Empirical Analysis of Determinants of Utilization of Modern Contraceptives among Rural Women in Uganda

Abstract[1]

The purpose of the study was to examine the utilization level of modern contraceptives and to analyze the factors that influence the use of modem contraceptives among women who reside in rural areas in Uganda. Using secondary data of Uganda Demographic Health Survey 2016 (UDHS), the study uses a multivariate Probit analysis to examine the factors that influence the use of modern contraceptives among rural women. The results indicate that various socio-economic factors such as; education, age, wealth index of the woman, husband's education, husband's desire for children, number of living children and desire for children all significantly influence the use of modern contraceptives. To increase use of modern contraceptives among women in rural areas, investment in female education and involvement of religious leaders in family planning programs should be given prominent efforts. In addition, family planning programs and policies should target men, as well as advocate for and encourage women to have smaller and manageable families.

[1] Disclaimer: The views expressed in this paper are those of the authors and do not necessarily reflect the Position and Policies of the NPA Executive Board and/or the Executive Director.

1. INTRODUCTION/ BACKGROUND

With an annual population growth rate of about 3.26 percent, Uganda has experienced rapid population growth from 9.5 million in 1969 to 40.9 million in 2017 and is expected to reach 47 million in 2025. Such a surge in population which is not parallel to economic growth is detrimental to the Government's ability to attain social transformation and sustainable development especially in rural areas where more than 80 percent of Uganda's growing population resides. Out of the demographic components, fertility has contributed the most to population growth far exceeding the contributions played by migrations or increased survival (UN, 2006). Uganda's Total Fertility Rate (TFR) has gradually declined from 7.1 births per woman in 1966 to 5.7 births in 2015, however, this TFR still remains high compared to Uganda's neighbouring countries such as Kenya and Rwanda who have total fertility rates of 4.26 and 3.8 respectively. This decline in TFR albeit a slow one can be partly attributed to utilization of family planning services over the past two decades.

Modern contraceptives such as; injectables, the intrauterine contraceptive device (IUD), implants, male condom and female sterilization are one of the most effective ways to downsize fertility desires and enable couples to achieve small desired and manageable families. In addition, they are one of the most affordable and high return investments for reducing Uganda's high maternal mortality ratio, improving the health of the children and ultimately the nation.

The Government of Uganda in collaboration with local and International family planning organizations such as MarieStopes International have played a great role in expanding the availability and use of reproductive health and family planning services. Despite the effort expended, the Contraceptive Prevalence Rate (CPR) that currently stands at 39 percent is still low yet there is universal knowledge of modern contraceptives among rural women in Uganda. Without increased utilization of modern contraceptives among reproductive-age women in rural areas, rapid population growth due to high fertility levels will continue to be an uphill task for the Ugandan Government. It is against this background that this study aims at investigating the factors that influence rural women to uptake modern contraception services in Uganda. A number of studies have explained why low utilization of contraceptives exists among women (Nalwadda et al., 2010; Okech et al., 2011), however, less attention has been given to the factors

behind the low utilization of modern methods of contraception among women in rural areas in Uganda given that they are almost fully aware of them.

2. DATA AND METHODS

The study uses cross-section secondary data for the Uganda Demographic Health Survey 2016. A nationally representative sample of 20,880 households was randomly selected for the Uganda Demographic Health Survey 2016 and 18,506 women were successfully interviewed.

The survey collected information regarding different areas such as; background characteristics, reproduction history, maternal and child health, marriage and sexual activity, fertility preferences, use of family planning methods, adult and maternal mortality, early child development and domestic violence among others. However, for the purpose of this current study, information on the use of family planning methods has been considered so as to capture the factors that affect the utilization of modern contraceptives among women.

The data was further collapsed to capture women who live in rural areas since the current study's focus is to find out which factors influence the use of modern contraceptives among women who live in rural areas and this reduced the number of observations to 14,127. The sample size of this study covered 15 regions in Uganda which include; South Central, North Central, Lango, Acholi, Ankole, Bunyoro, Bukedi, Bugisu, Kigezi, Karamoja, Tooro, Teso, Busoga and West Nile.

3. THEORETICAL FRAMEWORK

The theoretical framework adopted for this study is motivated by the Grossman model which assumes that an individual is born with a stock of health which depreciates with age but can be augmented with acts of health investment such as diet, health care services, and exercises among others. It is assumed that the i^{th} reproductive woman is a rational consumer and has a utility function that comprises of her health H_i consumption of other market goods Z_i while $X_i$is a vector of the socio-economic characteristics that influence an i^{th} reproductive woman to use modern contraceptives such as; age, education, religion, and marital status and occupation.

An indirect utility function of the following form is used since it is difficult to measure the number of modern contraceptives consumed by reproductive women.

$$V_{ij} = V\left(P_{ij}, PZ_i', Y_i, X_{ij}, P_o\right) \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (1)$$

Where V_{ij} is indirect utility a reproductive woman derives from consuming modern contraception services where j = 1, 2,…,m; P_{ij} is a vector of prices that a reproductive woman i faces for the modern methods of contraceptives, PZ_i' is a vector of prices for other goods and complementary health inputs, Y_i is the income of the ith woman, X_{ij} are personal characteristics of ith woman like age, education, religion, among others for modern contraceptive services and P_o consists of Government policies relating to modern contraceptive services.

It is assumed that each ith woman faces a budget constraint as expressed below;

$$I_i = P_{mc}mc_i + P_z'Z_i' \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots . (2)$$

Solving for the first order conditions that describe the optimal consumption bundles of mc_i and Z_i' results in modern contraceptive demand for the ith reproductive woman as shown below;

$$mc_i = D_i(P_{mc}, P_z', I_i, X_i) \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots .. (3)$$

4. EMPIRICAL METHODOLOGY

The econometric estimation technique applied in this study is a binary probit regression model which is employed to test for the effect of the explanatory variables on the use of modern contraceptives among women in rural areas of Uganda. A probit model is used in this study because the response variables are categorical in nature such that a woman either uses modern contraceptives or does not use modern contraceptives. The binary probit model overcomes problems of the linear probability model which include; predicted probabilities exceeding the 0-1 interval, questionable value of R as a measure of goodness of fit, non-homoscedastic variances of the disturbances and non-normality of the disturbances. Therefore the probit model is an appropriate model to use for estimation purposes since the assumptions of the classical linear regression model (CLRM) are not fulfilled. (Gujarati, 2004)

The probit model is specified in the form

$$\Pr(M\_Contraceptive\ use_i = 1) \quad = \quad \phi\ \beta_0 + \beta_1 Age\_Dummy_i + \beta_2 Educ_i + \beta_3 Hus\ Educ_i + \beta_4 Wealth\ Index_i + \beta_5 Working\ status_i + \beta_6 Religion_i + \beta_7\ Living\ children_i +$$

$\beta_8 Desire\ for\ children_i + \beta_9 Hus\ desire\ for\ chn_i +$

ε_i ……(10)

Where ε_i is the error term which follows a standard normal distribution.

5. EMPIRICAL RESULTS

5.1 Descriptive Statistics

This section presents the descriptive statistics which give an insight into the features of the variables used in this study. The unit of analysis is a woman who resides in a rural area in Uganda and utilizes modern contraceptives. It is revealed that approximately 73.7 percent of women in rural areas do not use any modern method of contraception.

Table 1: Descriptive and Summary Statistics of the Variables

	No. of Obs.	Frequency	Percent	Min	Max
Modern contraceptive use	13,771	10154	73.73	0	1
Employment status(employed)	14,107	11222	79.55	0	1
Education level					
No education	14,127	1845	13.06	0	1
Primary education	14,127	9198	65.11	0	1
Secondary education	14,127	2547	18.03	0	1
Higher education	14,127	537	3.8	0	1
Age of the respondent					
15-17 years	14,127	2108	14.92	0	1
18-24 years	14,127	3999	28.31	0	1
25-35 years	14,127	4482	31.73	0	1
36-49 years	14,127	3538	25.04	0	1
Education level of husband					
No education	8,902	787	8.84	0	1
Primary education	8,902	5277	59.28	0	1
Secondary education	8,902	2140	24.04	0	1
Higher education	8,902	698	7.84	0	1
Wealth Index					
Poor	14,127	6974	49.37	0	1
Middle	14,127	3173	22.46	0	1
Richer	14,127	2783	19.70	0	1
Richest	14,127	1197	8.47	0	1
Religion of the respondent					
No religion	13,869	19	0.14	0	1
Anglican	13,869	4581	33.03	0	1
Catholic	13,869	5953	42.92	0	1

Muslim	13,869	1402	10.11	0	1
Pentecost	13,869	1761	12.70	0	1
Others	13,869	153	1.10	0	1
Husband's desire for children					
Same children	8,842	3201	36.20	0	1
More children	8,842	3021	34.17	0	1
Less children	8,842	819	9.26	0	1
Not sure	8,842	1801	20.37	0	1
Number of living children					
No children	14,127	5996	42.44	0	1
1-2 children	14,127	3655	25.87	0	1
3-5 children	14,127	4476	31.68	0	1
Desire for children					
No more children	12,983	4431	34.13	0	1
Desires within 2 years	12,983	1603	12.35	0	1
Desires after 2 years	12,983	5714	44.01	0	1
Desires but unsure of timing	12,983	1235	9.51	0	1

Source: Author's construction based on UDHS, 2016

The second objective of the study was to determine the impact of socio-economic factors and socio-demographic factors on the utilization of modern contraceptive methods among rural women in Uganda. Various socio-economic factors were considered such as; education, age, wealth index of the woman, husband's education, husband's desire for children, number of living children and desire for children among others. Information obtained was analysed as summarized in Table 1.

Concerning husband's education levels, the majority of the husbands have primary education (59.2 percent), 8.84 percent have no formal education, 24 percent have secondary education and 7.8 percent have a higher education that includes university and tertiary education.

Table 5.1 further reveals that 31.7 percent of the respondents in the entire sample are between 25-35 years, 28.3 percent are between 18-24 years, 14.9 percent are between 15-17 years and 25.04 percent are between 36-49 years.

Concerning wealth index, 49.3 percent are poor, 22.4 percent belong to the middle category and 19.7 percent and 8.4 percent belong to the richer and richest categories respectively. The wealth index was computed based on the number and kinds of consumer goods the women-owned as

well as housing characteristics such as toilet facilities, the source of drinking water and flooring materials.

It is also evidenced from table 5.1 that; 33.03 percent of the women are Anglicans, 42.9 percent are Catholics, 10.11 percent are Muslims, 12.7 percent are Pentecost,1.1 percent belong to other religious affiliations and the remaining 0.14 percent do not belong to any religion.

In terms of husband's desire for children; 36.2 percent of the women reported that their husbands had their same desire for children, 34.17 percent of the women revealed that their husbands desired for more children,9.26 percent reported that their husbands desired for fewer children and 20.37 percent were not sure of their husband's desire for children.

In addition, 34.13 percent of the women did not desire to have any more children, 12.35 percent desired for children within two years, 44.01 percent desired for children after two years and 9.51 percent desired for children but were not sure of the timing.

Concerning the number of living children, 42.44 percent of the women who were interviewed did not have any living children, 25.87 percent of the women had 1-2 children and 31.68 percent of women had 3-5 children.

Lastly, Table 1 reveals that the majority of the women are employed in professional, clerical, agricultural, household and domestic activities among others (79.55 percent) while the remaining 20.45 percent are unemployed.

5.2 Regression Results

The Probit regression model to predict the combined effects of the independent variables on the use of modern contraceptives is presented in Table 2. Apart from their signs, the coefficients in the Probit model are not easy to interpret directly, therefore marginal effects which measure the discrete change in the binary regressors are used to interpret the parameters. (Verbeek, 2008).

This table shows the marginal effects of the Probit model estimates with the use of modern contraceptives as the dependent variable and the independent variables are; education, age, husband's education, wealth index, working status, husband's desire for children, number of living children and desire for children. A correlation matrix is used to test if there is any

correlation between the independent variables that may cause multicollinearity. The person correlation coefficient reveals that there is no bivariate correlation that is above 0.7 across all the independent variables. To further detect for the presence of multicollinearity, Variance of Inflation Factors (VIF's) is computed for each of the independent variables and it is observed that the mean variance of inflation is 6.43 which is below the threshold of 10 hence there is no multicollinearity problem across the explanatory variables in the model.

Table 2: Probit Regression Results of Utilization of Modern Contraceptives

VARIABLES	Marginal Effects	Standard Error(Robust)	Coefficient
Education Level			
Primary Education	0.128***	(0.017)	0.377***
Secondary Education	0.144***	(0.022)	0.424***
Higher Education	0.157***	(0.036)	0.462***
Age			
18-24years	0.094***	(0.035)	0.275***
25-35years	0.169***	(0.036)	0.497***
36-49years	0.148***	(0.038)	0.435***
Husband's Education Level			
Primary Education	0.083***	(0.022)	0.244***
Secondary Education	0.095***	(0.024)	0.280***
Higher Education	0.115***	(0.030)	0.337***
Wealth Index			
Middle	0.074***	(0.013)	0.216***
Richer	0.111***	(0.014)	0.326***
Richest	0.102***	(0.023)	0.301***
Religion			
Anglican	-0.578***	(0.047)	-1.697***
Catholic	-0.608***	(0.046)	-1.786***
Muslim	-0.629***	(0.048)	-1.849***
Pentecost	-0.615***	(0.047)	-1.807***
Others	-0.646***	(0.065)	-1.899***
Working status			
Working	0.012	(0.015)	0.036
Husband's desire for children			
More children	0.059***	(0.015)	0.204***
Less children	0.080***	(0.020)	0.174***
Same children	0.070***	(0.015)	0.234***
Number of living children			
1-2 children	0.046***	(0.018)	0.136***
3-5 children	0.049***	(0.014)	0.143***
Desire for children			
Desire within 2 years	-0.148***	(0.017)	-0.434***
Desire after 2 years	-0.029**	(0.014)	-0.086**

Desires but unsure of timing	-0.078*	(0.044)	-0.229*
Observations	7,724		
Wald Chi2	1350.15		
Significance	0.0000		
% Correctly specified	68.06		

Variables significant at *** p<0.01, ** p<0.05 and * p<0.1

Source: STATA output from UDHS, 2016

6. DISCUSSION AND CONCLUSIONS

The results from the Probit regression model indicate that education of the respondent is significantly and positively associated with the use of modern contraceptives. The results reveal that women with primary education are 12 percentage points more likely to use modern contraceptives compared to their counterparts with no education. Similarly, women with secondary education and higher education are 14 percentage points and 15 percentage points respectively more likely to use modern contraceptives compared to their counterparts with no education. Women who are highly educated are more likely to use modern contraceptives because education improves the practice and efficacy of modern contraceptives. This observation is in agreement with the studies conducted by Sileo (2009), Mutea (2012) and Jejeebhoy (1995).

The marginal effects of the Probit model reveal that wealth index is significantly and positively associated with the use of modern contraceptives. Women in the middle wealth quintile are 7 percentage points more likely to use modern contraceptives compared to women in the poor wealth quintile. In addition, women in the richer and richest wealth quintiles are 11 percentage points and 10 percentage points more likely to use modern contraceptives compared to their counterparts in the poor wealth quintile respectively. This can be attributed to the fact women in the higher wealth quintiles are likely to be financially stable and therefore can afford to pay for both the direct and indirect costs of modern contraceptives. These results are consistent with those of Mlinga *et al*., (2014) who found that contraceptive use was higher among wealthy women compared to poor women.

The Probit results reveal that the age of a woman based in rural areas in Uganda is significantly and positively associated with the use of modern contraceptives. Women aged 18-24 years are 9

percentage points more likely to use modern contraceptives compared to women aged 15-17 years. Similarly, women aged 25-35 years and 36-49 years are 16 percentage points and 14 percentage points respectively more likely to use modern contraceptives compared to women aged 15-17 years. This means that as a woman becomes older, the need to limit births through the use modern contraceptives increases. This could be attributed to the fact that older women have attained their fertility goals hence have a low desire to have more children. This observation attests to the results of Lutalo *et al*., (2000) and Assimwe *et al*., (2013).

Religion is found to be a significant and negative predictor of modern contraceptive use among women who reside in rural areas in Uganda. From Table 5.7, all religious affiliations are significant at 0.01 confidence interval relative to women who do not belong to any religion. Women who are Anglicans are 57 percentage points less likely to use modern contraceptives compared to women who do not subscribe to any religion. Catholic and Muslim women are 60 percentage points and 62 percentage points respectively less likely to use modern contraceptives compared to women who are not affiliated with any religion. Similarly, Pentecostal women and women who belong to other religions such as; seventh day Adventist, orthodox, salvation army among others are 61 percentage points and 64 percentage points respectively less likely to use modern contraceptives. This could be due to the fact that most religions discourage the use of modern contraceptives and advocate for the use of natural methods that include not using modern contraceptives. The author's results are in agreement with the results of Nassoro *et al*., (2006) and Okech *et al*., (2011).

Husband's education level positively and significantly explains the use of modern contraceptives among rural women in Uganda. Women who reported that their husbands had a primary level education are 8 percentage points more likely to use modern contraceptives compared to women who reported that their husbands had no formal education. In addition, women who reported that their husbands had a secondary level education and higher education are 9 percentage points and 11 percentage points respectively more likely to use modern contraceptives than women who revealed that their husbands had no formal education. This is most likely due to the fact that education enables husbands to appreciate the importance of modern contraceptives and thus

encourage their partners to use them more often. This observation attests to the findings of the studies conducted by Kyalo (1996) and Cherono (2014).

The Probit results further reveal that the desire for children is significant and negatively associated with the use of modern contraceptives. The desire for children as an independent variable is found to be a significant variable at 0.01 confidence interval. Women who desire for children within 2 years are 14 percentage points less likely to use modern contraceptives compared to women who do not want any more children. Furthermore, women who desire for children after 2 years and women who desire for children but unsure of the timing are 2 percentage points and 7 percentage points respectively less likely to use modern contraceptives than women who do not want any more children. This finding could be attributed to the fact that women who have attained their ideal family size are more like to use modern contraceptives than women who have not reached their ideal family size. These results are in line with the findings of the studies conducted by Bairagi (2001) who reported that fertility preferences of women shape their behaviour towards modern contraceptives and women who desire more children are less likely to use modern contraceptives.

Husband's desire for children, on the other hand, is a positive and significant predictor of modern contraceptive use among women in Uganda. Women who reported that their husbands desired for fewer children are 8 percentage points more likely to use modern contraceptives than women who reported that they are not sure of their husband's desire for children. This could be attributed to the fact that men are considered as the head of the household and therefore are most likely to influence reproduction decisions such as the use of contraceptives. In contrast, women who revealed that their husbands desired for more children and women who indicated that they have an equal desire of children like their husbands are 5 percentage and 7 percentage points more likely to use modern contraceptives respectively compared to their counterparts who were not sure of their husband's desire for children. This observation is consistent with the results of Muanda *et al*., (2017) who reveal that women's judgment takes precedence over their husband's desire for children hence the increased use of contraceptives. Women are likely to use modern contraceptives because of the poor financial and health outcomes that they bear due to having many children.

The marginal effects of the Probit model reveal that the number of living children is significant at 0.01 confidence interval and is positively associated with the use of modern contraceptives. Women with 1-2 children and 3-5 children are 4.6 percentage points and 4.9 percentage points more likely to use modern contraceptives respectively compared to their counterparts that do not have any children. This is due to the fact that women with no children have a high desire for children and hence avoid using modern contraceptives. This observation concurs with the findings of Mahidu *et al*., (1998) who revealed that the use of contraceptives was low among married teenagers and newlyweds who most likely did not have children. The results are also consistent with the studies of Mostafa *et al*., (2010), Lwelamira *et al*., (2012) and Stephenson *et al*., (2004) which reported that modern contraceptive use increases as the number of living children increases.

Surprisingly, against expectations, the Probit results reveal that working status is not significant in explaining the use of modern contraceptives. This could be attributed to the fact that most rural women are engaged in blue-collar jobs which children are most likely to be engaged in hence their parents view them as assets thus there is no opportunity cost between engaging in work and child-bearing.

7. RECOMMENDATIONS

The above research findings provide relevant information that is pertinent to the formulation of important policies. First, education was found to have a positive and statistically significant influence on the use of modern contraceptives, therefore there is a strong rationale for the Government of Uganda to increase girl child enrolment in formal education and ensuring completion until the university level. Investment in female education increases the use of modern contraceptives which in turn improves child-health and promotes smaller families.

Secondly, since religion was found to have a negative and significant influence on the use of modern contraceptives among women, there is a dire need to train religious leaders on the importance of modern contraceptives in order to debunk religious myths and misconceptions that are initiated by these leaders. In addition, since religious leaders usually have a mass following,

it is imperative for them to be at the forefront of modern contraception programmes and this eventually instils a positive perception in the masses regarding the use of modern contraceptives.

Thirdly, it was found that both husband's education and husband's desire for children are positively and statistically associated with the use of modern contraceptives among rural women in Uganda. Therefore, the Government of Uganda should intensify programmes that are aimed at increasing male enrolment in schools and completion of all the levels of education should be encouraged. In addition, family planning programs and policies should target men especially at the family planning service points with the objective of increasing knowledge on the importance of modern contraceptives which enables them to make an informed decision together with their partners when choosing contraceptive methods.

Lastly, desire for children among women was found to have a negative and significant relationship with the use of modern contraceptives. It is therefore imperative for health care providers and family planning campaigns to advocate and encourage women to have smaller and manageable families which in turn will reduce the burden of poor financial and health outcomes that are associated with large families.

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AD is the main author of the manuscript, and she initiated the research idea, undertook literature review, developed the theoretical framework, collected and analyzed the data from the different sources. OO is a co-author of this manuscript. He approved the research idea, supported the theoretical underpinning of the research paper, undertook quality assurance and supported the empirical data analysis and generation of policy implications. Both authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interest in this publication.

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