e. starting bids at BDT 400, 600 and 800).

2.4.2 Sampling method

We use a combined sample in this study by including both patients and the general population when investigating WTP. Participants were recruited from two different settings as described below:

General slum population: We included the WTP module in the population-based survey that we carried out among 1,600 randomly selected households from four slums in Dhaka. The survey included collecting some basic socio-demographic and economic information and a module that included a series of questions to elicit the WTP for eye glasses. One respondent aged 18 years or more was selected in each household to administer the survey and WTP elicitation module. By surveying the general population in slums, we take an ex-ante perspective for eliciting WTP where there is uncertainty about suffering from refractive error and requiring treatment (i.e. eye glasses).

Patient exit interviews at eye care facilities: We also surveyed 558 individuals at five different eye care facilities in Dhaka (see Table 2). These individuals were selected randomly among patients who were exiting doctors' chambers with a prescription for eye glasses. We used the same WTP elicitation technique as in the household survey. In this case, respondents were in an intermediate state, where the diagnosis had been confirmed but the treatment had not started and uncertainty remained about the efficacy of treatment. We were interested to see if there were any differences in WTP between the general slum population, where vision problems were hypothetical (ex ante state), and individuals who have been diagnosed with refractive error (intermediate state). For interviews with exiting patients at the eye care facilities, no simulation of refractive error was required as the interviewees had already been diagnosed with refractive error and received full refraction using trial lenses or an autorefractor.

Table 2: Description of selected eye care facilities

Location of facilities	Name of facilities	Type of facility	Services offered
Nayabazar, Dhaka	Mohanagar General Hospital, Dhaka City Corporation	Public, general hospital with vision centre located within hospital premises	Refraction
Keraniganj, Dhaka	Bashundhara Ad-Din Medical College Hospital, Ad-din Foundation, NGO	Private (NGO), general hospital with vision centre located within hospital premises	Cataract, refraction
Mohammadpur, Dhaka.	VARD Eye Hospital, Voluntary Association for Rural Development (VARD), NGO	Private (NGO), specialized eye hospital	Cataract, refraction
Sher-E-Bangla Nagar, Dhaka	National Institute of Ophthalmology (NIO)	Public, teaching/tertiary eye hospital	Cataract, refraction
Mirpur, Dhaka	BNSB Eye Hospital, Bangladesh National Society for the Blind (BNSB), NGO	Private (NGO), specialized eye hospital	Cataract, refraction

2.4.3 Validation of WTP values:

CVM is a 'stated preference' technique, where potential consumers are asked to state their preference, as opposed to 'revealed preference' techniques, where value is estimated based on respondents' actual behaviour rather than what they say. In order to validate the WTP elicitation study, we compared WTP values with actual market transactions by interviewing 356 randomly selected customers in three different optic shops. These optical shops were deliberately selected because they sold a good range of spectacles and were specifically targeting the poorest segment of the population in Dhaka (see Table 3).

A systematic random sampling technique was adopted where one in every four patients exiting selected facilities was interviewed. Some deviations were allowed depending on the actual patient flow at the facility and the time required to conduct the interview.

Table 3: Description of selected optic shops

Location of optic shop	Place situated	Name of facility	Type of facility
Keraniganj, Dhaka	Inside the outpatient department (OPD) of the hospital	Bashundhara Ad-Din Medical College Hospital, Ad-din Foundation, NGO	Private (NGO), general hospital with vision centre located within hospital premises

Location of optic shop	Place situated	Name of facility	Type of facility
Moghbazar, Dhaka	Inside the outpatient department (OPD) of the hospital	Ad-Din Women's Medical College Hospital, Ad-din Foundation, NGO	Private (NGO), general hospital with vision centre located within hospital premises
Mirpur, Dhaka	Inside the outpatient department (OPD) of the hospital	BNSB Eye Hospital, Bangladesh National Society for the Blind (BNSB), NGO	Private (NGO), specialized eye hospital

2.5 Data collection and analysis

2.5.1 Quantitative component

Data collection for the household survey, facility and optic shop exit interviews were conducted in person. Household data was entered through CSPro version 6.0.1 software. Facility and optic shop exit interview data was collected using tablet devices through CSPro Android version 4.1.2. Quantitative data was analysed using STATA version 12.1. Data was first transported from CSPro to STATA and then analysed. Quantitative data was first analysed by descriptive analysis and was presented as mean, standard deviation, frequency and percentage analysis. Chi-square statistical analysis was used to test for significant associations between independent variables (age, gender, socioeconomic status, marital status, etc.) and dependent variables (type of self-reported eye problem, health-seeking behaviour, willingness to pay, etc.). Multivariate analysis was done as well.

2.5.2 Qualitative component

Qualitative data were collected using the guidelines developed from the study objectives. The qualitative interviews were audio recorded and thorough field notes were taken during data collection. Then the data was transcribed and translated by a team of transcribers. Deductive coding was done using *priori* codes based on study objectives and guidelines. On completion of the coding, a qualitative data matrix was developed and thematic analysis done.

2.6 Challenges experienced

There were various challenges while conducting the study. Firstly, there have been some difficulties in accessing the survey participants. The households in the slum areas were difficult to identify and the participants with jobs were often very hard to reach. Also, finding survey

participants for qualitative interviews was a difficult task due to the high geographic mobility of the slum population in urban settings. Interviewing the randomly selected household participant was also challenging, partly as a result of their availability and/or gaining their consent to be interviewed. Accordingly, enumerators visited households multiple times in order to conduct interviews at the times that best suited the respondent.

Interestingly, the simulation of eye sight impediments with spectacles for the WTP elicitation module was occasionally misinterpreted by the respondents as a "door-to-door eye glass selling business initiative". To overcome this, enumerators had to spend additional time explaining to respondents the purpose of the study.

Conducting interviews of patients exiting from facilities and optic shop customers was difficult and enumerators and field coordinators had to overcome some challenges. As both the patient and the customers were exiting from the facilities or shops, convincing them to set aside an additional 25 to 30 minutes was difficult. Political unrest and strikes in Bangladesh during the data collection period also hindered the implementation of the study.

Some facilities were closed during the GIS data collection period, making it difficult to collect information from them. Consequently, data collectors had to visit these facilities multiple times. Access to the facilities was also not easy, as permission had to be granted formally. Another difficulty surfaced during the collecting of geographical coordinates due to the proximity of high-rise buildings, as these affected the GPS values. To overcome this, the GIS team used 'Google Earth' images as a background format, which helped to collect accurate coordinate values from the field. Facility mapping was also difficult to interpret due to facilities being clustered in a small geographical area.

2.7 Ethical considerations

This study was approved by the Ethical Review Committee of the James P Grant School of Public Health, BRAC University. The objectives of the study were explained to the respondents prior to interviews being conducted. Verbal consent was obtained from each respondent after clarifying the confidentiality and voluntary participation features of the study. Interviews were conducted so as to protect the privacy of the respondents concerning sensitive questions. Confidentiality was maintained by using a unique identification number for each participant in place of their names.

3.0 FINDINGS

3.1 GIS mapping and facility assessment

The findings of this study have been divided into two sections: (i) geographical distribution of the eye care facilities in Dhaka City Corporation (North and South); and (ii) general profile and information on services and human resources in these facilities.

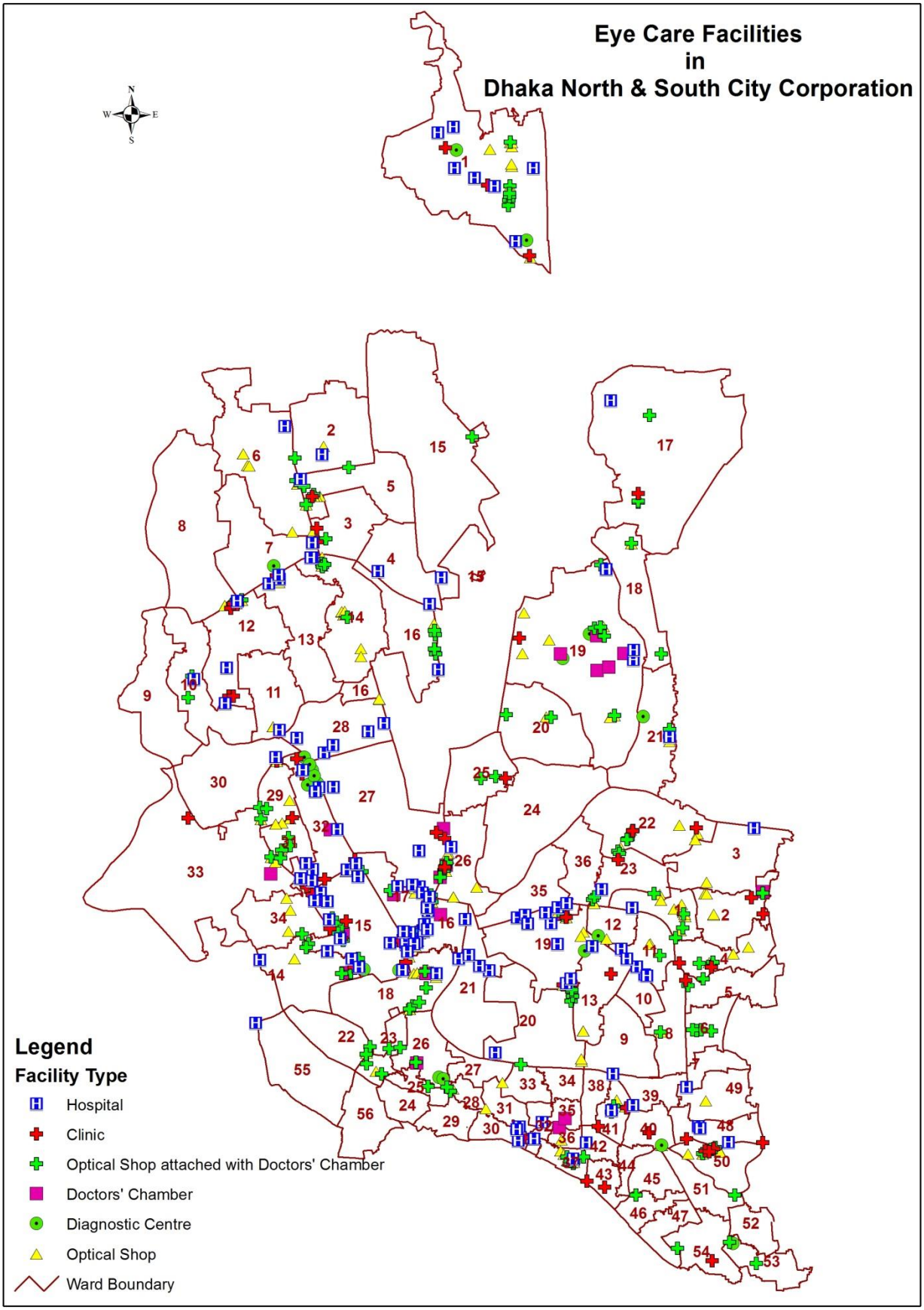
3.1.1 Geographical distribution of eye care facilities

The map below shows the location of eye care facilities in Dhaka city by category using the following definitions (see map 1):

(i) Hospitals which were defined as formal institutions providing both outdoor and indoor services with more than 30 beds (including both specialized eye care facilities and general facilities with eye care services).
(ii) Clinics defined as formal institutions with or without indoor services having less than 30 beds (specialized and general facilities).
(iii) Diagnostic centres which consist of facilities that provide medical testing and imaging facilities with or without patient services.
(iv) Doctors chambers.
(v) Stand-alone optical shops located outside health care facility premises.
(vi) Optical shops attached to doctors chambers which are located outside health care facility premises,

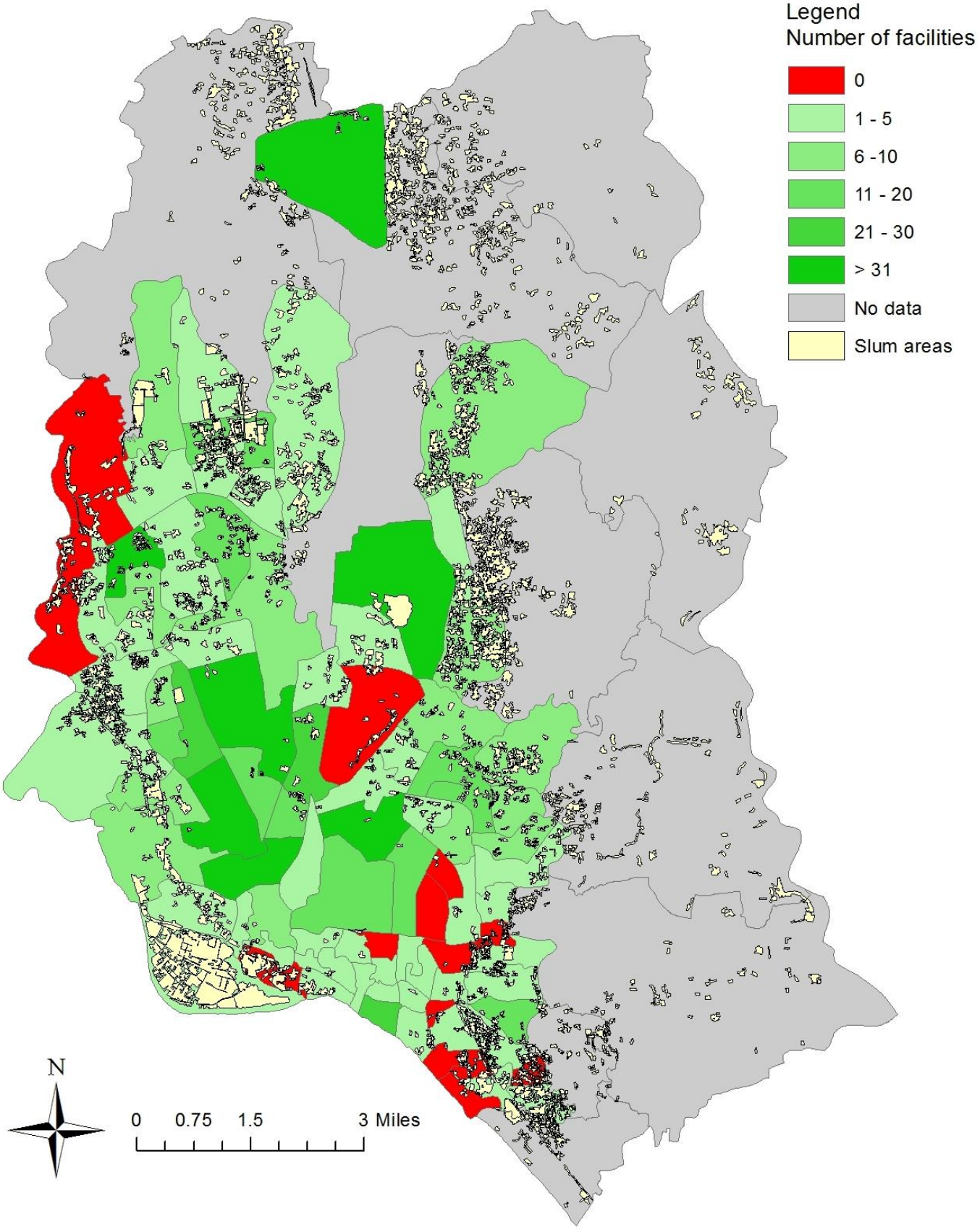
A total of 715 facilities providing eye care services were identified in Dhaka City Corporation, including 280 stand-alone optical shops (39%), 206 optical shops with doctors chambers (29%), 118 hospitals (16.5%), 65 clinics (9%), 24 diagnostic centres (3.4%), and 22 doctors chambers (3.1%). However, these facilities are not uniformly distributed across the city and tend to be concentrated around major crossroads or market places. In Dhaka City Corporation, 338 facilities representing nearly half of all eye care facilities (47%) are concentrated within 10 wards out of a total of 91. Among the wards with a high density of facilities, six are located in DCCN (ward #1, 12, 19, 26, 27, and 32) and four in DCCS (wards #15, 18, 19, and 37).

Map 1: Eye Care Facility Map of Dhaka City Corporation (DCC)



When superimposing data on the number of eye care facilities by ward and actual slum areas in Dhaka city, it is clear that the wards with the largest slum areas have fewer facilities compared to others. Although facilities are not directly located inside slums, wards with a high concentration of eye care facilities (i.e. wards with > 20 facilities) are usually adjacent to or within a 1.5-mile radius of slum areas.

Map 2: Slum areas and eye care facility concentration in Dhaka City Corporation (DCC)



Map compiled using GIS data from slum mapping of Dhaka 2006-2010 (Gruebner et al., 2014), dataset accessible at: http://dx.doi.org/10.1155/2014/172182/dataset

3.1.2 Breakdown of eye care facilities by ward

There are of 371 eye care facilities in DCCN (52%) and 344 facilities located in DCCS (48%). In DCCN, the number of facilities range between 0 and 48 per ward, with an average of 10.3 per ward. Three wards out of 36 (8%) have no eye care facilities and these are highly concentrated in six wards, which total 203 facilities or 55% of all eye care facilities in DCCN. The number of facilities per ward for DCCS varies between 0 and 40 facilities, with fewer facilities per ward compared to DCCN (6.1 facilities on average). Twelve wards have no eye care facilities (22%) while only six wards total up half of the facilities in DCCS (n=173).

The table below provides more detail concerning the number of eye care facilities for DCC North and South by ward and type of facility:

Table 4: List of eye care facilities in DCC area (N=715)

Dhaka City Corporation (North)

Ward #	Optical shops (stand-alone)	Optical shop attached with doctors' chambers	Hospitals	Clinics	Diagnostic centres	Doctors chambers	Total (per ward)
1	12	8	7	3	2		32
2	1	2	1				4
3	1	1		2			4
4			2				2
5	7	4	1	1			13
6	7	1	1				9
7	2		1		1		4
10		2	1	1			4
11	3		2	1			6
12	18	18	2	3	1		42
13	1		3	1			5
14	12	5	2				19
15		1	1				2
16	3	5	1				9
17	1	4	2	1			8
18	1	2					3
19	16	7	3	1	2	6	35

Ward #	Optical shops (stand-alone)	Optical shop attached with doctors' chambers	Hospitals	Clinics	Diagnostic centres	Doctors chambers	Total (per ward)
20	1	3					4
21	2	3	1		1		7
22	2	5		2			9
23	5	4	1	1			11
25		2		1			3
26	21		1				22
27	19	18	5	3		3	48
28			5				5
29	4	4		2			10
30			1				1
31	7	5					12
32	2		8	6	7	1	24
33	1			1		1	3
34	3	1	1	3			8
35			2				2
36	1						1
Total	**153**	**105**	**55**	**33**	**14**	**11**	**371**

Dhaka City Corporation (South)

Ward #	Optical shops (stand-alone)	Optical shop attached with doctors chambers	Hospitals	Clinics	Diagnostic centres	Doctors chambers	Total (per ward)
1	7	3	1				11
2	5			2			7
3	3	1	1			1	6
4	2	5		2			9
5		1		1			2
6		4					4
8	1	1					2
11	2	1	5				8
12	1		2		1		4
13	12		2	1			15
14	2	3	3	1		1	10
15	6	12	6	5	2	1	32
16	3	2	5			1	11
17	4	3	8	1	1	2	19
18	24	10	4		1	1	40
19	14	11	7	2	1	1	36
20	2	15	2				19
21			2				2

Ward #	Optical shops (stand-alone)	Optical shop attached with doctors chambers	Hospitals	Clinics	Diagnostic centres	Doctors chambers	Total (per ward)
22	2	3					5
23	1	2					3
25		2					2
26		3			2	1	6
27	1						1
28	2						2
30			2	2			4
31			1	3			4
32			2				2
33		1					1
35						1	1
36	1					1	2
37	19	7	1				27
38	1	2	2				5
40	1		1	1	1		4
41	3			2			5
42			1				1
43				2			2
45		1					1
48			3	1			4
49	1		1				2
50	7	4		5			16
51		1					1
53		2			1		3
54		1		1			2
55			1				1
Total	**127**	**101**	**63**	**32**	**10**	**11**	**344**
Grand total (DCC)	***280***	***206***	***118***	***65***	***24***	***22***	***715***

3.1.3 Eye care facility assessment

Eye care facility profile

Eye care facilities in DCC were categorized as specialized eye care facilities (3%, n=23), general facilities/ doctors providing eye care services (58%, n=412), and stand-alone optical shops (39%, n=280). The vast majority of facilities providing eye care services in Dhaka city were privately owned (99%). The number of private for-profit facilities was the highest with 685 facilities

recorded, including 405 general or specialized health facilities and 280 optic shops compared to non-profit facilities (n=22), and public facilities (n=8). All the stand-alone optic shops identified in this study were operating as private for-profit-facilities.

Table 5: Profile of eye care facilities in DCC area

	Specialized facilities n (%)	General facilities/doctors (with eye care services) n (%)**	Optical shops (stand-alone) n (%)	Total N(%)
Eye care providers				
Hospital	7 (30.43)	111 (26.94)	-	
Clinic/diagnostic centre	16 (69.57)	73 (17.72)	-	
Chamber	-	228 (55.34)	-	
Optical shop	-	-	280 (100)	
Total	23 (3.22)*	412 (57.62)*	280 (39.16)*	715 (100)*
Management type				
Public	1 (4.35)	7 (1.70)	-	
Private	-	-	-	
For profit	14 (60.87)	391 (94.90)	280 (100)	715 (100)
Non-profit	8 (34.78)	14 (3.40)	-	

*Percentage calculation based on the total 715 eye care providers, which contain specialized, general facilities and optical shops.

** including optical shops attached to doctors chambers

All specialized and general health facilities that were enumerated were registered and 95% were operating with a medical licence.

Table 6: Operational status of eye care facilities in DCC area (excluding optical shops*)

N=435	n (%)
Licencing status	
Licenced	413 (94.94)
Not licenced	18 (4.13)
Missing data	4 (0.92)
Registration status	
Registered	435(100)
Not registered	-

* Stand-alone optical shops are excluded from calculation, as they require business licence, not medical licencing and registration

Services provided by eye care facilities in DCC area

Outpatient services were available in all specialized eye care facilities and about half of these facilities provided ambulatory surgery (56.5%). Of these facilities, 83% were also equipped to provide eye care surgery requiring the patient to be admitted and remain in hospital (inpatient services, IPD). The number of beds was 53 on average per facility, ranging from 5 to 280 for the largest hospital. In terms of opening times, all specialized facilities operated on a weekly basis: 16 of the 23 facilities opened seven days a week (69.6%). In 83% of the specialized facilities, general service and doctors were available 24 hours a day.

Among general facilities providing eye care services, 99.5% had an outpatient department and 33.5% provided ambulatory surgery. Fewer facilities offered inpatient services with only 34.5% having an IPD department with surgery, and 1.2% having an IPD service without surgery. Bed numbers at general facilities averaged 130, although no data was available to determine how many of them were reserved for eye patients. Like the specialized facilities, almost all the general facilities worked on a weekly basis. Around 59% of them opened seven days a week and 36% opened for five to six days a week. Twenty-four-hour general service and 24-hour doctor services were both available in 36% of the facilities. None of the specialized eye care facilities in our sample provided outreach services and only one general facility reported to do so.

A total of 278 facilities included in the study (64%) reported having some mechanisms in place to facilitate access to services for low-income patients who were unable to pay. These mechanisms included provision of services or medicines at a discounted price (n=191), free health care (n=64), free care on specific days (n=9) and having a certain number of beds allocated to low-income patients qualifying for free care provision (n=13).

Table 7: Services provided by eye care facilities in DCC area

Service type	Specialized facility (N=23) (n, %)	General facility (w/ eye care services) (N=412) (n, %)
Outreach	-	1 (0.24)
Indoor		
With surgery	19 (82.61)	142 (34.47)
Without surgery	-	5 (1.21)
No indoor services	4 (17.39)	265 (64.32)
Outdoor		
With surgery	13 (56.52)	138 (33.50)
Without surgery	10 (43.48)	272 (66.02)
No ambulatory services		2 (0.48)
Number of facilities with bed	19 (82.61)	148 (35.92)
Average bed*	Mean: 53, Max- 280, Min- 5	Mean: 130, Max- 2150, Min- 2
Pattern of service		
Weekly	23 (100)	411 (99.76)
Monthly	-	1 (0.24)
Service availability in a week		
7 days a week	16 (69.57)	243 (58.98)
5-6 days a week	7 (30.43)	149 (36.17)
Less than 5 days a week	-	20 (4.85)
Service availability in a day **		

On call doctor available	1(4.34)	9(2.18)
24hr general service available	19(82.61)	148(35.92)
24hr outdoor service available	5(21.74)	74(17.96)
24hr doctor available	19(82.61)	147(35.68)
Special provisions for targeted population (low-income patients)		
Discounted medicine	-	5 (1.21)
Free beds	-	13 (3.16)
Free clinic day	2 (8.70)	7 (1.70)
Subsidy for services	7 (30.43)	179 (43.45)
Free services	6 (26.09)	58 (14.08)
Health cards	-	1 (0.24)

*Present average number of beds for all types of facility. **Cumulative percentage is more than 100%, as more than one type of service might be available in one facility.

Human resources of eye care facilities in DCC area

Staff numbers at eye care facilities in Dhaka City Corporation averaged 98 at 23 specialized eye facilities and 122 at 412 general facilities. There were, on average, 21 physicians in specialized facilities and 29 in general facilities. A total of 985 ophthalmologists were recorded at the facilities included in this study, with the average number of ophthalmologists being higher in specialized facilities ($\bar{x}$ =7) compared to general hospitals ($\bar{x}$ = 2), as one could expect.

Table 8: Average human resources in eye care facilities in DCC area

Type of staff	Specialized facility (Average)	General facility (Eye care services) (Average)
General staff		
Total staff in facility	98	122
Physicians in facility	21	29
Nurse	18	23
Paramedics	3	1
Midwives	1	1
Pharmacists	1	1
Non physician clinicians	4	9
Other staff (medical)	1	1
Other staff (support)	49	57
Specialized doctors		
Anaesthetist	3	5
Ophthalmologist	7	2

Patient exit interviews

Patient exit interviews were conducted with 1,114 respondents randomly selected from five eye care facilities within Dhaka. Two thirds of respondents were domiciled in the city (66%) while the remaining third lived outside. The main reasons given for seeking consultations at a facility were: poor vision (44%), cataracts (24.5%), symptoms related to allergy, infection or inflammation (13%), lacrimation (10%), ocular trauma (2%) and other symptoms or conditions (9%).

Patients paid BDT 1,663 (USD 21.6) on average for eye care services but this amount varied greatly depending on the eye diagnostic group and treatment prescribed. The difference in patients' costs between those living in the city and those coming from outside Dhaka was significant; BDT 787 (USD 10.2) and BDT 3,356 (USD 43.6) respectively. Higher transport costs were a factor, but they do not fully explain the level of increase observed in overall cost of seeking eye care.

On average, patients required three hours 18 minutes (one way) to travel to the facility but more than half of respondents indicated that they could reach the facility from their home in less than an hour (56%). The average travel time for Dhaka residents was slightly under one hour ($\bar{x}$=57min), while it was nearly seven hours and 50 minutes for those living outside Dhaka ($\bar{x}$=470min). Patients also report increased transport costs as a result of the longer journey time: BDT 104 (USD 1.35) on average for Dhaka residents and BDT 963 (USD 12.5) for patients coming from outside the city.

Table 9: Information collected during patient exit interviews

Patient exit interviews (n=1114)	**Patients from Dhaka N (%)**	**Patients from outside Dhaka N (%)**	**Total N (%)**
Origin of patients	734 (65.9)*	380 (34.1)*	1,114 (100%)
Reasons for visiting facility			
Poor vision	353 (48.1)	140 (36.8)	493 (44.25%)
Cataract	135 (18.4)	138 (36.3)	273 (24.5%)
Allergy, infection or inflammation symptoms	112 (15.3)	29 (7.6)	141 (12.7%)
Lacrimation	82 (11.2)	29 (7.6)	111 (10%)
Ocular trauma	13 (1.8)	9 (2.4)	22 (2%)
Other	39 (5.3)	35 (9.2)	74 (6.6%)
Time spent travelling to facility**			
Less than 1 hour	596 (81.2)	27 (7.1)	623 (55.9%)
1-3 hours	122 (16.6)	74 (19.5)	196 (17.6%)
3-6 hours	13 (1.8)	105 (27.6)	118 (10.6%)
6-9 hours	0	54 (14.2)	54 (4.85%))
More than 9 hours	3 (0.4)	120 (31.6)	123 (11.4%)
Patient expenditures (average in BDT)			
All	787	3,356	1,663
Poor vision	309	1,444	631
Cataract	2,729	4,554	3,652

Allergy, infection or inflammation symptoms	270	1,423	507
Lacrimation	255	2,360	805
Ocular trauma	1,426	6,618	3,550
Other	777	7,862	4,128
Source of payment			
Current income	666 (90.7)	282 (74.2)	948 (85.1)
Borrowing from relatives/friends	27 (3.7)	42 (11.0)	69 (6.2)
Savings	25 (3.4)	27 (7.1)	52 (4.7)
Selling household assets	1 (0.1)	4 (1.05)	5 (0.45)
Loan	0	3 (0.8)	3 (0.3)
Reducing expenditures	0	21 (5.5)	1 (0.1)
Others	15 (2.0)	1 (0.3)	36 (3.2)

*% is calculated based on row total instead of columns as for the rest of the table.

** time required to travel to facility from home (one way), excluding return travel.

*** total expenditures as reported by respondents, including transport, consultation, medicine, surgery, hospital accommodation and other direct expenditures incurred for seeking care.

3.2 Health-seeking behaviour

As mentioned earlier, health-seeking behaviours of urban slum-dwellers were assessed using a mixed method approach including: i) a household survey, and ii) qualitative interviews and FGDs.

3.2.1 Household survey results

Respondents' demographic profile

A total of 1,600 participants aged 18 years and above were included in this study. The average age of the participants was 35 years (SD $\pm$ 13 years). Those aged between 18 and 29 years represented the greatest number of participants (39%), while those aged 60 years and above represented the lowest number (7%). Female participants (59%) outnumbered male participants (41%). Most of the participants were married (85%), with the remainder unmarried (7%) or belonging to other categories including separated, widowed or divorced (8%). Almost all participants (98%) were Muslim. The greater number of participants had no formal education (40%). Other participants had undertaken primary education (31%), secondary education or higher (17%), SSC/HSC equivalent education (9%) and the rest had studied at or above graduate level (2%). The majority of the respondents were homemakers (35%), followed by salaried workers (19%); service holders were the least in number (8%).

Table 10: Demographic information on participants:

Variables (N=1,600)	Percentage (%) (Frequency=n)
Age (Mean: 34.94 years, SD: ± 13.10)	
18 to 29 years	39.38 (630)
30 to 39 years	26.69 (427)
40 to 49 years	18.13 (290)
50 to 59 years	9.00 (144)
60 years and above	6.81 (109)
Gender	
Male	40.63 (650)
Female	59.38 (950)
Marital status	
Married	84.63 (1354)
Unmarried	7.56 (121)
Widowed/separated/divorced	7.81 (125)
Religion	
Islam	98.06 (1569)
Hindu	1.88 (30)
Christian	0.06 (1)
Educational status	
No formal education	40.44 (647)
Primary education	30.56 (489)
Secondary education	17.50 (280)
SSC/HSC equivalent	9.06 (145)
Graduation and above	2.44 (39)
Occupational status	
Salaried worker	19.00 (304)
Self-employed	9.19 (147)
Garment worker	10.25 (164)
Service	7.88 (126)
Homemaker	34.50 (552)
Other (student, retired, unemployed, etc.)	19.19 (307)

Respondents' economic profile

Average monthly family income among respondents was BDT 14,626 (USD 188) with the majority of family incomes (48%) ranging between BDT 10,000 and BDT 20,000 (USD 129 and USD 257). The average monthly individual income of respondents was much lower compared to family income (BDT 5,244 or USD 67). A significant number of participants (58%) earned less than BDT 5,000 (USD 64) per month. Survey respondents were generally wealthier when compared to the general population in Bangladesh using the equity measurement tool developed by UCSF. According to the wealth index, based on dwelling characteristics and ownership of durable assets, the majority of survey respondents (61%) belonged to the wealthiest quintile of the population, with only 0.31% of survey respondents in the poorest wealth quintile. The most common source of drinking water was piped water into the dwellings (43%), followed by public tap or stand pipe (24%). Toilets that flush into the sewer system were found to be the most common type of toilet used by the respondents (59%). Toilets flushing into septic tanks and pit latrines were both seen in the same percentage (19%). Almost 89% respondents shared toilets with other households. A high percentage of participants owned mobile phones (82%) and televisions (72%). Around a fifth of participants were landowners (19%), owning 0.11 acres of land on average.

Table 11: Economic information on participants

Variables (N=1600)	**Percentage (%) (Frequency=n)**
Monthly family income (Mean: 14625.61, SD: ± 10522.25)/(Mean: USD* 188.08, SD: ± 135.31)	
10,000tk and below (USD 128.60 and below)	37.44 (599)
10,001tk to 20,000tk (USD 128.60 to USD 257.20)	48.19 (771)
20,001tk to 30,000tk (USD 257.20 to USD 385.79)	9.25 (148)
More than 30,000tk (More than USD 385.79)	5.13 (82)
Monthly individual income (Mean: 5243.73, SD: ± 6973.95)/(Mean: USD* 67.43, SD: ± 89.68)	
5,000tk and below (USD 64.30 and below)	57.69 (923)
5,001tk to 10,000tk (USD 64.30 to USD 128.60)	28.75 (460)
10,001tk to 15,000tk (USD 128.60 to USD 192.90)	9.31 (149)
More than 15,000tk (more than USD 192.90)	4.25 (68)
Wealth quintile	
Quintile 1 (poorest)	0.31 (5)
Quintile 2	1.00 (16)
Quintile 3	3.06 (49)
Quintile 4	35.13 (562)
Quintile 5 (wealthiest)	60.50 (968)

Variables (N=1600)	Percentage (%) (Frequency=n)
Source of drinking water	
Piped into dwelling	42.50 (680)
Piped to yard/plot	16.69 (267)
Public tap/stand pipe	23.66 (369)
Tube well/protected well or spring/other	17.75 (284)
Type of toilet	
Flush to piped sewer system	59.44 (951)
Flush to septic tank	19.19 (307)
Any type of pit latrine	18.89 (302)
Flush to pit latrine/elsewhere/unknown	1.06 (17)
Hanging toilet	1.44 (23)
Toilet shared with other household/s	88.94 (1423)
Mobile phone owner	81.81 (1309)
Television owner	72.38 (1158)
Landowner	19.25 (308)
Mean: 0.11 acre SD: ± 0.51	

*1 BDT= 0.013 USD

Health care-seeking behaviour of respondents

Self-reported eye illness at the time of survey

Out of 1,600 participants, responses from 1,587 participants were taken into account; 13 participants were excluded due to recorded errors. Of the 1,587 respondents, 773 (49%) complained of at least one eye problem that they were suffering from at the time of the survey. Most commonly reported current eye problems were blurred vision (33.38%) followed by lacrimation (27.04%), itching/irritation (18.89%), poor near vision (15.65%), eye ache (13.32%), poor distance vision (8.67%) and burning sensation (5.43%).

Sixty one out of the 1,587 participants reported suffering from eye illnesses during the 30 days prior to their interview, for which symptoms were no longer present. Given the small number (4% of the total sample), a detailed analysis was conducted only on the data for current self-reported eye illness.

For the purpose of analysis, the self-reported problems were separated into five categories: (i) lacrimation, (ii) symptoms generally representing allergy, infection or inflammation (e.g. discharge,

itching/irritation, burning sensation, eye ache and conjunctivitis), (iii) poor vision (e.g. blurred vision, poor distance vision, poor near vision, night blindness and complete blindness excluding cataract), (iv) cataract, and (v) other (e.g. trauma, squint and photophobia). After categorization, the most prevalent self-reported eye problem was found to be poor vision (61%) followed by symptoms of allergy, infection or inflammation (44%) and lacrimation (28%).

Table 12: Prevalence of self-reported current eye problems

Variables (N=773)	**Percentage (%) (Frequency=n)**
Lacrimation	27.55 (213)
Allergy/infection/inflammation	43.73 (338)
Poor vision (excluding cataract)	61.45 (475)
Cataract	2.59 (20)
Other	6.60 (51)

* Cumulative percentage may not be 100%, as multiple problems were reported.

Delays in seeking treatment

Average duration of self-reported eye problems was around three years at the time of the survey. Respondents who sought care from some kind of Health Care Provider (HCP) for any eye problem, took more than a year on average to seek care counting from the time their symptoms began. This delay in seeking treatment was found to extend as long as 18 years in some cases. In most of the cases (69.42%), participants with eye problems waited at least 3 months before seeking any kind of treatment.

Table 13: Delay in treatment seeking for current eye problems

Mean: 428.01 days (1 year 2 months)	
Maximum: 6,570 days (18 years)	Minimum: 1 day
Duration of delay (N=773)	**Percentage (%) (Frequency=n)**
7 days or less	8.24 (38)
7 to 30 days	10.85 (50)
1 to 3 months	11.50 (53)
3 months to 1 year	42.52 (196)
More than 1 year	26.90 (124)

Treatment-seeking behaviour

In the majority of cases (76%), people did nothing to resolve the eye problems they were experiencing, whereas 60% subsequently went to some kind of health care provider (formal/informal). Very few used home remedies (2%).

Table 14: Treatment choice for current eye problems

Variables (N=773)	Percentage (%) (Frequency=n)
Did nothing	75.94 (587)
Used home remedy	2.46 (19)
Went to a health care provider	59.64 (461)

*Cumulative percentage might not be 100%, as treatment seeking behaviour for multiple illnesses was recorded.

One interesting finding was that facility-based qualified eye care providers like MBBS doctors, government/ NGO/private hospitals were found to be the most commonly stated first choice for eye care services (78%). They were also the most common second and third choices. Community health workers were the least used eye care service providers (0%-1%).

Table 15: Choice of health care provider for current eye problems

Providers	First choice % (Frequency)	Second choice % (Frequency)	Third choice % (Frequency)
Qualified/specialist HcP (facility based)	77.81 (298)	69.39 (68)	76 (19)
Qualified/specialist HcP (outreach activities)	8.36 (32)	13.26 (13)	4 (1)
Community Health Workers	0.78 (3)	1.02 (1)	0 (0)
Informal providers	13.05 (50)	16.33 (16)	20 (5)
Total	100 (383)	100 (98)	100 (25)

For purposes of analysis, eye care service providers were divided into two groups: (i) formal providers (including MBBS doctors, NGO/private/public hospitals and eye camps), and (ii) informal providers (including non-MBBS doctors, health workers, traditional healers and others). After categorization, it was found that 86% of respondents first consulted a formal health care provider for their current eye problem.

Type of treatment and mode of payment

There were 417 cases where participants attending a health care provider were given some form of treatment. The most commonly given treatment was eye drops (60%), followed by spectacles (38%). Participants mostly paid for their treatment from their current income (78%). In around

15% of cases, participants received free treatment while only 7% of cases incurred catastrophic expenditures forcing them to sell assets or borrow money to bear the treatment cost.

Table 16: Treatment provided by a health care provider for current eye problems

Type of treatment received (N=417 incidences)	Percentage (%) Frequency (n)
Eye drops	59.95 (250)
Medicine	32.61 (136)
Spectacles	38.13 (159)
Surgery	5.04 (21)
Other (ointment, traditional treatment, advice, etc.)	6.47 (27)

*Cumulative percentage may not be 100%, as multiple treatment record for each reported eye problem was taken.

Compliance to eye treatment

Among participants who received treatment from a health care provider for their current eye problem, 81% fully complied with the treatment advice and 13% did not comply at all. Approximately 6% of participants partially followed the full treatment regime. The most common reason for non-compliance or partial compliance was financial constraint (50%). Only 3% did not comply because symptoms ceased without treatment.

Table 17: Reason for non-compliance to given treatment for current eye problems

Reason for non-compliance to treatment	Percentage (%) (Frequency=n)
Financial constraints	50 (33)
Problem resolved without treatment	3.03 (2)
Did not want to take the treatment	13.64 (9)
Other (fear of treatment, losing medication/glasses, shyness, etc.)	33.33 (22)
Total (N)	100 (66 responses)

Reason for not seeking eye care services

In total, 606 participants did not seek care from any kind of health care provider for their eye illnesses and 526 provided explanations for their choice. The most common reason was financial constraint (45%), followed by not taking the problem seriously (31%) and lack of time to go to a health care provider (16%).

Table 18: Reason for not seeking treatment for current eye problems

Reason for not seeking treatment	Percentage (%) Frequency (n)
Financial constraints	45.06 (237)
Did not feel important	30.80 (162)

Time constraints	15.78 (83)
Other (didn't know where to go, no one to accompany, fear, etc.)	8.36 (44)
Total (N)	100 (526 responses)

Sources of eye health and eye care service information

Out of 1,587 participants, 456 (29%) had received information concerning eye illness or eye care during the three months prior to the survey. Of them, 63% received the information from eye care promotional activities, 13% from friends, relatives or neighbours, 7% from television, 13% from camps and health care providers and the rest from health facilities, radio and newspapers.

Factors associated with eye care-seeking behaviour

A statistically significant association was found between treatment-seeking behaviour and respondents' gender and education (*p<0.05)*. Female participants and participants with at least some formal education were found to seek treatment from health care providers more than male and uneducated participants (See Table 17). Although occupation was initially found to be a significant factor *(p<0.05)* in bivariate analysis, it was later found to be insignificant after controlling for other factors. No association was demonstrated between the type of ailment and the treatment-seeking behaviour.

Table 19: Factors associated with treatment-seeking behaviour for current eye illness

Variables	Odds ratio	z	P > |z|
Age			
<30 years	1		
>30 years	1.248012	1.55	0.122
Gender			
Male	1		
Female	1.382438	2.05	0.041*
Education			
No formal education	1		
Some formal education	1.424387	2.67	0.008*
Occupation			
Non-income generating	1		
Income generating	0.821531	-1.31	0.192
Family income			
BDT<15,000/ USD 193	1		
BDT>15,000/ USD 193	1.147079	1	0.315
Eye problem			
Other problem	1		
Vision impairment	0.858557	-1.19	0.235
Constant	0.237814	-2.42	0.015

**p value significant, i.e. p< 0.05*

It was also found that age, gender and education significantly influenced choice of health care provider. Among the participants, women, individuals aged 30 years or older and those with some formal education were more likely to visit formal eye care providers than those who were under 30 years of age, male or uneducated (See Table 18).

Table 20: Factors associated with choice of health care provider for current eye illness

Variables	Odds ratio	z	P > |z|
Age			
<30 years	1		
>30 years	3.089572	3.2	0.001*
Gender			
Male	1		
Female	2.24048	2.09	0.037*
Education			
Non-formal education	1		
Some formal education	3.220436	3.42	0.001*
Occupation			
Non-income generating	1		
Income generating	0.846788	-0.44	0.657
Family income			
BDT<15,000/USD 193	1		
BDT>15,000/USD 193	1.241846	0.61	0.542
Eye problem			
Other problem	1		
Vision impairment	1.216817	0.58	0.559
Constant	0.031051	-2.36	0.018

**p value significant, i.e. p< 0.05*

3.2.2 Qualitative study result

Self-reported current eye problems

Out of the 43 respondents selected for qualitative study, 38 complained of some type of eye problem during their interview. Most eye problems were presented as difficulties in seeing things at a distance or nearby, difficulties watching television, spontaneous tearing up of the eyes, headaches and eye ache.

"Sometimes I used to have blurred vision … Generally I didn't feel any problem for that. Only I felt problem while watching television. Otherwise there was no problem." (ID-03060740, Female, aged 25 years)

"When I drive at night, my vision gets blurred. I cannot stare at light for very long time. I cannot see the people right in front of me like the way we cannot recognize people from a kilometre distance." (ID- 03091123, Male, aged 35 years)

"I used to work in road construction. I used to work in a lot of smoke, I left the job. My eyes used to hurt. After I quit, now my eye keep watering when I'm turned on one side. Both of my eyes keep tearing up." (ID- 03091117, Male, aged 23 years)

Reported eye problems ranged in duration from two to three months to 20 years. Fourteen respondents were found to have been suffering from eye problems for the last year. Delaying treatment seeking was common among the respondents. During the FGD, participants expressed various reasons why people might not seek treatment, including: not taking eye problems seriously, not wanting to seek help as long as the symptoms were tolerable, not knowing enough about the potential consequences of eye diseases and having previous experiences of health facilities which they considered to be deceitful.

First contact person to consult about eye problem

Most respondents (11/38, 29%) didn't share details of their eye problems with anyone. Others reported consulting with family members (16/38, 42%), with pharmacy assistants (3/38, 8%) or with a BRAC CHW (9/38, 24%) concerning their eye problems.

"No, I didn't tell anyone. Suddenly my eyes start itching and then get better automatically. It's not serious at all. Not enough to go to someone." (ID-0306707, Female, aged 20 years)

"…I told my children at home, and my husband. I also told the Madam, whose house I work at. She took me to Al-Nur Hospital." (ID-03071140, Female, aged 50 years)

"I didn't seek anyone's advice. My mother [is] diabetic. I took her to the doctor at Khulna, I also got my eyes checked there. [The doctor] told me that I will be fine if I use power glass. He also gave me eye drops." (ID-02100125, Female, aged 20 years)

The most common advice from the first contact person was to visit an eye care facility or consult an eye specialist (10/38, 26%). Other advice included eating more vegetables, not using spectacles, taking eye drops, avoiding water or looking down, etc.

"*When my eye problem started, I went to someone I know, he's not a doctor … He uses spectacles as well … He told me, not to use spectacles as long as it can be avoided ... He advised me to look closely at*

green grasses after Morning Prayer every day. He also told me to eat more green vegetables. I eat green vegetables, as per his advice; also look at green things if I see any." (IDI-03010422, Male, aged 60 years).

Few of the respondents followed any of the treatment advice given. Financial barriers were cited most often as the reason for this. The findings were similar to the statement of the community members.

"… I am a driver. When I drive at night I have blurred vision … I am facing this problem for the last 4-5 years. But now it's giving me more trouble. I have talked about my problem with my parents and sister. But you know my family could not bear the cost of the treatment…" (ID-03091123, Male, aged 35 years)

Choice of service provider for eye treatment

Thirty four of the 38 IDI participants with eye problems went to health care facilities that provide eye treatment or consulted eye specialists. The others went to local doctors or Kabiraj (traditional healers).

"First I went to eye hospital. They gave me spectacles, but that didn't work for me. Then, you know the people who do the announcements using [microphones] and do eye examinations, they told me to have surgery … then I went to Ad-din Hospital. They checked my eyes and did the surgery." (ID-01111117, Female, aged 50 years)

"I don't understand about these things (eye problems) much. I went to a Kabiraj (traditional healer), he gave some medicine, I took them … My next door neighbour had the same problem as mine; he got cured by the medicine from that Kabiraj. That's why I went there." (ID-02011518, Male, aged 26 years)

When community members were asked about the availability of common eye care services in the locality, they reported that there were no such eye care hospitals in their area. Several of them reported that most often local drug stores were the first service providers for their eye problems.

"We do not have any eye care hospitals in our area. Normally, for any kind of eye problem people go to the local drug sellers or the pharmacies. They treat with drops, ointments and medicines, etc. Along with this, sometimes NGO people do campaigns using a [microphone] and encourage people to come and visit them if they have any eye problems. If someone faces anything serious then they go to the

Dhaka Medical College Hospital, Ad-din Hospital, or newly-built local Mugda General Hospital…" (FGD 4, Female, aged <30 years)

Some IDI participants stated that community members visited different service providers from the general health care providers or specialized eye care facilities when they suspected their eye illnesses might be severe or a potential cataract. However, in the FGD, participants revealed that they went to the same service providers for eye problems as for general illnesses.

Experience regarding eye care services

Participants mostly described bad experiences regarding previous visits to eye care facilities, but a few also talked about good experiences as well. Some participants highlighted the cordial behaviour of the doctors, having their eyes checked with the use of medical equipment and getting eye drops as a good experience, but mostly they were satisfied with the service as a whole.

"I didn't like the doctor's behaviour in Islamia. Doctors were in so much hurry. I don't know what they wrote or not in a rush, I didn't like it very much. But I liked the service of the hospital in Lalmatia … They asked me about my problem with a lot of care. Then hung the letters in English and asked me to tell them which side they are facing. I liked these things." (ID-03010422, Male, age 60 years)

On the other hand most participants said that their previous experience of a facility had been unsatisfactory. The reasons given included poor behaviour on the part of the doctors (being disrespectful or unprofessional), having to pay bribes, long waiting times, etc.

"…Oh God, I had to wait for such a long time. It was unbearable. That is why we don't go (to the hospital) easily. Your brother (her husband) went to bring the slip and it took him such a long time to do that. Now he needs to change the power of his glasses, but he doesn't want to go. You have to wait in a queue for long time and they don't care about you … we are uneducated people, we can't recognise which is room 1 and which is room 2, someone needs to show us. Doctors don't help us, they tell us to go some direction and ask someone…" (IDI-02011539, Female, aged 40 years)

"I went to an eye facility to consult with a doctor. He was chatting with someone else. He didn't take heed to my problems carefully. And then I didn't go to him again."(ID-3030304, Female, aged 65 years)

Perception of good quality eye care

The criteria for good quality eye care expressed by the majority of respondents involved caring and pleasant behaviour from staff and doctors. Other factors the respondents considered to be indicative of quality eye care included doctors prescribing appropriate medicines, listening carefully to patients, prescribing medicines rather than surgery, and ensuring availability of relevant medical instruments. Some expressed that the service at private eye care facilities was good. In general, however, good service, low cost and less waiting time were perceived as the main indicators of quality eye care.

"Good quality care means where I will get the solution of my health problem … [For] example, the free treatment I got, I'm feeling better after taking that medicine." (ID-02100125, Female, aged 20 years)

"I want the staff and doctors to be good. I want them to take to me for the examination and explain the problems to me. If there is any complication, I want them to describe it to me in detail." (ID-02100137, Male, aged 18 years)

Barriers and enablers to seeking eye care

The key reported barriers to seeking eye care included lack of money, the time required for travelling to facilities, repeated referrals, prolonged waiting times while taking treatment, etc. Additionally , some older and some female participants stated that they couldn't attend facilities alone and, without anyone to go with them, they were unable to access eye care services. Not considering the eye illness to be serious was also a significant barrier.

"I knew that I need[ed] to consult with a doctor as soon as possible. But I failed to do that due to lack of money. You know … you need money to step your feet outside home…" (04061503, Female, aged 35 years)

"…When I first had the problem, my husband told me that he will take me to the eye hospital to see a doctor … I didn't go. The problem occurred sometimes and sometimes it didn't. I didn't go due to laziness." (ID-03040207, Female, aged 25 years)

Similar responses were given during FGDs:

"…Listen, people have lost faith [in] facilities for eye treatment. They give a form for 30 taka, give a ticket and tell you to go some place. If we go there, they take [an] unreasonable amount of money, we

have to sell [the] rickshaw and other stuff in order to pay for the treatment. People fear this kind of situation. I myself was in a situation like this. Say, I told 40 people about it, and they told another 40 people. Now, when people hear these announcements about eye [care], they run on the opposite side…" (FGD-1, Male, aged 36 years)

Participants also expressed that the opportunity to receive free treatment, spectacles and medicines from the facility, having facilities close to home and being able to get appointments during holidays and weekends, etc. would help them to better utilize the services.

"I don't want money from anyone. I don't want to beg. But It would be very helpful for me if someone could take [me] to [an] eye specialist for examination and give me free eye glasses. That would be enough for me. I don't want any money." (ID-03010422, Male, aged 60 years)

Attitude towards spectacles and people using spectacles

Respondents reported that attitudes towards spectacles varied based on who was wearing them. Use of eye glasses was often associated with status. Some participants stated that it was better to use eye glasses to protect eyes from dust. They also noted that people using eye glasses were sometimes teased for not being able to see well; they were called names as well, like- "kana" (blind), "chashmish" (someone who wears eye glasses), "charchokh" (four-eyed) etc. Some respondents stated that they had been discouraged from using eye glasses by their families and peers. Others felt that using spectacles was a fashion rather than a necessity, and that it was better to consult another doctor. Most of them thought using spectacles was acceptable for older people but not the young.

"There are many passengers who do not get on the rickshaw of a rickshaw-puller who uses spectacles, thinking that he might not see well and there is [a] chance of [an] accident. Because of this, lots of people do not use eye glasses…" (FGD 1, Male, aged >30 years)

"I feel shy. So I don't wear glasses. I work. What people there (at work) will say if they see me wearing glasses … I don't have any other reason [for not wearing them]..." (FGD-2, Female, aged 35)

Recommendations

Respondents made various suggestions for improving the quality of eye treatment in their locality, including: establishing permanent eye care facilities, organizing temporary eye camps, information

posters to raise public awareness about eye care and disease, organizing seminars and giving free treatment.

3.3 Willingness-to-pay (WTP) study

3.3.1 Demographic characteristics of respondents

Table 21 presents demographic information on the respondents separated into three groups; those taking the household survey, those undertaking an exit interview at eye care facility, and actual refractive error patients at optical shops. Some of the respondents undertaking the facility and optic shop interviews were under 18 years old. In those cases, the guardian or accompanying adult was interviewed. The majority of participants in all three groups were between 18 and 29 years old; the lowest percentage by age was for participants 60 years and over. All age groups were represented in all the samples.

Women participants were in the majority in all three groups, with most of them being married. Respondents from the first group had received less education than respondents from the other two groups. In relation to work, people without any regular income (housewives, retired or unemployed people, listed as 'Other') constituted more than 50% of the participants in all three groups. The majority of income generating participants in the household survey were waged workers, whereas service workers constituted the largest group among patients interviewed in the facilities and optic shops. Participants working in garment factories numbered higher in the household survey compared with those interviewed in facilities and optic shops.

In terms of actual income, more than 80% of the households participating in the survey earned less than or equal to 20,000 BDT (USD 254.13). Among them, 36% earned less than or equal to 10,000 BDT (USD 127.06) and almost 50% earned between 10,000 and 20,000 BDT (USD 127.06 – 254.12). Patients interviewed in the facilities and optic shops had higher household incomes.

Household incomes of facility patients and optic shop customers were broadly similar. Around 70% of these participants had household incomes of less than or equal to BDT 20,000 (USD 254.12), while 15-17% had household incomes of between BDT 20,000 and BDT 30,000 (USD 381.19). Only 1% of survey respondents reported their monthly household incomes to be between BDT 40,000

and BDT 50,000 (USD 508.25 – USD 635.35) compared to about 5% of participants with the same income among facility and optic shop patients.

Table 21: Demographic characteristics of participants

	HH survey (N=1560)	Exit interview (N=558)	Optic shop (N=356)
	Percentage (%) (Frequency=n)		
Age			
Less than 18 years		9.86 (55)	13.20 (47)
18 to 29 years	39.49 (616)	23.12 (129)	23.03 (82)
30 to 39 years	26.79 (418)	16.49 (92)	18.54 (66)
40 to 49 years	18.33 (286)	22.04 (123)	20.22 (72)
50 to 59 years	8.78 (137)	15.77 (88)	14.04 (50)
60 years and above	6.60 (103)	12.72 (71)	10.96 (39)
Gender			
Male	41.28 (644)	47.67 (266)	43.82 (156)
Female	58.72 (916)	52.33 (292)	56.18 (200)
Marital status			
Married	84.04 (1311)	69.35 (387)	66.85 (238)
Unmarried	15.96 (249)	30.65 (171)	33.15 (118)
Educational status			
No formal education	39.55 (617)	28.49 (159)	23.31 (83)
Primary education	31.15 (486)	17.56 (98)	24.44 (87)
Secondary education	17.88 (279)	14.34 (80)	19.66 (70)
SSC/HSC equivalent	9.01 (142)	26.70 (149)	24.44 (87)
Graduate and above	2.31 (36)	12.90 (72)	8.15 (29)
Occupational status			
Wage worker	19.17 (299)	1.43 (8)	3.09 (11)
Self employed	9..94 (155)	10.39 (58)	10.67 (38)
Garment worker	10.51 (164)	3.41 (19)	6.74 (24)
Service	8.53 (133)	22.22 (124)	20.22 (72)
Homemaker	33.85 (528)	33.69 (188)	28.65 (102)
Other (retired, unemployed etc.)	18.01 (281)	28.85 (161)	30.62 (109)
Monthly family income (taka)			
Less than or equal to 10,000	35.96 (561)	34.59 (193)	29.49 (105)
Above 10,000 to 20,000	49.36 (770)	34.77 (194)	38.20 (136)
Above 20,000 to 30,000	9.42 (147)	14.70 (82)	16.57 (59)
Above 30,000 to 40,000	3.08 (48)	6.81 (38)	6.18 (22)
Above 40,000 to 50,000	0.96 (15)	4.84 (27)	5.06 (18)
Above 50,000	1.22 (19)	4.30 (24)	4.49 (16)
Starting bid (taka)			
400	34.17 (533)	33.33 (186)	
600	32.63 (509)	33.51 (187)	
800	33.21 (518)	33.15 (185)	

3.3.2 WTP and association with respondent characteristics

Multivariate analysis

The association of WTP with income and basic socio-demographic characteristics of the respondent was analysed by univariate and multivariate regressions, using the following function form $Y_i^* = X_i\beta + \varepsilon_i$, where Y_i^* is the WTP for refractive error corrections, which is latent. Using the double-bound valuation method, a series of intervals $[Y_i^l, Y_i^h]$ can be assumed, within which the true Y_i^* will lie. The values Y_i^l and Y_i^h are observable for each respondent along with individual characteristics, X_i. Using a standard ordered probit model (i.e. assuming the error terms in the linear utility function or unobserved WTP function are normally distributed with a mean of 0 and a standard deviation of σ), the probability of lying with an interval, $\Pr(Y_i^l \leq Y_i^* < Y_i^h)$ can be assumed. Replacing the equation for the WTP, the probability can be expressed as $\Pr(Y_i^l \leq X_i\beta + \varepsilon_i < Y_i^h)$.

3.3.3 Regression results

Interval regression results are presented in Table 22, where columns 1 and 3 represent regressions excluding any independent variables. In columns 2 and 4, regression results including all variables (described in Table 22) are presented. The tables list coefficients of each independent variable, including constants and P-value shown in parenthesis. The coefficients can be described in the same manner as ordinary least squares (OLS) regression (considering P-values for statistical significance level). So, for one unit change in the independent variable, the outcome variable (WTP in this case) is expected to be changed by the regression coefficient, all other factors remaining constant (*ceteris paribus*). The statistical significance level of the coefficients is shown using asterisks (*** for 1%, ** for 5% and * for 10% level of significance).

Table 22: Regression results

VARIABLES	Household survey		Exiting patients	
	(1)	(2)	(3)	(4)
Constant	596.84***	486.62***	847.40***	438.61**
	(0.00)	(0.00)	(0.00)	(0.01)
= 1 if female		-134.41***		-8.98
		(0.00)		(0.88)
Age (in years)		-3.61***		-3.13**
		(0.00)		(0.02)

VARIABLES	Household survey		Exiting patients	
	(1)	(2)	(3)	(4)
Education level:				
None		**Base**		**Base**
Some primary		11.35		74.50
		(0.68)		(0.21)
Primary or more		154.55***		155.23***
		(0.00)		(0.00)
= 1 if HH has a TV		59.22**		76.31
		(0.02)		(0.13)
= 1 if HH has a mobile phone		164.82***		83.12
		(0.00)		(0.43)
Land ownership (decimal, standardized)		56.73***		44.05*
		(0.00)		(0.10)
HH Total income (taka, standardized)		133.82***		80.11***
		(0.00)		(0.00)
Family size (number):				
1 - 2		**Base**		**Base**
3 - 4		-2.95		45.14
		(0.93)		(0.49)
5 or more		29.56		47.56
		(0.45)		(0.46)
Fraction of respondent's contribution to total HH income, %		-23.90		63.53
		(0.66)		(0.37)
Number of income earners:				
1		**Base**		**-**
2		15.13		
		(0.62)		
3 or more		-51.62		
		(0.25)		
=1 if conditioned to higher correction (+2D)		13.30		-
		(0.55)		
Starting bid (BDT.):				
400		**Base**		**Base**
600		25.68		74.40
		(0.34)		(0.11)
800		45.80		86.31*
		(0.10)		(0.07)
Occupation:				
Wage workers		**Base**		**Base**
Self-employed		184.96***		226.20*
		(0.00)		(0.06)
Garment workers		233.47***		227.62
		(0.00)		(0.14)
Service		132.23***		141.66
		(0.01)		(0.22)
Homemakers		148.30***		169.85
		(0.01)		(0.19)
Other		78.82*		167.33

VARIABLES	Household survey		Exiting patients	
	(1)	(2)	(3)	(4)
		(0.06)		(0.16)
= 1 if respondent reported having eye problem		-116.91***		-
		(0.00)		
Observations	1,560	1,560	558	558
P value in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

The first two regression models 1 and 3 do not include any independent variables for either sample sets (i.e. household survey and interviews of exiting patients). The value of the constant terms can be interpreted as the average WTP value for each group: BDT 596.84 ≈ 600 (USD 7.58) in the survey population, whereas WTP for actual patients diagnosed with refractive errors is BDT 847.40 ≈ 850 (USD 10.77) which represents a 42% increase (USD 3.19 on average). So, being diagnosed with refractive errors seems to increase the amount that people are willing to pay for spectacles. Interestingly, comparing average WTP with the average income of the respondents of both groups (i.e. household respondents and refractive error patients) reveals that both of the average WTP amounts are 4% of their monthly incomes, which represents a little more than a day's income (1.2 days) respectively.

Other factors associated with WTP for spectacles were age, gender, family income, education, occupation and ownership of land, television, and mobile phones. Female survey respondents were willing to spend BDT 134 (USD 1.70) less on average compared to males (P-val=0.00). WTP also decreased with respondents' age by an amount of BDT 36 (USD 0.05) for every additional year (P-val=0.00). Individuals with primary or higher level education were willing to pay BDT 155 (USD 1.97) more on average compared to those with no education (P-val=0.00). Respondents' WTP also increased by an average of BDT 134 (USD 1.70) per monthly income tranche of BDT 10,000 (P-val=0.00), but respondents' actual contribution to family income and the number of income earners in the family were not statistically associated with WTP. With regard to occupational differences, survey respondents working as wage workers and self-employed people (such as shop owners, landlords, etc.) were willing to pay BDT 185 (USD 2.35) more, whereas garment factory workers, other service holders and homemakers expressed higher WTP of about BDT 234 (USD 2.97), BDT 132 (USD 1.68), and BDT 148 (USD 1.88) respectively. All the coefficients with different occupational classes described above were found to be statistically significant at 1% level. Family size did not seem to be significantly associated with WTP. With regard to land ownership, members of households who owned land were willing to pay about 57 BDT (USD 0.74) more for each

additional decimal of land (P-val=0.00). Finally, members of households with a television and mobile phone were willing to pay about BDT 59 (USD0.77) and BDT 165 (USD 2.14) more on average for spectacles compared to members of households who did not own these goods.

We find no evidence of bias with regard to the elicitation method and format used for estimating WTP. There is no apparent anchoring effect as the coefficients for different starting bids are not statistically different (except for the starting bid of BDT 800 among actual patients at 10% level of significance). Nor is there any evidence of strategic bias with regard to spectacles, i.e. where individuals misstate their actual WTP in order to benefit from the services at a lower price ("free-riding"), although we found that survey respondents suffering with self-reported eye problems stated that they were willing to pay BDT 117 (USD 1.49) less than respondents with no eye problem.

3.3.4 Estimating demand curve for spectacles

Based on the number of accepted bids for different price intervals, histograms were constructed to show the extent to which respondents' WTP varies depending on the starting bid amount. Figure 2 depicts the percentage of accepted bids at different price intervals for the 1,560 respondents of the household survey, and figure 3 shows the results for the 558 patients prescribed with eye glasses by their doctors.

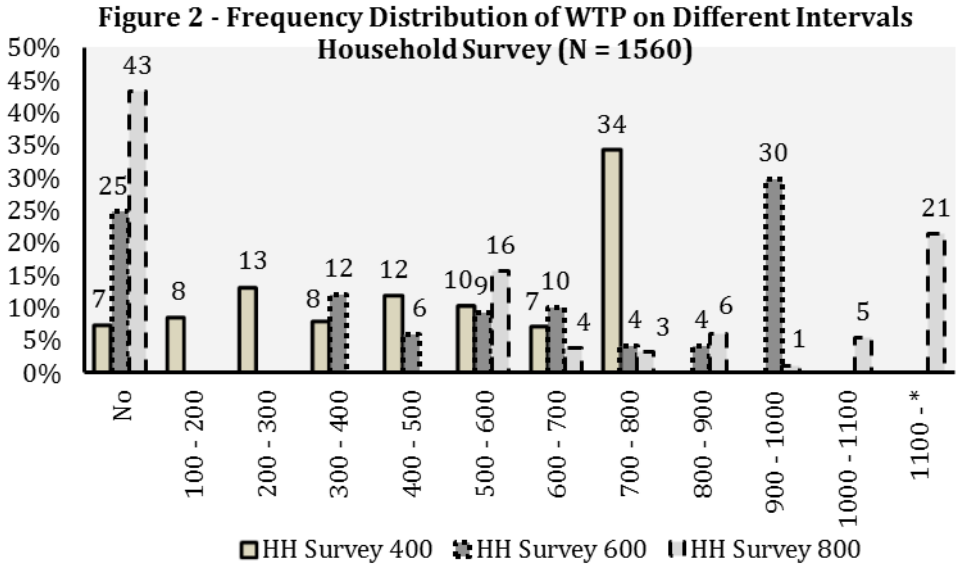
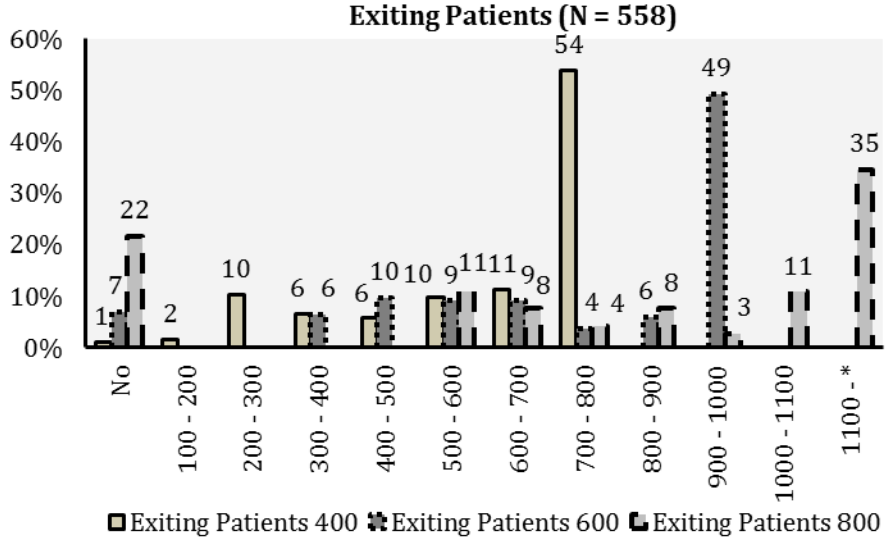
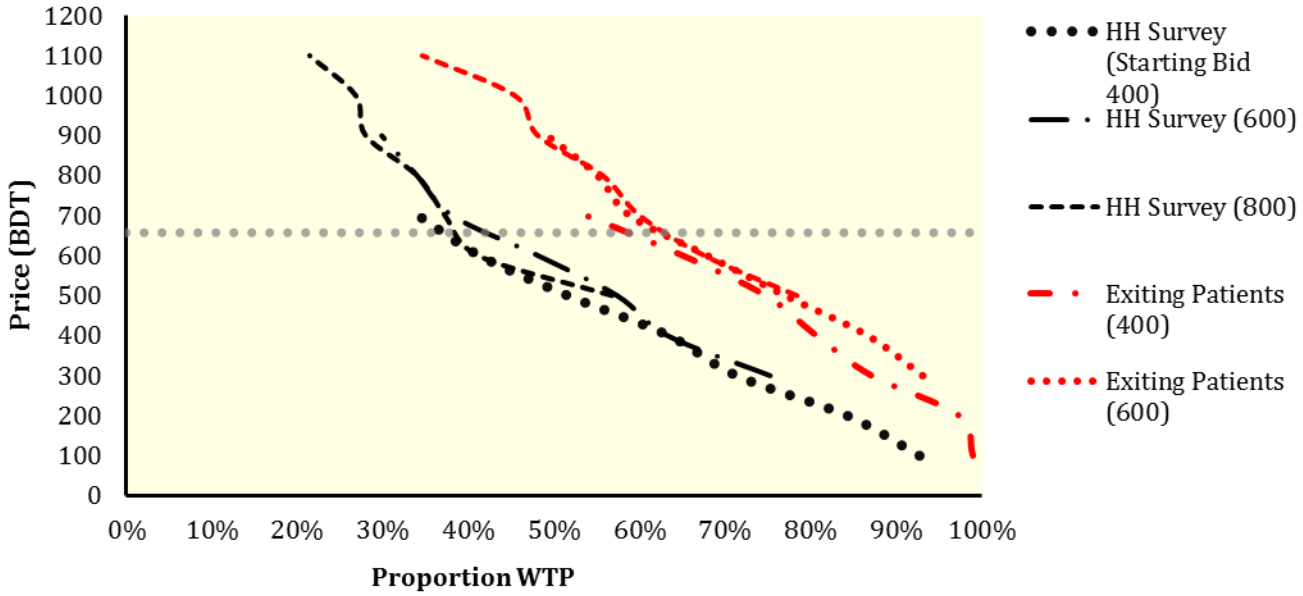


Figure 3- Frequency Distribution of WTP on Different Intervals
Exiting Patients (N = 558)



The results from the two experiments can be summarized by drawing two demand curves using WTP data for each of the three starting bids. Figure 4 shows the suggested demand curves for each sub-group (i.e. household survey and facility patients with prescribed glasses). We assumed that respondents would agree to pay any amount less than their stated maximum WTP. Since the exact WTP amount for each individual is not available, we used the percentage of respondents who would accept the offer against the lower bound of each price interval to draw the demand curves.

Figure 4: Hypothetical Demand Curves derived from WTP analysis



The suggested or hypothetical demand curves that we obtain have the appearance of a demand curve that is frequently encountered for normal goods (showing a decrease in demand associated with an increase in price), providing reassurance that WTP demand curves for eye glasses are not particularly unusual. At BDT 100 (USD 1.27), 93% of respondents in the household survey would be willing to pay that price for spectacles, while about 99% of patients with a prescription would be willing to pay that amount. The probability of buying eye glasses was the lowest (21.4%) when the offered price was BDT 1,100 for survey participants ,compared to refractive error patients (34.6%).

The difference between the hypothetical demand curves of the general population (household survey) and the actual refractive error patients (exit interviews) is substantive. A shift in demand can be assumed between respondents, eliciting WTP before and after being diagnosed with refractive error (and receiving a prescription for spectacles). Three demand curves overlap at the prices of BDT 300 to BDT 700 (with 75.2 % to 38.1% acceptance) for household respondents and BDT 500 to BDT 900 (78.4% to 49.2% acceptance) for exiting patients. Figure 4 also shows the average price of BDT 657.43 (USD 8.35), at which 356 randomly selected customers actually purchased their eye glasses (see details below). Comparing the WTP with the average price of BDT 657.43 (USD 8.35) that we obtain, shows what the equilibrium points may be at current market prices.

3.3.5 Actual transaction prices for eye glasses

Table 23 shows the actual transaction prices for spectacles, collected from 356 randomly selected customers exiting optic shops. It shows that 80% of customers who were interviewed paid between BDT 300 (USD 3.81) and BDT 900 (USD 11.43) for eye glasses. Among them, 138 customers (39%) paid between BDT 500 (USD 6.35) and BDT 700 (USD 8.89) and 83 customers (23%) paid between BDT 700 and BDT 900 (USD 8.89 – 11.43). Few subjects (5.3%) paid more than BDT 900 (USD 11.43), with a maximum amount recorded of BDT 2,200 (USD 27.95).

Table 23: Actual transaction prices for spectacles (n=356)

Purchased prices of frame and lenses (BDT)	Frequency	Percentage	Max	Min
Less than or equal to 300	31	8.71	300	150
Above 300 to 500	67	18.82	500	330
Above 500 to 700	138	38.76	700	550
Above 700 to 900	83	23.31	900	750
Above 900 to 1,100	19	5.34	1,050	950
Above 1,100	18	5.06	2,200	1150

3.3.6 Sources of payment

The source of payment reported by all three participant groups is presented in Table 24. For household survey participants and those interviewed at facilities, reported sources of payment are hypothetical, whereas for the customers of optical shops actual sources of payment are recorded. The majority of respondents intended or managed to use their income from the current month to cover the costs related to purchasing spectacles.

Table 24: Reported payment sources for spectacles

Source of payment (%)	Household survey (N = 1560)	Interview of exiting patients (N = 558)	Interview of optical shop customers (N = 356)
Income	64	87	86
Savings	18	4	8
Borrowing from relatives	16	8	6
Reducing expenditure	2	1	–

4.0 COMMENTS

The findings from this study provide a comprehensive picture of the demand and provision of eye care services for urban slum-dwelling communities in Dhaka. On the supply side, we looked specifically at the number, location and characteristics of eye care facilities. On the demand side, we explored eye health-seeking behaviour, barriers to accessing services, and WTP for spectacles. The main findings from the study are discussed below with regard to what we already know about provision

4.1 Eye care facilities mapping and assessment

A total of 715 facilities providing eye care services were identified within Dhaka City Corporation boundaries, including 23 specialized eye care facilities (3%), 412 general facilities or practitioners offering eye care services (58%) and 280 stand-alone optical shops (39%). The vast majority of these eye care facilities were operating as private for-profit entities (96%), with few private non-profit (3%) or public facilities (1%). Respectively, 21% and 22.5% of eye care facilities are providing outpatient and inpatient surgical services. It is however difficult to assess whether the

number of facilities and eye care services are adequate to address the need of the population as it requires more detailed information on facility activity (outputs), human resources for eye health (including mid-level ophthalmic personnel) and sub-specialties services and quality of care offered in each facility. When looking at national eye health statistics, Dhaka division performs relatively well compared to others. It has the lowest prevalence of blindness (Dineen et al., 2003) and the second highest cataract surgical rate (CSR) after Sylhet division, with respectively 1,052 and 1,302 surgeries performed per year and per million population. It is also above the national CSR of 957. Yet, this number is still below the CSR estimate of 1,500-2,000 required to address the incidence of cataracts, and the estimated 2,000-3,000 CSR needed to eliminate the backlog of unoperated cataracts (MHFW & BNCB, 2000). These figures may also hide intra-urban health differences between slum and non-slum dwellers as suggested by other studies conducted in Bangladesh (NIPORT, 2013).

In terms of location and access, the map shows an uneven distribution of eye care facilities across the city, with a concentration of facilities in a certain areas/wards. Nearly half of all eye care facilities in Dhaka City Corporation (47%) are concentrated in 10 wards out of 91. The wards with a high density of eye care facilities are also those with the lowest proportion of slum-dwellers. The distribution may have an impact in terms of access to eye care services for the poorest or most vulnerable population by increasing the distance and cost to access services. An inverse relationship between distance or travel time to health facilities and use of health services has been demonstrated to be an important barrier to access (Peters et al, 2008; Black et al, 2004). Although most of the slum areas identified in Dhaka would be within a 1.5-mile radius of a ward with a high concentration of eye care facilities, respondents in the survey still indicated that long distances between residence and facility, time required to travel to a facility and long waiting times were barriers to accessing services during IDIs and FGDs. Interviews with 1,114 patients exiting five selected eye care facilities in Dhaka show that the travel time required to reach these facilities was three hours and 18 minutes on average; journey times for city residents averaged 57 minutes compared with seven hours and 50 minutes for patients travelling from outside Dhaka. Transport expenditure was an important component of patient costs, amounting on average to BDT 104 (USD 1.35) for city residents and BDT 963 (USD 12.5) for patients coming from outside Dhaka.

In terms of access to eye care services for the poorest section of the population, 64% of facilities providing eye care services (including optical shops) reported having some mechanisms in place to facilitate their access, mainly by offering free or subsidized service to low-income patients.

However, no data was available on the proportion of low-income patients actually benefiting from these mechanisms. Financial constraint was the main reason given by survey respondents for not seeking care services or not complying with the recommended treatments. Only 15% of respondents reported having received eye care for free; 79% paid fees using their monthly income and 7% had to sell assets or borrow money to obtain eye care services. Patients exiting facilities reported paying BDT 1,663 (USD 21.6) on average to receive eye care services, including medical and non-medical expenditures, but this amount varies based on the patient's diagnostic, treatment procedure and whether they come from inside/outside Dhaka.

Survey respondents who expressed dissatisfaction with care complained about the attitude of health care providers and long waiting times.

4.2 Eye care-seeking behaviour

Eye care morbidities are common among slum-dwellers, with nearly half of respondents self-reporting an eye problem at the time of the survey. The most prevalent conditions were poor vision (61.5%), lacrimation (27.5%) and allergy/infection or inflammation of the eye (43.7%). This is in line with findings from the baseline study conducted for the Dhaka Urban Comprehensive Eye Care (DUCEC) project, where the two most prevalent eye problems were visual impairment (52%) and lacrimation (12%), (Ali et al, 2009). Studies from other low- or middle-income countries show also that these conditions are the most commonly reported eye problems, in addition to symptoms associated with allergy, infection or inflammation of the eye: itching of eye, red eye, eye ache, burning sensation, etc. (Senyonjo et al, 2014; Ocansey et al, 2014).

Yet, 76% of respondents with self-reported eye problems had not sought any treatment at the time of the survey. Reasons for not seeking treatment included financial constraints, not considering the problem to be important, lack of time, not knowing where to go for treatment, fear of treatment/surgery/complication and having no one to accompany (especially in the case of women). A study conducted in rural Andhra Pradesh, South India, among the visually impaired population, found similar reasons for not accessing treatment for eye problems (Kovai et al., 2007). Although the eye is considered to be a vital organ because of its relation to vision, which is generally considered as the most important sense, people do not necessarily seek prompt treatment for eye problems (Hayden, 2012). Delaying treatment for eye conditions was found to be

a strategy commonly used among survey respondents. From the qualitative study, we found that people tend to ignore eye problems for as long as they can. Lack of information about eye diseases was reported as one of the reasons for delaying treatment since eye care is given a low priority among competing health and non-health needs. From the qualitative study, it was evident also that previous experience in health care facilities and behaviour of the staff and doctors played an important role in the utilization of eye care facilities.

In terms of factors associated with eye care-seeking behaviours, we found that gender and education were significantly associated with seeking treatment for eye conditions. Women were more likely to seek treatment compared to men (OR=1.38, P-val.=0.041), and the same was observed for respondents with formal education compared to those without (OR=1.42, P-val.=0.008). Generally, it is assumed that health care-seeking behaviour is related to the type or severity of illness, but no statistically significant association was found in our study. Also, respondents engaged in income-generating activities were also less likely to seek treatment in univariate analysis ($p<0.05$), but this association is no longer significant after controlling for other factors. This may be explained by the strong association between gender and occupation (99% of homemakers were female). Among survey respondents who sought treatment for their eye condition, 86% visited a qualified or specialist health care provider at a fixed facility or outreach camp as their first choice. We found that about 1 in 8 respondents (13%) visited an informal care provider as a first point of contact. These findings differ from other research conducted in Bangladesh on health-seeking behaviour and choice of health care provider for different diseases such as diarrhoea, tuberculosis, and maternal morbidity. Almost all these studies show that informal health care providers are more commonly chosen over the formal ones (Larson et al., 2006; Ahmed et al., 2009; Hossain et al., 2014). Another study on the use of health care services in Dhaka's urban slums and adjacent rural areas (Khan et al., 2012) shows that pharmacies or drug stores are the most popular choice for treatment seeking in both urban and rural areas in Bangladesh. Indeed, we find that when respondents sought eye care services from informal providers, pharmacy attendants (drug sellers) were the most common source of care.

Over 80% of respondents reported that they complied with the treatment recommendation, and the most frequent reason given for non-compliance was financial constraint (50%). Compliance with a prescribed treatment changed according to the type of treatment. During IDIs, participants indicated that they preferred medicine over surgery and spectacles, and this is reflected in compliance rates. During qualitative interviews, some respondents mentioned that there was some

stigma associated with wearing spectacles. Participants reported that one could be mocked and discriminated against for using glasses. These findings are remarkably similar to studies in India. A study on low uptake of eye care service in rural India reported a high level of compliance for medication and less for surgery and glasses. They found that fear of surgery was a major barrier even among people whose eye problem did not require surgery but whose perception of possible treatment recommendations included this outcome (Fletcher et al, 1999). In another study (Balasubramaniam et al., 2013), parents expressed their reluctance to make their children wear glasses, especially if the child is a girl, as it is considered to be cosmetically unappealing. In our study, no gender component was found regarding the stigma associated with wearing eye glasses, but age came out as an important factor in this matter. Use of spectacles by old patients seemed to be more acceptable in the community, whereas it was not considered normal for young people to be wearing them.

When participants in IDIs and FGDs were asked to identify factors that would enable patients to seek eye care treatment, they mentioned: the opportunity to get appointments at convenient times, accessing free or subsidized services (including spectacles), and having facilities closer to their home. Other suggestions made by community members included establishing good quality eye care services, arranging health camps close to peoples' homes, arranging awareness campaigns, providing free treatment and disseminating eye care information.

4.3 Willingness-to-pay (WTP) study

In this study we focused on eliciting the WTP for refractive error correction (spectacles) targeting urban slum communities. WTP and contingent valuation methods have been used successfully in developing countries to assess the demand for specific health services and the potential for cost-recovery (Foreit and Foreit, 2003; Yeung and Smith, 2005; Prata et al. 2013; Tamiru et al., 2014). Refractive error correction (using spectacles) is a cost-effective intervention which can lead to substantial improvement in quality of life (World Health Organization, 2007). This type of analysis is very relevant as spectacles are often seen as a private good, and hence have been considered a low priority by governments. As a consequence, spectacles are often provided by private organizations (for-profit and NGOs) and the question of pricing or cost recovery is very important for the sustainability of these services.

Our findings suggest that individuals living in the urban slums of Dhaka are willing to pay for spectacles, and the average WTP amount is BDT 597 (USD 7.76), representing 11.3% and 4% of average individual and household income respectively. To put this into context, it represents about one and half times the daily wage rate for a low- to semi-skilled worker in Dhaka (HIES, 2010). The WTP increased for individuals who had actually been diagnosed with refractive errors, with an average value of 847 BDT (USD 11). This difference remained even after using statistical matching techniques based on a set of respondents' characteristics. Other factors determining WTP for spectacles were age, gender, family income, and education. Female respondents were willing to spend BDT 134 (USD 1.70) less on average compared to males (P-val.=0.00); individuals with primary/higher education were willing to pay BDT 155 (USD 1.97) more compared to those without formal education (P-val.=0.00). Respondents' WTP also increased by an average of BDT 134 (USD 1.70) based on a monthly income tranche of BDT 10,000; but it decreased for older respondents by BDT 36 (USD 0.05) on average for every additional year (P-val.=0.00).

It is important to note that respondents in our household survey were found to be poorer than the average urban population, but this is not necessarily the case when considering the entire population of Bangladesh. This is in line with findings from the 2006 Bangladesh Health Survey, where women and men in the slums were found to be poorer than their counterparts in non-slums or district municipalities. Yet, when compared to the general population in Bangladesh, 60% of survey respondents belonged to the richest quintile (20%) of the population. This finding may seem counter-intuitive initially, but is plausible when considering that, nationwide, more than half of the population (55%) residing in urban areas is in the highest wealth quintile, compared with 9% in rural areas. Among the administrative divisions in Bangladesh, people living in Dhaka are more likely to fall within the highest wealth quintile than people living in other divisions (DHS Bangladesh, 2011).

Our findings indicate that there is a potential to use cost recovery and market-based approaches for providing spectacles to slum-dwellers in Dhaka.. The approach that we used in this study (i.e. contingent valuation with simulation of refractive error) appears to produce reliable and valid WTP estimates and can be used by development practitioners and other stakeholders to make pricing decisions for spectacles. WTP varies according to individuals' characteristics and adjustment in prices could potentially lead to an increase in uptake of services. The capacity to pay for spectacles also varies greatly among slum-dwellers and financial access to eye care services continues to be an issue, as evidenced in the household survey and qualitative study. This means

that there is still a need for offering spectacles at no fees or at a subsidised price, and better mechanisms for identifying those who cannot afford to pay are required to enable the poorest to access eye care services.

5.0 CONCLUSION

This study provides a valuable insight into demand and provision of eye care services among slum-dwellers in Dhaka. The study shows that there is a high proportion of ocular morbidities in Dhaka's slum population, and many slum-dwellers would benefit from accessible eye care services. The demand for services however is low and constrained by both individual and community factors, including knowledge and education, direct and indirect costs of services and perception of treatment in the light of other competing needs. Although issues on the supply side in Dhaka may be less problematic than in rural areas of Bangladesh, the unequal distribution of services and the high number of private for profit providers have an impact on access to eye care services for the poorest or most vulnerable populations by increasing the distance and costs of access. It is also clear that the lack of awareness and low priority given to eye care are important factors influencing health seeking behaviour of slum-dwellers. More emphasis should be given to awareness campaigns and changing behaviour/attitudes in order to increase service uptake. Our study also shows that slum-dwellers are not a homogeneous community. Our study on WTP for spectacles indicates that slum-dwellers are willing to pay for spectacles, although this amount varies depending on respondent characteristics. Slum-dwellers in Dhaka are not necessarily the poorest individuals when compared to the rest of the population of Bangladesh. A market-based approach to delivering spectacles to slum-dwellers seems to be a viable option that needs to be explored further. However, mechanisms for identifying the poorest individuals and enabling them to access eye care services remains crucial. The WTP approach used in this study prove to be a useful tool to accurately estimate communities WTP for a health commodity; despite certain reservations in the literature about the use of such approach in lower socio-economic groups. We recommend replicating this approach in other studies of health seeking behaviour and demand for eye care services. The findings of this study should be used as the evidence base for future policies and programmes to increase the uptake of eye care services by urban slum-dwellers, particularly the poorest among them.

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Captured moments

Picture 1: Focus group discussion

Picture 2: In-depth interview

Picture 3: Household in a slum community