

Rural Households' Willingness to Pay for Improved Healthcare Services in Oyo State, Nigeria: A Choice Experiment Approach

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Abstract

Limited health budget is a major challenge confronting provision of improved health care services in Nigeria and some other developing countries. This requires alternative innovative ways of raising fund to provide health care services in rural communities.. In this regard a user fee approach is proposed for Ido local government area of Oyo state, Nigeria. Multistage sampling technique was adopted to select 150 rural households from where one person per household was selected to constitute 150 respondents for the study. Data were collected through administration of structured questionnaire. This work further employed attribute-based choice valuation technique using six improved health care attributes; price, ambulance, medical doctor, night duty, drug and ownership. Result from the analysis using conditional logit revealed that individual members of the community were willing to pay for improved health care services per consultation. The mean Willingness to Pay (WTP) was estimated at ₦808.86. The paper suggests that adoption of users' fee is a good policy option for primary healthcare service in the rural communities.

Keywords: Willingness to pay, Choice experiment, Improved health care, users' fee

INTRODUCTION AND PROBLEM STATEMENT

Health is reviewed in Grossman's model as a durable capital stock that yields an output of health time. By investing in health, a household expects to increase the stock of available healthy time, which will increase the amount of time available for earning income or for producing consumption goods (John, 2009). Healthcare is a vital service that touches the lives of millions of people at significant and vulnerable times; birth, illness, and death (Federal Trade Commission, 2004). Every government in Nigeria holds the view that a healthy population is essential for rapid socio-economic development of the country hence healthcare is on the concurrent list in the Nigerian constitution and its allocation comes next to education and defence in the national budget (National Population Commission, 2003). The administrative framework of the health sector is from the cabinet to the federal ministry of health; down to the state ministry, then to the local governments and the political wards. The state of Health takes a great place among the Well-being indicators, in the development process of every country. Health can be appreciated not only as indicator of economic development, but also as a form of human Capital. Health is also an

indicator of human poverty (Joachim *et al*, 2004). Primary healthcare delivery refers to provision of such preventive services as immunization, maternal and child healthcare, and control of locally endemic diseases including malaria, tuberculosis, polio, and prevention of HIV/AIDS infection. The focus is on the local government level because Nigeria's National Health Policy assigns responsibility for primary healthcare delivery to local governments with coordination and assistance of state governments (FMOH 2005).

Reviewed Literatures on willingness to pay for health care services in sub-Sahara African and Nigeria in particular shows the attitude of individuals to improvement in healthcare services. In spite of a well-structured health system, development of the Primary Health Care (PHC) has not improved the health experience of the population especially those in the rural area: The health sector's contribution to the national development remains a serious issue (Omoruanet *et al* 2009). In many developing countries like Nigeria limited health budgets are a serious problem. (Ali *et al* 2004). While the World Bank in the 1990s deemphasised the use of the user fees system and promote the use of risk-sharing arrangements for health care financing, Nigeria

still lacks these structures and the rural poor do not have access to formal insurance schemes (Ataguba 2008). Funding has continued to be inadequate and has failed to meet the World Health Organisation (WHO), Abuja Declaration of 2001 and Macroeconomic Commission on Health targets. Out of pocket expenditure still accounts for 70% of health care financing in Nigeria, thus making healthcare services economically inaccessible especially to the populations in greatest need. The re-launched NHIS has the potential of increasing economic access to healthcare services but coverage still remains at less than 10% (NHC 2009). According to Khan (2001), a majority of rural households (more than 90%) in many developing countries do not only face limited access to health care but also endure poor quality water and unsafe sanitation. Therefore it is not surprising that compared to urban counterparts; rural households tend to suffer disproportionately from higher levels of ill health, mortality, malnutrition and inadequate health which are one of the factors perpetuating poverty (Gwatkin *et al*, 2005).

In response to concerns that user fees reduce access to health services among the poor, governments have implemented waiver and exemption mechanisms. However the mechanisms do not address informal fees and other cost incurred by clients and little information is available on the effectiveness of the mechanisms in increasing access to healthcare services (Suneeta *et al*, 2005). The belief by Nigerians that health is an essential commodity which must be provided free of cost by the government, making health services to be politicized has contributed to the poor state of the health system in the country (Campbell 2008).

Primary healthcare, which is the bedrock of Nigeria's health policy and identified as central to the healthcare delivery system remains prostrate. The level of government saddled with the responsibility of primary health care services provision (LGA) is the level least committed and with the least capacity (NHC 2009). How then can there be improvement in the delivery of service by primary health care based on willingness to pay for improved health care?

The need for this study is premised on the ground that it examined the areas where the delivery of services by primary health care is below expectation, and provide information on how much they are willing to pay for the desired services. Choice Experiment (CE) adopted in this study is increasingly being used and preferred in modelling of choice and appears to have some

advantages over the Contingent Valuation (CV) method as it may minimize some sources of bias and provides the researcher with an opportunity to examine the individual impact of the characteristics that make up the good or service in question, hence increasing the amount of information obtained by the researcher. CE also has an advantage with respect to validation of economic theory not only the standard neoclassical economic theory but also others such as principal-agent theory and transaction cost theory (Trine, 2005). In contradistinction to the CV approach, the status quo and the hypothetical alternative differ with regard to several or all attributes rather than price only (Zweifel *et al*, 2009).

Arising from the foregoing, this study sought to achieve the following objectives: first, to identify and describe the kind of dissatisfaction experience from the existing healthcare services; and to estimate marginal mean willingness to pay for improved health care services.

Theoretical framework

The choice experiment method has its theoretical grounding in Lancaster's model of consumer choice (Lancaster, 1966), and its econometric basis in random utility theory (Luce, 1959; McFadden, 1974). Lancaster proposed that consumers derive satisfaction not from goods themselves but from the attributes they provide. To illustrate the basic model behind the choice experiment presented here, consider a local respondent's choice for improve health care service and assume that utility depends on choices made from a set C , i.e., a choice set, which includes all the possible improved health care service alternatives. The respondent is assumed to have a utility function of the form:

$$U_{ij} = V(Z_{ij}) + e(Z_{ij}) \dots\dots\dots (1)$$

where for any respondent i , a given level of utility will be associated with any improve health care service alternative j . Utility derived from any of the improve health care service alternatives depends on its attributes (Z), such as the quantity and quality of improve health care provided. The random utility theory (RUT) is the theoretical basis for integrating behaviour with economic valuation in the choice experiment method. According to RUT, the utility of a choice is comprised of a deterministic component (V) and an error component (e), which is independent of the deterministic part and follows a predetermined distribution. This error component implies that predictions cannot be made with certainty.

Choices made between alternatives will be a function of the probability that the utility associated with a particular improve health care service option j is higher than those for other alternatives.

MATERIAL AND METHODS

The study was conducted in Ido local government of Oyo state. The study area is located in between the humid and sub-humid tropical climate. The mean annual rainfall ranges from 1,117.1 to 1,693.3mm. The rainfall pattern has a characteristic bimodal distribution with peaks usually in June or July and September and the period of low precipitation in August with four months of dry season (December–March). The annual temperature ranges from an average minimum of 24.6°C to average maximum of 31.5°C. The mean monthly relative humidity reaches a minimum of 52 percent in February and a maximum of 83 percent in August (IITA, 1993; FRIN, 1999; Erakhrumen *et al* 2010). It has an area 986km² and a population of 103,261 going by the 2006 census. Ido local government is made up of 10 wards, having about 15 primary health care centres across the wards. A multistage random sampling technique was adopted in this study. The first stage involved selecting randomly three wards out of the ten wards in the study area. The second stage was random selection of 150 households proportionate to size of the chosen three wards in the LGA. In the last stage, one person was selected per household for the interview through the use of interview schedule.

Experimental design

The data set used for this Choice Experiment (CE) comprises a representative sample of 150 individuals chosen randomly proportionate to size from Akinware, Odetola and Ido wards as representative sample of Ido local government area. The CE made use of factorial design. We made use of the orthogonal design to generate choice profiles. In the choice experiment, each respondent faced six choice sets. In each choice set, respondents were asked to choose between three alternatives. To reduce the hypothetical character of the choice experiment, the third alternative indicated the current situation in the study area. The third option of choosing none of the hypothetical alternative commonly called

status quo, shows there would be no changes in the health care service attributes in the area of study. Alternatives 1 and 2 were characterized by a change in the charges and health care service attributes in the study area with respect to the status quo alternatives. Based on the observed need for improvement in the primary health care services in the study area a monetary attribute, availability of ambulance, regular supply of drug, availability of medical personnel for night duty, presence of medical doctor, and ownership of the healthcare centre were chosen.

Data analysis

Conditional Logit was used to estimate willingness to pay for improved health care services and the mean willingness to pay for the attributes. The model assumes homogenous preferences for consumers and allows for a simple way to model a likelihood function that tells probability of individual n choosing alternatives i in choice set B of a choice experiment. The conditional logit model can be computed with maximum likelihood estimation and it yields parameter estimates that tell the consumers' relative preferences for the attributes in a choice set. In order to derive an exact formulation for the choice probability (1) based on the random utility theory, some further assumptions need to be made about the nature of the error term of the consumer's utility function. It is presumed to be independently and identically distributed (i.i.d.), and it is assumed to follow a double exponential extreme value distribution having the form $F(e_{ij}) = \exp(-\exp(-e_{ij}))$ (Bateman *et al.* 2002, Loureiro and Umberger 2007, Train 2009). This type of error term characterisation is a common assumption in the context of choice experiments (Bateman *et al.* 2002, Holmes and Adamawitz, 2003). The extreme value distribution differs from the normal distribution in mathematical properties, but empirically its difference from a normal distribution is usually trivial (Train 2009). From this, however, it follows that the difference in the error terms function (2) has a logistic distribution (Loureiro and Umberger 2007). This allows for a simple and analytically practical form for the likelihood function that models the probability of an individual choosing alternative i in choice set B :

$$P(V_{ni} > V_{nj}) = \frac{\exp [\mu (\beta^{ASC_i} + \beta X_{ni})]}{\sum_{j \in B} \exp [\mu (\beta^{ASC_j} + \beta X_{nj})]} \dots\dots\dots (2)$$

where μ is a scale factor that can be normalised to one and J is the total number of alternatives.
 β is the vector of the coefficients for the attributes,
 X_i is the vector of the exogenous levels of the attributes and the
 β^{ASC} are the vectors of the coefficients for the alternatives-specific constants (ASC) (Hu *et al.* 2004, Jaffry *et al.* 2004, Vermunt and Magidson 2005).

The alternative-specific constant are included in the model in order to consider the utility associated with the no-choice alternatives: they indicate the utility derived from the three alternatives so that there is a constant for each

The baseline model:

$$V_{ni} = ASC + \beta_1 Price_{ni} + \beta_2 Ambulance_{ni} + \beta_3 Medical_doctor_{ni} + \beta_4 Nightduty_{ni} + \beta_5 Drug_{ni} + \beta_6 Ownership_{ni}$$

Choice Model with socio-economic factors:

$$V_{ni} = ASC + \alpha_1 Age_i^* + \alpha_2 Sex_i^* + \alpha_3 Eduyr_i^* + \alpha_4 Income_i^* + \alpha_5 Farming_i^* + \beta_1 Price_{ni} + \beta_2 Ambulance_{ni} + \beta_3 Medical-doctor_{ni} + \beta_4 Night-duty_{ni} + \beta_5 Drug_{ni} + \beta_6 Ownership_{ni}$$

Note: * on the socio economic characteristics means they've been interacted with ASC.

Where $i = 0, 1, 2, \dots, 150$; and $n = 1, 2, 3$

Where the variables are defined as:

V_{ni} = Utility of the individual (0=non-choice option, 1=choice option)

ASC= Alternate specific constant (1= if options 1 or 2 is chosen; 0, otherwise)

Price = Charges for healthcare services per consultation (at prices ₦300, ₦500 and ₦700 for improved options, otherwise =₦0 for the status quo.

Ambulance = Availability of ambulance (No=0, Yes=1)

Medical Doctor= Availability of medical doctor (None=0, twice a week=2, thrice a week=3, all through the week=7)

option (Adamowicz *et al.*, 1998, Mtimet and Albisu 2006). In general, the ASCs are used to capture the effect of factors that are left outside the model but have a systematic impact on the utility (Adamowicz *et al.*, 1998, Kasenius 2010).

In the Choice model (CM) analysis, two models were estimated. The first model considered the base line model option while the second model considered the baseline together with the selected socio-economic variable (Adamowicz and Bennett 1994). It is the role of the alternative specific constant (ASC) to take up any variation in choices that cannot be explained by either the attributes or the socio-economic variables.

Night Duties= Provision of personnel for night shift (No=0, Yes=1)

Drug= Presence of drug in the centres (irregular=0, regular=1)

Ownership= Management of the health care centre (Public=0, Private=1)

Age = age of respondent in years

Sex = gender (1=male, 0=female)

Eduyr = years spent in formal education

Income = monthly income of individual respondents in Naira

Farming = dummy variable for occupation of respondents (Farming=1 if occupation is farming, Farming=0 if otherwise).

The parameter estimates from the basic model are used to calculate the mean marginal willingness to pay given as:

$$Mean\ WTP = \frac{-\beta_{attribute}}{\beta_{price}} \dots\dots\dots (3)$$

community didn't have minimum universal education level.

Furthermore, the result on Table 1, shows that majority of the sampled respondents were farmers which characterised rural communities in Nigeria. On the average, the study reveals that the rural community's household adult members earned about ₦17,428 in a month.

Dissatisfaction experiences from the present health care services

The results of responses on assessment of present primary health care facilities in the study area are profiled in Table 2. The results on

RESULTS AND DISCUSSION

Socioeconomic description of respondents

Socioeconomic characteristics of respondents such as: sex, age, educational status, occupation and income of respondents in the study area are shown in Table 1. The result reveals that 51.3percent of the sampled respondents were males while 48.7percent were females. This result shows that majority of the respondents were within the age bracket 15-30 years. However, the mean age of the sample was 42 years with youngest and oldest respondents observed at 18 and 78 years respectively. About one-third (63.3 percent) of the sampled respondents in the rural

dissatisfaction experience reveals that 71.3 percent of the respondents reported they were not satisfied with the present state of irregular supply of drugs and 44.0 percent of the respondents indicated that they were not satisfied with irregular availability of medical personnel to attend to patients at their community primary health care centres. Furthermore, residents in the

study area embrace the proposed improvement in health care services as a need at hand as 88.7 percent of the respondents indicated their choice for improved health care service. The implication of this result is that majority of the individual seek for improved health care service in the study area.

Table 1: Socioeconomic characteristic of respondents (n=150)

Variables	Frequency	Percentage	Mean	Standard deviation
Sex : Male	77	51.3		
Female	73	48.7		
Age : 15-30	53	35.3	41.72	16.19
31-45	44	29.3		
46-60	28	18.7		
61-75	22	14.7		
76-100	3	2.0		
Educational Status				
No formal Education	56	37.3		
Primary Education	39	26.0		
Secondary/Technical Education	31	20.7		
Tertiary Education	24	16.0		
Occupation				
Farming	72	49.3		
Trade	42	28.0		
Civil servant	7	4.7		
Student	7	4.7		
Artisan	20	13.3		
Income : ≤5000	33	22.0	17428	13673.04
5001-25000	88	58.7		
25001-45000	22	14.7		
45001-65000	5	3.3		
65001-85000	2	1.3		

Table 2: Level of dissatisfaction experience in the community

Response	Dissatisfied		Satisfied	
	Frequency	Percentage	Frequency	Percentage
Drug Supply	107	71.3	43	28.7
Medical Personnel Availability	66	44.0	84	56.0
Desire for Improved Health care services	17	11.3	133	88.7

Willingness to pay for improved health care services

The result of willingness to pay and choice of improved attributes of primary healthcare centres is presented in Table 3. The diagnostic statistics of the conditional logit regression model shows that the model is fit and having log likelihood value of -385.1449, LR test significant at 1% and pseudo R² of 0.77, meaning that 77 percent of the variations in the choice made for improved health care services was explained by the stated

attributes. The basic model shows that price is highly significant and coefficient being negative is as expected since higher price reduces the utility derived by an individual. Attributes like ambulance, drug and ownership were significant with their coefficient being positive in agreement with a priory expectation since this will increase the respondents utility derived. Other attributes such as medical doctor and night duty were significant but with negative coefficient showing that there is lower willingness to choose

availability of medical doctor and availability of personnel for night duty. This is expected since this offer come at a higher cost.

Table 3: Result of conditional Logit model for basic and extended choice model

Variables	Basic model		Extended model	
	Coefficient	Standard error	Coefficient	Standard error
ASC	7.8737***	0.6625	7.4426***	0.8137
Price	-0.0106***	0.0013	-0.0105***	0.0014
Ambulance	8.3448***	0.4086	8.3389***	0.4098
Medical doctor	-0.2381***	0.0881	-0.2406***	0.0885
Night duty	-0.5317**	0.2663	-0.5287**	0.2673
Drug	0.4206*	0.2476	0.4209*	0.2478
Ownership	0.5782**	0.2383	0.5797**	0.2388
Age*			0.0073	0.0079
Sex*			0.0443	0.2199
Eduyr*			0.0144	0.0249
Income*			-0.0008	0.0082
Farming*			0.0114	0.2487
Number of obs.	2700		2700	
Pseudo R ²	0.7733		0.7736	
Log likelihood	-385.1449		-384.6341	
Prob>chi ²	0.0000		0.0000	

Note (*), (**), (***) denote significance at 10, 5 and 1 percent levels respectively. (*) in front of the socio economic variables means it's been interacted with ASC.

Also the result shows the interactions between the socioeconomic variables and the ASC in the extended model. The interactions were found not to be significant in explaining the respondents' willingness to pay. This means that the socio economic variables do not have a significant impact on the respondents' choice of improved healthcare services and this justifies the choice of basic model above the extended model in this work.

Table 4 shows the estimated Mean Willingness To Pay (MWTP) for improved healthcare services obtained as the ratio of coefficients of the non-monetary and the monetary attributes. The estimated MWTP for the basic and extended model does not differ greatly, thus the estimated MWTP of the basic model is adopted for this work. The mean willingness to pay for ambulance is ₦787.25, implying that individuals on the average are willing to pay charge worth ₦787.25 for availability of

ambulance during emergency. This could be linked to the need for safety that can be guaranteed by fast evacuation of patient to secondary and tertiary health facilities that are available in the close by city of Ibadan. Respondents are also willing to pay ₦39.68 for regular drug and ₦54.55 for private control.

The negative values for MWTP for doctor and night duty shows utility derived will be reduced in payment for these attributes which signifies that non willingness to pay for these attributes. The result on Table 4, of the estimated MWTP shows that individuals were willing to pay for availability of ambulance, regular drug and private clinic but the estimated MWTP for attributes, regular drug and private clinic were smaller than the least price bid presented to the respondent. On the average, the estimates reveals that the rural community are willing to pay ₦808.86 as user's fee per consultation for improved healthcare facilities.

Table 4: Mean willingness to pay values for the basic and extended model

Attributes	Basic model	Extended model
Ambulance	787.25	794.18
Medical doctor	(22.46)	(22.91)
Night duty	(50.16)	(50.35)
Drug	39.68	40.09
Ownership	54.55	55.21

Note () shows that the values are negative.

CONCLUSION AND RECOMMENDATION

This study concludes from the findings of the work that respondents in the study area are not satisfied with the level of services at their primary health care centres; they desire greatly an improvement in areas of availability of drug and medical personnel at their health centres regularly. The residents are willing to pay for improved health care services to earn better wellness. The study therefore recommends from the observed high level of dissatisfaction in irregular availability of drug and medical personnel in the study area, that government should ensure that drugs are available at the primary health care centres and put in place monitoring team to ensure medical personnel are on their duty post. Users' fee is a probable policy prescription for the rural communities arising from their stated preference.

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