Willingness to pay and benefit–cost analysis of modern contraceptives in Nigeria

ARTICLE *in* INTERNATIONAL JOURNAL OF GYNAECOLOGY AND OBSTETRICS: THE OFFICIAL ORGAN OF THE INTERNATIONAL FEDERATION OF GYNAECOLOGY AND OBSTETRICS · JUNE 2013

Impact Factor: 1.54 · DOI: 10.1016/j.ijgo.2013.03.024 · Source: PubMed

4 AUTHORS, INCLUDING:

Obinna Onwujekwe
University of Nigeria
200 PUBLICATIONS **1,929** CITATIONS
SEE PROFILE

Chinwe Ogbonna
United Nations Population Fund
3 PUBLICATIONS **7** CITATIONS
SEE PROFILE

Ogochukwu Ibe
Health Policy Research Group, University of…
21 PUBLICATIONS **147** CITATIONS
SEE PROFILE

International Journal of Gynecology and Obstetrics 122 (2013) 94–98

Contents lists available at SciVerse ScienceDirect

International Journal of Gynecology and Obstetrics

journal homepage: www.elsevier.com/locate/ijgo

CLINICAL ARTICLE

Willingness to pay and benefit–cost analysis of modern contraceptives in Nigeria

Obinna Onwujekwe [a,b], Chinwe Ogbonna [c], Ogochukwu Ibe [a,*], Benjamin Uzochukwu [a,d]

[a] Health Policy Research Group, Department of Pharmacology and Therapeutics, College of Medicine, University of Nigeria, Enugu, Nigeria
[b] Department of Health Administration and Management, College of Medicine, University of Nigeria, Enugu, Nigeria
[c] United Nations Population Fund, Abuja, Nigeria
[d] Department of Community Medicine, College of Medicine, University of Nigeria, Enugu, Nigeria

ARTICLE INFO

Article history:
Received 18 October 2012
Received in revised form 14 March 2013
Accepted 16 May 2013

Keywords:
Benefit–cost analysis
Contraceptives
Family planning
Willingness to pay

ABSTRACT

Objective: To determine the willingness to pay (WTP) and the benefit–cost of modern contraceptives delivered through the public sector in Nigeria. *Methods:* Data were collected from 4517 randomly selected households. The WTP for the 6 major contraceptive methods available in the public sector was elicited. Logistic regression was used to determine whether the decision to state a positive WTP amount was valid; Tobit regression was used to test the validity of the elicited WTP amounts. For each contraceptive, 3 BCR values were computed, based on the official unit price, the unit cost per couple-year of protection (CYP), and the average actual expenditure for contraceptives in the month preceding the interview. *Results:* The mean WTP for the different contraceptives varied by socioeconomic status and geographic (urban versus rural) location ($P < 0.01$). The BCR analysis showed that the benefits of providing contraceptives through the public sector far outweighed the costs, except for female condoms, where the CYP-based BCR was 0.9. *Conclusion:* The benefits of providing contraceptives outweigh the costs, making public sector investment worthwhile. The median WTP amounts, which reflect the ideal upper thresholds for pricing, indicate that cost recovery is feasible for all contraceptives.

1. Introduction

In response to the rapid rate of population growth and its formidable challenges to development, the Nigerian government reviewed the national population policy in 2004 and included as one of its goals a reduction in the population growth rate through the use of modern contraceptives [1]. Despite adoption of the policy, the 2008 Nigeria Demographic and Health Survey (NDHS) showed that Nigeria had not made much progress toward achieving this goal. Although there has been a slight increase (from 8.2% in 2003 to 9.7% in 2008 [2]) in the use of modern contraceptive methods, the overall prevalence of contraceptive use is still low.

The financial sustainability of reproductive health services has become crucial as countries face reductions in contraceptive financing from donor organizations. Thus, governments are faced with the challenge of recovering the costs of family planning services while aiming to increase the use of contraceptives [3]. The introduction of cost recovery mechanisms to improve or expand services can be facilitated by determining people's willingness to pay (WTP) for the services in question.

The WTP is defined as the maximum amount of money that individuals are prepared to spend for what they gain (utility and satisfaction) from the consumption of a particular good or service [4]. In the case of contraceptives, the WTP informs on the value that people attach to the benefits of various contraceptives and shows whether it is worthwhile for government and its partners to invest in the free or subsidized delivery of contraceptives. Information from a WTP study can also be used for evidence-based pricing decisions, should the government and its partners wish to introduce cost recovery measures.

The present study determined the levels of WTP for contraceptives delivered through the public sector in Nigeria using the contingent valuation method (CVM). The study also provides new knowledge on the maximum amount of money that people from different socioeconomic groups and from urban versus rural residential areas are willing to pay for the main contraceptives available in Nigeria, and informs on factors that could explain people's WTP decisions in this context. The findings could help in increasing the demand for contraceptives in Nigeria and in developing a cost recovery system.

2. Materials and methods

The present study took place in 6 Nigerian states selected randomly from each of the 6 geopolitical regions in Nigeria. From each participating state, an urban and a rural area were selected randomly for inclusion in the study. The study was conducted from August 1 to October 31, 2010. More details about the study processes are contained in the study report [5]. All participants gave informed

* Corresponding author at: Health Policy Research Group, Department of Pharmacology and Therapeutics, College of Medicine, University of Nigeria, PMB 01 129 Enugu, Nigeria. Tel.: +234 806 15 58346.
E-mail address: mypaskie@yahoo.co.uk (O. Ibe).

0020-7292/$ – see front matter
http://dx.doi.org/10.1016/j.ijgo.2013.03.024

consent beforehand. Ethics clearance for the study was obtained from the Ethics Committee of the University of Nigeria.

The CVM approach was used to elicit the WTP for contraceptives. This approach is widely acknowledged as a theoretically acceptable method for the valuation of goods and services by potential consumers [6]. The technique can be adapted to suit the unique nature of the healthcare market [7], which can be characterized by conditions such as information asymmetry, externalities, the provision of public and merit goods, and uncertainty. These characteristics are associated with market failure, meaning that neoclassical and other demand models based on revealed preferences are unsuitable for the correct valuation of consumer surplus. A detailed and credible CVM scenario acts to minimize the problem of limited knowledge about the commodity to be valued, enabling respondents to make better informed and potentially more reliable and valid choices.

The present study was a cross-sectional quantitative study. Information from the participating households was collected through a pre-tested interviewer-administered questionnaire. The households were selected by simple random sampling from a sample frame of households. The primary respondent in each household was a female primary caregiver of childbearing age (usually the wife), who is the potential main beneficiary of the use of modern contraceptives, or the male head of the household if the primary respondent remained absent after repeated visits. However, efforts were made to ensure that the respondent was the wife.

Assuming a power of 80%, a confidence level of 95%, and a rate of contraceptive use of 10%, the minimum sample size was calculated to be 350 per urban and rural site. This was increased to 385 per site, to control for refusals and nonresponse, giving a number of 770 per state.

Using the bidding game format, the levels of WTP for the 6 major family planning methods available in the public sector—oral contraceptive pills (OCP), injectables, male and female condoms, intrauterine devices (IUDs), and implants— were elicited.

Before the WTP amounts were elicited, the respondents received information on the benefits and adverse effects of each contraceptive method, the payment vehicle, and the way in which each contraceptive prevents pregnancy. Therefore, the respondents had adequate knowledge about the contraceptives they were asked to value. The respondents also received information on the quantity of contraceptive that each elicited amount would purchase and were told that the modern contraceptives would be delivered by the public sector. Hence, the WTP values and benefit–cost ratios (BCRs) in the present study refer to a scenario where contraceptives are provided by the public sector. The starting bids for the bidding game were informed by the official prices for each contraceptive so as to create a realistic market situation [8]. To counter any ordering effect, the order in which the WTP information was elicited was alternated sequentially per contraceptive. A sample bidding game iteration is presented in Box 1.

The data were initially processed using Epi Info (Centers for Disease Control and Prevention, Atlanta, GA, USA) and were then transferred into Stata (StataCorp, College Station, TX, USA) and SPSS (IBM, Armonk, NY, USA) for detailed analysis using tabulations and bivariate and multivariate analysis. The average WTP estimates for contraceptives were computed. For the regression analysis, $P < 0.10$ was used to indicate statistical significance of the variables in relation to the WTP, whereas the sign of the regression coefficient showed the nature of the relationship between the WTP and the independent variables.

The links between socioeconomic status (SES) and geographic location of the respondents with WTP were examined. To analyze the implications of the data in terms of socioeconomic equity, an asset-based SES index was created using principal components analysis [9]. The variables included in the SES index were household ownership of a radio set, bicycle, television set, motorcycle, and fridge, as well as the per-capita weekly food value. The weights for the SES index, derived from the first principal component, were used to divide the households into socioeconomic quintiles. The χ^2 test was used to determine the statistical significance ($P < 0.05$) of the differentiation of WTP by SES quintile.

Box 1
Bidding game iteration for eliciting the willingness-to-pay amount from consumers

1. The price of a contraceptive is 600 naira; are you willing to pay? 1 = Yes (Q2) 0 = No (Q3) Do not know (Q4)
2. What if the price was 700 naira, would you be willing to pay? 1 = yes (Q4) 0 = No (Q4)
3. What if the price was 500 naira, would you be willing to pay? 1 = yes (Q4) 0 = No (Q4)
4. What is the maximum amount you are willing to pay, bearing in mind your average monthly household income and the money you spend on various items?

The validity of the findings was assessed using logistic multiple regression and Tobit regression analyses. This was necessary because the bidding game method generates continuous limited dependent WTP amounts. Logistic regression was used to determine the validity of the decision to state a positive WTP amount (in other words, to accept the starting bid), whereas Tobit regression was used to test the validity of the elicited final continuous WTP amounts. In addition, heteroscedasticity was evaluated and correlation coefficients between the dependent and the independent variables were calculated to assess multicollinearity. The Ramsey Regression Equation Specification Error Test [10] was used to detect functional misspecification of the regression models where applicable.

Three BCRs for the different contraceptives were computed using pooled data from the 6 states. The 3 ratios were based on the official unit price, the unit cost per couple-year of protection (CYP) [11], and the average actual expenditure for contraceptives within the month before the interview.

3. Results

The response rate was more than 95% and a total of 4517 questionnaires were analyzed. Most respondents were either wives (3308 [73.2%]) or another adult female household representative (817 [18.1%]), and most were married (3659 [81.0%]). In total, 3985 (88.2%) respondents had some form of formal education and the average number of years spent in school was 10.7 ± 5.5 years. The average age of the respondents was 31.4 ± 7.1 years. These figures are comparable to those from the NDHS, where more than two-thirds (69%) of the respondents were married and the majority had some level of education [12].

Generally, less than half of the respondents were willing to pay the starting bids for the contraceptives. Acceptance of the starting bid was highest for female condoms (45%) followed by male condoms (41%), and it was lowest for injectables (27%), implants (29%), and IUDs (29%) (Table 1). Male and female condoms were the only contraceptive methods where rural dwellers were more willing to pay the starting bids than urbanites.

The major reasons why people were not willing to pay for contraceptives were either that they did not need them or that they did not like them. Issues such as contraceptives being perceived as harmful were stated more often for IUDs, implants, and injectables.

The combined mean WTP amount was highest for implants (1447 naira [US$9.4]), followed by IUDs (1001 naira [US$6.6]) (Table 2). It was lowest for female condoms (105 naira [US$0.7]) and male condoms (148 naira [US$0.9]). The WTP the starting bids and the average stated WTP amounts increased with increasing SES ($P < 0.01$) (Tables 3 and 4). The combined mean WTP amount of 148 naira (US $0.9) for male condoms was higher than the mean WTP amounts in

Table 1
Willingness to pay the starting bids for various contraceptives by geographic location.[a]

Contraceptive method	Starting bid, US dollar[b]	Willingness to pay			Urban–rural ratio	χ^2 (*P* value)
		Urban (n = 2294)	Rural (n = 2223)	Combined (n = 4517)		
Male condom	1.25	895 (39.0)	960 (43.2)	1855 (41.0)	0.9	0.38 (0.540)
Female condom	1.25	1028 (44.8)	1018 (45.8)	2046 (45.2)	1.0	3.15 (0.076)
Oral contraceptive	6.25	736 (32.1)	694 (31.2)	1430 (31.6)	1.0	5.99 (0.014)
Injectable	7.5	694 (30.2)	542 (24.4)	1236 (27.3)	1.3	36.85 (<0.001)
Implant	12.5	732 (31.9)	574 (25.8)	1306 (29.0)	1.3	38.71 (<0.001)
IUD	12.5	732 (31.9)	567 (25.8)	1299 (29.0)	1.3	41.68 (<0.001)

Abbreviation: IUD, intrauterine device.
[a] Values are given as number (percentage) unless otherwise indicated.
[b] 1 US dollar = 150 naira.

the 2 quintiles with the lowest SES (Q1 and Q2). For the other 5 contraceptives, the mean WTP amounts in the 3 quintiles with the lowest SES (Q1, Q2, and Q3) were lower than the combined mean WTP amounts for the different contraceptives.

Logistic regression analysis assessing the relationship between independent variables and WTP the starting bids showed that the WTP was statistically significantly related to many variables. Across the 6 contraceptives, WTP was positively related to the SES of the respondents, implying that WTP increases with increasing SES. The WTP was negatively related to age, indicating that the younger the respondent, the higher the WTP. All logistic regression results were statistically significant, and corrected predicted more than 60% of observations in each case to be within the specified range.

Tobit regression analysis showed that many variables were independently related with the stated WTP amounts (Table 5), with the results being in line with economic theory. The state of residence was positively related to the WTP amount for 5 of the 6 contraceptives. Other variables that were positively and statistically significantly related to the WTP amounts for at least 3 contraceptives were status in the household, educational level (the higher the level of education, the higher the WTP amount), acceptability of the contraceptives, previous use of contraceptives (with previous use being related to a higher WTP amount), and SES (the richer, the higher the WTP amount). The WTP amount was negatively related to residence in a rural location (meaning that people in rural areas were less likely to be willing to pay). The WTP amount was also negatively related to employment (with the unemployed and self-employed being less likely to be willing to pay).

The BCRs for the contraceptives were higher than 1, showing that the benefits of the contraceptives outweighed their costs, with the exception of female condoms, where the CYP-based BCR was 0.9 (Table 6).

4. Discussion

People in Nigeria were generally willing to pay for contraceptives, but the levels of WTP differed by SES and geographic (urban versus rural) location, with people with a higher SES and those living in urban areas stating higher WTP values. This finding is in accordance with results obtained for the Philippines, where payment for modern contraceptives differed by geographic location and household wealth status [13]. A possible explanation is that rich people and urbanites are usually more educated, and they may also be more exposed to

Table 2
Mean willingness-to-pay amounts (US dollar)[a] for various contraceptives by geographic location.

Contraceptive method	Willingness-to-pay amount			Urban–rural ratio	χ^2 (*P* value)
	Urban (n = 2294)	Rural (n = 2223)	Combined (n = 4517)		
Male condom	1.0 ± 1.1	0.9 ± 1.0	0.9 ± 1.1	1.1	10.8 (0.001)
Female condom	0.7 ± 1.0	0.7 ± 0.9	0.7 ± 0.9	1.1	18.1 (<0.001)
Oral contraceptive	2.0 ± 1.9	2.0 ± 1.8	1.8 ± 1.8	1.2	18.2 (<0.001)
Injectable	5.0 ± 5.2	4.0 ± 4.2	4.1 ± 4.6	1.2	32.0 (<0.001)
Implant	11.0 ± 11.1	9.0 ± 9.6	9.6 ± 9.6	1.2	24.7 (<0.001)
IUD	8.0 ± 10.1	6.0 ± 8.2	6.6 ± 9.2	1.3	40.1 (<0.001)

Abbreviations: IUD, intrauterine device.
[a] 1 US dollar = 150 naira.

Table 3
Willingness to pay the starting bids for various contraceptives by socioeconomic status.[a]

Contraceptive method	Q1 Most poor (n = 904)	Q2 Very poor (n = 904)	Q3 Moderately poor (n = 903)	Q4 Poor (n = 903)	Q5 Least poor (n = 903)	χ^2 (*P* value)
Male condom	250 (27.6)	309 (34.2)	416 (46.0)	394 (43.6)	486 (53.8)	157.4 (<0.01)
Female condom	293 (32.4)	358 (39.6)	425 (47.1)	460 (50.9)	510 (56.5)	130.7 (<0.01)
Oral contraceptives	221 (24.4)	256 (28.3)	290 (32.1)	296 (32.8)	367 (40.6)	60.7 (<0.01)
Injectable	172 (19.0)	234 (25.8)	247 (27.3)	270 (29.9)	313 (34.6)	59.7 (<0.01)
Implant	151 (16.7)	215 (23.8)	238 (26.3)	295 (32.7)	407 (45.0)	200.9 (<0.01)
IUD	163 (18.0)	185 (20.4)	265 (29.3)	276 (30.5)	410 (45.4)	204.8 (<0.01)

Abbreviations: IUD, intrauterine device.
[a] Values are given as number (percentage) unless otherwise indicated.

Table 4
Mean willingness-to-pay amounts (US dollar)[a] for various contraceptives by socioeconomic status.

Contraceptive method	Q1 Most poor (n = 904)	Q2 Very poor (n = 904)	Q3 Moderately poor (n = 903)	Q4 Poor (n = 903)	Q5 Least poor (n = 903)	χ^2 (*P* value)
Male condom	0.7 ± 0.9	0.8 ± 0.9	1.0 ± 1.0	1.0 ± 1.1	1.4 ± 1.2	240.2 (<0.01)
Female condom	0.5 ± 0.8	0.5 ± 0.7	0.7 ± 0.8	0.8 ± 1.0	1.0 ± 1.2	245.4 (<0.01)
Oral contraceptives	1.4 ± 1.6	1.6 ± 1.7	1.8 ± 1.8	1.9 ± 1.9	2.4 ± 2.1	108.4 (<0.01)
Injectable	3.0 ± 3.8	3.8 ± 4.4	4.2 ± 4.4	4.7 ± 4.8	5.4 ± 5.1	110.9 (<0.01)
Implant	6.3 ± 8.1	7.4 ± 9.1	9.2 ± 9.7	10.8 ± 10.7	14.2 ± 10.0	233.0 (<0.01)
IUD	4.0 ± 6.9	5.0 ± 7.4	6.5 ± 8.5	6.9 ± 9.3	11.0 ± 11.6	201.0 (<0.01)

Abbreviations: IUD, intrauterine device; Q, quintile.
[a] 1 US dollar = 150 naira.

contraceptive awareness campaigns; therefore, they may better appreciate the benefits of using contraceptives for birth spacing. Similar trends have also been recorded in other low-income countries, with contextual factors such as availability of family planning services and approval of family planning within communities having a large part [14].

Although the highest mean WTP amounts were stated for implants and IUDs, fewer people were willing to accept the starting bids for these contraceptives. Another study [15] conducted elsewhere has shown that IUDs and implants are more often used by the relatively wealthy and by urban women, and this could explain the high WTP amounts attached to these contraceptives in the present study. However, the demand for IUDs, implants, and male and female sterilization in Nigeria is low, partly because there is a lack of trained health workers who can provide these methods [16].

In the present study, the mean WTP amounts for contraceptives provided by the public sector exceeded the current unit prices for contraceptives provided by the private sector. This shows that public investment in the provision of modern contraceptives is worthwhile. The median WTP amounts, which are the ideal upper thresholds for pricing, show that cost recovery is feasible for all the contraceptives, without necessarily undermining equity. The results also show that there is scope for instituting cost recovery measures based on appropriate pricing to enable the sustainability of family planning programs. However, this is tempered by the finding that the mean WTP amounts stated by respondents in the 3 quintiles with the lowest SES were generally lower than the combined mean WTP amount for each contraceptive. Hence, people in these quintiles may not be able to afford prices that are set on the basis of group mean WTP amounts. The implication is that any instituted financing mechanism will need to promote equity, for example by offering subsidies to the poor, for the level of access to contraceptives to increase significantly. In addition, ways and means of ensuring that the most poor and some vulnerable groups receive contraceptives without paying at all should be introduced.

The elicited WTP values in the present study are valid because most of the independent variables were related to WTP in a way that is expected from economic theory. For instance, the WTP increased with increasing SES status (income) and increasing acceptability of contraceptives. Hence, the results can be confidently used for decision-making and resource allocation. Bryan and Jowett [17] showed that hypothetical WTP choices in a healthcare context approximate real preferences, offering considerable support for the use of WTP and benefit–cost analysis in the context of health care.

Table 5
Tobit regression analysis of the association between willingness to pay and respondent characteristics.[a]

Characteristic of the respondent	Male condom	Female condom	Oral contraceptive	Injectable	Implant	Intrauterine device
State of residence	0.01 ± 0.01[b]	0.04 ± 0.01[b]	−0.02 ± 0.01[c]	0.00 ± 0.01	0.03 ± 0.01[b]	0.02 ± 0.01[d]
Residence in rural versus urban area	−0.05 ± 0.03	−0.05 ± 0.03	−0.12 ± 0.03[b]	−0.13 ± 0.03[b]	−0.16 ± 0.03[b]	−0.15 ± 0.04[b]
Status in the household	−0.05 ± 0.05	0.11 ± 0.05[c]	0.11 ± 0.05[c]	0.06 ± 0.05	0.12 ± 0.06[c]	0.17 ± 0.07[b]
Number of household residents	−0.02 ± 0.01[b]	−0.01 ± 0.01[d]	0.00 ± 0.01	−0.00 ± 0.01	0.00 ± 0.01	0.01 ± 0.01
Sex	0.13 ± 0.10	−0.05 ± 0.11	0.02 ± 0.11	0.08 ± 0.12	−0.20 ± 0.12	−0.33 ± 0.15[c]
Age	−0.01 ± 0.00[b]	−0.00 ± 0.00	−0.00 ± 0.00[c]	−0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
Receipt of schooling	0.28 ± 0.08[b]	0.23 ± 0.08[b]	0.22 ± 0.07[b]	0.17 ± 0.07[c]	0.30 ± 0.08[b]	0.18 ± 0.10[d]
Years of schooling	−0.00 ± 0.00	0.01 ± 0.00[c]	0.00 ± 0.01	0.01 ± 0.00[d]	0.01 ± 0.00[b]	0.01 ± 0.01[b]
Unemployed	−0.04 ± 0.05	−0.11 ± 0.06[c]	−0.05 ± 0.05	−0.07 ± 0.05	−0.21 ± 0.06[b]	−0.24 ± 0.07[b]
Subsistent farmer/herd keeper	0.26 ± 0.09[b]	0.09 ± 0.09	0.22 ± 0.08[b]	−0.03 ± 0.09	−0.02 ± 0.09	−0.13 ± 0.11
Petty trader	0.16 ± 0.06[b]	0.03 ± 0.06	0.07 ± 0.06	0.10 ± 0.05	0.01 ± 0.06	−0.09 ± 0.07
Government worker	0.09 ± 0.06	0.02 ± 0.07	0.15 ± 0.06	0.12 ± 0.06[c]	0.05 ± 0.07	−0.03 ± 0.08
Employed in the private sector	0.03 ± 0.06	−0.07 ± 0.07	0.07 ± 0.07	0.05 ± 0.06	−0.09 ± 0.07	−0.04 ± 0.08
Self-employed	−0.13 ± 0.06[c]	−0.18 ± 0.06[b]	−0.11 ± 0.06[c]	−0.07 ± 0.06	−0.10 ± 0.06	−0.08 ± 0.07
Marital status	−0.07 ± 0.05	−0.07 ± 0.05	−0.02 ± 0.05	−0.12 ± 0.05[c]	−0.09 ± 0.06	−0.11 ± 0.07[d]
Acceptance of contraceptives	0.12 ± 0.06[c]	0.03 ± 0.06	0.07 ± 0.06	0.13 ± 0.06[c]	0.19 ± 0.07[b]	0.29 ± 0.08[b]
Ever use of contraceptives	0.05 ± 0.04	0.08 ± 0.04[c]	−0.03 ± 0.04	0.01 ± 0.04	0.08 ± 0.04[c]	0.09 ± 0.05[c]
History of previous payment for contraceptives	−0.06 ± 0.04	0.00 ± 0.05	−0.09 ± 0.04[c]	−0.07 ± 0.04	−0.05 ± 0.05	−0.06 ± 0.05
Socioeconomic status	0.17 ± 0.01[b]	0.26 ± 0.04[b]	0.12 ± 0.04[b]	0.08 ± 0.05	0.26 ± 0.06[b]	0.32 ± 0.08[b]
Constant	4.99 ± 0.14	4.5 ± 0.15[b]	5.76 ± 0.14[b]	6.5 ± 0.13[b]	7.02 ± 0.15[b]	6.82 ± 0.18[b]
χ^2 value	229.76	142	126.09	128.34	214.87	166.37
P value[e]	<0.001	<0.001	<0.001	<0.001[b]	<0.001	<0.001
Log likelihood	−3520.62	−3352.39	−3683.28	−3414.2	−3201.36	−2781.89

[a] Values are given as Tobit coefficient ± standard error unless otherwise indicated.
[b] $P < 0.01$ for the comparison between dependent and independent variables at 99% confidence level.
[c] $P < 0.05$ for the comparison between dependent and independent variables at 95% confidence level.
[d] $P < 0.10$ for the comparison between dependent and independent variables at 90% confidence level.
[e] *P* values for the comparison between dependent and independent variables.

Table 6
Benefit–cost analyses of various contraceptives, based on official prices, CYP, and actual expenditure per unit.[a]

Contraceptive method	Official price[b]	CYP	Actual expenditure
Male condom			
Unit price (cost)	1 (0.006)	120 (0.8)	50 (0.3)
Mean WTP amount (benefit)	148 (0.9)	148 (0.9)	148 (0.9)
BCR	148	1.2	3.0
Female condom			
Unit price	1 (0.006)	120 (0.8)	12 (0.08)
Mean WTP amount	105 (0.7)	105 (0.7)	105 (0.7)
BCR	105	0.9	8.8
Oral contraceptives			
Unit price	15 (0.1)	225 (1.5)	69 (0.5)
Mean WTP amount	276 (1.8)	276 (1.8)	276 (1.8)
BCR	18.4	1.2	4.0
Inject			
Unit price	60 (0.4)	240 (1.6)	137 (0.9)
Mean WTP amount	642 (4.3)	642 (4.3)	642 (4.3)
BCR	10.7	2.7	4.7
Implant			
Unit price	800 (5.3)	400 (2.7)	97 (0.6)
Mean WTP amount	1447 (9.6)	1447 (9.6)	1447 (9.6)
BCR	1.8	3.6	16.6
Intrauterine device			
Unit price	100 (0.7)	29 (0.2)	67 (0.4)
Mean WTP amount	1001 (6.7)	1001 (6.7)	1001 (6.7)
BCR	10.0	34.5	14.9

Abbreviations: BCR, benefit–cost ratio; CYP, couple-year of protection; WTP, willingness to pay.
[a] Prices are given in naira (US$).
[b] Current public sector prices [11].

The present benefit–cost analysis indicates that the overall benefits outweigh the costs for all contraceptives. Therefore, based on the current market prices for contraceptives, the unit costs per CYP, and the unit prices that people are currently paying for these commodities in the private sector, it can be concluded that public investment in contraceptives is a worthwhile step toward ensuring universal access to contraceptives.

The present study is limited by its lack of a qualitative component exploring the reasons why people were more willing to pay for some contraceptives than for others.

In conclusion, with any cost recovery mechanism, the differential WTP across different population groups should be borne in mind because not all groups may be able to pay. Any cost recovery strategy should include selective targeting of the groups that are least able to finance the services they need. There should also be legitimization of modern contraceptives through other community-based approaches to address the reasons why people are not willing to pay for contraceptives and to improve the demand for contraceptives.

Acknowledgments

The study was funded by the United Nations Population Fund.

Conflict of interest

The authors have no conflicts of interest.

References

[1] National Population Commission, ORC Macro. Nigeria Demographic and Health Survey 2003. http://pdf.usaid.gov/pdf_docs/Pnacx579.pdf. Published April 2004.
[2] National Population Commission, ICF Macro. Nigeria Demographic and Health Survey 2008. http://nigeria.unfpa.org/pdf/nigeriadhs2008.pdf. Published November 2009.
[3] Hennink M, Madise N. Influence of user fees on contraceptive use in Malawi. Afr Popul Stud 2005;20(2):125–41.
[4] Phillips KA, Homan RK, Luft HS, Hiatt PH, Olson KR, Kearney TE, et al. Willingness to pay for poison control centers. J Health Econ 1997;16(3):343–57.
[5] UNFPA, Federal Ministry of Health. Willingness to pay survey for modern contraceptives in Nigeria. Abuja, Nigeria: UNFPA; 2010.
[6] Brookshire DS, Thayer MA, Schulze WD, d'Arge RC. Valuing Public Goods: A Comparison of Survey and Hedonic Approaches. Am Econ Rev 1982;72(1):165–77.
[7] Golan EH, Shechter M. Contingent valuation of supplemental health care in Israel. Med Decis Making 1993;13(4):302–10.
[8] Onwujekwe O. Criterion and content validity of a novel structured haggling contingent valuation question format versus the bidding game and binary with follow-up format. Soc Sci Med 2004;58(3):525–37.
[9] Filmer D, Pritchett LH. Estimating wealth effects without expenditure data–or tears: an application to educational enrollments in states of India. Demography 2001;38(1):115–32.
[10] Ramsey JB. Test for specification errors in classical linear least squares regression analysis. J R Stat Soc 1969;31(2):350–71.
[11] USAID, Deliver Project. The Logistics Handbook: A Practical Guide for the Supply Chain Management of Health Commodities. http://deliver.jsi.com/dlvr_content/resources/allpubs/guidelines/LogiHand.pdf. Published 2011.
[12] National Population Commission (Nigeria), ICF Macro. Nigeria Demographic and Health Survey 2008. http://nigeria.unfpa.org/pdf/nigeriadhs2008.pdf. Published 2009.
[13] Lamberte EE, Lee NR, Garganian DCU, Kantner A. Family Planning Service Utilization and Market Segmentation in the Philippines. http://www.measuredhs.com/pubs/pdf/FA34/FA34.pdf. Published October 2000.
[14] Stephenson R, Baschieri A, Clements S, Hennink M, Madise N. Contextual influences on modern contraceptive use in sub-Saharan Africa. Am J Public Health 2007;97(7):1233–40.
[15] Winfrey W. Ability and Willingness to Pay for Family Planning in Vietnam. http://www.path.org/publications/files/RH_willing_pay_fp_vietnam.pdf. Published November 29, 2010.
[16] Ogbaje E, Igharo E. Contraceptive Security in Nigeria: Assessing Strengths and Weaknesses. http://pdf.usaid.gov/pdf_docs/PNADS809.pdf. Published September 2009.
[17] Bryan S, Jowett S. Hypothetical versus real preferences: results from an opportunistic field experiment. Health Econ 2010;19(12):1502–9.