A STATISTICAL APPLICATION OF REGRESSION ANALYSIS TO INVESTIGATE AND DETERMINETHE FACTORS THAT INFLUENCE THE UPTAKE OF FAMILY PLANNING IN MERU COUNTY, KENYA

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ABSTRACT

Family planning is one of the mitigation factors adopted by the Kenyan Government in achieving its strategic development goals through reducing maternal and child mortality, preventing unwanted pregnancies, preventing STDs, promoting education, and women's economic empowerment. Despite the many advantages of family planning, its use and adoption in Kenya are still low. Unwanted pregnancies, premature deliveries, illegal abortions, and maternal mortality have all resulted from a low uptake of family planning. The low application of family planning methods has been associated with low awareness of the existence of family planning services, lack of information about various forms of family planning services, and negative attitude toward some family planning methods due to lack of counseling/sensitization to mothers on their side effects, complex in assessing the family planning services by some rural women, religious beliefs and fear of not being able to bear children again. South Imenti is a Sub County in Meru County associated with low uptake of family planning services despite providing free family planning services in all government clinics. The goal of this study was to employ the regression method to examine factors that impact the usage of family planning methods in the South Imenti sub-county. The target population was 3390 women between the ages of 15 and 49. A total of 385 mothers were chosen using simple random sampling from the target population for this survey. The study used descriptive and binary logistic regression methods of analysis. The explanatory variables included education level, age, marital status, Number of children born, Religion, Occupation, household income, and frequency of listening to media. In conclusion, the application of the binary logistic regression model on the data collected showed that age, marital status, level of education, number of children mothers have, and frequency of mothers following media were potential explanatory variables that significantly affected the use of family planning methods. The education level of women of childbearing age 15-49 years had the highest significant effect on the usage of family planning.

Keywords: *Family planning, family planning services, family planning methods, pregnancy, beliefs, child birth.*

1.0 INTRODUCTION

According to United Nations (UN), the world estimated population by November 2020 was 7.8 billion, which has become a global concern since many countries were experiencing challenges in sustaining their population growths. Kenya is a developing nation; its population has doubled in the past 25 years.[1] furthermore, the Nation has a youth age structure where 45% of the population is under the age of 15 years and has high fertility and low use of contraceptives.[2] This suggested that the county's population is projected to grow continuously. Family Guidance Association in Kenya, NGOs, and government organizations have provided high-quality birth control services over the past 45 years. Kenya has been one of the affiliate members of the International Planned Parenthood Federation (IPPF) since the early 1970s, and the objectives of this body were to promote awareness to the public to understand the importance of responsible sexual life, reproductive, family planning, and the effects of population growth through educational programs. During the first face after embracement, the association faced many difficulties, critics, and opposition towards population control by families and entire communities.[3] This led to establishment of a family planning information center in Nairobi to intensify the sensitization of family planning to families and communities. The association realized that it could not meet all the family planning needs of the Kenyan population and therefore involved government and non-government agencies. To develop an effective fertility measure control, there was a need to understand factors related to high fertility and provide education services to address these factors. UNFPA stated that women who get married early are illiterate on contraceptive use, live in rural areas, are poor, and have high fertility.[4] This study aims to use regression analysis models to establish factors associated with family planning usage in the South Imenti sub-county.

*2.*0 LITERATURE REVIEW

2.1 Contraceptive use among women in Kenya

In line with our objectives to investigate demographic and social-cultural features amongst women of childbearing age (15-49 years) in South Imenti Sub County, CPR is the fraction or a percentage of partners who are in union and are currently using contraceptive means. According to a published study in Pan African Medical Journal 2015, married couples utilized family planning methods to avoid unwanted pregnancy and reduce the mother-child mortality rate. According to the study, the primary motivations for the use of family planning services were (a) to space children's 94% percent (47/50) and (b) to avoid sexually transmitted infections and pregnancy 84 % (42/50). According to the study, those who used family planning methods were primarily in-union and aged between 15 to 49.[5] CPR has steadily improved in East Africa during the last three decades. According to the UN, Kenya and Rwanda are the most known countries where the prevalence of access to and use of contraceptives is high. Ethiopia and Rwanda

[1] United Nations, 2009: World Population Prospects.

[2] Kenya National Bureau of Statistics, Kenya Demographic and Health Survey 2014, KNBS and ICF Macro Calverton, Editor. 2014: Nairobi, Kenya and Maryland, USA.

[3] Andi, J.R., et al., Modern contraceptive use among women in Uganda: An analysis of trend a

[4] WHO, Unsafe Abortion: Global and Regional Estimates of the Incidence of Unsafe Abortion and Associated Mortality in 2008, W.H.O. Department of Reproductive Health and Research, Editor.

[5] Blacker, J., et al., Fertility in Kenya and Uganda: A Comparative Study of Trends and Determinants. Population Studies (Camb), 2005. Nov 59(3): p. 355-73.

made the most rapid gains in CPR between 2000 and 2010, increasing by more than thrice, from 8% and 17% to 29% and 53%, respectively.[6] In addition, contraceptive usage deteriorated in Tanzania and Uganda in the mid-2000s and equally in Rwanda following the catastrophic 1994 genocide. Kenya was, in 1967, the first SSA nation to foster a strategy for family planning program.[7] The government of Kenya did not create the National Council for Population and Development (NCPD) until the 1980s to deal with population and development issues. NCPD expressly formed the National Population Advocacy and IEC Strategy for Sustainable Development (1996-2010) in 1996 to promote contraception usage among underprivileged populations.[8]

In the 1980s and 1990s, the number of contraception suppliers increased, as did the number of health professionals who provided community-based FP services. As a result of these efforts, contraceptive use increased from approximately 17% in 1984 to 39% in 1998.[9] During the 2000s, Kenyan fecundity declined as the country's goals shifted away from FP progress toward HIV/AIDS prevention.[10]

The resurgence of the FP agenda in the 2010s and the implementation of new development and population policy in 2012 revived interest in FP as a strategy for attaining long-term population growth.[11]

[6] Bongaarts, J., et al., Family Planning Programs for the 21st Century Rationale and Design, The Population Council, Editor. 2012, Population council: New York.

[7] National Bureau of Statistics Tanzania, Tanzania Demographic and Health Survey 1996, NBS and ICF Macro, Editor. 1996: Dar es Salaam, Tanzania and Maryland, USA.

[8] Magadi, M.A., and S.L. Curtis, Trends and Determinants of Contraceptive Method Choice in Kenya. Studies in Family Planning, 2003. 34(3): p. 149-59.

[9] National Institute of Statistics of Rwanda, Rwanda Demographic and Health Survey 1992, NISR and ICF Macro, Editor. 1992: Kigali, Rwanda and Maryland, USA.

[10] United Nations, Unmet need, and demand satisfied by family planning, Department of Economic and Social Affairs Population Division, Editor. 2015: New York

[11] Uganda Bureau of Statistics, Uganda Demographic and Health Survey 2011, UBOS and ICF Macro, Editor. 2011: Kampala, Uganda and Maryland, USA.

2.2 Unintended pregnancy risk and contraceptive practice

Unwanted pregnancy occurs when a woman becomes pregnant when it is not her choice. A primary cause of unintended pregnancy is the failure to use contraceptives. Similarly, utilizing effective contraceptive techniques poorly or inconsistently can lead to an unplanned pregnancy.[12] The number of women claiming undesired pregnancies has increased in Uganda and Tanzania, decreased in Ethiopia and Kenya and remained virtually stable in Rwanda during the early 2000s.[13] Currently, Kenya, Rwanda, and Uganda have the most significant rates of unwanted pregnancy among women of reproductive age, while Ethiopia and Tanzania have the lowest rates. In Kenya, a reduced rate of unintended pregnancies is followed by an increase in contraceptive use.[14] Accidental pregnancy is rising across Uganda and Tanzania, despite rising contraception use.

3.0 METHODOLOGY

Chi Square Tests: Chi-square statistics was used to test whether there was any significant relationship between,

- Use of family planning and social-cultural factors.
- Use of family planning and demographic parameters.
- Use of family planning and economic factors.

The chi square test statistics used was:

[12] Ellen, S., N. Maureen, and M. Rachel, investing in family planning: a key to achieving the sustainable development goals. Global Health: Science and Practice, 2016. 4(2): p. 191-210.

[13] UNFPA, Programme of Action of the International Conference on Population Development adopted at the international Conference on Population and Development Cairo, 5-13 September 1994,

[14] UNFPA, Levels and Trends in Child Mortality, the UN Inter-agency Group for Child Mortality Estimation, Editor. 2015, United Nations: New York, USA.

$$\chi^2 = \sum \frac{(O_{ij}-E_{ij})}{(E_{ij})}$$

Odds ratio: Odds ratio determines the level of association between exposure and outcome. It gives the odds that an outcome will happen given a particular exposure, as compared to the odds of the outcome happening in absence of that exposure. Odds of an event happening is given by;

$$Odds(E) = \frac{P(A)}{P(A')} = \frac{P(A)}{1 - P(A')}$$

Then the Odds ratio is given by.

$$\text{Odds Ratio} = \frac{\text{Odds of event (A)}}{\text{Odds of event (B)}}$$

3.1 Model fit

Likelihood ratio test: is the estimation of the parameter in models by comparing the fit of one model to the fit of another.

$$G = -2ln\frac{l_0}{l_1} = -2(\ln l_0 - lnl_1)$$

Small deviations, indicates that the model is more significant.

Wald statistic: tests individual contribution of the predictor. It also gives the significance on the coefficients. It is computed as follows.

$$W_j = \frac{{\beta_j}^2}{{SE_{\beta j}}^2}$$

4.0 RESULTS AND DISCUSSIONS

Table 4.1 below shows the Chi-Square test that sought to determine the association between the use of family planning and other predictor variables under the study. Result indicates a substantial significant relationship between the family planning uses and predictors.

Table 4.1

Variables	Value	D.f	P-Values
Age of women	7.2	3	0.006
Mothers Education	14.174	3	0.003
Husband Education	12.552	3	0.006
Marital Status	4.161	3	0.045
Number of Children	13.655	3	0.003
Religion	11.667	2	0.503
Women Occupation	8.016	4	0.091
H/Hold income	0.757	4	0.044
Wealth index	4.37	2	0.012
media frequency	5.426	3	0.043

From table 4.1 above, it is observed that the age of women, educational level of mothers, academic level of husbands, marital status, average monthly household income, wealth index, and frequency of listening to media are statistically significantly associated with the use of family planning at a 95% confidence level where P-value is 0.05, while women's occupation is insignificant.

Results of analysis of binary logistic Regression

The result of binary logistic regression, significance and the impact of each of our explanatory variable on the response variable are discussed.

Table 4.2: Omnibus test of model coefficients

Omnibus Tests of Model Coefficients				
		Chi-square	df	Sig.
Step 1	Step	42.438363 1	10	.00 0
	Block	42.438363 1	10	.00 0
	Mode l	42.438363 1	10	.00 0

Table 4.2 above shows the model, which includes all predictor variables. All the values in the Omnibus Tests of Model Coefficients are given in a Chi-Square of 42.438, which is significant at 0.05. This is the test of the null hypothesis, and since our omnibus test is important at a 5% level of significance, it can then be concluded that the addition of the predictors variable significantly improved our ability to predict the use of family planning method. The likelihood ratio test is the most common method of assessment of the overall model fit in logistic regression, which is simply the chi-square difference between the null model (i.e., with the constant only) and a model containing the predictors variable. Under Model Summary table 4.3 below, we see that the -2 Log Likelihood statistics is 101.741a. This statistic measures how poorly the model predicts the use of family planning method, the smaller statistic the better the model.

The value of Cox & Snell and Nagelkerke R2 are good enough R2 is an analogous statistic in logistic regression for the coefficient of determination R2. The model summary provides some approximation of statistics in logistic regression. Cox and Snell's R2 attempts to imitate multiple R2 based on likelihood.

In this study, Cox and Snell R2 is 0.3, which indicates that 30% of the variation in the dependent variable use of the family planning method was explained by the explanatory variables. Nagelkerke R2 in model summary table 4.3 above is 0.427, which indicates that 42.7% of the variability in the dependent variable using of family planning method was explained by the explanatory variables**.**

Table 4.3

Model Summary			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R-square
1	101.741a	0.3	0.427

Binary logistic Regression analysis

This section discusses the findings of binary logistic regression, its significance, and the effect of each explanatory variable on the response variable.

Wald test

The Wald test column shows statistical significance for each independent variable from the table above. For example, the age group 25-34 (p-value = 0.002) added significantly to the model. The age group above 44 (p-value is 0.773, which is greater than 0.05) didn't add significantly to the model.

	RESULTS OF BINARY LOGISTIC REGRESSION (ODDS RATIO)						95.0%C. I for EXP(B)	
	B	S.E.	Wald	d.f	Sig.	Exp(B)		
Age			**10.877**	**4**	**.012***			
15-24	3.041	1.326	2.187	1	.002*	0.018	.001	.236
25-34	1.112	1.216	4.481	1	.107	0.141	.013	1.525
35-44	.153	1.065	2.602	1	.037*	.535	.0923	5.927
+45)	.155	1.022	0.83	1	.004*	.243	.056	7.223
Husband education			**14.488**	**3**	**.002***			
Primary	8.103	2.413	8.488	1	.001*	3304.47	30.486	358.18
Secondary	1.223	2.11	5.798	1	.094	9.163		122.811
higher	3.661	.392	7.546	1	.006*	756.601	1.684 6.681	856.86
Mother education			**8.872**	**3**	**.034***			
Primary	5.233	5.331	4.072	1	.035*	.979	.0098	110.35
Secondary	3.223	2.224	2.81	1	.056	77.152	.982	666.34
higher	0.224	6.221	2.002	1	.013*	9.779	.023	88.45
Marital status Single			**12.65**	**3**	**0.004***			
Married	3.672	3.288	8.129	1	.783	38.327	3.134	495.64
Divorced	1.472	3.716	0.076	1	.028*	1.603	2.055	46.35
windowed	6.273	5.396	4.843	1	.023*	197.189	2.781	21373.76
Religion			**6.355**	**2**	**.313**	**1**		
Protestant	.071	.372	1.893	1	.087*	1.114	.35	1.502
Catholic	.108	.218	4.621	1	.621	1.074	.726	1.708
Income<5000			**24.331**	**4**	**.482**	**1**	**1**	
5000-15000	.522	.233	11.361	1	.013*	1.699	.399	2.449
15001-25000	.278	.305	3.761	1	.011*	1.342	.366	3.260
25001-35000	.092	.310	6.533	1	.765	.9220	.497	2.066
Above 35000	-.344	.208	2.676	1	.132	.7130	.407	3.941
Work enviro.			**55.99**	**2**	**.006***	**1**	**1**	
Poor	.137	.539	3.667	1	.040*	.872	.310	2.448
Good	.729	.603	52.321	1	.0312	.563	.394	3.342
Wealth index			**23.3435**	**6**	**.082***	**1**	**1**	
Govt employ	-.128	.257	2.003	1	.698	.798	.311	2.44

Self-employ	-.573	.395	11.453	1	.816	.543	.384	3.72
Housewife	-.133	.476	5.666	1	.069*	.877	.394	3.81
Media			**12.316**	**4**	**.034***	**1.119**		
Non	.213	.113	.658	1	.073	1.239	.064	1.602
Rarely	.487	.332	.115	1	.003*	1.288	.0123	2.935
Once a week	.321	.365	.753	1	.002*	1.376	.0945	4.671
Every week	.687	.209	10.79	1	.384	1.977	1.976	10.33
Constant	1.887	3.241	0.441	1	.564	.226		

Wald test

From the table above, the Wald test column shows statistical significance for each of the independent variables. For example, age group 15-34 (p-value = 0.002) which is less than 0.05, indicating that it added significantly to the model. Age group 25-34 (p-value is 0.107) which is greater than 0.05, indicating it didn't add significantly to the model.

Odds Ratio

Use of family planning and Age.

The log odd of mothers who were using family planning in the age interval 35-44 is increased by 0.54 as compared to the age interval15-24 controlling other variables in the model (Coefficient = 0.153, OR=0.535, P=0.037, CI=[0.0923, 5.927]).

Use of family planning and Education

The log odd of mothers who were using family planning in the higher level of education is increased by 9.779 as compared to those who are in illiterate (Coefficient = 0.224, OR=9.779, P=0.013, CI=[0.023, 88.45]).

The log odd of mothers who were using family planning whose husband had primary level of education is increased by 3304 as compared to those whose husbands are in illiterate (Coefficient = 8.103, OR=3304, P=0.001, CI= [30.5, 358.2]).

Use of family planning and marital status.

The log odd of mothers who were using family planning and windowed is increase by 197.189 as compared to those who are single. (Coefficient=6.27, OR=197.2, P=0.023, CI=[2.78, 21373])

Use of family planning and Religion.

The log odd of mothers who were using family planning and are protestants is increased by 1.114 as compared to other religions (Coefficient=0.071, OR=1.114, P=0.013, CI= [0.35, 1.5])

Use of family planning and Income.

The log odd of mothers who were using family planning with income between 15001-25000 is increased by 1.699 as compared to those income is less than 5000 (Coefficient=0522, OR=1.699, P=0.013, CI= [0.399, 2.44])

Use of family planning and work environment.

The log odd of mothers who were using family planning in poor work environment is increased by 0.872 as compared to others (Coefficient=0137, OR=0.872, P=0.04, CI= [0.31, 2.45])

Use of family planning and wealth index.

The log odd of mothers who were using family planning and are housewives is decreased by 0.877 as compared to those

employed by government (Coefficient=-0.133, OR=0.877, P=0.069, CI= [0.394, 3.81])

Use of family planning and listening to media

The log odd of mothers who follow media rarely, their use of family planning is increased by 1.288 as compared to those who don't follow at all (Coefficient =0.487, OR=1.288, P=0.003, CI=[0.123, 2.94]).

From the study findings, one can now be able to deduce factors that determine the use of family planning in South Imenti Sub-County. According to the results, about 59% of the respondents don't use family planning methods. The most important covariates identified in the multiple logistic regressions are age, marital status, education, Religion, Income, Wealth and frequency of listening to media. 14.2% of Variability in using family planning is explained by age, marital status, education, Religion, Income, Wealth and frequency of listening to media.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

The findings of this study have shed light on the factors that influence women of childbearing age in South Imenti constituency, uptake of family planning methods. The findings reveal that at the age bracket of 15-34 years, there are still many women not using family planning. Similarly, more people above 35 years are not using family planning methods. This calls for more sensitization of communities especially those that are sexually active (15-34 years).

The research findings also indicates that about seventy percent of women sampled do not regularly use any form of family planning methods. Education level, in this case illiteracy, affects 81.8 percent of the women who do not regularly use family planning method, and 18.2 percent of these women on average have five children. In general, the research findings further indicated that the most relevant factors that influence uptake and method of family planning among those sampled are age, levels of education, marital status, the number of children they have, and the amount of time they spend following the different types of media.

5.2 Conclusions

The result findings have shed light on the factors that influence the use of family planning in south Imenti sub-county in Meru County. The majority of women (59%) were not using any form of family planning method. The result shows that age of mothers, educational level of mother, educational level of husband, marital status, income, wealth index and frequency of listening to media are statistically significant in association with the use of family planning among women of childbearing age. Again, the result of binary logistic regression model indicates that age, marital status, level of education, wealth index, income and frequency of mother's listening to media were potential explanatory variables that have a significant impact on the use of family planning. The log odd of mothers who were enrolled primary level of education were using family planning better as compared to those who never enrolled in education. The log odd of mothers who were using family planning and windowed was high as compared to those who are single. Moreover, it was concluded that mothers who frequently had a habit of listening to media had high chances of using family planning as compared to those who were not listening to media.

5.3. Recommendations

Based on the results obtained in this study the following recommendations are made: encourage husbands and mothers to be involved actively in education related to family planning programmes and increase the habit of listening to different media.

5.4. Areas for further study

A further study on factors influencing non uptake of family planning by mothers whose husband have higher education level. From this study, it is evidenced that husband with higher education level is the least not using family planning 28/226 (13%) and also the least in using family planning 29/159 (18%).

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