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Predictors of modern contraceptive use during the postpartum period among women in Uganda: a population-based cross sectional study

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Abstract

Background: The rationale for promotion of family planning (FP) to delay conception after a recent birth is a best practice that can lead to optimal maternal and child health outcomes. Uptake of postpartum family planning (PPFP) remains low in sub-Saharan Africa. However, little is known about how pregnant women arrive at their decisions to adopt PPFP.

Methods: We used 3298 women of reproductive ages 15–49 from the 2011 UDHS dataset, who had a birth in the 5 years preceding the survey. We then applied both descriptive analyses comprising Pearson's chi-square test and later a binary logistic regression model to analyze the relative contribution of the various predictors of uptake of modern contraceptives during the postpartum period.

Results: More than a quarter (28%) of the women used modern family planning during the postpartum period in Uganda. PPFP was significantly associated with primary or higher education (OR=1.96; 95% CI=1.43-2.68; OR=2.73; 95% CI=1.88-3.97 respectively); richest wealth status (OR=2.64; 95% CI=1.81-3.86); protestant religion (OR=1.27; 95% CI=1.05-1.54) and age of woman (OR=0.97, 95% CI=0.95-0.99). In addition, PPFP was associated with number of surviving children (OR=1.09; 95% CI=1.03-1.16); exposure to media (OR=1.30; 95% CI=1.05-1.61); skilled birth attendance (OR=1.39; 95% CI=1.12-1.17); and 1–2 days timing of post-delivery care (OR=1.68; 95% CI=1.14-2.47).

Conclusions: Increasing reproductive health education and information among postpartum women especially those who are disadvantaged, those with no education and the poor would significantly improve PPFP in Uganda.

Keywords: Predictors, Postpartum, Family Planning, Contraception, Women, Uganda

Background

The rationale for promotion of family planning (FP) to delay conception after a recent birth is a best practice that can lead to optimal maternal and child health outcomes. On the contrary, short inter-pregnancy intervals can result in negative health outcomes such as maternal anaemia, low birth weight, and neonatal/infant mortality [1,2].

The postpartum period is a time when many routine interventions are provided to mothers [3]. Uptake of postpartum family planning (PPFP) remains low in sub-Saharan Africa and very little is known about how

pregnant women arrive at their decisions to adopt PPFP [4]. Yet, the benefit of early adoption or continuation of family planning are well known and are positive [5-7].

Postpartum months are a challenging time for women because of breastfeeding, childcare, menstrual resumption, and resumption of sexual relations. In a study of women residents of two Nairobi settlements of Korogocho and Viwandani, results showed that sexual resumption occurred earlier than that of menstruation and postpartum contraceptive use [2]. Resumption of sex puts woman at the risk of conception and therefore, creates the need for postpartum contraception.

Some evidence is available to support selected postpartum contraceptive methods [3,8-14]. These methods include the Intra Uterine Device (IUD), the progestin-only

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oral contraception (POC) among others. Some authors have pointed out that an efficient contraceptive during the postpartum period is lactational amenorrhea (LAM), which is highly acceptable by some religious authorities [8].

The choice of a post-partum contraceptive method depends on many factors, including the need for a temporary versus a permanent method, the infant feeding choice and the extent to which informed consent is made prior to delivery [12]. One of the reasons put forward for limited use of some hormonal contraceptive methods during the postpartum period is often their effects on lactation and infant growth [15]. In addition, other side effects such as heavy menstrual bleeding and pain, have been associated with these methods [16].

Although concerns remain that using a progestin contraceptive in the early postpartum period could negatively affect lactogenesis, as well as the quantity and quality of the breast milk [12], the postpartum contraceptive options available to mothers include progestin-only oral contraceptives; intrauterine devices, including the levonorgestrel intrauterine contraceptive; barrier methods; and the etonogestrel implant [6,11]. Earlier research evidence [17] suggests that postpartum and intrapartum application of the IUD technique is feasible and does not interfere with normal uterine involution. Moreover, the ability to utilize the IUD in the immediate postpartum period, when motivation for acceptance of birth control devices is at its peak, provides a clinician with another tool for use in women who are unlikely to return for follow-up visits [11,16,18].

High rates of acceptance of contraceptive services in the immediate postpartum period indicate that this period is the most effective means of initially reaching the women in need of family planning services [19]. In the United States, the National Surveys of Family Growth data showed that as of 1982, most lactating women who were sexually active used a contraceptive method; barrier methods were most frequently used. However, black women and those of higher parity and lower educational level, were more likely to be sexually active and not using a method [7]. In a related study, Weston, Neustad and Gilliam [20], suggest that the facilitators to IUD uptake included strong recommendations from providers or family members, planning for IUD during pregnancy, and perceived reproductive autonomy. Incidences of repeat pregnancy were reported among participants who did not obtain IUDs and instead used condoms, used no method, or intermittently used hormonal methods in the same study.

Planning for postpartum contraception is particularly important for pregnant women at risk of rapid repeat unintended pregnancy. Yee and Simon in 2012 [5] in their study at a medical center in Chicago, used a

qualitative approach to examine women's perspectives toward the optimal provision of comprehensive contraceptive counseling. The findings suggest that focused antenatal contraceptive counseling about postpartum contraception increased the possibility of use [5].

In the current study, we posit that individual socio-economic and demographic factors operate through societal and institutional factors to increase or diminish the demand for PFP. Invariably, this conceptualization mirrors the basic tenets of other Health-Belief Models - HBM [21-23]. The HBM has been previously applied to studies on family planning use and consistently explains the importance of a number of factors in the use of FP [24,25]. The basic argument in the HBM framework is that, there are factors that influence a person's decision to use a PFP. These include: 1) Enabling factors like availability of PFP services, organization of the health system, economic means (income, insurance, transport etc.); 2) Predisposing characteristics (Demographic factors, social structures and beliefs); and 3) Need (perceived and evaluated). In this study, we attempt to analyze some of these factors as indicated in the methods section.

Therefore, the key question addressed by this study is, what are the predictors of modern contraceptive use during the post-partum period in Uganda? The study therefore, addressed the following two specific objectives. First, it sought to establish the level of contraceptive use during the postpartum period; and second, was to analyze the predictors of PFP in Uganda.

Methods

Data source and study sample

We used secondary population-based cross-sectional survey data – the Uganda Demographic and Health Survey (UDHS) conducted in 2011. Although these data are already in public domain, authorization to use the data was obtained from MEASURE DHS by providing a brief description of the study through their website.

The UDHS employed nationally representative sample, which were based on a two-stage stratified sample of households. These types of surveys are carried out every after five years to provide information on national demographic, socio-economic, health indicators including contraceptive use among women. These surveys are conducted by the Uganda Bureau of Statistics (UBOS) in collaboration Macro International.

A total of 8,674 women aged 15–49 was the sample for the 2011 DHS. Informed consent for participation in the study was acquired from all the respondents. Detailed information about data collection procedures including the informed consent form are contained in the UDHS 2011 report [26].

A total of 3298 postpartum women aged 15–49 years were extracted from the 2011 UDHS data for further

Table 1 Percentage distribution of postpartum women age 15–49 by selected characteristics

Variable	Category	Frequency	Percent (%)
Education level attainment	None	509	15.4
	Primary	2006	60.8
	Secondary +	783	23.7
Region of residence	Kampala	252	7.6
	Central	655	19.9
	Eastern	867	26.3
	Northern	638	19.3
	Western	886	26.9
Religion	Catholic	1,351	41.0
	Protestant	1,374	41.7
	Muslim	452	13.7
	Other	121	3.7
Mean Age of women	(Continuous)	3298	29.7
Residence	Urban	544	16.5
	Rural	2753	83.5
Marital status	Never married	112	3.4
	Married	2754	83.6
	Previously married	430	13.0
Wealth Index	Poorest	684	20.7
	Poorer	675	20.5
	Middle	617	18.7
	Richer	593	18.0
	Richest	729	22.1
Mean number of living children	(Continuous)	3298	3.9
Exposure to media	No	855	25.9
	Yes	2443	74.1
Timing of post-delivery checkup	None	2030	61.6
	<1 day	1021	31.0
	1-2 days	136	4.1
	3+ days	110	3.3
Skilled birth attendant	Not skilled	1032	31.3
	Skilled	2036	61.7
	TBA	230	7.0
Used PFP	No	2384	72.3
	Yes	914	27.7
Total		3298	100.0

analyses. Women included in the analysis, had completed the full 12 months of the postpartum period. Only the most recent birth was considered, even if a woman delivered more than once during the reference

period. We excluded women who did not have a live birth in the five years before the survey.

Variables

We defined postpartum contraceptive or post-partum family planning (PPFP) as a woman's use of any modern method of contraception during the 12 months following her most recent childbirth. The modern methods included pill, IUD, injection, diaphragm, condom (male or female), sterilization (male or female), implant, or foam/jelly). Therefore, the outcome variable in this study – PPFP, was expressed as the binary outcome, whether a woman utilized modern postpartum family planning or otherwise. PPFP was coded 1, if a woman used any modern method of contraception and coded 0 otherwise.

Predictor variables considered (see Table 1) included those commonly reported in the contraceptive use studies. They included (categories are given in parentheses) : place of residence (urban, rural), education level attainment (no education, primary, secondary and higher), religion (Catholic, Protestant, Muslims, others; where other religions include Seventh Day Adventists (SDA) and unknown religions), wealth index (poorest, poor middle, rich and richest), region (Kampala, Central, Eastern, Northern and Western), marital status (never married, currently married, previously married). Additional variables included the following: age of the woman (continuous), number of surviving children, exposure to media (whether a woman had ever accessed family planning information through print, radio and television channels), skilled birth attendance and timing of post-delivery check-up. The UBOS generated these variables and their coding categories before availing them for public use.

Data analysis

Descriptive statistics (either as percentages for the categorical variables or mean for the continuous variables) are shown for selected predictors (Table 1). Bivariate analyses (based on Pearson chi-square tests) were performed to examine the association between PPFP and each of the selected predictors (Table 2). The chi-square tests were used to analyze differences in all variables between the two groups. All predictors with significant difference ($p < 0.05$) were selected and included in a multivariate logistic regression analysis.

Finally, odd ratios (ORs) based on the 95% confidence intervals were calculated for each group of the categorical predictors (Table 3). The logistic regression models were used to predict the log-odds of using modern contraceptives during the postpartum period.

Formally, the estimated equation may be expressed as follows:

$$\text{logit}[P(Y = 1)] = \beta_0 + \sum_{j=1}^k \beta_j X_j \quad (1)$$

Where; $\text{logit}[P(Y=1)]$ refers to the natural log odds that a respondent will: use postpartum contraception, β_0 refers to the intercept of the regression model; and $\beta_j X_j$ refer to regression estimates for the set of explanatory variables (numbered 1 through k) included in the models.

For purposes of accounting for the complex sample design, used in DHS data collection, we weighted the data during the analysis. This procedure was intended to iron out the effects of clustering and stratification as well as the effect of sampling weights when computing the variance, standard error, and confidence intervals (the “*vce – robust*” option was used). The variables were also checked for multi-collinearity, and those variables that passed the test were the ones included in the final model. We analyzed the data using STATA software version 13.

Results

Descriptive results

Table 1 presents selected background characteristics for postpartum women – women who had their most recent birth in the period five years prior to the date of interview. More than half of the postpartum women had primary education and lived in eastern and western regions. Nearly half of the women were Catholics. Protestants had similar distribution. The women’s mean age was 30 years. More than three quarters of the women were rural residents and were married. Nearly half of the women were from the poorest and poorer wealth status.

Women had an average of four surviving children. Nearly three quarters of the women had exposure to family planning on the mass media – newspaper, radio or television. The majority of women did not receive any post-delivery check-up. More than half of the women had a skilled birth attendant. Finally, slightly over a quarter of the women received modern postpartum family planning services.

Association between PFP and selected predictors

Table 2 shows the percent distribution of women aged 15–49 by their use of modern postpartum family planning. There was a strong association between PFP use and women’s background characteristics, with the exception of marital status. Consequently, we dropped marital status from the multivariable logistic regression models due to its non-significance.

Multivariate results

Table 3 shows the log-odds of utilization of modern postpartum family planning by women, controlling for

selected predictor variables. In Model 1, we included proximate predictors of PFP only. In Model 2, we added socio-economic factors. In model 3, we controlled for both proximate and socio-economic factors.

In Model 1, the results show that a one-year increase in age of the woman was significantly associated with a slight reduction in the odds of utilizing PFP (OR=0.98; 95% CI=0.96-1.00). This finding was consistent even after controlling for socio-economic factors in Models 2 and 3. Furthermore, Models 2 and 3 show that a one-child increment in the number of living children was associated with an increase in the log-odds of using PFP of about 9 percent (OR=1.09; 95% CI=1.022-1.15).

As expected, women who had exposure to media on family planning were significantly more likely to use PFP, compared to those who did not. The results shown in Model 1 suggest that women with media exposure had 1.9 times log-odds (OR=1.89; 95% CI=1.55-2.30) of using PFP compared to those who had no such exposure. Even after controlling for socio-economic factors (Model 3), this relationship persisted (OR=1.30; 95% CI=1.05-1.61).

Women who received skilled birth attendance were more likely to utilize PFP compared to those who did not deliver (OR=1.94; 95% CI=1.58-2.39). In final model, after controlling for all other factors, this relationship was maintained, although with slight reduction as shown in Model 3 (OR=1.39; 95% CI=1.12-1.74).

The timing of receipt of post-delivery care was associated with PFP. Longer timing of receipt of post-delivery care was associated with higher likelihood of utilization of PFP. Women who took 1–2 days to get post-delivery care had 1.5 times the log odds of utilizing PFP (95% CI=1.07-2.21), compared to those who did not receive post-delivery. This relationship was even stronger after controlling for all other variables in third model (OR=1.68; 95% CI=1.14-2.47).

Women’s education significantly predicted PFP utilization. The log odds of PFP use were higher among women primary education in Model 2 (OR=2.09; 95% CI=1.54-2.87) and Model 3 (OR=1.96; 95% CI=1.43-2.68). Similarly, PFP utilization was increased among women with secondary education in Model 2 (OR=3.03; 95% CI=2.09-4.38) and Model 3 (OR=2.73; 95% CI=1.88-3.97). This relationship was consistent even after controlling for all the variables in Model 3, although with some reduction.

PFP utilization was significantly associated with higher wealth status. Women in higher wealth quintiles were significantly more likely to use PFP compared to those within the lowest wealth quintiles. This finding was consistent in both Model 2 and Model 3. Model 2 showed that compared to women in the poorest category, the log-odds of using PFP increased from 1.5 (95% CI=1.14-2.14) among

Table 2 Percent Distribution of women aged 15–49 by use of PFP and selected background characteristics

Variable	Category	Non-use (%)	Used PFP (%)	Frequency	P-value
Education level attainment					
	None	88.1	11.9	509	0.000
	Primary	74.0	26.0	2006	
	Secondary+	57.6	42.4	783	
Region of residence					
	Kampala	54.8	45.2	252	0.000
	Central	63.8	36.2	655	
	Eastern	72.8	27.3	867	
	Northern	83.0	17.0	638	
	Western	75.4	24.6	886	
Religion Catholic					
	Catholic	75.8	24.2	1,351	0.000
	Protestant	71.5	28.5	1,374	
	Muslim	63.5	36.5	452	
	Other	74.5	25.5	121	
Age-group					
	15-19	75.9	24.1	162	0.000
	20-24	69.4	30.6	709	
	25-29	67.8	32.2	872	
	30-34	72.5	27.5	610	
	35-39	75.2	24.8	544	
	40-44	77.2	22.8	302	
	45-49	94.2	5.9	99	
Residence Urban					
	Urban	56.3	43.7	544	0.000
	Rural	75.5	24.6	2753	
Marital status					
	Never married	67.2	32.8	112	0.206
	Married	71.6	28.4	2754	
	Previously married	79.1	20.9	430	
Wealth Index					
	Poorest	88.9	11.1	684	0.00
	Poorer	79.5	20.5	675	
	Middle	74.4	25.6	617	
	Richer	69.0	31.0	593	
	Richest	57.3	42.7	729	
Number of living children					
	<3	69.4	30.6	1110	0.002
	3-5	71.7	28.3	1338	
	6+	77.0	23.0	849	
Exposure to media					
	No	81.3	18.7	855	0.000
	Yes	69.2	30.9	2443	

Table 2 Percent Distribution of women aged 15–49 by use of PFP and selected background characteristics (Continued)

Timing of post-delivery care checkup					
	Received none	75.9	24.1	2030	
	<1 day	67.5	32.5	1021	
	1-2 days	68.5	31.5	136	0.000
	3+ days	55.8	44.2	110	
Skilled birth attendant					
	Not skilled	81.3	18.7	1032	
	Skilled	66.6	33.4	2036	0.000
	TBA	82.2	17.8	230	

women in the poorer category to 1.9 (95% CI=1.38-2.64) among the middle wealth index category and were highest among women of richest category (OR=3.12; 95% CI=2.15-4.53).

Finally, religious affiliation was also associated with PFP. The findings in Models 2 and 3 showed that compared to Catholics, the use of PFP among Protestants was higher (OR=1.26; 95% CI=1.04-1.53), as shown in Model 2. This latter relationship persisted in the full Model 3 (OR=1.27; 95% CI=1.05-1.54).

Discussion

This study had two fold objectives: first, estimating the prevalence and second, investigating predictors of modern postpartum family planning use in Uganda. Slightly over a quarter (28%) of the women used modern family planning during the postpartum period. This rate was slightly higher than of all women of reproductive ages in Uganda (26%) in 2011 [26].

Utilization of modern PFP was significantly associated women's: education level, wealth status, religion, age of the woman, number of surviving children, exposure to the media, and utilization of reproductive health services including skilled delivery care, and timing of post-delivery care.

Our findings show that women's primary or secondary education predicted utilization of modern PFP. This relationship is consistent with findings reported by other studies [2,7,27-30]. Higher education level attainment invariably gives postpartum women a better understanding of the available modern contraceptive methods and the benefits of fertility regulation and hence the need for contraception during the postpartum period. In addition, higher education increases awareness of the side effects of contraceptive methods and preference for the most convenient ones [30].

The results indicated a direct relationship between women's wealth status and the utilization of PFP. Women from richer households were more likely to use PFP compared to those in the poorest households. This finding collaborates with a study in Malawi which showed

that women in the highest wealth quintiles were more likely to use contraception, relative to those in the poorest income categories [31].

Religious affiliation was generally not significant in the regression models except for the Protestants category. The explanation for this could perhaps lie in the fact that the protestant ethic often tends to be more accepting to contraceptive use compared to Catholics. This argument is consistent with literature elsewhere where Protestant women were more likely than Catholics to use highly effective contraceptive methods [32].

Increment in women's age significantly reduced their use of PFP. This implies that PFP was higher among the younger women compared to the older women. In a study on use of long active reversible contraceptives at a military facility in the US, the study revealed that younger women <25 years were more likely to use these methods [33]. Similar results were also reported concerning current contraceptive use in Malawi, where younger women were more likely to use contraceptives compared to older women [31]. The explanation for this finding is not clear, since all events studied related to the most recent period – five years prior to the survey. In a US study among low income women, use of Depot Medroxyprogesterone Acetate (DMPA) reduced with increasing age of woman [34]. Another significant demographic factor analyzed was the number of living children. The findings showed a direct relationship between a woman's number of living children and her likelihood of using PFP.

Women's exposure to family planning messages on the media increased use of PFP. Exposure to media content is known to increase demand for services and in the long run, causing behavior change through information, education and communication (IEC) campaigns [18,35,36]. Specific family planning studies in Kenya and Bangladesh have equally reported increase in utilization of family planning methods as a result of exposure to media [37-39]. An earlier study on Uganda using data from the Delivery of Improved Health Services Surveys of 1997 and 1999 also indicated that exposure to Behavioral Change

Table 3 Logistic regression model predicting the log-odds of utilizing PFP controlling for selected variables (Adjusted odds-ratios are presented)

Variable/category	Model (1)		Model (2)		Model (3)	
	Odds-ratio	95% CI	Odds-ratio	95% CI	Odds-ratio	95% CI
Education level attainment						
None (Rc)			1.000	-	1.000	-
Primary			**2.099	[1.537-2.868]	**1.957	[1.429-2.682]
Secondary +			**3.027	[2.094-4.376]	**2.730	[1.879-3.968]
Region of residence						
Kampala (Rc)			1.000	-	1.000	-
Central			1.351	[0.967-1.889]	1.389	[0.990-1.948]
Eastern			1.195	[0.838-1.704]	1.217	[0.848-1.746]
Northern			0.900	[0.631-1.309]	0.866	[0.597-1.256]
Western			1.051	[0.734-1.505]	1.094	[0.759-1.576]
Wealth Index						
Poorest (Rc)			1.000	-	1.000	-
Poorer			**1.564	[1.143-2.139]	**1.442	[1.052-1.975]
Middle			**1.911	[1.384-2.639]	**1.692	[1.218-2.350]
Richer			**2.249	[1.614-3.133]	**1.993	[1.426-2.784]
Richest			**3.121	[2.148-4.533]	**2.643	[1.812-3.856]
Religion						
Catholic (Rc)			1.000	-	1.000	-
Protestant			*1.262	[1.043-1.526]	**1.271	[1.050-1.539]
Muslim			1.047	[0.810-1.355]	1.059	[0.816-1.375]
Other			0.999	[0.607-1.642]	0.953	[0.586-1.551]
Age of woman (continuous)	**0.981	[0.963-0.998]	**0.969	[0.950-0.987]	**0.969	[0.950-0.988]
Place Residence						
Urban (Rc)			1.000	-	1.000	-
Rural			0.845	[0.651-1.095]	0.891	[0.686-1.157]
Number of living children	1.013	[0.958-1.071]	**1.085	[1.022-1.152]	**1.090	[1.026-1.158]
Exposure to media						
No (Rc)	1.000	-			1.000	-
Yes	**1.891	[1.552-2.303]			**1.300	[1.049-1.611]
Skilled birth attendant						
No (Rc)	1.000	-			1.000	-
Skilled attendance	**1.943	[1.579-2.390]			**1.393	[1.116-1.738]
TBA	0.956	[0.630-1.449]			0.889	[0.581-1.360]
Timing of post-delivery care checkup						
Received None (Rc)	1.000	-			1.000	-
<1 day	0.997	[0.823-1.207]			0.893	[0.728-1.095]
1-2 days	**1.537	[1.068-2.211]			**1.681	[1.144-2.470]
3+ days	**2.090	[1.429-3.056]			**2.141	[1.429-3.207]
Model constant	**0.225	[0.145-0.351]	**0.151	[0.081-0.283]	**0.108	[0.057-0.206]

Note: Rc= reference category; ** and bold=significant finding at p<95%.

Communication (BCC) messages was associated with increased contraceptive use and intention to use [40].

Furthermore, skilled birth attendance significantly increased utilization of PPF. This is expected because the motivation to use contraception and discussion with clinicians is usually high in the immediate postpartum period [17]. This study also established that women who had their post-delivery checkup after one day were significantly more likely to use PPF compared to those who did not have any post-delivery check-up. However, we do not have sufficient explanation for this finding. This finding needs further investigation.

Study limitations

The cross sectional nature of the data poses causality challenges. It is difficult to ascertain the association between PPF and the predictor variables since they were measured at one point in time.

The study did not address all health system related factors that affect postpartum family planning utilization. Despite these limitations, we used reliable data and appropriate methods hence the findings reflect accurately on PPF utilization in Uganda. The large size of this study and its likely representativeness is a great strength.

Conclusions

From the analysis, the factors that predicted PPF utilization were women's primary or higher education level, higher wealth status, protestant religion, younger age, higher number of surviving children, and exposure to family planning through media. In addition, skilled birth attendance and later timing of post-delivery checkup also predicted use of PPF. These results suggest that any programme aimed at enhancing postpartum contraceptive use should target women with low education, low wealth status, older ages and those with limited exposure to mass media.

Increasing reproductive health education among postpartum disadvantaged and poor women would significantly improve the uptake of PPF in Uganda. We suggest that the Ugandan government and development partners sponsor family planning messages on radio, in newspapers and television and perhaps even intensify these efforts. Further utilization of alternative strategies like street plays, one-on-one and group counseling in clinics and hospitals would avail information to those who might not have access to print media.

Given the well-documented benefits of postpartum family planning, we recommend that PPF be fully integrated into maternal health care services. It is likely that such integration would help increase the uptake of modern family planning. This is because delivery and postnatal services remain important windows of opportunity to

provide access to family planning messages and to offer women various contraceptive methods.

Finally, there is need for further research on how male involvement and timing of post-delivery check-up influences PPF in Uganda.

Abbreviations

BCC: Behavior change communication; IEC: Information education and communication; IUD: Intra uterine device; UDHS: Uganda demographic and health survey; DHS: Demographic and health survey; DMPA: Depot Medroxyprogesterone Acetate; LAM: Lactational Amenorrhoea; PPF: Postpartum family planning.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

GR conceived the study, conducted data analyses, wrote the manuscript, interpreted the findings, discussed and reviewed results, wrote conclusions. AK and SOW participated in scientific content, discussion and review of the manuscript; HLN participated in the conceptualization of the study and sample selection. EA and TJ participated in manuscript conceptualization and review. All authors read and approved the final manuscript.

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