

# Household Preferences and Willingness to Pay for Health Insurance in Kampala City: A Discrete Choice Experiment

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## Research

**Keywords:** health insurance, discrete choice experiment, preferences, willingness to pay, Kampala, Uganda

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**Household preferences and Willingness to Pay for Health Insurance in Kampala City :  
A Discrete Choice Experiment**

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### **Authors contribution**

Edward Kalyango: Conceptualization, Methodology, Validation, Formal analysis, Investigation, writing original draft, visualization, Project administration. Rornald Kananura Muhumuza: Conceptualization, Writing original draft, Validation, Preparation of the manuscript and supervision of the work. Elizabeth Ekirapa Kiracho: Conceptualization, Validation, Writing original draft, Preparation of the manuscript and supervision.

### **Ethical Approval**

The authors obtained ethical approval from the institutional review board of the school of public health, Makerere University.

### **Consent to participate**

Informed consent was obtained from all individual participants included in the study.

### **Consent for publication**

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## **Abstract**

**Introduction:** Uganda is in discussions to introduce a national health insurance scheme. However, there is a paucity of information on household preferences and willingness to pay for health insurance attributes that may guide the design of an acceptable health insurance scheme. Our study sought to assess households' preferences and willingness to pay for health insurance using a discrete choice experiment.

**Methods:** This study was conducted from 16<sup>th</sup> February 2020 to 10<sup>th</sup> April 2020 on 240 households in Kawempe division, Kampala city, stratified into slum and non-slum communities to get a representative sample of the area. Four household and policy-relevant attributes were used in the experimental design of the study. Each respondent attended to 9 binary choice sets of health insurance plans. Data were analysed using mixed logit models.

**Results:** Households from the non-slum and slum communities preferred plans that included both private and public providers to plans that included public providers only (non-slum 0.81  $\beta$ ,  $P < 0.05$ ; slum 0.87  $\beta$ ,  $p < 0.05$ ), and plans that covered extended family members to plans that had limitations on number of family members allowed (non-slum  $\beta$  0.44,  $P < 0.05$ ; slum 0.36  $\beta$ ,  $p < 0.05$ ). Households from the non-slum community in particular preferred plans that covered chronic illnesses and major surgeries to other plans (0.97  $\beta$ ,  $P < 0.05$ ). Our findings suggest that location of the household matters in determining willingness to pay with households from non-slum communities willing to pay more for the preferred attributes.

**Conclusion:** Potential health insurance schemes should consider including both private and public providers, fewer restrictions on the number of family members enrolled for both communities; and coverage for chronic illnesses and major surgeries for non-slum communities. However, the inclusion of more family members needs to be weighed against possible early depletion of resources.

**Keywords:** health insurance, discrete choice experiment, preferences, willingness to pay, Kampala, Uganda

### **Key findings**

- The Ministry of Health may need to design different health insurance schemes for the poor communities (slum and rural) and the less poor communities (non-slum) because of differences in their preferences and willingness to pay estimates.
- Households from both communities prefer to receive health care from both private and public providers rather than public providers alone or private providers alone and fewer restrictions on the number of family members allowed. However, the inclusion of more family members needs to be weighed against possible early depletion of resources. Besides, enrollment of more family members was not as valued as other attributes for example receiving health care from both private and public providers. Households from less poor communities also prefer coverage for chronic illnesses and major surgeries to other forms of coverage.

## **1 Introduction**

In Sub-Saharan Africa (SSA), the current health expenditure as a percentage of gross domestic product (GDP) is estimated at 5.2%, which is low when compared to the global estimate of 9.9%, and the estimates for the developed regions for example North America (16.6%) and the European union (9.9%) (1). In Uganda, the current health expenditure as a percentage of GDP is estimated at 6.2%, which is slightly above the average for SSA but lower than the global average (1). The government health expenditure as a percentage of GDP in Uganda is approximately 0.97% which is less than the recommended 5% (1,2). Additionally, the current health expenditure per capita of Uganda is estimated at 38.4 United states dollars (USD) which is also low when compared to the recommended USD 86 (1,2). Thus, the health

sector in Uganda like other SSA countries is underfunded and perhaps explains the high out of pocket expenditure (OOP) in the country that is currently contributing about 40% of the total health expenditure (3). Uganda needs to raise adequate funds for its health sector in a way that does not place the financial burden on the households (HHs) to reduce OOP and improve the quality of health services. The World health organization recommends taxes and health insurance as a means of raising funds for the health sector in low-and middle-income countries (LMIC) (4). Uganda is in discussions to introduce a national health insurance scheme (NHIS) to reduce OOP and raise adequate funds for the health sector (5).

As mentioned earlier, taxes and health insurance are the recommended means of funding the health sector in the LMIC (4). Currently, health insurance in Uganda is still underdeveloped contributing less than 3% of the health financing and is majorly provided by the private sector (3). There has been some success in community health insurance schemes and potential for community-saving groups indicating the communities' interest in saving for health (6,7). A NHIS is needed but questions remain on how it should be designed such that it is acceptable for the majority of Ugandans. Information on HH preferences and valuation of the attributes of health insurance in Uganda is inconclusive as most available studies are based on contingent valuation methods that assess willingness to pay (WTP) but not HH preferences (8–10). Information on HH preferences is important to determine the acceptability of any health insurance scheme.

A successful NHIS requires a scheme that has been well thought out and that reflects HH preferences. The purpose of this study was to assess HH preferences and WTP for health insurance using a discrete choice experiment (DCE) to contribute information that may be used by the ministry of health (MoH) to design an attractive and acceptable NHIS. The specific objectives for this study included; identifying differences between HHs in the slum and non-

slum communities that may affect their choice of health insurance plans, determining preferences for the attributes of health insurance, and estimating the WTP for health insurance by HHs.

## **2 Methods**

### **2.1 Study design, study area and population**

This was a DCE that was conducted from 16<sup>th</sup> February 2020 to 10<sup>th</sup> April 2020 in Kawempe division, Kampala city which was stratified into the slum and non-slum communities because we wanted to get a representative sample of the area whose population was assumed to be mainly divided into slum communities and non-slum communities.

**Fig. 1** summarizes how our study was designed.

Kawempe division has about 94,202 HHs with 13.2% of them living within 5km or more from a public health facility (11). Sixty seven percent of persons above 18 years in this area are employed with 92 % of the HHs having at least one member involved in a non-agricultural based enterprise (91.9%) (11).

The study population included all HH heads/spouses in Kawempe division, Kampala City. HH heads/spouses in Kawempe division who had stayed in the area for at least 6 months and were at least 18 years of age at the time of conducting this study were considered for the study. Child headed HHs, HHs heads/spouses who refused to participate in this study or were not available at the time of conducting this study and visitors of the areas were left out.

### **2.2 Study variables and sample size**

The dependent variable was the choice of health insurance plan. The independent variables included attributes and their levels (Table 1). HH characteristics were used to assess for

differences between the slum and non-slum communities that may affect their choice behaviour.

### Table 1

Equation 1 was used to calculate the sample size for the quantitative study (12).

$$n \geq \frac{q}{rpa^2} \left[ \left( \frac{\Phi^{-1}(1-\alpha/2)}{p} \right)^2 \right] \quad (1)$$

Where, n is the minimum number of HHs to be interviewed, (r) is the number of choice sets per HH=8, (p) is the true choice probability in the population = assumed to be 0.5, (q) is one minus true choice probability in the population = 0.5,  $\Phi^{-1}$  is the inverse normal distribution, (a) is the allowed deviation from the true population proportion=0.05,  $\alpha$  is the significance level=0.05. which gave 192 HHs. Considering a non-response rate of 10%, and the theory that each sample block is supposed to contain at least 30 HHs to avoid imprecise estimations during econometric analysis, the final sample size was revised to 240 HHs (Ryan et al., 2008).

## 2.3 Development of the DCE

### 2.3.1 Development of the attributes for the experimental design

In line with recommendations, conceptual attributes were first identified from the literature and policy documents and later revised after conducting a qualitative study (13–17). The candidate attributes relevant to the Ugandan context included: premiums; unit of enrollment; the type of health care providers; the health care package; and copayment (5,18–26).

Concerning the prior qualitative study that was used to generate the attributes and their levels, four focused group discussions (FGDs) were conducted in the area. We preferred FGDs because they yield larger amounts of information over a short time. We expected four FGDs to

be adequate for saturation because other studies have used a similar number (12,27–29). The village chairmen helped with the selection of FGD participants. The FGDs included men and women, who had stayed in the areas for at least six months, above 18 years of age, and were either HH heads or their spouses. The FGDs had roughly equal numbers of men and women in to ensure the balance of opinions. Conceptual themes were identified from the literature and later used to design the FGD guide. The FGD guide consisted of 4 sections (see additional file 1). The first section was about introductions and setting the agenda. The second section assessed awareness, experience and understanding of health insurance. The third section introduced the concept of health insurance and how it works. The last section was for deriving attributes and their levels. We audio-recorded and later transcribed the data of each FGD. Voice recording was undertaken after securing consent from all participants. Writing of notes was carried out to supplement the audio recordings and record nonverbal cues. We analysed the data using both deductive and inductive thematic approaches. The conceptual themes included service providers, premiums, enrollment, copayment and benefits package. The conceptual themes were either confirmed or new ones developed.

Table 2 summarizes the characteristics of respondents who participated in the FGDs. The participants from the non-slum community were on average older and with higher monthly income compared to their counterparts from the slum community.

## **Table 2**

Table 3 summarizes the findings from the FGDs. The participants from the non-slum community generally suggested higher premiums for the NHIS compared to their counterparts from the slum community.

**Table 3**

**2.3.2 Experimental design**

Experimental design refers to the process of generating specific combinations of attributes levels that respondents evaluate in choice sets. Two approaches are used to design choice sets namely; orthogonal methods and D- optimal methods. We used a D optimal method because it performs better than the orthogonal designs and requires fewer choice sets and sample sizes compared to orthogonal designs (15). The generated design had 32 choice sets that were organized into 4 blocks to reduce the cognitive burden on each respondent. Each HH head/spouse answered 9 choice sets that included a fixed choice question that was used to assess the predictive power of the models.

**2.4 Sampling procedures**

Two parishes that represented slum and non-slum communities were selected. We applied systematic random sampling in the selection of the HHs that participated in the DCE from each parish.

**2.5 Data collection tools**

The DCE questionnaire had 3 sections that collected data on socio-demographic characteristics of the HHs, the choice sets, and lastly questions that were used to calculate the wealth index.

Table 4 shows an example of a choice set.

**Table 4**

The data collection tools were in English and Luganda, the most commonly spoken languages in this area.

## 2.6 Final data collection and data management

We conducted a pre-test of the questionnaire on 30 HH heads and made minor revisions. We edited the data in the field to ensure completeness and consistency. We checked for errors and omissions on the questionnaires that could affect the validity of the results. We discussed the identified issues with the data collectors regularly.

Epidata version 4.6.0.2 software was used for capturing data. We entered the collected data twice to limit data entry errors. STATA version 14.1 was used for statistical analysis.

## 2.7 Data analysis:

We applied Chi-square tests and t-tests to assess for differences between the slum and the non-slum communities that may influence choice behaviour. Statistical analysis of the DCE data was based on random utility models. Random utility models are used to analyse the choices of individuals among discrete sets of alternatives.

Equation 2 shows the random utility model. According to random utility theory, the utility that a HH ( $n$ ) obtains from an insurance plan  $i$  is given by:

$$U_{in} = V(x_{in}, B) + C_{in} = V(x_{in}, B) + \mu_i + \varepsilon_n \quad (2)$$

Where  $U_{in}$  is the latent utility for an item  $i$ ,  $V(x_{in}, B)$  is the systematic component which is a function of attributes  $x$  and marginal utility  $B$ . The total error term ( $C_{in}$ ) in mixed logit models is split into two parts. The first part  $\mu_i$  is an individual specific random effect that takes into account the panel nature of the data. The second part  $\varepsilon_n$  is an independent extreme value type-1 distributed part of the error such that the parameters can be estimated as a logit model (30,31).

Equation 3 shows the form of the model.

$$V(x_{in}, B) = B_0 + B_1 \text{premiums} + B_2 \text{Both} + B_3 \text{private} + B_4 \text{simple} + B_5 \text{comprehensive} + B_6 \text{core1} + B_7 \text{Extended} \quad (3)$$

Where  $B$  represents the parameter mean and its standard deviation in the population.

For our study, two main effects models were fit to the data because of differences between the two communities that can influence their choice behaviour.

#### *Calculating willingness to pay*

Equation 4 shows how WTP was calculated. This was calculated by dividing the coefficient of the attribute of interest with the negative premium coefficient.

$$WTP_{attribute} = B_{attribute} / -B_{premium} \quad 4$$

### **2.8 Ethical considerations**

The institutional review board of the school of public health, Makerere university approved this study. Informed consent was secured from each person interviewed.

## **3 Results**

### **3.1 Characteristics of households**

Table 5 summarizes the characteristics of HHs that participated in this study. Overall, 240 HH heads/spouses were interviewed, of which 70.4% were males. Sixty five percent of the HHs had at most three children, 88.7% reported paying for health care in public facilities, 94.0% were not insured and 33.6% had at least one family member with a chronic illness. Also, 67.9% of HH heads were either married or living with a partner and 66.7% had attained at least a senior 4 level of education.

Differences in demographic, socio-economic position and presence in the HH family members with chronic illnesses between the slum and non-slum communities were observed. Compared to the slum community, the non-slum community had more HHs with more than three children, (43.3% non-slum versus 26.7% slum,  $p < 0.001$ ), had more HH heads with at

least senior 4 levels of education (40.8% non-slum versus 26.7% slum,  $p < 0.001$ ), and more HH heads who were self-employed (45.8% non-slum versus 35.8% slum,  $p < 0.001$ ). In terms of socio-economic position, the non-slum community had more HHs in the richest quartile (40.0% non-slum versus 10.0% slum,  $p < 0.001$ ) and had HHs which were on average UGX 248,125 richer than those in the slum community ( $p < 0.001$ ) while the slum community had more HHs in the poorest quartile (37.7% slum versus 13.3% non-slum,  $p < 0.001$ ). In terms of presence in the HH of family members with chronic illnesses, the slum community had more HHs with members suffering from chronic illnesses compared to the non-slum community (37.5% slum versus 30.0% non-slum,  $p < 0.001$ ).

### **Table 5**

### **3.2 Preferences of health insurance attributes**

Tables 6 summarizes HH preferences for the non-slum community and slum community. Two main effects models were fit to the data; one for the slum community and the other for the non-slum community because of differences between the two communities in terms of characteristics that can influence choice behaviour that included demographic characteristics, socio-economic position and presence in the HH of members with chronic illnesses .

HHs from the non-slum community preferred health insurance plans that allowed extended family enrollment ( $\beta = 0.44$ ,  $P < 0.05$ ) compared to plans that allowed unrestricted enrollment of children; and plans in which they could receive health care from both private and public providers compared to plans in which they could receive health care from only public providers ( $\beta = 0.81$ ,  $P < 0.05$ ). They disliked health insurance plans that had a simple coverage (primary health care diseases, minor surgeries, ANC, family planning) compared to plans that had a moderate coverage (chronic illnesses and major surgeries) ( $\beta = -0.97$ ,  $P < 0.05$ ); and plans

that allowed a restricted enrollment of children compared to plans that allowed an unrestricted enrollment of children ( $\beta = -0.90, P < 0.05$ ).

HHs from the slum community disliked health insurance plans that allowed a restricted enrollment of children ( $\beta = -0.32, p < 0.05$ ) but preferred plans that allowed extended family enrollment compared to plans that allowed an unrestricted enrollment of children ( $\beta = 0.36, p < 0.05$ ); and plans in which they could receive health care from both private and public health providers compared to plans in which they could receive health care from public providers ( $\beta = 0.87, p < 0.05$ ).

## **Table 6**

### **3.3 Willingness to pay**

Table 7 summarizes WTP estimates for the slum and the non-slum communities. HHs from the non-slum community were on average willing to pay per year UGX 206,960 for a plan that allowed extended family enrollment rather than one that allowed an unrestricted enrollment of children, UGX 41,8932 for a plan that allowed an unrestricted enrollment of children rather than one that allowed a restricted enrollment of children, UGX 454,727 for a plan with moderate coverage rather than one with simple coverage, and UGX 377,057 to receive health care from both private and public providers rather than public providers.

HHs from the slum community were on average willing to pay per year UGX 36,540 for a plan that allowed an unrestricted enrollment of children rather than one that allowed a restricted enrollment of children, UGX 40,937 for a plan that allowed extended family enrollment rather one that allowed an unrestricted enrollment of children, and UGX 98,738 to receive health care from both private and public providers rather than public providers.

## Table 7

### 3.4 Internal validity

Most of the estimated coefficients had the expected signs. The premium attribute had a negative sign in both models as expected which adds to the theoretical validity of the results. Internal validity was also assessed using a fixed choice question. The model for the non-slum community predicted that 66.1% would choose health insurance A of the fixed choice question. From the data collected, 64.2 chose health insurance A of the fixed choice question. The model for the slum community predicted that 54.5% would choose health insurance A of the fixed choice question. From the data collected, 54.2% chose health insurance A of the fixed choice question. These results show that both models had good prediction.

## 4 Discussions

We present data of HH preferences and WTP for health insurance in Kawempe division, Kampala district stratified into the slum and the non-slum communities. This is one of the first studies to examine preferences for health insurance from Uganda. We found that HHs from both communities prefer health insurance plans that have fewer restrictions on the number of family members allowed and plans in which they can receive health care from both private and public providers. We found differences between the two communities in terms of preferences for coverage with HHs in the non-slum community preferring health insurance plans that covered chronic illnesses and major surgeries.

We found that HHs from both communities prefer plans that allow extended family enrollment compared to plans with limitations on the number of family members. In Africa, most families are extended and therefore plans that have extended family enrollment are

expected to more attractive. Many studies from Africa agree with our findings (18,24,25). However, one study from Ethiopia had different results with HHs in this study disliking extended family enrollment compared to limited family enrollment; the authors of this study found these results surprising and gave reasons such as respondents attaching implicit cost of enrolling extended family members, the cost of health care for parents being shared among siblings, and respondents not being immediately responsible for the health of their parents to explain their findings (24). Surprisingly, HHs from the slum community equally liked enrollment with restrictions on the number of children and enrollment without restrictions on the number of children. This may have been due to the fact that HHs in the slum community had fewer children compared to those in the non-slum community. The greater number of children in the HHs from the non-slum community compared to the slum community was not expected and the possible explanation could be because HH heads from the slum community were younger and probably as their families grow and they also grow older, they move out of the slum communities. Including more family members in the NHIS would be attractive for the HHs but this needs to be weighed against possible early depletion of resources. Besides, this attribute was not valued as much as other preferred attributes.

We found that HHs from the non-slum community preferred a moderate coverage (chronic illnesses and major surgeries) to either a simple (primary health care diseases, minor surgeries, ANC, family planning) or a comprehensive coverage (cancers, kidney disease, heart surgeries, neurosurgeries, ICU and special care units). This may be because HHs consider conditions covered in moderate coverage more serious and costly compared to conditions covered in a simple coverage (9,21). For the case of comprehensive coverage, the conditions covered may be perceived by the HHs to be rare and therefore not important to insure against as very few family members are likely to get them. These findings agree with findings from other DCEs in which coverage for major surgeries and chronic illnesses was important for the

respondents (18,21). In contrast, HH from the slum community equally preferred all forms of coverage. This may be explained by the fact that slum communities are disproportionately affected by most diseases compared to the rest of the communities and therefore it's hard for them to decide on the best benefit package. Therefore, the MoH may need to modify the NHIS for the slum communities.

We found that HHs from both communities prefer plans in which they can receive health care from both private and public providers. These findings agree with several other studies that found that, given an opportunity, individuals prefer to receive health care from both private and public providers (20,24). The preference for both providers may point to the fact that public providers may have some disadvantages, but they also have advantages. For example, public providers tend to have better infrastructure and more qualified staff but suffer from the challenges of health worker absenteeism, low staffing, frequent break down of equipment due to poor maintenance, and unavailability of drugs (32,33). The preference for both providers may also be explained by the HH's concerns about the profit-making motives of private providers that may compromise their services (26,33). Therefore, the MoH may need to contract some private providers in addition to public providers in NHIS in order to make the scheme more attractive and acceptable for the majority of HHs.

Our study shows that HHs in the non-slum community are willing to pay more for the preferred attributes compared to their counterparts in the slum community. This can be explained by the better income and a higher level of awareness of the benefits of health insurance in the non-slum community compared to the slum community (9,21). In addition, the non-slum community had more HH heads who had attained at least Senior 4 level of education compared to the slum community. The level of education has been found to influence WTP for health insurance (9,34).

### **Strengths and limitations of this study**

The strength of this study based on the design is that DCEs not only estimate preferences, but can also be used to estimate WTP, and thus, are not as limited as CV methods that can estimate WTP but not preferences. The limitation of this study based on the study design is that the respondents may face challenges in answering the multiple questions that require tradeoffs that characterize DCEs.

In terms of generalization, our findings may be generalizable to the urban slums and non-slum communities in Uganda. However, the preferences and WTP estimates for the health insurance attributes may also give an insight into the preferences and WTP for health insurance in other countries that share the same context as Uganda. In addition, the disaggregation of results into urban slums and non-slums may give a reflection of the preferences in rural communities which face situations similar to the urban slums.

### **Conclusions and recommendations**

Our study reveals that HHs in the slum and the non-slum communities prefer and value plans that include both private and public providers. Therefore, for the type of providers to include in the NHIS, we advise the MoH to consider contracting some private providers to make the scheme more attractive and acceptable for majority of HHs. Although findings from our study suggest that more HHs may join the NHIS if more family members are allowed, this needs to be weighed against possible early depletion of resources; besides this attribute was not valued as much as other preferred attributes. For the benefit package to include in the NHIS, we advise the MoH to focus on providing coverage for chronic illnesses and major surgeries especially for the non-slum communities rather than prioritizing specialized care units.

The MoH may need to subsidize the scheme for the poor communities (slum and rural) to make the scheme affordable for the poor while at the same time set reasonable premiums for the less poor communities (non-slum) in order to raise adequate funds for the health sector.

Further research may be needed targeting specifically people who work in the formal sector and the richest class to provide information about these groups' preferences and WTP. A qualitative research targeting policy makers may also be needed to get their perspectives on how the health insurance scheme should be designed.

## **5 Acronyms and abbreviations**

CI	Confidence interval
CV	Contingent valuation
DCE	Discrete choice experiment
FGD	Focused group discussion
GDP	Gross Domestic Product
HH	Household
NHIS	National Health Insurance scheme
ICU	Intensive care unit
IPD	In patient department
MoH	Ministry of Health
MoPS	Ministry of Public service
NRM	National Resistance Movement
OECD	Organization for economic cooperation and development
OOP	Out of pocket expenditure

OPD	Outpatient department
SD	Standard deviation
UBOS	Uganda bureau of standards
UGX	Uganda shillings
UN	United Nations
USD	United states dollars
WHO	World Health Organization
WTP	Willingness to pay

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# Figures

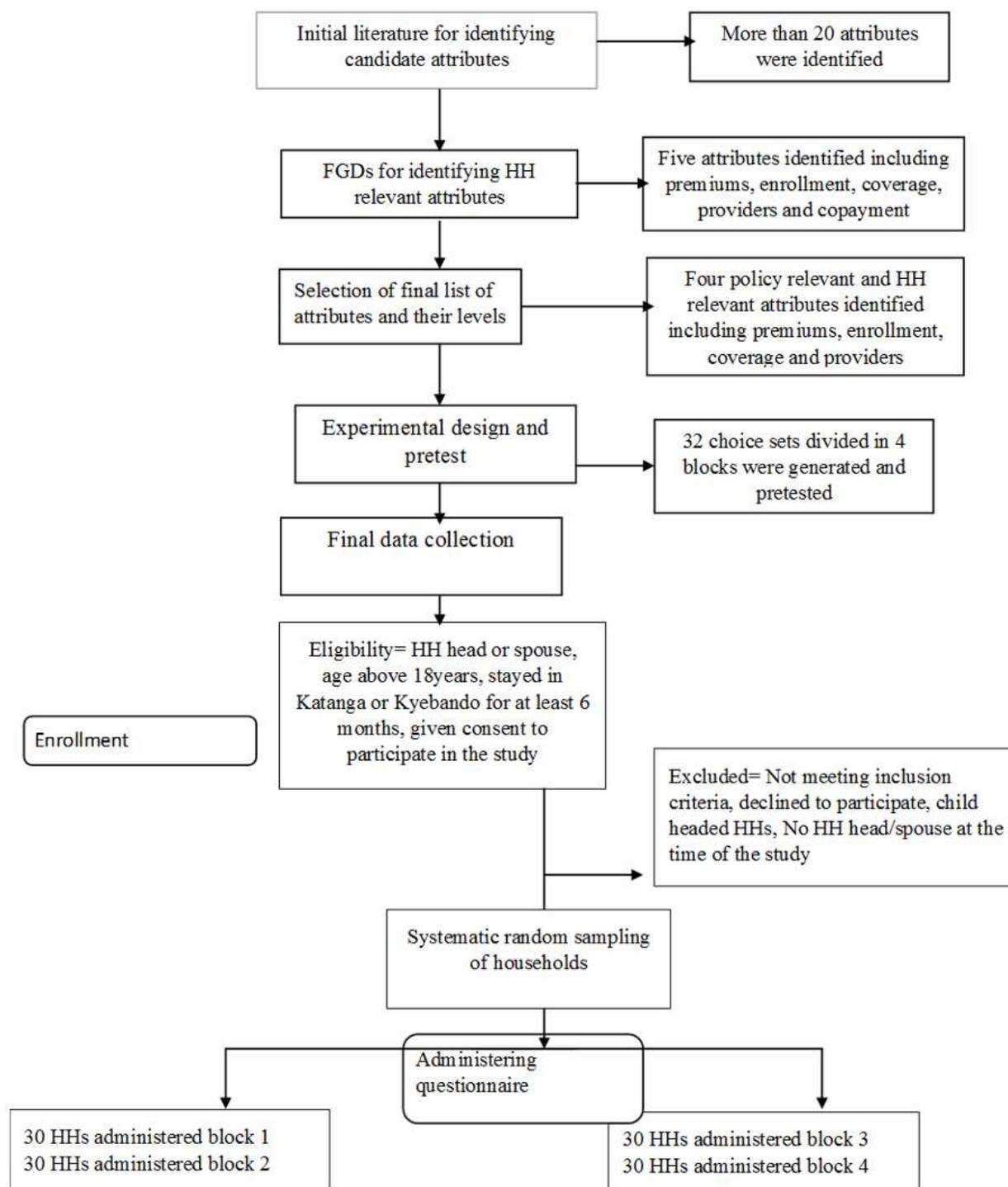


Figure 1

summarizes how our study was designed.

## Supplementary Files

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- [DCEsupplimentaryfile.docx](#)
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