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Version: Accepted Version

Article:
Hasan, M.Z., Webb, E.J.D., Quayyum, Z. et al. (2026) Preferences for Primary Healthcare Providers Among Urban Slum Dwellers of Dhaka City in Bangladesh: A Discrete Choice Experiment. Applied Health Economics and Health Policy. ISSN: 1175-5652

https://doi.org/10.1007/s40258-026-01076-w

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Title: Preferences for Primary Healthcare Providers Among Urban Slum Dwellers of Dhaka City in Bangladesh: A Discrete Choice Experiment

Running heading: Preferences for Primary Healthcare Providers among Urban Slum Dwellers

Authors: Md. Zahid Hasan[1,2,3], Edward JD Webb[2], Zahidul Quayyum[1,4], Tim Ensor[1]

Affiliations

[1] Nuffield Centre for International Health and Development, Leeds Institute of Health Sciences, University of Leeds, Leeds, West Yorkshire, Leeds, LS2 9NL, UK

[2] Academic Unit of Health Economics, Leeds Institute of Health Sciences, University of Leeds, Worsley Building, Clarendon Way, Leeds, LS2 9NL, UK

[3] Health Economics and Financing, Health Systems and Population Studies Division, icddr,b, Dhaka, 1212, Bangladesh

[4] BRAC James P Grant School of Public Health, BRAC University, Dhaka, Bangladesh

***Corresponding author**

Md Zahid Hasan, PhD

Postal address: Leeds Institute of Health Sciences, University of Leeds, Worsley Building, Clarendon Way, Leeds, LS2 9NL, UK

Email address: m.z.hasan@leeds.ac.uk; md.zahid@icddrb.org

ORCID: 0000-0002-3824-8947

Statement and Declaration

Conflict of interest

Md. Zahid Hasan, Edward J. D. Webb, Zahidul Quayyum and Tim Ensor have no conflicts of interest that are directly relevant to the content of this article.

Ethical Approval

This study was approved by the School of Medicine Research Ethics Committee, University of Leeds (MREC 22–038) and by the Institutional Review Board of James P. Grant School of Public Health, BRAC University, Bangladesh (IRB-22 December22-076).

Funding

This study is a part of a PhD project under the Community-led Responsive and Effective Urban Health Systems (CHORUS) Research Program Consortium, funded by Foreign, Commonwealth and Development Office (FCDO) with Grant Number: 301132.

Acknowledgements

The authors are thankful to the Chief Health Officer, Dhaka North City Corporation and Director General Health Economics Unit, Ministry of Health and Family Welfare of the Government of

Bangladesh for their support to conduct the study. The authors are also grateful to the data collectors who helped in conducting the survey.

Data availability

Data will be made available on reasonable request to the corresponding author.

Consent to participate

Informed written consent was obtained from all the participants prior to the interviews, ensuring confidentiality and anonymity at every stage of the study.

Code availability

The Apollo (R) and Stata code used to estimate the models reported in this paper is available from the corresponding author on reasonable request.

Consent for publication

Not applicable. The manuscript contains no individual-level details, images, or videos from which any participant could be identified.

Authors' contributions

MZH conceptualised the study, developed the DCE instrument, supervised data collection, conducted the analysis, and drafted the manuscript. EW provided technical guidance on the experimental design, choice modelling, and analysis. EW, ZQ, and TE contributed to the development of the DCE instrument, the survey implementation plan, and the interpretation of findings. All authors critically revised and approved the final manuscript.

Abstract

Background and objective: Strengthening the urban primary healthcare system is essential for delivering need-based services to the rapidly growing low-income urban population in Bangladesh. This study examined the preferences of slum dwellers for primary healthcare providers under hypothetical minor- and major-illness conditions.

Methods: A discrete choice experiment was conducted among 304 slum dwellers in Dhaka, Bangladesh, in January–February 2024. Six final attributes (time to reach healthcare centre, waiting time to see a provider, recommendation from neighbours/relatives, type of healthcare provider, consultation fee and medicine expenditure) were identified through a systematic review, focus group discussions and key informant interviews, and finalised through a community ranking exercise and expert consultation. A Bayesian D-efficient design was used to construct choice sets, each presenting two hypothetical primary healthcare providers and an opt-out option; respondents completed each choice set for minor and major illnesses. Data were analysed using mixed logit models (in preference and willingness-to-pay space), relative importance analysis and latent class analysis.

Results: Consultation fee had the highest relative importance for minor illness and type of healthcare provider for major illness. An MBBS/qualified doctor for minor illness and a senior/experienced doctor for major illness were strongly preferred over non-qualified providers. Utility decreased significantly with longer travel time (60 min) and waiting time (30 min), and higher consultation fees ($p<0.001$). Compared with no recommendation, a negative recommendation significantly reduced utility for major illness, and a positive recommendation significantly increased utility for minor illness. Free medicines and a 50% discount on medicines significantly increased utility relative to no discount in both conditions ($p\leq0.004$), with higher utility for free medicines.

Conclusions: Consultation fee was the most important attribute for minor illness and provider type for major illness; respondents also valued qualified providers, shorter travel and waiting times and free or discounted medicines. Deploying qualified doctors in accessible community facilities, reducing consultation fees and subsidising medicines may improve the uptake of primary healthcare among urban slum dwellers in Bangladesh. These findings can inform patient-centred primary healthcare policy for low-income urban populations.

Keywords: Primary healthcare, Patient preferences, Bangladesh, Urban health, discrete choice experiment.

Key Points for Decision Makers:

1. This study reveals that in primary healthcare provider choice among urban slum dwellers, provider type was strongly valued for both minor and major illness, while consultation fee mattered most for minor illness.
2. Provider preferences differ with illness severity: qualified doctors are most valued for minor illness, while senior/experienced doctors are strongly preferred for major illness.
3. The study provides new evidence that despite consistent average preferences for free or discounted medicines across illness conditions, substantial heterogeneity exists in how slum dwellers prioritise healthcare attributes.
4. The findings highlight the need for targeted policies to improve access to qualified healthcare providers and affordable medicines in urban slum areas of Bangladesh.

1. Background

Rapid and uncontrolled urbanisation poses challenges for urban primary healthcare (PHC) systems in many low-and middle-income countries (LMICs) in meeting the growing healthcare demand of the urban population, especially among vulnerable groups [1]. Like many other LMICs, Bangladesh is undergoing rapid urbanisation, with 38% of its population now residing in urban areas [2]. This shift places increasing pressure on the urban health service delivery system, which is further exacerbated by the absence of a robust and organised urban PHC system [3]. Public PHC in urban areas is mainly delivered through contracting out to non-government organisations (NGOs) under the Urban Primary Health Care Services Delivery Project, with at least 30% of services free to the poor along with essential medicines. Moreover, out-of-pocket (OOP) payments for healthcare account for around 68.5% of total health expenditure in Bangladesh, which is considerably higher than in many developed and developing countries [4]. Obtaining good quality care at an affordable cost remains a significant concern for the growing low-income urban slum population due to poverty, lack of awareness, and limited access to formal healthcare services [5]. Notably, compared with their non-slum counterparts, a higher proportion of slum dwellers often do not seek treatment for their illness [6]. With an estimated 3.5 million people living in urban slums across the country, addressing the healthcare needs of this vulnerable population is crucial for achieving universal health coverage (UHC) by 2032 [7]. To address these healthcare needs, the urban PHC system needs to be restructured. Such reform, guided by the preferences of the low-income populations, can enable policymakers to create a more efficient and tailored PHC service delivery system.

Various techniques are employed across different disciplines to understand preferences for goods or services, including both revealed- and stated- preference methods. Stated preference approaches encompass discrete choice experiments (DCEs), which are used to examine the preferences for various attributes of goods or services, capturing the trade-offs that revealed preference data, based on observed behaviour, cannot isolate [8,9]. With growing popularity in health-related research, DCEs are increasingly used to understand preferences, prioritise health interventions, and inform healthcare policy and planning [10]. Several studies have explored patients' preferences for healthcare providers and facilities across various contexts using DCEs [11–13]. However, literature on the preference for PHC providers in LMICs is limited and primarily focused on specific populations or disease groups, notably among hypertensive patients in Ghana [14], paediatric conditions in Malaysia [15], and acute respiratory tract infections in China [16]. Only a few studies have employed DCE methods to understand the factors behind the choice of providers among urban residents in different countries, including China [17,18] and India [19,20]. However, there is a notable gap in examining the preferences for healthcare providers in Bangladesh, particularly focusing on the urban low-income population. While, to our knowledge, no DCE has examined provider preferences in this population, several studies have reported that the urban poor in Bangladesh predominantly seek care from informal providers such

as drug sellers, driven by proximity, low cost, and short waiting times [21–23]. However, such revealed-behaviour data cannot isolate the relative importance individuals place on competing provider attributes or quantify the trade-offs they are willing to make.

Identifying how people value different healthcare attributes and understanding their choice behaviour are crucial for the efficient design and delivery of need-based healthcare services [24,25]. Thus, this study aimed to examine the preferences of urban slum dwellers for PHC providers in two selected slums in Dhaka, Bangladesh.

2. Methods

2.1 Study design

The data collection was conducted from January to February 2024 in two purposively selected slums of Dhaka City, namely Korail and Mirpur. During data collection, Korail had 12,748 households (separated into ten blocks) with approximately 48,070 members, and Mirpur had 8819 households (separated into 27 blocks) with 32,213 members, according to unpublished 2024 urban health and demographic surveillance system data from the International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b).

2.2 Development of DCE

2.2.1 Identification of study attributes

Following the general framework for instrument development proposed by Janssen et al. [27], we adopted several approaches to identify the attributes, which have been described in another paper by Hasan et al. (under review) on developing DCE choice sets in low-income settings [28]. In brief, we first conducted a systematic literature review to identify attributes used to understand the preferences (both revealed and stated preferences) of urban low-income individuals for PHC providers. We also conducted four focus group discussions (FGDs) with slum dwellers (two with males and two with females) to understand their experiences with illness, sources of seeking healthcare, and priorities while visiting a healthcare provider. Finally, we conducted eight key informant interviews (KIIs) with four healthcare providers, two facility managers, and two programme managers related to urban PHC services to gather insights and policy relevance on the attributes that influence PHC preferences in the urban population. Together, these approaches provided a comprehensive understanding of the factors that shape healthcare decision-making among urban low-income individuals, informing the design of our DCE study.

2.2.2 Selection of attributes

The identified attributes from the systematic review (the complete review had 203 mentions of attributes from quantitative studies) [29], FGDs, and KIIs were grouped into different themes based on their

common characteristics and functionality. These attributes were compiled into a consolidated long list of 25 attributes which deliberately retained overlapping and closely related items to support discussion among the research team (Supplementary Table A1). Through discussion and contextualisation, overlapping items were merged, for example, distance and travel time, different components of costs (medicines and diagnostics), reducing the number of attributes to 12. To understand the priority of attributes among community members for further reduction, we conducted priority-setting exercises with 15 community members in two separate sessions with these 12 candidate attributes. We had four consultation meetings with urban health experts and academics to gather their opinions on the most relevant attributes to be included in the choice sets. We also verified the relevance of attributes and levels in the context of urban low-income individuals and the PHC system. Based on the findings from expert consultation and the priority setting exercise, six final attributes were selected. During expert consultation, the 'cost of care' attribute was split into two separate attributes, consultation fee and medicine expenditure, for a better understanding of the context [28]. However, this split did not introduce new attributes beyond what had already been found during the literature review and FGDs, rather it reinstated components that had been consolidated during attribute reduction. This co-design of the DCE helped ensure that the attributes included in the DCE study accurately reflected the needs and preferences of the target population.

2.2.3 Designing choice sets for DCE survey

The selected six attributes included ‘time to reach healthcare centre’, ‘waiting time’, ‘recommendation from neighbours/relatives’, ‘type/qualification of healthcare provider’, ‘consultation fee’, and ‘medicine expenditure’. The attributes and their corresponding levels used in developing choice sets are shown in Table 1**.** Five of the six selected attributes were assigned three levels, while the consultation fee attribute was assigned four levels. Most attributes were assigned three levels to capture non-linear preferences and limit the cognitive burden on respondents. The consultation fee was assigned a fourth level to reflect the actual consultation fee gradient identified during the FGDs, with a ‘0 BDT’ level added following expert consultation. A Bayesian D-efficient design was used to construct choice sets using NGene [30]. The prior parameters of each attribute level in NGene were assumed to be close to zero, with the expected sign corresponding to the preference (e.g., -0.001 or 0.001). We constructed 40 choice sets and then divided them into four blocks. This kept each respondent's burden manageable while providing enough choice situations to estimate all attribute-level parameters. Each block contained 10 choice questions, which were used to conduct the DCE considering two hypothetical states of illness, i.e., minor and major illness. We included two states of illness in our DCE design because, during FGDs, it was revealed that people had different preferences for providers based on their perceived severity of illness. Previous studies also revealed that the perceived severity of an illness significantly influences how patients prioritise different healthcare service attributes [18,31,32]. For instance, factors such as cost, waiting time, or proximity might be weighed differently depending on

whether the patient perceives their condition as minor or major. When faced with minor illnesses, patients are often more likely to choose the opt-out option, preferring self-care or home remedies over professional healthcare services [33].

In each DCE task, participants were shown two hypothetical PHC providers (i.e., Healthcare centre A and Healthcare centre B) and an opt-out (local pharmacy or stay at home). The respondents made two choices for each of the sets, first imagining they were seeking care for a minor illness, and then for a major illness. Both conditions were presented using standardised symptom descriptions, which were identified during the FGDs, to provide a common reference point. We did not measure each respondent's own perception of the severity of these descriptions. A minor illness was described by symptoms such as fever, cough, mild pain, or a headache. On the other hand, a major illness was described as any condition that might be more serious than a minor illness or makes the respondents feel worried and anxious about their health condition. In addition to the ten choice sets, the survey instrument included a dominant choice set to check whether the responses were rational during the survey. Furthermore, to reduce position bias, we manually varied the attribute order in each block of the choice sets.

(Table 1 to be inserted here)

2.3 Data collection

2.3.1 Sample size and selection of the respondents

The minimum sample size for the DCE study was estimated following the rule of thumb proposed by Johnson and Orme for conjoint analysis: N > 500c / (t x a). To estimate the main effects, the sample size (N) is dependent on the number of choice tasks (t), the number of alternatives per task (a), and the highest number of levels of any attribute (c) [34,35]. Following the formula, the estimated minimum sample size was 100. However, to get more precise estimates on the effect parameters, we aimed to conduct a total of 300 interviews during the data collection period. The respondents were selected using a systematic random sampling technique from the selected slums. We selected 9 out of 10 blocks in Korail slum (excluding block one where the data collection tools were piloted) and 11 out of 27 blocks in Mirpur slum, each with at least 300 households. Households in slum areas are often not separated as they are in non-slum areas, with multiple families living in one house. Nearly three-fourths of slum families live in a single room, sharing toilets, bathrooms, and water sources, and having limited access to basic amenities [7]. We used an interval of 45 households (about one household in every four houses) to select a household for an interview. If a selected household did not agree to participate in the interview, we approached another household in that house or the next house.

The data collection tool included DCE choice sets and questions on socioeconomic characteristics of the respondents and their households, including gender, age, marital status, education, occupation, household size, and monthly household income. The survey also collected information on the number of children under five in the household, the illness status of household members over the last six months,

and respondents' experience of seeking healthcare in the last six months prior to the survey either for themselves or when accompanying household members/friends/relatives. The collected information served two purposes: first, to evaluate the representativeness of the respondents, and second, to understand if any household or individual factors influenced preferences. The instrument was pretested in a slum adjacent to, but outside, the study site, focusing on the comprehension of the attributes, levels, and choice scenarios among the low-literacy populations. The instrument was refined iteratively during the pretesting. The full details of the pretesting are reported in the attribute-development paper [28].

Data were collected through face-to-face interviews using hypothetical scenarios presented on Q-cards (Figure 1). Before starting choice tasks, interviewers explained every attribute and its levels on Q-cards along with their meaning using a standardised written script (Supplementary Text A1). This approach enhanced respondent engagement and reduced survey completion time. Five research assistants, supervised by a researcher, conducted the interviews and collected socioeconomic data. They underwent four days of training to ensure consistency and reliability in the data collection process. The data collection was piloted for three days to identify any potential issues with the data collection instrument, and necessary adjustments were made before the actual data collection began. Furthermore, regular check-ins and debriefing sessions were held to address any issues or concerns arising during the interviews.

Figure 1. A sample of a choice set

2.4 Data analysis

The analysis of the DCE data was carried out using the Apollo choice modelling package for R [36]. A random parameters logit model was used to estimate the utility function for two different conditions: minor illness and major illness. The coefficients reflected the preference weights of the attributes or levels for choosing healthcare centres for major and minor illnesses. Equation 1 represents the utility function for both major and minor illness conditions. The opt-out, although offered in both conditions, was never chosen under major illness, so the opt-out function (Equation 2) was estimated only for minor illness. The two functions were specified as follows:

$$U_{njt} = \beta 1 \cdot TravelTime_{njt} + \beta 2 \cdot WaitTime_{njt} + \beta 3 \cdot TypeProvider_{njt} + \beta 4 \cdot Recommend_{njt} + \beta 5 \cdot ConsultFee_{njt} + \beta 6.MedicineCost_{njt} + \varepsilon_{njt} ---------- (1)$$

β1-β6 are the estimated parameters associated with respective attributes for individual *n*, alternative *j*, and in choice situation *t*.

$$U_{n0t} = \beta_0 + \varepsilon_{n0t} ---------- (2)$$

Where β_0 is the alternative-specific constant for the opt-out option.

- It captures the intrinsic preference for the opt-out option relative to a healthcare provider over and above the differences captured by the attributes.
- If β_0<0, it implies that (on average) the opt-out option is less preferred than choosing a healthcare provider with the baseline characteristics of each attribute.

A model in willingness-to-pay (WTP) space [37] was estimated using the following utility function in Apollo.

$$U_{njt} = -\lambda n.C_{njt} + \sum_{k=1}^{K} WTP_{kn}.X_{knjt} + \varepsilon_{njt} -------- (3)$$

U_{njt}: $Utility\ of\ respondent\ (n)\ for\ alternative\ (j)\ in\ choice\ task\ (t)$

C_{njt}: $Cost\ attribute\ (consultation\ fee\ )$

λ_n: $Scale\ parameter\ for\ individual\ (n)$

WTP_{kn}: $Marginal\ willingness\ to\ pay\ for\ attribute\ (k)\ for\ individual\ (n)$

X_{knjt}: $Attribute\ (k)\ value\ for\ alternative\ (j), respondent\ (n), choice\ (t)$

ε_{njt}: $error\ term$

Each choice task was treated as a single observation with attribute levels varying across choice sets. As each respondent completed multiple choice tasks, the model used a panel specification that held random parameters for everyone as constant across their choice tasks. Attribute differences in the choice sets were captured using a main-effects model. The relative importance of each attribute was determined by

comparing the difference between the lowest and highest coefficients for that attribute. For consultation fee, this difference was the absolute value of the coefficient multiplied by the range of fee levels. This difference was then divided by the sum of all such differences across all attributes to estimate the relative importance [38].

2.4.1 Latent class analysis

To identify patterns of respondent preferences, a latent class analysis (LCA) was conducted with up to six latent classes separately for minor illness and major illness conditions. The final model selection was guided by the Bayesian information criterion (BIC) statistics [39] and implemented using the lclogit command in Stata 17. The standard errors and inferential statistics were obtained through parameter maximisation using lclogitml [40]. Additionally, the posterior probabilities of class membership were estimated for each respondent. The LCA included all attributes as categorical, except the consultation fee, which was included as a continuous variable. We assessed the influence of socio-economic characteristics on class membership by including age (continuous), gender (reference: female), healthcare seeking experience in the last six months (reference: no), presence of a sick household member in the previous six months (reference: no), and natural log of household income. Each respondent's modal class membership was cross-tabulated across the minor- and major-illness conditions and tested for association using a chi-square test **(Table A2).**

2.5 Patient and Public Involvement

Patients and the public were involved in the design of this study. Urban slum dwellers participated in four FGDs and a ranking exercise (15 participants) to identify and refine the healthcare attributes included in the DCE.

3. Results

Table 2 shows the socioeconomic characteristics of the respondents. A total of 304 respondents were interviewed from the Mirpur and Korail slums (152 from each). More than half of the respondents were aged between 18 and 34 years. About 60% of them were female, and 87% were currently married. About 32% of the respondents did not have any institutional education, whereas only about 4% had education above the higher-secondary level (e.g., completed graduate or equivalent studies). In terms of occupation, the largest proportion of the respondents were housewives (36%). Most of the respondents (58%) belonged to households with two to three members. About 46% of the interviewed households had at least one child under five. About 29% of the households had a monthly income of less than BDT 15,000, whereas 20% had an income of more than BDT 33,000. Almost all interviewed households (93%) had at least one sick member in the last six-month period. About 52% of the respondents mentioned that they had experience of visiting a healthcare provider in the previous six-

month period either for their own illness or to accompany friends or relatives. In the case of minor illness, about 28.6% of the time, participants chose to opt out; for major illness, the opt-out option was never chosen out of 3,040 choices (not shown in the table).

(Table 2 to be inserted here)

3.1 Findings from the Mixed Logit Model

Table 3 shows the utility coefficients for the two hypothetical conditions of perceived severity of illness: minor illness and major illness. The coefficients demonstrated the impact of attribute levels on the choice of PHC options under two hypothetical perceived conditions. The sign of a coefficient indicated the negative or positive impact of the levels of the attribute on the utility of the alternatives. We found that most of the attributes significantly influenced choices in both conditions, with a few exceptions. For minor illness, '15 minutes of waiting time' (p=0.648) and 'negative recommendation' (p=0.300) were not statistically significant. For major illness, the negative utility of '30 minutes to reach a centre' (p=0.995) and the positive utility of 'positive recommendation' (p=0.205) were not statistically significant.

The negative signs of coefficients for longer travel time, waiting time, negative recommendation, and higher consultation fees indicated negative utility, reflecting that respondents preferred healthcare centres with shorter travel time, shorter waiting time, no negative recommendation, and lower consultation fees. It is interesting to note that for the minor illness condition, '15 minutes of waiting time' did not differ significantly from 'seen immediately' (p=0.648) but showed significantly negative utility in case of major illness (p<0.05). Similarly, in the minor illness condition, respondents had significant utility loss for travel time of '30 minutes to reach a centre' compared with '15 minutes to reach a centre'. However, the utility loss was not statistically significant for major illness conditions.

'Positive recommendation' was significantly valued compared with 'no recommendation' for minor illness conditions; however, the utility gain for 'positive recommendation' in major illness was not statistically significant. Regarding consultation fees, the coefficients were negative and statistically significant in both major and minor illness conditions, indicating that respondents consistently preferred lower consultation fees, regardless of the severity of illness. Finally, the utility gain in a '50% discount on medicines' and 'free medicines' was significantly higher than for 'no discount on medicines' in both minor illness and major illness conditions. Importantly, the utility of 'free medicines' was higher than that of a '50% discount on medicines'.

(Table 3 to be inserted here)

Figure 2a illustrates the relative importance of healthcare provider attributes for perceived minor illness. Respondents placed the highest importance on consultation fee, followed by type of healthcare provider, travel time to reach a healthcare centre and medicine expenditure. Although the MBBS/qualified doctor level had the largest coefficient of any attribute level, consultation fee ranked highest because its effect accumulates across the full fee range (BDT 0–500). Figure 2b presents the relative importance of attributes for perceived major illness. Respondents prioritised type of healthcare provider, followed by consultation fee, medicine expenditure and travel time to reach a healthcare centre.

Figure 2. Relative importance of attributes in different illness conditions. (to be inserted here)

3.2 Willingness-to-Pay (WTP) Estimates for Major and Minor Illness Conditions

The WTP estimates (Table 4) for minor illness conditions showed that increased travel time significantly reduced the utility of the respondents. A travel time of '30 minutes' decreased WTP by BDT 44.31 (p=0.003), while '60 minutes' led to a substantial reduction of BDT 206.51 (p<0.001). In the case of major illness, the decrease in WTP for '30 minutes travel time' was similar to that for minor illness conditions; however, the decrease was substantially higher for '60 minutes travel time' (BDT 480), more than double compared with the minor illness. For minor illness, an increase in waiting times from 'seen immediately' to '15 minutes' and '30 minutes' reduced WTP by BDT 15.07 (p=0.295) and BDT 74.03 (p<0.001), respectively. However, for major illness, 15- and 30-minute waiting times reduced WTP by BDT 217 (p=0.034) and BDT 421 (p<0.001), respectively, considerably more than for minor illness. Compared with 'no recommendation,' a 'positive recommendation' while seeking care for a minor illness increased WTP by BDT 35.17 (p=0.026), while respondents were willing to pay BDT 21.78 less when receiving a 'negative recommendation', though it was not statistically significant (p = 0.114). Whereas for major illness conditions, compared with 'no recommendation', visiting a provider with a 'negative recommendation' reduced WTP by more than twice as much (BDT 307, p<0.001) as gain from a 'positive recommendation' (BDT 138, p<0.165). Interestingly, for minor illness, compared with a 'non-qualified provider', visiting an 'MBBS/qualified doctor' had a WTP of BDT 189.73 (p<0.001), which was also higher (more than double) than the WTP for visiting 'a senior doctor' (BDT 71.49, p=0.016). The pattern for major illness was the opposite of that for minor illness condition. For example, the WTP for visiting 'a senior or experienced doctor' was more than double (BDT 5,478, p<0.001) that for visiting 'an MBBS/qualified provider' (BDT 2583, p<0.001). It is notable that for major illnesses, the WTP for both types of providers was very high. Compared with 'no discount on medicines', respondents were willing to pay BDT 52.61 for 'a 50% discount on medicines' price and about 60% higher for (BDT

83.98) for 'free medicines' (both p<0.01). Similarly, for major illnesses, respondents were willing to pay BDT 483 for 'a 50% discount on medicines' and BDT 502 for getting 'free medicines', both of which were significantly higher than the WTP for 'no discount on medicines'.

(Table 4 to be inserted here)

3.3 Findings from the LCA

The results of the optimal models with three classes for both minor and major illness conditions are presented in **Table 5**. For the minor illness condition, three classes were identified: Class 1 (27.5% of members), Class 2 (22.3%), and Class 3 (50.1%). Individuals from Class 1 demonstrated a significant aversion to longer travel and waiting times (access sensitive). While these individuals had a strong preference for visiting an MBBS doctor (β= 0.470, p=0.055) and a significantly negative preference for a negative recommendation (β= -0.457, p<0.05), the availability of a discount on medicines did not significantly influence their choices. Individuals in Class 2 placed a high value on the type of provider, with strong preferences for MBBS doctors and senior doctors, and discounted or free medicines, but were relatively less concerned about travel times (Provider and discounted medicine focused). However, they had a significant negative preference for longer waiting times, specifically if it was 30 minutes (β= -0.484, p<0.05). Individuals in Class 3 showed a positive preference for MBBS doctors and a comparatively lower preference for senior doctors. They were positively influenced by both positive and negative recommendations. This group also preferred free medicines and discounts on medicines. However, they appeared to be less influenced by travel and waiting times and even showed statistically significant positive utility for 30 minutes of travel and 15 minutes of waiting (mixed preference majority). All three classes had a significantly negative preference for a higher consultation fee.

Regarding sociodemographic factors influencing class membership, older individuals were less likely, and households with a recently sick member were more likely to belong to Class 1. Meanwhile, income and gender were not strong predictors of class membership.

For the major illness condition, Class 1 was the smallest with 11.7%, Class 2 was the largest with 55.7%, and Class 3 was in the middle with 32.6% of the respondents. Class 1 included quality-focused individuals having a strong preference for experienced doctors (β=2.694, p<0.001) followed by a qualified MBBS doctor (β=2.567, p<0.001). They also preferred free medicines (β=1.067, p<0.001) and discounted medicines (β=0.820, p<0.05) and were positive towards positive recommendations (β=0.548, p=0.06). They were not significantly influenced by distance or waiting time. Individuals in Class 2 were access and cost-sensitive, having a significantly negative preference for 60 minutes of travel time (β= -1.403, p<0.001) and 30 minutes of waiting time (β= -0.842, p<0.05). They placed the

highest value on MBBS doctors and senior/experienced doctors, although this was not statistically significant. The individuals had a significant aversion to higher consultation fees (β= -0.004, p<0.001) and strongly preferred free or discounted medicines. No influence of recommendation on preferences was observed for this class. Individuals in Class 3 were provider- and recommendation-oriented. They had a strong preference towards positive recommendation (β= 1.320, p=0.06), MBBS doctors (β= 5.580, p<0.001), and senior doctors, though the preference for senior doctor was not statistically significant. These individuals were not sensitive to travel time and waiting time. The influence of socio-economic characteristics of class membership demonstrated that, in the case of a major illness condition, respondents with older ages had a higher likelihood of belonging to class 2, although only statistically significant at the 10% level.

(Table 5 to be inserted here)

4. Discussion

This DCE study investigated the preferences of urban slum dwellers when choosing PHC providers in Dhaka, Bangladesh. To the best of our knowledge, this is the first study to quantitatively analyse the effects of six selected attributes on preferences for PHC providers among this urban low-income population. The findings revealed that urban slum dwellers weighed provider attributes differently depending on whether their hypothetical illness condition was minor or major. For conditions perceived as minor, consultation fee had the highest relative importance, followed by type of provider and travel time to reach healthcare centres. In contrast, for major illnesses, type of provider dominated, followed by consultation fees. Furthermore, the most preferred type of provider varied between the two conditions: for minor illness, MBBS doctors were the most preferred, and for major illness, senior/experienced doctors were the most preferred.

The LCA also revealed that most respondents highly valued provider quality. For minor illness conditions, respondents from all classes significantly preferred lower consultation fees, and a majority (72.4%) significantly preferred qualified providers. The same 72.4% preferred discounted or free medicines, and about 49.8% had a significant negative preference for longer waiting times. For major illness conditions, 67.4% had a positive preference for discounted/free medicines, while only Class 2 (55.7%) was significantly sensitive to consultation fees.

The findings suggested that urban low-income individuals, despite having different priorities across the provider attributes based on their perceived severity of illness, preferred to choose a qualified healthcare provider in a nearby area that offers discounted or free medicines. Choosing a senior or experienced provider for the major illness condition may be influenced by the dominance of private healthcare providers in urban areas. A similar study conducted in rural China reported that the residents valued affordability and availability over the medical skills of the providers, even in the

case of severe illness [33]. However, in urban areas, people with severe conditions are likely to choose skilled and experienced providers [41]. Notably, the type of healthcare provider was more important than either travel time or waiting time in both illness conditions. The findings also showed that for minor illness condition, travel time was the second most valued attribute, and WTP decreased by BDT 207 for 60 minutes of travel, which was the second highest for any attribute level. Findings were similar to those of a DCE conducted in urban China, which found that respondents highly valued travel time for accessing PHC, highlighting the importance of having healthcare centres available and accessible within proximity to the community [31]. Another study in Ghana revealed that waiting time and travel time significantly influenced the choice of healthcare provider [42].

Furthermore, for the 'discount on medicines' attribute, both the '50% discount' and 'free medicines' options provided significant utility gains in both mixed logit and LCA models. Respondents' strong preference for free/discounted medicines reflected the value they placed for cost savings on medications across both illness conditions. As the studied population was low-income, they would likely prioritise lower-cost options for consultations, as well as the provision of free or discounted medicines. A preference for affordable healthcare was found in several previous studies. For example, DCE study results from India showed a preference for the availability of free medication for hypertension [19]. In another instance, a study on the preference for PHC among urban residents in China also showed that respondents demonstrated a significant preference for low-price healthcare services [31]. The current cross-sectional study was conducted in a setting where there is a lack of access to public PHC facilities. The preferences of respondents across various dimensions of healthcare usage suggest that it is essential to focus on multiple dimensions when making urban PHC policy.

Acknowledging the crucial role of PHC, the government of Bangladesh, like other LMICs, is prioritising urban PHC. The public PHC services are delivered mainly through contracted NGOs, with a focus on free consultation and medicine for the poor population. Our findings are well aligned with this service delivery modality, as results reflected that participants had a strong preference for free or subsidised medicines and lower consultation fees. However, provider qualification was the most valued attribute in both conditions, which the current model cannot adequately address given its inadequate number of static clinics [22]. Moreover, the most accessible formal services in slums are often satellite clinics (if a PHC centre is not located within slum premises) which schedule outreach sessions to provide basic and preventive care and referral, rather than curative consultation by a qualified provider. The National Urban Health Strategy 2020 acknowledges the existing gaps in urban PHC services and emphasises the need to enhance capacity, governance, and stewardship of both public and private sectors to ensure equitable and high-quality healthcare for urban populations [43]. Reforms in the urban PHC system should incorporate these preferences, such as qualified providers with lower consultation fees in nearby areas, alongside the provision of free or subsidised medicines

to ensure that services meet the specific needs of the urban population in a timely and cost-effective manner.

4.1 Limitations

This study has a few limitations. First, the DCE included only six attributes with limited levels, meaning that the results should be interpreted in the context of these attributes. To reduce the risk of missing essential attributes, we undertook a thorough selection process involving community members, healthcare providers, urban health experts, relevant stakeholders and policymakers. This approach helped ensure that the chosen attributes and levels reflected real-life conditions in the community setting. Second, the WTP estimates for major illness exceeded the range of consultation fees used in the DCE (BDT 0–500) and should therefore be interpreted with caution. Third, we assessed rational choice behaviour using a dominance task but did not include a repeated choice set to test temporal consistency; future studies could incorporate such a test, balanced against the additional respondent burden. Finally, as the DCE was conducted in only two slums of Dhaka City, the findings may not be generalisable to other low-resource settings, particularly rural areas.

5. Conclusion

Understanding the driving factors in the healthcare decision-making process among this population is vital to designing a patient-centred urban PHC system. It was evident that lower consultation fees, qualified MBBS providers, easily accessible centres and free/discounted medicines were valued for minor illness conditions. In contrast, experienced healthcare providers, lower waiting times and free/discounted medicines were valued for major illness conditions. The findings emphasise the need for accessible and affordable healthcare services by employing qualified healthcare providers and making free/discounted medicines available, in line with the preferences of low-income urban slum dwellers. This evidence can inform policymakers in designing and delivering patient-centred PHC services. Aligning PHC services with beneficiaries' needs and preferences may improve access to and use of formal PHC and could, in turn, contribute to better health outcomes for the urban poor.

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List of tables

Table 1: Attributes, attributes levels and description

Attributes	Attribute levels	Description
Travel time to reach healthcare centre	1. 15 Minutes to reach centre 2. 30 Minutes to reach centre 3. 60 Minutes to reach centre	Required time for a patient to travel from their home to healthcare centre.
Waiting time	1. Seen immediately 2. 15 minutes of waiting time 3. 30 minutes of waiting time	The amount of time a patient will have to wait after arriving at a healthcare centre before they can see the provider.
Recommendation	1. No recommendation 2. Positive recommendation 3. Negative recommendation	The reviews or recommendations they receive from friends, relatives, or neighbours regarding the healthcare centre's services.
Type of healthcare provider	1. Senior doctor/ experienced doctor 2. An MBBS/qualified doctor 3. Not an MBBS/qualified doctor	Educational qualification and experience level of the healthcare provider.
Consultation fee	1. 0 BDT 2. 100 BDT 3. 200 BDT 4. 500 BDT	Amount of money the patient is required to pay for a consultation with a healthcare provider.
Medicines expenditure	1. Free medicines 2. 50% discount on all medicines 3. No discount on medicines	Price required to pay for the prescribed medicines at the provider

1 USD =110 Bangladeshi Taka (BDT) in Jan 2024 [44]

Table 2. Background characteristics of the respondents (n=304)

Characteristics	Number	Percentage
Age		
18 - 24	85	27.96
25 - 34	97	31.91
35 - 44	67	22.04
45 - 54	29	9.54
55+	26	8.55
Sex		
Male	119	39.14
Female	185	60.86
Marital status		
Never married	24	7.89
Currently married	264	86.84
Widowed/separated	16	5.26
Education		
No institutional education	98	32.24
Up to primary level	82	26.97
Secondary level incomplete	70	23.03
Higher secondary	43	14.14
Above higher secondary	11	3.62
Occupation		
Housewife	110	36.18
Business	36	11.84
Private sector	32	10.53
Housemaid	21	6.91
Rickshaw/van puller	21	6.91
Garment worker	20	6.58
Day labourer	20	6.58
Student	12	3.95
Unemployed	23	7.57
Other (self-employed/beggar)	9	2.96
Household size		
2 to 3 members	175	57.57
4 to 5 members	61	20.07
More than 6 members	68	22.37
Households have under five years children		
Yes	139	45.72
No	165	54.28
Household income group		
1st (6000-15000 BDT)	88	28.95
2nd (16000-20000 BDT)	66	21.71
3rd (21000-25000 BDT)	44	14.47
4th (25300-33000 BDT)	46	15.13
5th (More than 33000 BDT)	60	19.74
At least one member was ill in the last six months		
Yes	283	93.09

No	21	6.91
Had experience of visiting a doctor in the last six months		
Yes	157	51.64
No	147	48.36

1

2

Table 3: Random parameter mixed logit regression model for minor and major illness condition

	Minor illness			Major illness		
Attributes and Levels	**Mean / SD**	**Rob.t-ratios**	**p-value/ statistic**	**Mean / SD**	**Rob.t-ratios**	**p-value/ statistic**
Alternatives						
Health centre (A)	**Ref**			**Ref**		
Health centre(B)	0.120	1.179	0.238	0.015	0.138	0.891
Optout	-1.438	-5.633	**<0.001**	NA		
Travel time to reach healthcare centre						
15 mins to reach	**Ref**			**Ref**		
30 mins to reach	-0.375	-2.472	**0.013**	0.001	0.006	0.995
SD	1.299	6.522	**<0.001**	0.112	0.382	0.703
60 mins to reach	-1.122	-5.706	**<0.001**	-0.813	-4.117	**<0.001**
SD	1.823	8.088	**<0.001**	0.049	0.314	0.754
Waiting time for getting treatment						
Seen immediately	**Ref**			**Ref**		
15 minutes of waiting time	-0.066	-0.457	0.648	-0.365	-2.139	**0.032**
SD	1.020	5.450	**<0.001**	0.051	0.289	0.773
30 minutes of waiting time	-0.554	-3.950	**<0.001**	-0.709	-4.426	**<0.001**
SD	1.173	6.218	**<0.001**	0.446	0.899	0.369
Recommendation from neighbours/relatives						
No recommendation	**Ref**			**Ref**		
Negative recommendation	-0.135	-1.036	0.300	-0.547	-3.340	**<0.001**
SD	1.269	6.553	**<0.001**	0.443	0.868	0.386
Positive recommendation	0.430	3.128	**<0.001**	0.236	1.266	0.205
SD	1.143	3.321	**<0.001**	1.084	4.539	**<0.001**
Type of healthcare provider						
Not an MBBS/qualified doctor	**Ref**			**Ref**		
An MBBS/qualified doctor	1.673	8.467	**<0.001**	4.530	8.347	**<0.001**
SD	2.260	10.524	**<0.001**	0.214	0.845	0.398
Senior doctor/ experienced doctor	0.930	3.426	**<0.001**	9.893	6.875	**<0.001**
SD	2.896	8.376	**<0.001**	3.708	4.821	**<0.001**
Consultation fee						
Consultation fee	-1.132	-15.054	**<0.001**	-0.179	-4.707	**<0.001**
SD	0.742	10.804	**<0.001**	0.210	2.401	**0.016**
Medicine expenditure						
No discount on Medicines	**Ref**			**Ref**		
50% Discount on Medicines	0.477	2.845	**0.004**	0.745	3.185	**<0.001**
SD	0.305	0.278	0.781	0.225	0.359	0.720
Free Medicines	0.791	6.064	**<0.001**	0.820	4.842	**<0.001**
SD	1.146	5.664	**<0.001**	0.777	2.180	**0.029**
Model parameters						
Log likelihood			-2308.91			-862.95
Akaike information criterion			4665.83			1771.9
Bayesian information criterion			4810.3			1910.35

Ref= reference group

Table 4: Willingness to pay for different attribute levels during minor and major illness conditions

	Minor illness			Major illness		
Attributes and Levels	**Mean (BDT)/ SD**	**Rob. t-ratios**	**p-value/ statistic**	**Mean (BDT)/ SD**	**Rob. t-ratios**	**p-value/ statistic**
Alternatives						
Health centre (A)	**Ref**			**Ref**		
Health centre (B)	0.223	2.415	**0.016**	-0.019	-0.184	0.854
Optout	-1.245	-5.633	**<0.001**			
Travel time to reach healthcare centre						
15 mins to reach	**Ref**			**Ref**		
30 mins to reach	-44.314	-2.991	**0.003**	-47.803	-0.487	0.626
SD	114.344	4.074	**<0.001**	72.469	0.958	0.338
60 mins to reach	-206.508	18.449	**<0.001**	-480.420	-3.711	**<0.001**
SD	531.575	6.756	**<0.001**	19.278	0.450	0.653
Waiting time for getting treatment						
Seen immediately	**Ref**			**Ref**		
15 minutes of waiting time	-15.073	-1.048	0.295	-217.323	-2.125	**0.034**
SD	118.495	4.895	**<0.001**	332.767	1.992	**0.046**
30 minutes of waiting time	-74.032	-4.806	**<0.001**	-421.345	-4.074	**<0.001**
SD	138.651	6.838	**<0.001**	197.763	0.958	0.338
Recommendation from neighbours /relatives						
No recommendation	**Ref**			**Ref**		
Negative Recommendation	-21.784	-1.579	0.114	-307.349	-14.326	**<0.001**
SD	148.198	7.341	**<0.001**	359.715	7.437	**<0.001**
Positive Recommendation	35.173	2.233	**0.026**	138.397	1.389	0.165
SD	159.385	6.384	**<0.001**	583.707	3.128	**0.002**
Type of healthcare provider						
Not an MBBS/qualified doctor	**Ref**			**Ref**		
An MBBS/qualified doctor	189.725	8.830	**<0.001**	2,582.958	6.117	**<0.001**
SD	271.938	11.367	**<0.001**	36.100	0.373	0.709
Senior doctor/ experienced doctor	71.485	2.411	**0.016**	5,477.991	6.123	**<0.001**
SD	431.798	8.917	**<0.001**	1,876.473	4.883	**<0.001**
Consultation fee						
Consultation fee	0.008	15.939	**<0.001**	0.002	5.131	**<0.001**
SD						
Medicine expenditure						
No discount on Medicines	**Ref**			**Ref**		
50% Discount on Medicines	52.610	2.912	0.004	482.977	16.191	**<0.001**
SD	75.692	1.460	0.144	257.383	1.486	0.137
Free Medicines	83.977	5.907	**<0.001**	501.918	20.184	**<0.001**
SD	121.695	6.152	**<0.001**	533.304	4.573	**<0.001**
Model parameters						
Log likelihood			-2393.08			-862.27
Akaike information criterion			4832.17			1768.55
Bayesian information criterion			4970.62			1900.98

Ref= reference group

1

Table 5: Latent class preferences for PHC providers for minor illness and major illness condition

Utility function	Minor illness condition						Major illness condition					
	Class 1: *Access sensitive*		**Class 2:** *Provider and discounted medicine focused*		**Class 3:** *Mixed-preference majority*		**Class 1:** *Quality focused*		**Class 2:** *Access and cost sensitive*		**Class 3:** *Provider and recommendation oriented*	
	Coeff.	***p*-value**	**Coeff.**	***p*-value**	**Coeff.**	***p*-value**	**Coeff.**	***p*-value**	**Coeff.**	***p*-value**	**Coeff.**	***p*-value**
Travel time to reach healthcare centre												
15 mins to reach	**Ref.**						**Ref.**					
30 mins to reach	-0.430	<0.05	0.379	0.067	0.399	<0.01	-0.373	0.241	-0.533	0.341	1.513	0.105
60 mins to reach	-1.582	<0.001	-0.312	0.100	0.024	0.900	-0.446	0.122	-1.403	<0.001	0.334	0.729
Waiting time for getting treatment												
Seen immediately	**Ref.**						**Ref.**					
15 minutes of waiting time	-0.346	0.079	-0.013	0.938	0.828	<0.001	-0.247	0.373	-0.775	0.053	-0.212	0.726
30 minutes of waiting time	-0.771	<0.001	-0.484	<0.05	0.218	0.065	0.103	0.714	-0.842	<0.05	-1.090	0.143
Recommendation from neighbours/ relatives												
No recommendation	**Ref.**						**Ref.**					
Positive recommendation	-0.078	0.698	0.248	0.197	0.893	<0.001	0.548	0.057	-0.338	0.219	1.320	0.060
Negative recommendation	-0.457	<0.05	-0.019	0.904	0.531	<0.001	-0.155	0.488	-0.370	0.155	-0.848	0.107
Type of healthcare provider												
Not an MBBS/qualified doctor	**Ref.**						**Ref.**					
An MBBS/qualified doctor	0.470	0.055	2.627	<0.001	1.195	<0.001	2.694	<0.001	25.654	0.992	5.580	<0.001
Senior doctor/ experienced doctor	-0.352	0.431	2.974	<0.001	0.749	<0.001	2.567	<0.001	28.883	0.991	25.153	0.965
Medicine expenditure												
No discount on Medicines	**Ref.**						**Ref.**					
50% discount on Medicines	0.052	0.838	0.522	<0.05	0.375	<0.05	0.820	<0.05	1.455	<0.001	-0.296	0.721
Free Medicines	0.361	0.131	0.822	<0.001	0.857	<0.001	1.067	<0.001	1.435	<0.001	0.241	0.810
Consultation fee												
Consultation fee	-0.008	<0.001	-0.002	<0.001	-0.008	<0.001	0.0002	0.721	-0.004	<0.001	-0.001	0.456
Influence factors												
Age	-0.030	<0.05	-0.004	0.747	Ref.		-0.004	0.910	0.028	0.098	Ref.	
Gender (vs female)	-0.524	0.106	-0.375	0.273	Ref.		0.336	0.552	0.367	0.420	Ref.	
Had experience of care seeking[1] (vs no)	-0.185	0.603	0.598	0.210	Ref.		0.465	0.500	0.762	0.149	Ref.	
Household had sick member[1] (vs no)	2.324	<0.05	0.372	0.607	Ref.		-1.531	0.145	-0.853	0.438	Ref.	
Natural log of household income	-0.043	0.882	0.477	0.124	Ref.		0.013	0.979	-0.496	0.231	Ref.	
Constant	-0.446	0.892	-5.654	0.093	Ref.		-0.469	0.934	4.182	0.360	Ref.	
Class share	**0.275**		**0.223**		**0.501**		**0.117**		**0.557**		**0.326**	

[1] *In the last six months prior to the survey*

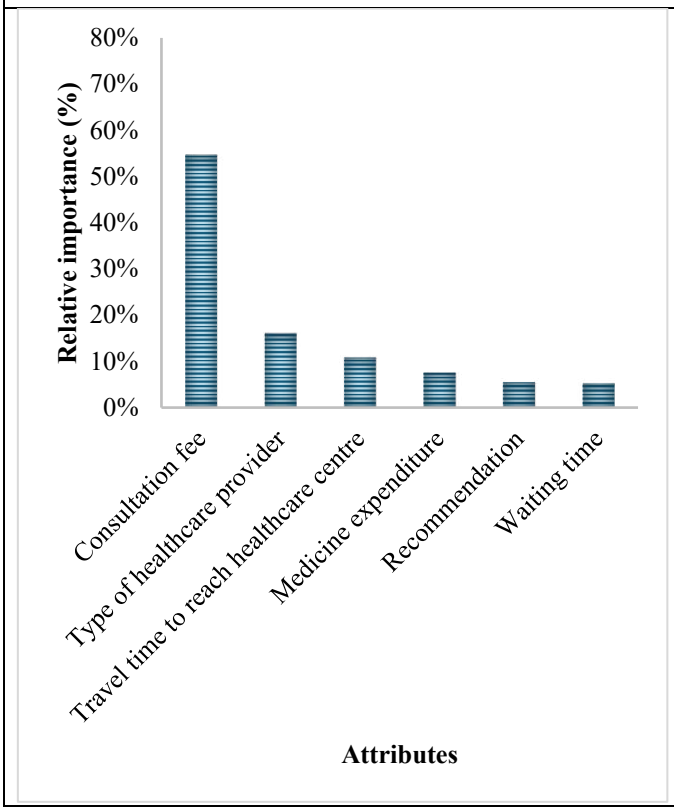
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Figure 1: A sample of choice set

Choice set 1 – Which of the set will you choose?			
Attributes	**Health centre A**	**Health centre B**	**Opt-out**
Time to reach healthcare Centre	 15 minutes	 15 minutes	Stay at home for selfcare or go to a pharmacy to get some medicine from drug sellers
Waiting time for getting treatment	 30 minutes of waiting	 15 minutes of waiting	
Recommendation from neighbours/ relatives	 Positive	 Negative recommendation	
Type of healthcare provider	 MBBS/qualified doctor	 Not an MBBS/qualified doctor	
Consultation fee	 BDT 100	 Free consultation	
Medicine expenditure	 Free medicine	 Free medicine	
I will choose	☐ Centre A for **minor** illness	☐ Centre B for **minor** illness	☐ not visit any Centre for minor illness
I will choose	☐ Centre A for **major** illness	☐ Centre B for **major** illness	☐ not visit any Centre for major illness

Figure 2: Relative importance of attribute in different illness condition

a) Minor illness



b) Major illness

