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Understanding what women want: eliciting preference for delivery health facility in a rural subcounty in Kenya, a discrete choice experiment

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ABSTRACT

Objective To identify what women want in a delivery health facility and how they rank the attributes that influence the choice of a place of delivery.

Design A discrete choice experiment (DCE) was conducted to elicit rural women's preferences for choice of delivery health facility. Data were analysed using a conditional logit model to evaluate the relative importance of the selected attributes. A mixed multinomial model evaluated how interactions with sociodemographic variables influence the choice of the selected attributes.

Setting Six health facilities in a rural subcounty.

Participants Women aged 18–49 years who had delivered within 6 weeks.

Primary outcome The DCE required women to select from hypothetical health facility A or B or opt-out alternative.

Results A total of 474 participants were sampled, 466 participants completed the survey (response rate 98%). The attribute with the strongest association with health facility preference was having a kind and supportive healthcare worker (β=1.184, p<0.001), second availability of medical equipment and drug supplies (β=1.073, p<0.001) and third quality of clinical services (β=0.826, p<0.001). Distance, availability of referral services and costs were ranked fourth, fifth and sixth, respectively (β=0.457, p<0.001; β=0.266, p<0.001; and β=0.000018, p<0.001). The opt-out alternative ranked last suggesting a disutility for home delivery (β=−0.849, p<0.001).

Conclusion The most highly valued attribute was a process indicator of quality of care followed by technical indicators. Policymakers need to consider women's preferences to inform strategies that are person centred and lead to improvements in quality of care during delivery.

BACKGROUND

In 2017, an estimated 295 000 women died while giving birth. While this represents a 35% improvement from 451 000 maternal deaths in 2000, the vast majority of these deaths are preventable.[1] Strategies to reduce the high burden of maternal mortality in low and middle-income countries have included increasing coverage for high-quality facility-based delivery.[2 3] Facility-based delivery is

Strengths and limitations of this study

► The study was done under the context of the free maternity services policy in Kenya and will inform the contextual aspects of quality of care valued by women based on their experience of care during delivery.
► The study provided a ranking of the attributes of health facility delivery valued by women in a rural setting that can be useful to policymakers when prioritising resources for quality of care improvements.
► The hypothetical nature might result in bias as respondents might make aspirational choices regarding the attributes rather than choices that represent their preferences.
► Hypothetical choices might not be representative of women's choices because decision-making around delivery place in real life may be made in a social context with other key family members involved especially in rural contexts.

increasing in sub-Saharan Africa due to the growing attention to efforts to reduce maternal mortality resulting in substantial declines in mortality over the last few decades.[4 5] This has been facilitated in part by overcoming barriers to access such as cost and distance. However, there remains the challenge of growing inequities in maternal health outcomes within countries and this demands that we pay attention to the barriers to access to high-quality facility-based delivery.

Kenya is one of the countries exhibiting insufficient progress in reducing preventable maternal deaths, the reported maternal mortality ratio is currently estimated at 362 deaths per 100 000 live births.[6] In a major move to eliminate barriers such as cost, the government initiated the free delivery policy in 2013.[7] The government's free maternity policy together with access to private delivery care financed by the National Health Insurance Fund expanded the options for delivery health facilities available for women to choose

from. This resulted in positive trends in access to facility-based delivery particularly in rural areas where investments in the health system and physical infrastructure such as road network had resulted in increased access. The total numbers of healthcare facilities in Kenya have grown to 3965 over the last 10 years.[8] All these strategies increased women's choices available for delivery health facilities.

However, inequities in maternal health outcomes still exist in Kenya particularly at the county level. A recent United Nations Population Fund (UNFPA) report in Kenya identified 15 counties that contribute to 98.7% of the maternal deaths with most of the deaths in rural counties.[9] The quality of care provided also differs substantively across regions in Kenya with one study identifying a 25-percentage point gap between Nairobi and Coast regions.[10] Additionally, higher volume facilities and those with caesarean section capacity seemed to offer a high quality of care.[10] There have also been recent reports of increased utilisation of county-level (referral) hospitals for deliveries.[11] National assessments of quality of care at health facilities in Kenya suggest that poorer women have a higher likelihood of encountering poor quality of maternal health services in Kenya.[12 13] Assessments targeting primary health facilities have shown that these facilities offer poorer quality of services, with gaps with regard to basic infrastructure, medical equipment and supplies, a diagnostic accuracy and adherence to clinical guidelines.[14 15] Within this context there is significant overlap between primary health facilities and delivery health facilities. With the free maternity services policy, health centres and dispensaries at the primary level of care were upgraded in order to be able to provide uncomplicated childbirth services. The government in recent times introduced the Kenya Quality Model for Health to improve the quality of care at health facilities.[16] This strategy aimed to support quality improvement by providing minimum standards and guidelines, and support the structure-process-outcome of health services by applying the principles and tools of quality management. However, several implementation challenges were identified such as substandard structures at health facilities and lack of pharmaceutical supplies at health facilities.

The WHO framework on quality of health services during facility-based delivery proposes that a high-quality health system is safe, effective, patient centred, timely, efficient and equitable.[17] These frameworks assume knowledge of the end users. However, it is likely that Kenyan women in rural areas may be incapable of assessing the clinical quality from a technical standpoint. They are able to assess the quality of the care and choose delivery health facilities based on their experience of care such as respectful treatment by healthcare workers. They are also able to assess other aspects of provision of care, such as the availability of medical equipment like theatre for caesarean section during an emergency, accessing drug supplies within the facility versus an outside pharmacy

and referral services that include transportation to a higher level facility.

There is limited knowledge in Kenya on the specific elements women value most in the care they receive from the health facilities. Most strategies available for assessing quality of care received during childbirth in Kenya have focused only on either the health system inputs required or satisfaction levels at the end of the continuum of care. Strategies are also based on national-level assessments of quality of care such as service provision assessment and demographic health surveys.[6 8] These studies, while useful and nationally representative, fail to identify and provide a ranking for demand side barriers. As a consequence, national data at present are unable to fully explain why women prefer certain health facilities over others. Contextual information on what women value when making decisions on choice of a health facility becomes increasingly important as women's choices increase. This information is particularly useful in resource-constrained settings where prioritisation guides allocation of scarce health resources.

Discrete choice experiments (DCE) can be particularly helpful in eliciting preferences. DCEs allow health services users to state individual preferences when offered different hypothetical choices.[18] They are based on the assumption that services can be described by their attributes, and that the value of a service depends on the nature and level of these attributes.[19] DCEs have been used to examine a broad range of health system challenges in sub-Saharan Africa including patient preferences for hospital services in South Africa[20] and maternal health services in rural areas of Ethiopia and Tanzania.[21 22] The main objective of this study was to use a DCE to elicit women's preferences with regard to the characteristics of a delivery health facility based on their delivery experiences in a rural subcounty. We aim to provide insights on what a woman's view of quality of care is, based on their experience of care. We hope these preferences will present the patient perspective to complement the needed technical quality improvement to support the development of a quality health system, so women can get what they want and deserve from the health system.

METHODS
Study setting
Naivasha Sub-County is a semirural setting 50 km northwest of Nairobi. It is composed of periurban settlements, and includes agriculturalist and pastoralist populations within Nakuru County. It has a population of roughly 181 966 people. Primary and secondary health facilities include government health facilities, several private health facilities and Naivasha County Referral Hospital. The population is also served by a faith-based private tertiary hospital, about 20 km away from Naivasha in neighbouring Kiambu County. Naivasha was selected as a study site because recent evidence from a UNFPA

Table 1 Final list of attributes and attribute levels included for the DCE

Attribute	Attribute level
Quality of clinical services at the health facility	Good quality services
	Bad quality services
Attitude of healthcare workers	Kind and supportive healthcare worker
	Unkind and unsupportive healthcare worker
Availability of medical equipment and supplies	Medical equipment and supplies available
	Medical equipment and supplies not available
Distance to the health facility	Health facility is close to residence
	Health facility is far from residence
Referral at the health facility	Referral services available at the health facility
	Referral services unavailable at the health facility
Cost of delivery service (Ksh)	3000; 5000; 8000

DCE, discrete choice experiment; Ksh, Kenyan shilling.

report rank ordered counties by contribution to the burden of maternal deaths and Nakuru County was ranked fourth.[9]

Discrete choice experiments

Identification of attributes and attribute levels

DCEs are an attribute driven technique used to elicit stated preferences and interventions and are based on the assumption that healthcare intervention services and policies can be described by their attributes.[18] The first stage in the development of a DCE is the identification of attributes and attribute levels. Previous studies suggest a review of the literature and qualitative work to aid in the identification of relevant attributes.[23] We undertook a comprehensive literature review on the topic of facility-based delivery and skilled birth attendance in sub-Saharan Africa to gain an in-depth understanding of the factors influencing place of delivery. We also conducted a qualitative study with six focus group discussions with 50 women at a mix of public and private health facilities. We also conducted in-depth interviews with 12 healthcare workers serving as in-charges at the maternities. We used an interview guide (see online supplemental appendix 1). The participants were purposively selected women aged 18–49 and had just delivered their babies within 6 weeks and were attending child welfare clinics at the different health facilities. Table 1 shows the final attributes and attribute levels selected for the DCE.

Experimental design

The attributes of the interventions and their assigned levels were combined using experimental designs that produce a set of hypothetical choice alternatives. Respondents were asked to choose which alternatives they prefer the attribute levels determine the utility of respondents attached to a particular characteristic of an intervention and hence their preferences.[24] The DCE was designed as an unlabelled one with 16 choice sets presented under three alternatives: health facility A, health facility B and an opt-out alternative where the woman would choose none of the two facilities, presented as preference for home delivery. See table 1 for the final attributes and attribute levels included in the DCE. All attributes in the choice experiment had two levels each except cost, which had three levels. This resulted in a design of ($2^5 \times 3^1 = 96$) choices in the full fractional design. This number of choices would have been too tedious for the respondents to handle. We opted to use a fractional factorial design to reduce the choices from 36 to 16, making it manageable for the respondents. This was done using a D-efficient design using *Ngene* software to generate the original experimental design[25] (see online supplemental appendix 2). All the attributes were dummy coded to allow comparison against a reference category. The reference categories were those that were the dominant choice, for example, good quality of clinical services, kind and supportive healthcare workers, availability of medical equipment, availability of referral services, short distance to the health facility and the lowest price of delivery service (Ksh3000). The D-efficient design also allowed for favourable design such as orthogonality, level balance, minimum balance and overlap.[26] The 16 choice set questions were generated from the design. Each choice set contained 16 questions. We then divided each choice set into two sets with eight questions each, and each respondent was presented with a single choice set from a single block.

DCE study sample

The choice sets were reviewed for content by a team of policymakers from the county headquarters during a 1-day meeting at the main referral hospital at the county. The meeting confirmed and validated the choice of attributes as important to both women and healthcare workers. This was followed by a pilot study with 30 women in a neighbouring subcounty to test the attributes. The women who participated in the pilot were not included in the main study. The pilot resulted in minor revisions to the wording of certain attributes, for example, the attribute 'treatment at the health facility' was changed to 'quality of clinical care during delivery' to provide a distinction between interpersonal and clinical aspects of quality of care. The availability of medical equipment and drug supplies was defined as easily observable equipment important to women, such as the theatre for caesarean sections and incubators for premature babies. Women could easily determine availability of drugs at the health facility when they are sent outside of the hospital to buy

The discrete choice experiment on attributes for place of delivery in rural subcounty in Kenya

Our objective is to conduct a DCE to explore the relative importance of attributes of place of delivery to Kenyan women living in Naivasha Sub-County to try and elucidate what women's values and their preferences are when they are making choices on place of delivery. You will be provided with a script on a mobile phone and you will be asked to imagine that you are pregnant and you are given a choice between the two health facilities to deliver your baby. Which one would you prefer? Facility A or facility B? You also have the option of choosing none of the two health facilities as option C. There are no right or wrong answers.

Sample choice card

Attribute	Health facility A	Health facility B	Option C
Quality of clinical care during delivery	Good quality	Bad quality	(None of the two health facilities—home delivery)
Attitude of healthcare workers	Kind and supportive attitude	Unkind attitude	
Cost of delivery services	Ksh3000	Ksh5000	
Availability of equipment and supplies	Equipment supplies not available	Equipment and supplies available	
Distance to health facility	Facility is close to home	Facility is far from home	
Availability of referral health services	Referral services available	Referral services unavailable	
Your choice (tick only one)	☐	☐	☐

DCE, discrete choice experiment.

essential drugs. Knowledge on both these attributes was also determined by conversations with other women from their social network. The availability of referral services was defined as the availability of a means of emergency referral transport to move the women from primary to tertiary level of care that could handle obstetric complications. The final DCE scenario with the final attributes can be seen in table 2.

These questions were then loaded into Open Data Kit (ODK) and incorporated into a questionnaire consisting of items on sociodemographic and maternal health utilisation variables. The questionnaire contained questions adapted from the Kenya Demographic Health Survey 2014. See online supplemental appendix 3.

To obtain the sample size for the DCE, we used the rule by Johnson and Orme[27] to suggest the sample size required for main effects. This depended on the number of choice tasks (t), the number of alternatives (a) and the number of analysis cells (c). We had 16 choice tasks (t) with 3 alternatives (a) and 3*2 analysis cells (c). N>500*c/t*a=N>500*6/16*3=N>62.5.[28] Using this formula, we derived a minimum sample size of 62.5. We however collected a larger random sample of 474 women that would enable appropriate estimation of both main and interaction effects for the DCE. Our eventual targeted sample size was 474 from six health facilities to satisfy the representativeness for the quantitative survey for the sociodemographic variables but also large enough power to provide results that were statistically significant for all relevant attributes. Lancsar and Louviere[29] in an earlier study recommend a sample of 20 respondents per questionnaire version as sufficient to estimate reliable DCE models.[29]

Data collection
A team of six research assistants along with their two supervisors received five trainings on data collection by the first author. Women were randomly recruited during postpartum immunisation clinics from a mix of six public and private health facilities. We randomly sampled 474 women. After the women gave informed consent, we then interviewed them using the ODK platform.

Patient and public involvement
During the pilot phases the women aged between 18 and 49 who were the main respondents provided feedback on the survey instruments. They also provided feedback during the qualitative phase on the selection of the attributes.

Model specification
The data were analysed in Stata V.15 (StataCorp, College Station, USA). Descriptive statistics were calculated for the non-DCE variables. The DCE data were analysed using the random utility model.[30] This framework assumes that women seek to maximise their utility according to the perceived benefit associated with the different attributes and attribute levels. A model that expresses the utility 'U' of an alternative i in a choice set C_n (perceived by individual n) is shown in two parts: (1) an explainable component specified as a function of the attributes of the alternatives $V(X_{in}, \beta)$; and (2) an unexplainable component (random variation) ε_{in}:

$$U_{in} = V(X_{in}, \beta) + {}_{in}$$

The individual n will choose alternative i over other alternatives in a choice set C if and only if this alternative gives the maximised utility. The relationship between the utility function and the observed k attributes of the

alternatives can be assumed under a linear-in-parameter function.[19] Therefore, the utility of the respondents attached is related to the attributes and attribute levels within the choice sets, meaning that if alternative i is chosen within a choice set, i will yield the maximum utility compared with j alternatives. A is the alternative specific constant (ASC), x are the attributes in the DCE and β are the coefficients describing the marginal utility of the attribute. The standard conditional logit model is shown below:

$$V_{in} = \alpha_i + \beta_i x_{i1} + + \beta_k x_{i+e}$$

A base conditional model was used to estimate the mean change in utility, a preference which the respondent placed on attributes. α_i is a constant term that represents the general preference for place of delivery at a health facility compared with the alternative of opting out and having a home delivery. The reference group was the choice of health facility A or health facility B. Dummy coding was used for the data, each categorical attribute level was assigned a value of 1 whenever it was retained and 0 when omitted. The cost variable was maintained as a continuous variable. The utility model makes the assumption that women will trade off between the different attribute levels and choose the alternative that gives the greatest utility. The conditional model is suitable for estimating average preferences across respondents. The utility function was estimated for the following model:

$$U_i = \alpha_i + \beta 1\, Quality Clinical care + \beta 2\, attitude of health workers +$$
$$\beta 3\, Medical equipment and supplies + \beta 4\, distance$$
$$+ \beta 5\, referral\ services + \beta 6\, Costs + \varepsilon\, (error\ term)$$

α_i is the ASC term that shows the preference for place of delivery (either a health facility or home), β1–β6 are the parameters for each of the attribute levels and ε is the error term.

Data analysis and model estimation

The aim of the base multinomial logit model estimation is to determine whether the attributes are important (statistically significant, as shown by the significance level of the β) and the direction of importance (shown by the sign of the estimated (β) and relative importance (size of the estimated parameter)). The main hypothesis test was whether the parameter estimates were significantly different from zero for all attributes.

Due to the assumption of irrelevant independent alternatives, the presence of heterogeneity in choices, we estimated a generalised mixed multinomial logit model to assess for preference heterogeneity among the women.[31] The mixed multinomial logit model overcomes some of the limitations of the base multinomial logit by allowing for random taste variation, unrestricted substitution patterns and correlation in unobserved factors over time. The mixed multinomial logit can also use any distribution for the random coefficients.[31] The five variables that described the attributes of place of delivery in the utility model above were entered into the model as random

parameters whereas the cost variable was entered as a fixed variable. The mixed multinomial logit model allows for the estimation of both main and interaction effects. This was done by extending the mixed multinomial model and testing interactions between the sociodemographic and the women's attributes in order to investigate how preferences may vary according to observed individual characteristics. The sociodemographic characteristics included, such as maternal age, marital status, education and income status, have been known to influence place of delivery in Kenya.[32–35] Education was measured in three categories: primary, secondary and tertiary education. We formed two dummy variables s1 and s2 representing a comparison between primary and secondary education to tertiary education. We categorised age into three categories: 18–24, 25–34 and 35–45 years. We then formed two dummy variables a1 and a2 to represent the first two age categories. Marital status and main earner had one dummy variable each that were interacted with the attributes.

The output of the mixed multinomial logit model includes the mean parameter estimate that represents the relative utility of each attribute. The SDs for a random parameter suggest the existence of heterogeneity in the parameter estimates over the sampled population around the mean parameter estimate, that is, different individuals possess individual-specific parameter estimates that may be different from the sample population mean parameter estimates. The p value of the interactions shows statistical significance for an interaction between sociodemographic variables and attributes, hence signifying the influence of the woman's characteristics. The robust SEs show the level of error. The theoretical validity of the design will be explored by examining the signs and significance levels of parameter estimates. To address bias, we tested for choice monotonicity; this is the assumption that a respondent will choose an alternative in the choice task that is superior to the other alternatives on all choice attributes.[29]

RESULTS

Participant characteristics

Four hundred and seventy-four women were invited to participate in the DCE. There were incomplete data for eight respondents. The DCE survey was successfully administered to 466 representing a 98% response rate. The average age of the respondents was 26 years, 32% were primiparous. Eighty-eight per cent of the women reported themselves as married and 48% had attained a secondary school education. About 53% of the heads of household had attained up to a secondary education. Only 18% of the rural women were heads of household; however, 95% respectively claimed to have influence over household-level decisions. Approximately 83% reported that they were not the main source of household income. Finally, about 67% of the women reported having moved to the study setting from elsewhere within the last

Table 3 Sociodemographic characteristics of women in Naivasha Sub-County (n=466)

Sociodemographic variables	Naivasha Sub-County n (%)
Age, n (mean (SD))	26 (5.1)
Marital status	
Single	57 (12)
Married	409 (88)
Education	
Primary school	175 (38)
Secondary school	221 (48)
University/tertiary	66 (14)
Parity	
1	151 (32)
≥2	215 (68)
Head of household status	
Woman not HH	381 (82)
Woman head of HH	85 (18)
Head of household education	
Primary school	100 (27)
Secondary school	196 (53)
University/tertiary	72 (20)
Woman's influence on decision-making within HH	
Woman had no influence	18 (5)
Woman had influence	363 (95)
Main earner status	
Is not the main earner	386 (83)
Is the main earner	79 (17)
Residence (moves)	
Moved in 5 years	226 (67)
Moved over 5 years	112 (33)
Delivery health facility	
Public facility	346 (74)
Private facility	91 (19)
Home delivery	29 (6)

HH, household.

5 years. See table 3 for details on the sociodemographic characteristics.

To enable the estimation of main and interaction effects, each respondent was given a survey with three unlabelled alternatives (health facility A, health facility B and an opt-out option) with 16 choice sets to choose from, resulting into 48 observations per respondent. The number of observations analysed within the rural site was 22 368 out of 22 566. One hundred and ninety-eight observations were dropped by STATA automatically because of dominant choices.

In the rural setting, the variable with the greatest association with choice of health facility was attitude of the healthcare workers, followed by availability of medical equipment and drugs, and third, the quality of clinical services during delivery, the distance to the health facility, availability of referral health facility; cost of delivery was ranked fourth, fifth and sixth (p<0.001). The opt-out alternative had a negative sign and was ranked seventh (p<0.001). See table 4.

The direction of the coefficient signs provides a check on the theoretical validity of the DCE model, that is, whether the coefficients move as economic theory or a priori expectation would predict. All the attributes with the exception of the opt-out had the expected positive signs. The cost attribute was positive; however, economic theory expects them to be negative showing that women have a disutility for high costs.

For the mixed multinomial logit model with no interactions, we found out that all the mean coefficient values for all the attributes were statistically significant at the 99% level (p<0.0001), with the exception of the opt-out attribute (p=0.377). See table 5. This meant that we could reject the null hypothesis and conclude that all the selected attributes selected were important to the female respondents. The low significance value for the opt-out suggested that women had a low value for home deliveries. All the attributes had strong statistically significant parameter estimates for the SD, except the cost attribute which had significance at the 90% level (p=0.639). This suggested weak preference heterogeneity, meaning that was very little variation around the mean, with very few women who possessed individual-specific parameter estimates that might be different from the sample population mean. On analysing the differences between primiparous and multiparous women with regard to choosing the opt-out, we found that women who were multiparous were more likely to choose the opt-out, suggesting a dissatisfaction with their experience at the health facility.

Preference heterogeneity

The influence of sociodemographic characteristics on the preferences suggested variation in preferences for the attributes for place of delivery. See table 6. For the mean parameters, women with a secondary education had a moderate strong preference for quality of clinical care (p=0.012). Women aged between 25 and 34 years had a moderately strong preference for good clinical quality (p=0.034) and a short distance to the health facility (p=0.024). Married women had a moderate preference for a health facility with available medical equipment and drugs (p=0.004) and a weak preference for a short distance to the health facility (p=0.085). Women who were main earners had a moderate strong preference for availability of referral services at a health facility (p=0.009), a short distance to the health facility (p=0.045) and a cost of delivery services (p=0.035).

The SD shows the variation around the mean, parameters showing heterogeneity in the preferences among

Table 4 The base multinomial logit model for a DCE on preferences for place of delivery among women in a rural subcounty

Attribute	Rural subcounty		
	β	Robust SE	95% CI
Attitude Kind (Reference)	1.184***	0.037	1.11 to 1.25
Medequip Available (Reference)	1.073***	<0.035	1.01 to 1.13
Qualclin Good (Reference)	0.826***	0.034	0.76 to 0.89
Distance Short (Reference)	0.457***	0.031	0.39 to 0.52
Referral Available (Reference)	0.266***	0.033	0.20 to 0.33
Costs	0.000018***	9.40e-06	2.55e-06 to 0.00033
ASC	−0.849***	0.082	−0.97 to 0.73

Attitude: attitude of healthcare workers. Distance: distance to health facility. Referral: referral service availability. Clean: cleanliness of the health facility.
*Significance at the 90% level; **Significance at the 95% level; ***Significance at the 99% level.
ASC, alternative specific constant; DCE, discrete choice experiment; Medequip, medical equipment and drugs; Qualclin, quality of the clinical delivery services.

the women. There was a strong variation in preferences for the three attributes: availability of medical equipment and drugs ($p<0.0001$), good quality clinical care ($p<0.0001$) and the availability of referral services at the health facility ($p<0.0001$) among women with secondary education. This finding suggests that several women in this category possessed individual-specific parameter estimates that are different from the sample population mean for the attributes. Women who were aged between 25 and 34 years showed strong preference heterogeneity for the attributes on kind and supportive health worker ($p=0.001$), availability of medical equipment and drug supplies ($p<0.0001$) and good quality clinical care ($p<0.0001$). Married women showed strong preference

Table 5 The mixed multinomial logit model showing means and SDs to explain preference heterogeneity in choices made by women in rural setting

Attribute	Mean coefficient values		SD	
	β	Robust SE	β	Robust SE
Attitude Kind (Reference)	1.972***	0.123	1.582***	0.108
Medequip Available (Reference)	1.764***	0.076	0.778***	0.702
Qualclin Good (Reference)	1.316***	0.106	1.577***	0.126
Distance Short (Reference)	0.759***	0.052	0.374***	0.091
Referral services Available (Reference)	0.436***	0.054	0.535***	0.085
ASC	0.289*	0.327	3.202***	0.179
Cost	−10.089***	0.302	0.112*	0.239
Observations (n)	22 368			
Wald χ^2	2173.84			
Prob>χ^2	0.0000			
Log likelihood	−4400.9			

Attitude: attitude of healthcare workers. Distance: distance to the health facilities.
*Significance at the 90% level; **Significance at the 95% level; ***Significance at the 99% level.
ASC, alternative specific constant; Medequip, medical equipment and drugs; Qualclin, quality of clinical services.

Table 6 The mixed multinomial logit model showing interactions between sociodemographic variables and attributes to explain preference heterogeneity in choices made by women in a rural subcounty

Attribute	With secondary education (ref)†		With age category 2‡ (ref)		With married (ref)		With main earner (ref)	
	β^a	RSE	β^a	RSE	β^a	RSE	β^a	RSE
Interactions (mean parameters)								
Attitude Kind (Reference)	0.118	0.143	0.205	0.141	0.218	0.187	−0.198	0.184
Medequip Available (Reference)	−0.124	0.09	−0.131	0.092	−0.419**	0.144	0.172	0.125
Qualclin Good quality (Reference)	0.355**	0.141	0.279**	0.131	−0.352	0.226	0.092	0.191
Distance Short (Reference)	−0.109	0.077	−0.176**	0.08	0.199*	0.116	−0.206**	0.103
Referral Available (Reference)	0.007	0.082**	0.027	0.083	0.109	0.121	−0.300**	0.114
Cost (Ksh)^b	0.00008	0.00002	−0.00003	0.00002	−0.00002	0.00003	−0.00006**	0.00003
Interactions (SDs)								
Attitude × covariate	−0.347	0.225	0.549***	0.167	0.886***	0.137	−0.817***	0.244
Medequip × covariate	−0.483***	0.090	−0.416***	0.116	0.398***	0.125	0.153	0.185
Qualclin × covariate	0.996***	0.220	0.920***	0.122	0.680***	0.131	−0.232	0.158
Distance × covariate	−0.093*	0.093	−0.026	0.086	−0.133	0.099	0.018	0.142
Referral × covariate	−0.379***	0.102	0.317**	0.131	0.382***	0.085	0.379***	0.118
Cost × covariate	0.0000297	0.00004	5.31e-06	−0.00002	0.00002	0.00002	0.00002	0.00003
Respondents (n)	466	466	466	466	466	466	466	466
Observations (n)	22272		22368		22368		22320	
Log likelihood	−4493.82		−4458.93		−4473.60		−4472.99	
Prob>χ²	0.0000		0.0000		0.0000		0.0000	
Likelihood ratio χ²	1462.9		2298.4		1052.7		909.6	

*Significance at the 90% level; **Significance at the 95% level; ***Significance at the 99% level.
†The level of education had two dummy variables so we present the referent category (secondary) compared with women with tertiary education. We have included the full results showing the primary education in online supplemental appendix 4.
‡The age was also categorised into three age categories; we only present the results for the second age category (a2) here. The rest are included in this table and in online supplemental appendix 4.
Ksh, Kenyan shilling; RSE, robust standard error.

heterogeneity for four attributes: kind and supportive attitude of healthcare workers (p<0.0001), availability of medical equipment and drug supplies (p=0.001), good quality clinical care (p<0.0001) and the availability of referral services at the health facility (p<0.0001). Lastly, women who reported themselves as main earners showed strong preference heterogeneity for the attributes of kind and supportive attitude of healthcare workers (p=0.001) and availability of referral services only (p=0.001).

All women across the four sociodemographic groups showed no variation for the attribute of costs of delivery and distance to the delivery health facility with the exception of women with secondary education (p<0.0001), suggesting that there was no variation in the individual characteristics of women who valued these two attributes

DISCUSSION

This study explored women's preferences for characteristics for delivery health facilities in a rural subcounty in Kenya. The most highly valued attribute for women when making a choice of a delivery facility was the attitude of healthcare workers; this was followed by the availability of medical equipment and quality of clinical services. Lowly valued attributes were the availability of referral services and the cost of delivery service. The opt-out alternative that signified home delivery was ranked last and was negative signifies women had a disutility for home deliveries in this setting. All the attributes had an impact on the probability of choosing a health facility for delivery over a home delivery. To the best of our knowledge, this is the first DCE to address attributes valued by women in a rural setting in Kenya within the context of a free maternity services policy.

We found out that the attitude of healthcare workers providing delivery services was valued above all other attributes. Quality of care standards require that women be treated in a respectful manner and in a way that upholds their dignity.[17] Recent evidence has identified that the attitude of health workers during labour and delivery presents a huge challenge with reports of mistreatment of women.[36] This has also been reported in diverse settings within sub-Saharan African such as Guinea,[37] Nigeria[38] and South Africa.[39] The high value for attitude of healthcare workers has been reflected in other DCE studies in rural settings in sub-Saharan Africa.[21 40] Mistreatment has increasingly been recognised as a barrier to women accessing facility-based delivery in Kenya across contexts with one study placing prevalence of disrespect and abuse at 20%.[41] Urgent international calls have been made for accountability for the mistreatment of women during labour and delivery because it is a compelling human rights issue.[42 43] Mistreatment should be addressed during regular supervision in all facilities to ensure a functioning feedback mechanism for respectful care during delivery.[44]

The second most valued attribute was the availability of medical equipment and drug supplies at the health facility. These were easily observable aspects of the health facilities that women saw during their antenatal care (ANC) visits and identifying the availability of theatres for caesarean sections and neonatal resuscitation equipment. They were also informed by friends and family who had prior visits to the health facilities. Studies evaluating the state of obstetric care coverage often compare the provision of care to the physical infrastructure available without assessing the care provided at health facilities. For example, a recent study that evaluated emergency obstetric care (EMOC) services across health facilities in rural Kenya found that EMOC capabilities were not being met and confirmed that only two of the five health centres assessed had acceptable EMOC capabilities illustrating the state of rural health facilities for obstetric care.[45] Additionally, recent assessments of quality of care at Kenyan health facilities have shown that medical equipment and drug supplies for mothers were only available at 41% of health facilities (both public and private).[15] Health policymakers need to focus on availing EMOC capabilities because women's preferences suggest that they value the availability of equipment as a way of judging the quality of care at a health facility.

The women showed a high preference for quality of clinical care and ranked it third. One study focused on attributes of respectful care ranked women's preference for good health system conditions such as having a qualified birth attendant among other conditions.[46] This suggests that women can ascertain to a certain degree of the quality of care is from assessing their delivery experience including the necessity of caesarean sections. This calls for skilled birth attendants to provide better quality clinical care that is based on WHO evidence-based guidelines.[17]

Referral availability at the health facility was defined as transportation of women from the health facility where they first sought care to a higher level health facility in the case of complications. Though ranked lower by women, this attribute was still valued. This finding suggests that referral options at health facilities in this setting are weak. Women mentioned that they were afraid of developing complications because of the unavailability of ambulances at the lower level health facilities. WHO standards advocate for referrals that are conducted in a timely fashion with a pre-established plan for delivery care and with relevant sharing of information between the concerned staff at the receiving health facilities.[17]

An unexpected finding was the disutility for lower costs. This finding suggests that the women had a value for paying higher amounts of money for better quality of delivery services. We hypothesise that the women were making a trade-off by selecting higher amounts and signalling that they were willing to pay higher amounts for obtaining services that they perceived as being of higher quality. This finding is critical given that approximately half of all women (55%) in this setting had access to any health insurance coverage of any type. This implies that the women would use out-of-pocket payments at private health facilities. Such payments have been associated with

putting patients at significant financial risk. Additional evidence points out challenges with the free maternity services with women reporting paying for key birthing items including pharmaceuticals.[47 48] The women also described public health facilities advertised as 'free', but were exposed to hidden informal indirect costs during billing. Costs, both direct and indirect, have been previously identified in studies assessing factors influencing place of delivery in Kenya.[49 50]

Our findings also indicate that multiparous women were more likely to choose a home delivery over primiparous women, suggesting some evidence of dissatisfactory experiences during delivery that would deter them from a repeat visit to the health facility. Recent studies in certain rural settings in Kenya suggest cultural values that promote home deliveries especially because of fear of health workers at health facilities.[33 51]

In assessing how sociodemographics influence choice of attributes, we found that women with secondary education had a strong preference for clinical quality, suggesting that highly educated women in this setting were able to discern certain elements of clinical quality either through their own experiences during ANC or the experiences of other women in their social network. Other DCE studies also had similar findings suggesting changing demographics with rural areas having more educated women.[22] We also discovered that younger women are more knowledgeable about the health system and might exercise their rights to demand better quality healthcare. Studies suggest that decisions on healthcare are done in a social context in consultation with their families and friends.[52 53] There have been recent reports of young mothers in rural areas in Kenya receiving poor quality services at health facilities.[54] Married women had more experiences with the health system from previous deliveries and were aware of expectations with regard to medical equipment and drugs. Lastly, women who were main earners had strong preferences for costs which was expected. Thus, targeting strategies specific to certain demographics within the population can help the health system be more responsive to women's needs.

The main strength of the study was that it was conducted within the context of the newly implemented free maternity services policy in Kenya. The findings of this study can inform the contextual aspects of quality of care valued by women. The main limitation of the study was the hypothetical nature of the DCE might result in bias. Respondents might make inaccurate choices while being aspirational regarding the quality of services they expect at a health facility during delivery. Hypothetical choices might not be representative of women's choices because decision-making around delivery place in real life may be made in a social context with other key family members involved especially in rural contexts.

The study sample were likely to be users of the health system and represent some positive bias towards the utilisation of health services. These findings might not generalise the findings to the minority of women who eschew health services-induced immunisation. In future, sampling of women who delivered at home might help assist with eliciting preferences of women who are not users of facility-based delivery services.

CONCLUSION

This study showed that women's experience of care during delivery, and attributes such as attitude of healthcare workers, availability of equipment and supplies, and access to good quality delivery care are highly valued by women and may affect the utilisation of health facilities during the free maternity services. The women's choices indicate their preferences for both structural and process aspects of quality of care. It is critical for policymakers to understand women's preferences and what drives them to seek delivery services at health facilities. Ensuring high-quality care that is patient centred can reduce inequities in maternal deaths and improve maternal health outcomes.

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