Influence of Smartphone Application Reminder Service on Postpartum Contraception among Postpartum Women in Kitui County, Kenya

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Abstract

Background: Low uptake of postpartum contraception remains a significant public health concern, contributing to the rising incidence of unintended pregnancies among postpartum women. This study aimed to establish the influence of smartphone application reminder service on postpartum contraception uptake among postpartum women in Kitui County, Kenya.

Methodology: A quasi-experimental study was conducted among 228 eligible participants drawn from two major referral health facilities (Kitui County Referral and Mwingi Central Sub-County Hospitals), which were purposively sampled. Trained interviewers conducted baseline and six-week postpartum interviews with eligible participants, who were recruited through systematic random sampling. The groups were dichotomised into an intervention group, which received the smartphone application (app) reminder and the control group, which did not receive the app reminder. The intervention was a smartphone application with an audio alert in the background, accompanied by a message three days a week. Informed consent and approvals were obtained before the commencement of the data collection process, which was achieved by the use of semi-structured questionnaires. Data were analysed using SPSS version 29. Inferential statistics included chi-square tests and logistic regression, while the Difference-in-Differences (DiD) method was employed to assess the impact of the intervention.

Results: Postpartum women with the smartphone app reminder utilised postpartum contraception more (49.1%) compared to those who did not have the reminder (6.1%). Smartphone app reminders increased the likelihood of using postpartum family planning by 8.23 times (OR: 8.23; P=0.000; CI: 14.22-102.41).

Conclusion and Recommendations: Smartphone app reminders significantly enhanced the uptake of postpartum contraception among postpartum women. We recommend that smartphone reminders be incorporated into the postpartum care package. The County government should strengthen postpartum contraception and boost capacity at the grassroots to enhance postpartum contraception through smartphone reminder services.

Key Words: *Uptake, Postpartum, Family Planning, Contraception, Influence*

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Introduction

The term "contraception" is synonymous with "family planning", or "birth control" or "anticonception" or "fertility control" and refers to deliberate prevention of conception or impregnation [1]. Approximately 225 million women wish to prevent pregnancy after delivery (postpartum contraception). Contraception helps reduce pregnancy-related morbidities and mortalities among young mothers [2].

Meeting the need for contraception among women of reproductive age, as outlined in SDG indicator 3.7.1, is essential to achieving the 2030 targets of reducing the global maternal mortality ratio to below 70 per 100,000 live births and the neonatal mortality rate to 12 or fewer deaths per 1,000 live births [3]. Additionally, the number and spacing of births are major determinants of maternal health [4]. Maternal deaths are common in resource-limited settings due to low socio-economic and cultural factors, among other factors [5]. A considerable number of maternal mortalities are preventable if proper interventions are put in place [6].

Sub-Saharan Africa (SSA) continues to face the highest rates of maternal and child mortality globally, with an approximate 70% of the global maternal deaths [7], a low pooled contraception use (33%) [8] and an overall unmet need for family planning of 24% [9]. SSA countries register the highest unmet need for postpartum contraception, which has led to high rates of unintended pregnancies, unsafe abortions, and unplanned births [10]. A study conducted in Ghana showed a low postpartum contraceptive use (26%) despite increased knowledge on contraception [11]. Similarly, the postpartum contraception use rate is 8.5%% and 20% in Uganda and Burundi, respectively [12]. In Kenya, although the unmet need for postpartum contraception has decreased from 75% to 16% there is still room to improve the provision of postpartum contraception in the adversely affected regions [13].

Kenya is ranked fourth in Africa for maternal mortality burden, with a maternal mortality ratio (MMR) of 594 per 100,000 live births [14]. Kitui County has a high fertility (3.2) coupled with a contraceptive utilisation rate of 62%, a contraceptive prevalence rate of 55% and a perceived much lower postpartum contraception uptake [15]. The current MMR for Kitui County has been missed out in the 2022 Kenya Demographic Health Survey fact sheet; however, the ratio might be higher. Mwingi, which hosts the second major referral hospital within Kitui County, after Kitui County Referral Hospital, registers a similar situation.

Mobile health has been instrumental in increasing the uptake of health services in other specialities. A systematic review done in 2014 indicated that "using smartphone reminder applications may be an important intervention as backup contraceptive reminder methods" [16]. A key benefit of eHealth is immediate and timely intervention facilitated by real-time alerts and reminders during critical periods of care [17].

Postpartum contraception using mobile phone reminders as part of postpartum service provision may increase the uptake of postpartum contraception [18]. Few apps have been documented as having been utilised in the provision of comprehensive information on available contraceptive methods [19]. Unintended pregnancies can be prevented during the immediate postpartum period if proper interventions are utilised, because, for instance, in Kenya, approximately 94% of the population have access to mobile phones [20], coupled with a smartphone penetration rate of 72.6% [21]. Smartphone application reminder services have been used in a variety of health-related aspects, which have been successful; however, the use of mHealth interventions in support of postpartum contraceptive use has not been explored adequately. Therefore, this study aimed to establish the influence of smartphone application reminder service on postpartum contraception uptake among postpartum women.

Methodology

Study design and site

This quasi-experimental design study was implemented in Kitui County, situated in the lower Eastern region of Kenya. The County is home to 1,136,187 [22] people, among whom 545,195 are females. Women of reproductive age (WRA) constitute 23% (246,300), and children under five years constitute 16% (172,300) of the

total population. High fertility (5.1 per woman compared to a national coverage of 3.3 per woman) in the area has led to rapid population growth [23]. Kitui County Referral Hospital and Mwingi Sub-County Hospital are the major referral hospitals in the county and serve a large catchment of women of reproductive age and their children.

Study population

Participants comprised postpartum women admitted to the labour ward, postnatal ward or visiting the family planning clinic within six weeks of childbirth and who owned and could use a smartphone. Those women who refused to consent and the mentally unstable, based on observational screening during initial interactions, were excluded from the study.

Sample size

The sample size was derived using Chan's formula [24] for comparing two proportions:

$$m = c \times \frac{\pi_1(1-\pi_1) + \pi_2(1-\pi_2)}{(\pi_1-\pi_2)^2}$$

With a 2-sided test at the 5% significance level, power of 90% (c=10.5), and medium effect size (π_1=0.2 vs π2=0.4), we obtained a minimum of 105 participants per group. This gave a total of 210. Allowing for a 10% non-response rate, the required sample size was 231. Ultimately, 228 women were enrolled (99% response rate, with three lost to follow-up

Sampling criteria

Purposive sampling was used to select the two study sites based on the fact that they are the major referral hospitals in Kitui County and serve a large catchment area. Systematic random sampling was used to recruit eligible participants into either an intervention group (n=116) or the control group (n=115), yielding a total of 231participants.

Study variables

The dependent variable was uptake of postpartum contraception, contextualised into "uptake" or "non-uptake" of any postpartum contraceptives. Postpartum contraceptive uptake was defined as commencement of a family planning method within six weeks postpartum, while non-uptake was defined as lack of family planning method uptake within six weeks postpartum.

From the literature review, independent variables (potential confounders) included socio-demographic, health facility and client-related factors. The interventional variable was a phone application reminder service, which was designed particularly for the interventional group.

Data collection

Intervention. The intervention was a smartphone application with an audio alert in the background, accompanied by a message at least three days a week. The message reminders were in three different languages, English, *Kiswahili* and *Kamba*. The message accompanying the audio alert was customised to a specific individual, preferred language and health facility. The message content was as follows:

English version. "*Hello…….. This is Judith from Mwingi Sub-County Hospital, reminding you of the need to use a family planning method. Please take note because it is beneficial to you and your family. Thank you*". The English version was translated into Kiswahili and Kamba.

The family planning reminder alarm application, *Medicore,* was developed by the researchers in collaboration with an information technology professional. The researchers retained ownership of the app, which was then used to send reminders. This was a locally designed Java-based application to provide reminder notifications for family planning activities, utilising alarm functionality with pop-up messages to alert users of the need for family planning. The Android Package Kit (APK) was shared from the principal researcher's phone to the respondent's phone using the various available sharing platforms, downloaded and installed.

The participants' role was to follow the application's prompts, then log in to access the services. They would then choose the health facility, select the family planning reminder service, and set a convenient time and day for the reminder. Additionally, before registration, the participant was required to select her preferred language. The reminder alarm was set to automatically be accompanied by a pop-up message depending on the participant's preferred settings at least three days a week, up to 42 days. The family planning app reminder was set to deactivate automatically once the set duration elapsed, after which exit interviews were done.

Validity and reliability

Data were collected using semi-structured questionnaires at baseline and post-intervention. The questionnaire was pre-tested using 20 randomly sampled respondents (10 in the intervention and 10 in the control group). The 20 post-partum women who participated in the pre-test were not included in the final analysis. Cronbach's Alpha was then computed, and a reliability mean value of 0.64 was obtained. Validity was ensured by adopting and modifying questions used in related studies and through appraisal by experts on the subject.

The study used a non-randomised quasi-experimental design, where unmeasured confounding variables pose a potential threat. Factors such as socio-demographic characteristics, client-related factors, and health facility characteristics were considered possible confounders. To address this, a comparison group similar to the intervention group was carefully selected, and these factors were included as control variables in the regression analysis.

Data analysis

Statistical Package of Social Sciences (SPSS) version 29 was used for the analysis at a $p<0.05$ level of significance. Descriptive analysis was computed to summarise data. Inferential statistics used were Pearson's chi-square test and logistic regression. The intervention's impact was then assessed using the Difference-in-Differences (DiD) method.

Ethical approval

Ethical approval was obtained from the Kenyatta University Ethics Review Committee, approval number PKU/2571/11697, Kenyatta University Graduate School and also from the National Commission for Science, Technology and Innovation (NACOSTI), License No: NACOSTI/P/22/2105. Informed consent and further permissions were sought as appropriate.

Results

Socio-demographic characteristics of the respondents

Table 1 shows that respondents aged 16-20 years and below accounted for 33.3% and 5.3% in the control and interventional group, respectively. A higher population of the respondents (48.2%) in the interventional group were aged 21-25 years compared to 30.7% in the control group who were within the same age group. The majority of the respondents in the control group (66.7%) were married compared to 42.1% in the intervention group living in a union, while most of the participants in the intervention group (57.9%) were not living in a union. On ethnicity, the majority of the study participants were Kamba for both groups. On religion, the majority of the participants in the control (93.8%) and in the intervention group (85.1%) were Christians (Protestants). On the level of education, the majority of the respondents in the control group (53.5%) had secondary level, while the majority of the respondents in the intervention arm (74.5%) had tertiary level.

Mobile phone characteristics and utilisation of smartphones

Nearly a third (31%) of the respondents in the control group and almost three-quarters (72.8%) in the intervention group reported having owned mobile phones for over 5 years. Most participants,71.7% of the control group and 98.1% of the intervention group, could use

smartphone applications. Over the past four months, the majority of participants consistently used smartphone apps, 57% in the control group and 72.8% in the intervention group.

Uptake of postpartum contraception before the intervention

Before the intervention, the postpartum contraception uptake in the control and intervention groups was 5.2% and 10.5% respectively, as shown in Table 3.

Uptake of postpartum contraception after the intervention

The uptake of postpartum contraception for the intervention and control group was 49.1% and 6.1% respectively, after the intervention, as shown in Figure 1.

Table 1
Socio-Demographic Characteristics of the Respondents at Baseline

Variable	Category	Control N=114 Frequency (%)	Intervention N=114 Frequency (%)
Age in years	16-20	38(33.3)	6(5.3)
	21-25	35(30.7)	55(48.2)
	26-30	25(21.9)	40(35.1)
	31-35	6(5.3)	9(7.9)
	36 and above	10(8.8)	4(3.5)
Marital status	In union	76(66.7)	48(42.1)
	Not in union	38(33.3)	66(57.9)
Ethnicity	Kamba	111(97.4)	85(74.6)
	Other	3(2.6)	29(25.4)
Religion	Protestants	107(93.8)	97(85.1)
	Catholics	6(5.3)	1(9.6)
	Others	1(0.9)	6(5.3)
Education level	Primary	36(31.6)	2(1.8)
	Secondary	61(53.5)	27(23.7)
	Tertiary	17(14.9)	85(74.5)
Area of residence	Rural	104(91.2)	36(31.6)
	Urban	10(8.8)	78(68.4)

Table 2
Smartphone-Related Characteristics of the Study Respondents

Variable	Category	Control (N=114) Frequency (%)	Intervention (N=114) Frequency (%)	Chi square
Duration of smartphone use	Below 1 year	45(39.5)	11(9.6)	χ 2 =28.176 df=2, P<0.001
	1-5 years	65(57)	93(81.6)	
	Above 5 years	4(3.5)	10(8.8)	
Use of apps	Yes	71(62.3)	106(93)	χ2 =30.941
	No	43(37.7)	8 (7)	df=1, P<0.001
Frequency of use	Always	65(57)	92(80.7)	χ 2 =14.911
	Not always	49(43)	22(19.3)	df=1, P<0.001

Table 3
Uptake of Postpartum Contraception before the Smartphone Application Intervention

Group	Uptake of PPC	Non uptake of PPC	χ 2	Df	P value
Control N=114	6(5.2%)	108(94.8%)	0.373	1	0.357
Intervention N=114	12(10.5%)	102(89.5%)			

Association and influence of smartphone application reminder service on postpartum contraception (PPC)

Table 4 shows a significant association between smartphone application reminder service and uptake of postpartum contraception ($\chi 2$ (1) =67.5, P=0.000).

Multivariate analysis using logistic regression

Table 5 shows the multivariate analysis using logistic regression to examine the predictors of postpartum contraception uptake. The use of smartphone application reminder service increased the odds of utilising postpartum contraception by 8 times among the participants who used it compared to those who did not (OR: 8.23; 95% confidence interval (CI): 14.22-102.41). Additionally, formal employment was significantly associated with postpartum contraception uptake (OR: 2.88; 95% confidence interval (CI): 1.58-5.23).

Difference-in-Differences (DiD) Impact

Table 6 shows the impact of intervention examination results using the Difference-in-difference method.

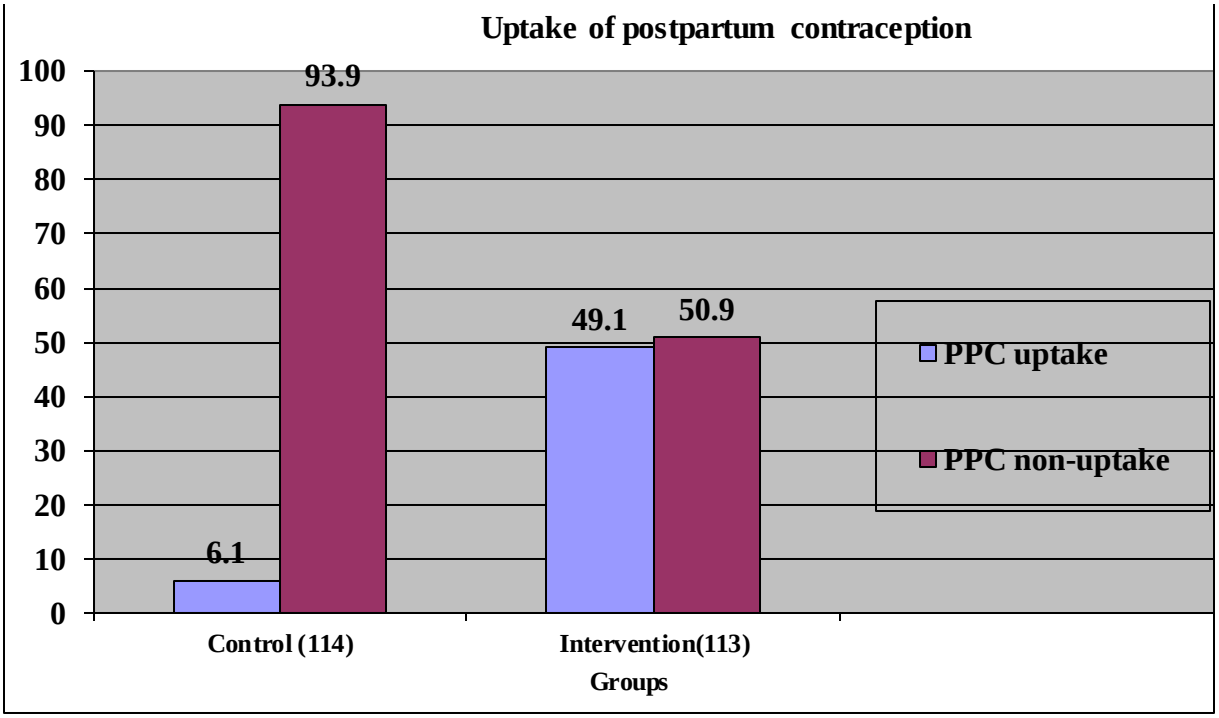

Figure 1
Showing Uptake of Postpartum Contraception After the Intervention

Table 4
Association and Influence of Smartphone Application Reminder Service on Postpartum Contraception

Association of smartphone app reminder service on postpartum contraception					
Group	Uptake of PPC	Non uptake of PPC	$\chi 2$	Df	P value
Control N=114	7(6.1%)	107(93.9%)	67.5	1	0.000
Intervention N=114	56(49.1%)	58(50.9%)			

Discussion

The uptake of postpartum contraception (PPC) varied across different demographics in this study, with age and employment status influencing the likelihood of using contraception after childbirth. The data revealed that women below 20 years of age had the lowest uptake of PPC, as this group may face challenges such as limited access to contraception services, a lack of awareness, or sociocultural pressures that discourage contraception use. Younger women may also be less likely to seek family planning due to the possible lack of decision-making autonomy in reproductive health [25]. On the other hand, women in the 26 to 30 years' age group had the highest uptake of PPC. This demographic may be more established in their personal and family lives, with greater financial stability and better access to healthcare services. These factors likely contribute to their higher use of contraception as they are more likely to plan and space pregnancies, ensuring better maternal and child health outcomes [26].

Table 5
Multivariate Analysis Using Logistic Regression Showing Predictors of Postpartum Contraception Uptake (N=228)

Category		Postpartum contraception utilisation		Odds Ratio (OR) (95% confidence interval (CI))	P value
		Frequency (%)			
		Uptake	Non-uptake		
Use of smartphone apps	No (Ref)	43(84%)	8(16%)		
	Yes	71(40%)	106(60%)	8.23(14.22-102.41)	<0.001
Age group (years)	20& below (Ref)	3(7%)	38(93%)		
	21-25	25(28%)	65(72%)	0.26(0.05-1.51)	0.134
	26-30	28(42%)	39(58%)	1.28(0.33-5.05)	0.722
	31-35	4(25%)	12(75%)	2.39(0.60-9.50)	0.215
	36& above	3(23%)	10(77%)	1.11(0.20-6.18)	0.904
Marital status	In union (Ref)	34(27%)	91(73%)		
	Not in union	29(28%)	74(72%)	0.95(0.53-1.71)	0.872
Level of education	Primary (Ref)	3(15%)	17(85%)		
	Secondary	17(19%)	71(81%)	0.32(0.09-1.14)	0.078
	Tertiary	43(36%)	77(64%)	0.43(0.22- 0.82)	0.010
Employment status	Unemployed (Ref)	35(41%)	50(59%)		
	Employed	28(20%)	115(80%)	2.88(1.58-5.23)	<0.001
Previous contraception use	No (Ref)	37(45%)	45(55%)		
	Yes	19(61%)	12(39%)	1.50(0.81-2.77)	0.202
Barriers to contraception	Fear of perceived effects (Ref)	162(72%)	62(28%)		
	Cost of preferred method	3(75%)	1(25%)	1.15 (0.12-11.25)	0.906

OR: Odds Ratio; CI: Confidence Interval; Ref: Reference group

Table 6
Difference-in-Differences (DiD) Impact estimation Results

Number of observations in the Difference-in-Differences:81			
	Before the smartphone app reminder Frequency (%)	After the smartphone app reminder Frequency (%)	Total
Control	6 (5.2%)	7(6.1%)	13
Intervention	12(10.5%)	56(49.1%)	68
	18	63	81

Employment and level of education also played a significant role in PPC uptake. More educated and employed women were more likely to use PPC compared to their less educated and unemployed counterparts. This is likely due to financial resources and healthcare access associated with education and employment, as well as a greater sense of independence that may encourage informed decision-making regarding contraception. Additionally, more educated, technologically literate and employed women may have more flexibility in terms of scheduling health care visits and accessing contraception [27].

There was a significant difference in uptake of postpartum contraception before and after smartphone reminder among the control and intervention groups. Specifically, the intervention group had an increased uptake of postpartum contraception compared to the control group by the end of the study. The results indicated that without the smartphone app reminder, the uptake of post-partum contraception in this study population was lower than the national percentage [28]. The intervention increased uptake to levels exceeding those reported for postpartum contraception in developed countries [29]. The DiD estimate was positive, suggesting that the smartphone app reminder had a positive effect on the postpartum contraception uptake. This finding is similar to findings from a study which showed that mobile phone-based interventions increase contraception use [30].

Medical software applications or apps have been described as a new way to healthcare. Patient communication app recruits clients and relatives to the network within the app and sends pre-formatted messages for updates regarding patient care. Healthcare apps are beneficial to healthcare professionals as a point-of-care tool, with excellent decision-making for better patient care [31]. Promoting family planning during the postpartum period is a high-impact and cost-effective approach to improve maternal and child health [32]. The World Health Organisation indicates that reminders and guidance through smartphones can bring positive behavioural changes among women and mothers, which could consequently help reduce maternal and child mortality.

Findings from this study agree with several other studies on the use of technology in health across the globe. In Uganda, for example, an interventional study established that mobile phone app use increased access to Sexual and Reproductive Health (SRH) services, including family planning, among the study participants, who demonstrated high uptake [33]. In a study conducted in Kenya, Nyanza and Nairobi, respectively, on the use of mobile applications to support contraceptive counselling and uptake, the uptake was increased by the use of the interactive mobile application reminders [34]. Similar results were reported in randomised controlled trial studies focusing on mobile app interventions that sought to improve contraceptive uptake compared with standard care, across countries worldwide, reporting improved contraceptive uptake [35].

Strengths, limitations and further research

The study employed a quasi-experimental design, which explored the influence of smartphone app reminders on post-partum contraception among postpartum women, making the results more likely to be generalizable to real-world contexts. Contraception is a sensitive issue, and whereas random assignment of study participants into control and intervention groups, respectively, is impossible due to ethical constraints, this design proved to be very helpful and cost-effective compared to true experiments.

The study included women visiting or admitted to health facilities during the study period who had access to a smartphone. Consequently, women who did not seek facility-

based care for childbirth, immunisation, or family planning services, or who obtained healthcare in other settings, may not have been captured. An area for further research would be the utilisation of smartphone reminders among postpartum women with disabilities.

Conclusion

The significant increase in contraception uptake from 6.1% to 49.1% among postpartum women following the introduction of a smartphone reminder service demonstrates the powerful impact of technology on public health interventions. The smartphone reminders appear to be effective in increasing postpartum contraception uptake, offering a promising avenue for enhancing reproductive health services in Kenya and similar settings.

Recommendations

We recommend the incorporation of smartphone reminders in the postpartum care package. The Ministry of Health and the County government should strengthen postpartum contraception strategies and boost capacity at the grassroots to enhance postpartum contraception through smartphone reminder services.

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References

1. World Health Organisation. Programming strategies for postpartum Family Planning. 2022.WorldHealth OrganisationGeneva *https://www.who.int/reproductivehealth/publications/family_planning/ppfp_strategies/en/*
2. World Health Organisation. Programming strategies for postpartum Family Planning. 2023. World Health Organisation, Geneva *https://www.who.int/initiatives/sdg3-global-action-plan/progress-and-impact/progress-reports/2023#*
3. Gelagay, A.A., Negash, W.D., Belachew, T.B. *et al*. Magnitude of unmet need for family planning and associated factors among women in the extended postpartum period in Dabat district, Northwest Ethiopia. Evidence from Dabat demographic health surveys. *BMC Public Health* 23, 1123. 2023. *https://doi.org/10.1186/s12889-023-16046-3*
4. Ministry of Health, Division of Family Health, Family Planning Program. National Family Planning Guidelines for Service Providers (6th Edition). Nairobi, Kenya: RMHSU, Oct 2018. Print
5. United Nations. Department of Economic and Social Affairs, Population Division. Family Planning and the 2030 Agenda for Sustainable Development. 2019. New York:UnitedNations.*https://www.un.org/en/development/desa/population/publications/pdf/family/familyPlanning_DataBooklet_2019.pdf*
6. Ministry of Health. Division of Family Health, National Family Planning Costed Implementation Plan 2017-2020.
7. World Economic Forum. How investing in maternal and child health fuels prosperity for women, young people and children in Africa, 19th edition. Retrieved: *https://www.weforum.org/publications/global-risks-report-2024/*
8. Yemane, T.T., Bogale, G.G., Egata, G., and Tefera, T.K. Postpartum Family Planning Use and Its Determinants among Women of the Reproductive Age Group in Low-Income Countries of Sub-Saharan Africa: A Systematic Review and Meta-Analysis. *Int J Reprod Med.* 2021 Aug 20; 2021:5580490. Doi: 10.1155/2021/5580490. PMID: 34462718; PMCID: PMC8403053.

9. Teshale, A.B. Factors associated with the unmet need for family planning in Sub-Saharan Africa: A Multilevel Multinomial Logistic Regression Analysis,2022. Published: February 10, 2022 *https://doi.org/10.1371/journal.pone.0263885*

10. Gahungu, J., Vahdaninia, M. & Regmi, P. The unmet needs for modern family planning methods among postpartum women in Sub-Saharan Africa: a systematic review of the literature. 2021 *Reprod Health* 18, 35. *https://doi.org/10.1186/s12978-021-01089-9*

11. Agula C, Henry EG, Asuming PO, *et al.* Postpartum contraceptive initiation and use: Evidence from Accra, Ghana. *Women's Health.* 2022;18. doi:10.1177/17455057221141290

12. Sisay, F.A., Ayalew, A.B., Erega, B.B., *et al.* Factors associated with knowledge of the postpartum intrauterine contraceptive device and attitude towards its use among women attending antenatal care in Debre Tabor town, Northwest Ethiopia, 2021: a cross-sectional study. 2023. *Contracept Reprod Med* 8, 7 https://doi.org/10.1186/s40834-022-00202-y

13. Thiongo, M.N., Gichangi, P.B., Waithaka, M. *et al.* Missed opportunities for family planning counselling among postpartum women in eleven counties in Kenya. 2022. *BMC Public Health* 22, 253. https://doi.org/10.1186/s12889-022-12623-0

14. USAID. U.S. Agency for International Development [Internet]. Usaid.gov. 2024. Available from: *https://www.usaid.gov/*

15. KNBS. Kenya National Bureau of Statistics [Internet]. Kenya National Bureau of Statistics. 2023. Available from: *https://www.knbs.or.ke/*

16. Gal N., Zite N., Wallace L. A systematic review of smartphone oral contraceptive reminder applications, Obstetrics & Gynaecology; May 2014 Volume 123 Issue P9S

17. World Health Organisation. Programming strategies for postpartum Family Planning. WorldHealthOrganisation, Geneva2020*https://www.who.int/reproductivehealth/publications/family_planning/ppfp_strategies/en/Date accessed*: February 5, 2020View in Article Google Scholar

18. Shaaban, O.M., Saber, T., Youness, E., Farouk, M., Abbas, A.M. Effect of a mobile phone-assisted postpartum family planning service on the use of long-acting reversible contraception: a randomised controlled trial. *Eur J Contracept Reprod Health Care*. 2020 Aug;25(4):264-268. doi: 10.1080/13625187.2020.1764528. Epub 2020 May 21. Update in: Eur J Contracept Reprod Health Care. 2022 Oct;27(5):437. Retraction in: Eur J Contracept Reprod Health Care. 2023 Oct;28(5):282. PMID: 32436800.

19. Lunde B., Perry R., Sridhar A., and Chen K. An Evaluation of Contraception Education and Health Promotion Applications for Patients, 2016

20. KNBS and ICF macro. Kenya Demographic and Health Survey 2022. Nairobi, Kenya, and Rockville, Maryland, USA: KNBS and ICF.2023

21. Communications Authority of Kenya. (CA)'s quarterly Sector Statistics report covering July-September 2024

22. KNBS. 2019 Kenya Population and Housing Census Reports - Kenya National Bureau of Statistics [Internet]. Kenya National Bureau of Statistics. 2020. Available from*: https://www.knbs.or.ke/2019-kenya-population-and-housing-census-reports/*

23. Kenya Demographic and Health Survey. Kenya National Bureau of Statistics [Internet]. 2022. Available from: *https://www.knbs.or.ke/reports/kdhs-2022/*

24. Chan Y.H. Randomised controlled Trials (RCTs)-Sample size: The magic Number? Singapore; 2003 *Medical Journal* vol.44(4): 172-174

25. Kenya National Bureau of Statistics. Kenya Demographic and Health Survey 2014. Kenya National Bureau of Statistics, 2015. Nairobi.

26. World Bank. World Bank data report 2023. Retrieved from *https://www.worldbank.org/en/research*

27. Kharono B, Kaggiah A, Mugo C, Seeh D, Guthrie BL, Moreno M, John-Stewart G, Inwani I, Ronen K. Mobile technology access and use among youth in Nairobi, Kenya: implications for mobile health intervention

design. Mhealth. 2022 Jan 20; 8:7. Doi: 10.21037/mhealth-21-23. PMID: 35178438; PMCID: PMC8800198.

28. Achwoka, D., Pintye, J., McGrath, C.J., Kinuthia, J., Unger, J.A., Obudho, N., Langat, A., John-Stewart, G., Drake, A.L. Collaborative HIV Impact on MCH Evaluation (CHIME) Study Team. Uptake and correlates of contraception among postpartum women in Kenya: results from a national cross-sectional survey. Contraception. 2018 Mar; 97 (3):227-235. doi: 10.1016/j.contraception.2017.10.001. Epub 2017 Oct 12. PMID: 29031815; PMCID: PMC5861297.

29. Nakiwunga, N., Kakaire, O., Ndikuno, C.K. *et al*. Contraceptive uptake and associated factors among women in the immediate postpartum period at Kawempe Hospital. 2022 *BMC Women's Health* 22. 281. *https://doi.org/10.1186/s12905-022-01856-1*

30. Perinpanathan, T., Maiya, S., van Velthoven, M. H. H., Nguyen, A. T., Free, C., & Smith, C. Mobile phone-based interventions for improving contraception use. 2023. *The Cochrane database of systematic reviews*, *7*(7), CD011159. https://doi.org/10.1002/14651858.CD011159.pub3

31. Sharma S, Kumari B, Ali A, Yadav RK, Sharma AK, Sharma KK, Hajela K, Singh GK. Mobile technology: A tool for healthcare and a boon in pandemic. J Family Med Prim Care. 2022 Jan; 11(1):37-43. doi: 10.4103/jfmpc.jfmpc_1114_21. Epub 2022 Jan 31. PMID: 35309626; PMCID: PMC8930125.

32. Black RE, Levin C, Walker N, *et al.* Reproductive, maternal, newborn, and child health: key messages from Disease Control Priorities 3rd Edition. *Lancet*. 2016 [PubMed] [Google Scholar]

33. Nalwanga R, Nuwamanya E, Nuwasiima A, Babigumira JU, Asiimwe FT, Babigumira JB. Utilization of a mobile phone application to increase access to sexual and reproductive health information, goods, and services among university students in Uganda. *Reprod Health.* 2021 May 17; 18(1):95. doi: 10.1186/s12978-020-01037-z. PMID: 34001178; PMCID: PMC8127235.

34. Dev, R., Woods, N.F., Unger, J.A., Kinuthia, J., Matemo, D., Farid, S., Begnel, E.R., Kohler, P., Drake, A.L. Acceptability, feasibility and utility of a Mobile health family planning decision aid for postpartum women in Kenya. *Reprod Health*. 2019 Jul 8;16 (1):97. doi: 10.1186/s12978-019-0767-9. PMID: 31286989; PMCID: PMC6615081.

35. Aung, B., Mitchell, J.W., Braun, K.L. Effectiveness of mHealth Interventions for Improving Contraceptive Use in Low- and Middle-Income Countries: A Systematic Review. *Glob Health Sci Pract*. 2020 Dec 23;8 (4):813-826. doi: 10.9745/GHSP-D-20-00069. PMID: 33361244; PMCID: PMC7784076.