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ABSTRACT

Background: **Modern contraceptive methods form a critical pillar in maternal health provision and population control initiatives. The Kenyan government promotes the use of family planning through provision of these services at various health facilities across the country. Baringo County has a prevalence rate of 33.1% for modern contraceptives use among women aged 15-49 while the national average is 53.2%. Consequently, many women in this county remain vulnerable to unplanned pregnancy and unsafe abortions.**

Objective: **The determinants of the uptake of modern contraceptives in Baringo County in Kenya using data from the Kenya Demographic and Health Survey of 2014 (KDHS, 2014) were evaluated.**

Design: **A probit model was used to statistically explore the factors that influence uptake of modern contraceptives.**

Results and Conclusion: **Level of education, number of children, and interaction with a health service provider, marital status, religious beliefs and income level were statistically significant in determining the uptake of modern contraception by women of reproductive age in Baringo County. A woman with secondary and/or a higher level of education, of middle or higher income and with knowledge about family planning from a healthcare facility had a higher probability of taking up modern contraceptives. It was recommended that poverty alleviation measures combined with increased access to formal education will positively influence the attitudes of women in the reproductive ages to embrace modern contraceptive methods.**

INTRODUCTION

Contraceptive use is important in population control and has potential benefits both at the micro (households) and at the macro level. At the household level, couples are able to space their births and protect themselves against sexually transmitted diseases (STDs). Benefits that accrue from the use of family planning at the macro level include controlled population growth rate and a reduction of the burden on the national budget[1]. Moreover, it has been shown that households with fewer births are able to offer their children better quality of life and necessities like health and education[2].

The rate of population growth is directly linked to contraceptive use. More developed regions have a lower average rate of population change when compared to less developed countries[3]. A population growth rate that exceeds the rate of economic growth is not desirable. Kenya had a population growth rate of 2.6% in 2015 which is above the global average of 1.2%[3].A population growth rate that is above 2 births per woman has been shown to hamper economic growth and expose a country to myriad socio-economic challenges that can never be left to stabilize on their own. There is pressure on land, housing and social amenities especially in the urban places[4].To initiate population decline, couples need to embrace and consume modern contraceptives while the government and the private sector work closely in ensuring that the unmet needs for contraceptives are reduced[5].

It is documented that over 50% of women of reproductive age in the African continent face unmet needs for contraceptives which can be broadly explained by factors ranging from gender-based barriers to religious and cultural factors, unavailability of family planning services and distance to healthcare facilities. East Africa, in particular, faces this challenge largely due to low socioeconomic status and unchecked reproductive behavior[6]

The population reference bureau in 2011 posted that nearly 55% of married women globally use modern family planning services while in Sub-Saharan Africa the proportion is only a paltry19%. Many countries in these resource-limited settings are unable to provide adequate family planning services to women of reproductive age leading to an ever widening gap of unmet need for contraceptives in this region[7].Resource-limited setting have more cases of unintended pregnancy since the only available family planning methods are short-acting, requiring daily or quarterly use[8]. Long-acting reversible contraceptive (LARC) methods have been shown to be more successful as they improve adherence and have higher continuance rates. The numerous cases of unintended pregnancies lead to high number of unplanned births, unsafe abortions and miscarriages which often leave the affected women with life threatening complications[7].

Nearly 40% of all pregnancies in Kenya are unintended, that is mistimed or unwanted. Studies have documented that more than 25% of married women in Kenya have unmet needs for contraceptives while the national prevalence of modern contraception stands at nearly 55.9%[9]. Pregnancies that are not planned have serious negative maternal health outcomes affecting even the unborn child psychological development and can hinder their economic usefulness in future. Majority of such pregnancies ends in unsafe abortions leaving the affected women with life threatening complications. Currently, Kenya loses nearly 2600 women and teenage girls due to unsafe abortions[10].

Factors that influence modern contraceptive use have been examined and the place of residence, wealth index, desire for more births, religion, interaction with a health service provider, number of sexual partners and the access to media have been shown to be significant factors in sexually active men in Kenya[11]. Another study showed that marital status, sources of income, age, desire for more children, knowledge of the contraceptive methods and side effects, level of education, and method approval by self-partner were sufficiently significant in explaining the use and or uptake of modern contraceptives among women in Baringo North District, Kenya[12]. Further, a study among women of reproductive age living in informal settlements in Nairobi, Kenya showed that religion, proximity to service providers, partner's approval; quality of services offered, friendliness of the operators, income, marital status and the number of children influenced the demand for contraceptives[13].Age, marital status, and awareness about contraceptives also positively influenced the use of modern contraceptives among women in the reproductive age among women in River State, Nigeria[14]. A study in Kenyan slums also found that women who lived far from the nearest health facility were less likely to use modern contraceptives and thus physical access was shown to be a key determinant influencing uptake of modern contraceptives[15].

Even though the national figures indicate that the knowledge of contraceptives is above 95%, counties such Baringo are below this rate. The population in Baringo grew by a total of 39,155 people in the three year period between 2012 and 2015 while the contraceptive prevalence increased by 11.5% between the same period[16]. However, contraceptive use remains low and actually falls far below the national average of 53.2%. At such rate, there is a need to increase access and knowledge of modern contraceptives in this county. This study sought to outline the factors that determine contraceptive use by women in Baringo County and to draw key policy implications, thereof.

METHODOLOGY

The study used data from the Kenya Demographic and Health Survey (KDHS) 2014 annual report, which had a nationally representative sample of 31,079 women in the age bracket of 15-49. The survey took place in 2014 from the month of May to October with the Kenya National Bureau of Statistics being the implementing agency alongside the Ministry of Health, the National AIDS Control Council (NACC), the National Council for Population and Development (NCPD) and the Kenya Medical Research Institute (KEMRI). Information on fertility levels and trends, fertility preference, maternal and child mortality, marriage, sexual activity, contraceptive prevalence, breast feeding practices, child and maternal health and nutritional status of women were collected. Variables that were examined are shown in Table 1.

Table 1
Variables examined and their definitions

Variables	Definition
Dependent variable	
Current Contraceptive Method	Modern contraceptive use=1 and 0 if otherwise
Explanatory Variables	
Education Level	No education=0 Primary=1 Secondary=2 Higher=3
Sex of the household Head	1 if female, 0 otherwise
Number of children living	Number of children born (count)
Visit to health facility and told of family planning	1 if yes, 0 otherwise
Age	15-19= 0 20-34=1 35-49=2
Employment status	1 if employed, 0 otherwise
Marital status	1 if married, 0 otherwise
Wealth Index	Poorest=0 Poor=1 Middle=2 Richer=3 Richest=4
Husbands level of Education	Traditional=0 Primary=1 Secondary=2 Higher=3
Religion	Traditional=0 Roman Catholic=1 Protestant/Christian=2 Muslim=3
Access to health facility	Big problem=1(less than or equals to 3 km) Not a big problem=0(more than 3 km)
Owns a Radio	Yes=1 No=0
Owns a TV	Yes=1 No=0

Statistical analysis and econometric model applied: Stata software (Stata Corp; 2011) was used to analyse the data sets and the Probit model fitted.

The following theoretical framework was used:

A household's utility maximization function was given as:

$U=f(F_h, C)$

Where;

U=the household utility

F_h=Family Health

C=consumption of other market goods.

It was estimated that the household maximizes its utility subject to a budget constraint and a health production function. This was stated as follows:

$M=(P_fF+ P_jJ+ P_cC)$

Where;

M= the households' income

P_f= the costs of using a family planning method

P_j= the costs of other market inputs such as knowledge of contraceptives

P_c= the cost of other household consumption goods.

Further, the health production function was given by:

$H= f (F_p, J_m, C_o)$

Where,

F_p= family planning methods

J_m= other markets inputs

C_o= other household consumption goods

Forming the Lagrange equation using (i) and (ii) gave:

$L (F, C) = U (F_h, C) + K (M-P_fF-P_jJ-P_cC)$

Solving equation (*iv*) above, gave the following reduced demand function for family planning use:

$D= f (P_f, P_j, P_c, Y, V)$

Where;

V= other variables.

P_f, P_j, P_c and Y remain as defined above.

A binary probit model was used to predict contraceptive use. The predictions lay within an interval of (0, 1), where it was assumed that the probability of an individual using or not using contraceptives was either 1 or 0. The binary outcomes were stated as follows:

$Y_i= f (X_i)$

Where;

Y_i= 1 if the individual is using a contraceptive method, given that $Y_i> 0$.

Y_i = 0 if the individual is not using a contraceptive method, given that $Y_i \leq 0$.

X_i = a set of explanatory variables.

A binary response model was defined by transforming $X\beta$ into a probability of the form[17]:

prob (y_i=1) =F ($X_i\beta$)

Where β refers to the parameters maximized.

The Maximum Likelihood method was used to estimate the probability of contraceptive use as follows:

$MCU=(\beta_0+\beta_1ED+\beta_2SHD+\beta_3NC+\beta_4VHWT+\beta_5AG+\beta_6ES+\beta_7MS+\beta_8WI+\beta_9HED+\beta_{10}RE+\beta_{11}DHF+\beta_{12}WTV+\beta_{13}LTR)$

Where;

MCU= Modern Contraceptive Use

ED= Education Level

SHD= Sex of the Household Head

NC=Number of Children living

VHWF=Visit to the Health Facility and discussed Family Planning with health care provider

AG=Age of respondent

ES=Employment Status

MS= Marital Status

WI=Wealth Index

HED= Husband Education Level

RE=Religion

DHF=Distance to Health Facility

WTV=Owns a TV

LTR=Owns a Radio

RESULTS AND DISCUSSION

There was a total of 598 observations included in the analysis.12% of the women were illiterate, 49% had primary level of education, 29% had secondary level of education and a further 10% had higher education level (Table 2). 42% of households were headed by females with the maximum number of children being 12. Women in the age bracket of 20-34 years formed half of the population (50%). The wealth index of households was categorized in terms of ownership of various

assets and showed about 34% of the women were poorest. Majority of the women were protestant Christians by religion (78%) with a small proportion being Roman Catholic and Muslim. About 30% of the women in this population had visited a health facility and been informed on family planning methods (Table 2).

Table 2

Descriptive statistics of variables examined

Variable	Mean	Std. Dev.	Min	Max
Women with no Education	0.1237458	0.329567	0	1
Secondary Education	0.2876254	0.4530345	0	1
Women with Primary Education	0.4899666	0.5003178	0	1
Women with Higher Education	0.0986622	0.2984576	0	1
Female head	0.416388	0.4933721	0	1
Number of children	2.51505	2.454738	0	12
Visit to Health Facility, told Family planning	0.2699115	0.444899	0	1
Fifteen to nineteen	0.2341137	0.4237981	0	1
Twenty to Thirty four	0.4983278	0.5004158	0	1
Thirty five to forty nine	0.2675585	0.4430567	0	1
Currently working	0.2876254	0.4530345	0	1
Married	0.5735786	0.4949706	0	1
Poorest	0.3428094	0.4750458	0	1
Poorer	0.1772575	0.3822062	0	1
Middle	0.1588629	0.3658542	0	1
Richer	0.2040134	0.4033162	0	1
Richest	0.1170569	0.3217572	0	1
Husband no education	0.0434783	0.3445886	0	1
Husband primary education	0.1170569	0.3217572	0	1
Husband secondary education	0.1070234	0.9477582	0	1
Husband higher education	0.1526316	1.081746	0	1
Muslim	0.0200669	0.1403465	0	1
Protestant	0.7842809	0.4116646	0	1
Roman catholic	0.1120401	0.3156799	0	1
Distance too long/a big problem	0.4202899	0.4945021	0	1
Owns a TV	0.1973244	0.3983124	0	1
Owns a Radio	0.3394649	0.4739241	0	1

There were various contraceptive methods used by women in Baringo County (Table 3). Nearly 70% of the women did not use any contraceptive method. Inject able methods were the most popular (12%) with periodic abstinence being fairly popular (4.5%). Oral contraceptive pills, implants and male condoms were used by about 3% of the population surveyed while the other methods accounted for less than 3% (Table 3).

Table 3

Distribution of contraceptive use in Baringo County

Contraceptive	Mean	Std. Dev.	Min	Max
Not using Contraceptives	0.6956522	0.4605159	0	1
Pill	0.0301003	0.1710065	0	1
Inter Uterine Device (IUD)	0.0217391	0.1459526	0	1
Injections	0.1187291	0.3237403	0	1
Condom	0.0284281	0.1663316	0	1
Female sterilization	0.0083612	0.0911328	0	1
Periodic abstinence	0.0451505	0.207808	0	1
Implants/Norplant	0.0351171	0.1842298	0	1
Lactational amenorrhea	0.0033445	0.057783	0	1
Female condom	0.0016722	0.040893	0	1
Other method	0.0016722	0.040893	0	1
Withdrawal	0.0100334	0.0997467	0	1

Determinants of Modern Contraceptive Use in Baringo County: The probit coefficients for the various factors examined are shown in Table 4. Further, marginal effects were generated for continuous variables and average effects for dummy variables (Table 5). The following correlates showed significant statistical association with uptake of modern contraceptives: secondary education or higher, number of children, healthcare worker-provided information about contraceptives, 20-34 age brackets, being married, income status and religion.

Table 4

Probit Regression Results of the determinants of Modern Contraceptives in Baringo County

Variables	Coefficients.	Robust Std. Err.	z	P>z	[95% Conf.	Interval]
Primary Education	0.3813714	0.295913	1.29	0.197	-0.1986074	0.9613501
Secondary Education	0.6908513	0.3227432	2.14	0.032	0.0582861	1.323416
Higher Education	1.112142	0.3719065	2.99	0.003	0.3832186	1.841065
Female head of household	-0.1563237	0.1328164	-1.18	0.239	-0.4166391	0.1039916
Number of children	0.0868272	0.0380188	2.28	0.022	0.0123116	0.1613428
Visit to health facility	0.4432176	0.2128444	2.08	0.037	0.0260502	0.8603849
Twenty to thirty four	0.863344	0.2153775	4.01	0.000	0.4412118	1.285476
Thirty five to forty nine	0.3238475	0.286772	1.13	0.259	-0.2382153	0.8859104
Currently working	-0.0219862	0.2132092	-0.10	0.918	-0.4398686	0.3958962
Married	0.3986321	0.1731434	2.30	0.021	0.0592773	0.7379869
Poorer	0.4690517	0.2089414	2.24	0.025	0.059534	0.8785693
Middle	0.4699384	0.2140872	2.20	0.028	0.0503352	0.8895416
Richer	0.7080939	0.2117741	3.34	0.001	0.2930243	1.123163
Richest	0.5400954	0.2603563	2.07	0.038	0.0298064	1.050384
Muslim	0.533055	0.6332471	0.84	0.400	-0.7080865	1.774196
Roman catholic	0.9290604	0.4684033	1.98	0.047	0.0110067	1.847114
Protestant	1.058462	0.4505881	2.35	0.019	0.1753253	1.941598
Husband primary education	-0.3664279	0.2796213	-1.31	0.190	-0.9144757	0.1816199
Husband secondary education	-0.2263179	0.2717823	-0.83	0.405	-0.7590015	0.3063656
Husband higher education	-0.1148259	0.342908	-0.33	0.738	-0.7869131	0.5572613
Owns TV	0.0053923	0.2091984	0.03	0.979	-0.404629	0.4154136
Owns a Radio	0.1686487	0.2256622	0.75	0.455	-0.273641	0.6109384
Access to health centre	0.1280201	0.1815583	0.71	0.481	-0.2278276	0.4838678
_cons	-3.502012	0.4918634	-7.12	0.000	-4.466047	-2.537978
Number of observations = 598						
Wald chi2(23) = 129.36						
Prob > chi2 = 0.0000						
Log pseudo likelihood = -284.11959						
Pseudo R2 = 0.2159						

Table 5

Probability of using Modern Contraceptive in Baringo County

Variable	Marginal Effects	Std. Err.	z	P>z	95% Confidence Interval	
Primary Education	0.1150208	0.08885	1.29	0.195	-0.059118	0.289159
Secondary Education	0.2271162	0.11226	2.02	0.043	0.007083	0.447149
Higher Education	0.4048734	0.13966	2.90	0.004	0.131148	0.678599
Female head of household	-0.0466572	0.03944	-1.18	0.237	-0.123965	0.030651
Number of children	0.026183	0.01145	2.29	0.022	0.003741	0.048625
Visit to health facility	0.1493309	0.07795	1.92	0.055	-0.003444	0.302105
Twenty to thirty four	0.2570432	0.06121	4.20	0.000	0.137069	0.377018
Thirty five to forty nine	0.1027765	0.09474	1.08	0.278	-0.08291	0.288463
Currently working	-0.0066067	0.0638	-0.10	0.918	-0.13166	0.118446
Married	0.1172407	0.04944	2.37	0.018	0.020336	0.214146
Poorer	0.1556809	0.07415	2.10	0.036	0.010346	0.301016
Middle	0.1567838	0.07675	2.04	0.041	0.006365	0.307202
Richer	0.24077	0.07701	3.13	0.002	0.089826	0.391714
Richest	0.1845122	0.09661	1.91	0.056	-0.004834	0.373859
Muslim	0.1867087	0.24384	0.77	0.444	-0.291215	0.664632
Roman catholic	0.3335749	0.17747	1.88	0.060	-0.014259	0.681409
Protestant	0.2443419	0.07067	3.46	0.001	0.105823	0.382861
Husband primary education	-0.0983935	0.06584	-1.49	0.135	-0.227435	0.030648
Husband secondary education	-0.0635608	0.07056	-0.90	0.368	-0.201848	0.074726
Husband higher education	-0.0332574	0.09514	-0.35	0.727	-0.219734	0.153219
Owns TV	0.001628	0.07045	0.03	0.979	-0.122319	0.125575
Owns a Radio	0.0518486	0.07045	0.74	0.462	-0.086227	0.189925
Access to health Centre	0.0397091	0.05798	0.68	0.493	-0.073931	0.153349

Level of education was positively correlated with modern contraceptives use. Women with a higher education level had a higher likelihood of using modern contraceptives (40%). The results are similar to those of previous studies on contraceptive use nationally[11]and regionally[14]. This could be attributed to well-educated women shedding traditional beliefs and making use of modern ways of controlling number of births to improve health outcomes. In addition, modern contraceptives may easily appeal to well-educated women than traditional family planning methods.

The number of children born and alive positively influenced the uptake of modern contraceptives. One additional birth increased the probability of modern contraceptives use by 2.6%. It has been shown that women with children are likely to space and limit births as opposed to those without children[18].Women who obtained information about family planning methods from a healthcare facility were more likely to take up modern contraceptives. The probability increased by about 15% compared to who did not have this information. This finding could be attributed to the fact that a woman with reproductive health information on

contraceptives use, effectiveness, types and associated side effects will be better placed to decide to acquire modern contraceptives to enable them plan their families well.

Women in the age bracket of 20-34 had a higher probability of using modern contraceptives compared to their younger or older counterparts. The probability increased by 26% compared to those in the age bracket of 15-19 years. These women are believed to be in the prime age of child-bearing, have heightened sexually activity and are therefore more likely to use modern contraceptives to prevent sexually transmitted diseases, avoid pregnancy and to limit and space births[19].

A married woman had 12% increased probability of taking up contraceptives compared to their unmarried counterparts. This can be explained by married women in the sample having increased utilization of modern contraceptives to either space or limit the number of births and to prevent unwanted births for those who have achieved their fertility preference.

The probability of modern contraceptive use increased as the wealth index increased with the probability of a woman classified as richer and richest using modern contraceptives increasing by 24% and 18% respectively, compared to one in the poorest category. It is likely that as wealth index of women increases, they are able to purchase modern contraceptives according to their tastes and preferences in comparison to poorer women who lack the financial ability.

By religion, the probability of a protestant woman using modern contraceptives increased by 24% compared to other religious faiths. This may be attributed to the fact that protestant beliefs are fairly liberal on the use of modern contraceptives. Our findings are similar to those of a survey carried out in the United States where protestant denominations were found to support contraceptive use while other religions, especially the Catholic faith was against it[20].

CONCLUSION AND RECOMMENDATIONS

The level of education, number of children, healthcare worker provided information on family planning, being married, income level and religious beliefs were statistically significant in determining the uptake of modern contraception by women in Baringo County. Improved standards of education are recommended to increase the probability of taking up modern contraceptives. This can be achieved by encouraging the local communities to embrace education and demystify prevailing cultural practices that act as barriers to women accessing education. Stakeholders in the reproductive health sector needs to increase focus on women with children and in the 20-34 age bracket by making contraception available to them at more affordable rates and organizing for more seminars to sensitize them on the need to space their children and/or to limit the number of births they may want to have. Furthermore, the national governments alongside the Baringo county governments should ensure the health facilities in the county actively disseminate reproductive health information to women of reproductive age on family planning methods, effective utilization and the need to practice family planning. In addition, the impact of distance to different health facilities on contraceptive use was not explored even though it has been shown to be a key determinant of uptake[15] and future research in this area is recommended in Baringo County.

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