

Enhancing contraceptive choice for postpartum women in sub-Saharan Africa with the progesterone vaginal ring: a review of the evidence

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Abstract: It is increasingly recognized that women who have just given birth have a high unmet need and require contraceptive protection in the first year postpartum. A majority of women in developing countries do breastfeed exclusively but for short durations, hence they may be sometimes unknowingly exposed to the risk of pregnancy if they are relying on nursing for contraceptive protection. The WHO's *Medical Eligibility Criteria for Contraceptive Use* recommends the use of different contraceptives in the first year postpartum depending on whether the woman is nursing or not and the time since delivery. Some of the options available for breastfeeding women include implants, IUDs and injectables, which can be obtained only from a trained family planning provider. Since 2013, Population Council has been carrying out a study in Senegal, Nigeria, and Kenya to assess the acceptability of progesterone vaginal ring (PVR) as a new contraceptive option designed specifically for use by breastfeeding women to extend the period of lactational amenorrhea and promote birth spacing. Breastfeeding in sub-Saharan Africa is near universal with fairly long durations, a situation that increases the effectiveness of PVR. Each ring delivers a daily dose of 10 mg of progesterone and can be used continuously up to 3 months with a woman being able to continue with its use up to 1 year (four rings used consecutively). Preliminary results indicate that many women who had used the method found it acceptable and their partners supported its use. Activities aimed at having PVR registered and made available in focal countries are ongoing. Integration of family planning and immunization services for mothers and their newborns will be a key strategy in introducing PVR into targeted health care markets. Given that the use of PVR does not require extensive clinical training, it will be easier to integrate it at all levels of the health system from tertiary health facilities to community-based services. The PVR has been recently included in the WHO *Model List of Essential Medicines* and the WHO's fifth edition of the *Medical Eligibility Criteria for Contraceptive Use* which should facilitate its introduction into the public and private sectors.

Keywords: breastfeeding, nursing, lactational amenorrhea, postpartum family planning, sub-Saharan Africa, contraception

Introduction

It is increasingly recognized that women who have just given birth need contraceptive protection and that health programs have to address this need.¹ The interest in postpartum contraception stems from three fronts. First, women who have just delivered are focused on bonding with their newborn babies and are rarely seeking a new pregnancy. Second, expert opinion is coalescing around a recommendation that birth to pregnancy intervals of at least 2 years is desirable for optimal maternal and child

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health (MCH) outcomes.^{1,2} Short birth to pregnancy intervals may result in potentially unsafe abortions (if the woman has had unintended pregnancy) and poor infant outcomes such as stillbirth, preterm birth, low birthweight, and small size for gestational age.³ Third, since the mother and the baby are likely to be in contact with health programs for postnatal, well-baby, or immunization services, it may be easier to integrate family planning (FP) information and services at the same visit and thereby maximize opportunities to cover unmet need.⁴ Thus, it behooves that FP programs address women's contraceptive needs for the health of mother and baby, and contribute to reducing maternal and infant mortality.

Researchers have analyzed women's reports regarding their fertility intentions, reproductive desires, and contraceptive behavior in the first year postpartum using large-scale Demographic and Health Survey (DHS) data collected in the 1990s.⁵ For instance, the analysis of DHS data from 27 countries across many geographic regions indicates that in the first year postpartum, two-thirds of women wish to space or limit childbearing but are not using contraception either. The region with the highest unmet need is sub-Saharan Africa with 74% of women reporting that they wished to delay or limit childbearing in the first year after birth but were not using a contraceptive. A recent analysis of newer DHS data from 21 countries reports that there has not been much change in the levels of unmet need among postpartum women from the 1990s to the 2000s.⁶ The lack of significant improvement is in part due to limited choice of contraceptives, inability to access appropriate contraceptives or lack of knowledge about the resumption of menses and return of fertility.

In many cultures and countries, many postpartum women feel that they are protected from a subsequent pregnancy either because they are breastfeeding or because they are amenorrheic. The return of menses is taken as the first sign of the return of fertility when contraception is adopted, if at all. Empirical evidence supports this observation; analysis of data from 17 national surveys found that the return of menses was significantly associated with modern contraceptive use.⁷ Exclusive breastfeeding, with frequent episodes of suckling, confers a good degree of pregnancy protection up to 6 months postpartum by delaying ovulation and the return of menses. However, women in many developing countries breastfeed exclusively for short durations; for example, in Nigeria, Kenya, and Senegal, women breastfeed exclusively for less than 2 months. Hence, women may sometimes be unknowingly exposed to the risk of pregnancy if they rely on breastfeeding and their amenorrheic status for contraceptive

protection when they resume sexual activity. According to a study of breastfeeding and non-contracepting women in Chile, the cumulative probability of pregnancy was 9% at day 180 postpartum; and 26% of the women had experienced ovulation by day 180 postpartum as well.⁸

In this paper, we describe the contraceptive needs of postpartum women, the challenges they have in meeting their needs, and how these are being addressed including enhancing contraceptive choice with the addition of the progesterone vaginal ring (PVR). We provide illustrations from Kenya, Nigeria, and Senegal as relevant to describe how programs are addressing the needs of postpartum women.

Postpartum women's contraceptive needs, behaviors, and access to services

A woman and her partner's decision to use contraceptives in the first year postpartum, if at all, could depend on many factors. The factors could range from personal desires and preferences (eg, reproductive desires and preference for specific contraceptives), behaviors (woman is nursing, sexually active, contraceptive use), physiological conditions (eg, lactational amenorrhea), knowledge (eg, risk of pregnancy, of different contraceptives), and access to services, to familial and social aspects. We briefly describe what is known about these factors that postpartum women and their partners take into consideration while making contraceptive decisions.

Women's interest in avoiding pregnancy, especially in the first year postpartum, is well documented. It is intuitive that women who have undergone a pregnancy and delivery are unlikely to want to conceive immediately. Ross and Winfrey's analysis of 27 DHSs found that only 3% of postpartum women wanted a baby within 2 years; or in other words, 97% did not want a baby. Even when women desire to have more children, survey data indicate that women would wish to wait for at least 27–50 months.^{9,10} Women's desired spacing durations are consistent with evidence regarding the effects of optimal spacing. Meta-analyses have demonstrated that after full-term or preterm delivery, inter-pregnancy interval <12 months and >60 months (or 5 years) is associated with increased risk of poor perinatal and maternal outcomes. Clearly meeting women's desired spacing will also result in public health impacts.

Women's concerns during the first months and year postpartum center on the newborn and its wellbeing and include matters such as nutrition, growth, and development.

The effectiveness of the birth spacing strategy that women and their partners pursue depends on the extent to which it is implemented. In many cultures, women and their partners rely on sexual abstinence and/or the protection that breastfeeding provides through lactational amenorrhea (although the primary motive of breastfeeding is to nurse the newborn). A multicountry analysis of large national surveys found that 17% of women with unmet need for contraception report their breastfeeding and amenorrheic status as their reason for not using contraceptives.¹¹

Evidence from a number of different settings across sub-Saharan Africa indicates that postpartum abstinence is a common practice.^{12,13} For example, in a Nigerian study of 256 postpartum women who had delivered 9–10 months before, 50% of women were not using contraception; of these nonusers, 20% reported that they were breastfeeding and had not resumed sex as reasons for nonuse.¹³ Abstinence requires that both sexual partners are in agreement about the proposed strategy to birth spacing and this may not always be the case as reported from a study from Ouagadougou, Burkina Faso, where conflicts did occur between women and their husbands regarding abstinence and timing of resumption of sexual intercourse.¹²

In many parts of West Africa, social and cultural beliefs support sexual abstinence and breastfeeding. For example, qualitative studies from Ouagadougou, Burkina Faso, and Côte d'Ivoire found that some of the male and female respondents reported that sexual relations could have a deleterious effect on breastmilk and harm the baby and thus the importance of sexual abstinence until the baby had been weaned or was old enough to walk.^{12,14} Although abstinence is an accepted norm in many sub-Saharan African cultures, there is evidence to suggest that this may be changing and women have concerns with its merit, given that an insistence on abstinence may lead to their husbands seeking other sexual partners.^{14,15}

Both women and FP service providers use the return of menses as a signal to indicate susceptibility to pregnancy and hence the time to initiate contraception.^{16,17} A partial explanation for the return of menses being used as a cue for adopting contraception is that women often do not know when they can conceive. Data from 7,300 women across Ghana, India, Rwanda, and Zambia indicate that 24%–48% did not know that they could get pregnant before their menses returned in the postpartum period.¹⁸ This is confirmed by findings from the small qualitative study from Nigeria reported earlier that at least a third of the women did not know when they could conceive.¹³ Providers too make the

return of menses as a requirement before providing contraceptive services to postpartum women citing the need to rule out pregnancy.¹⁹ However, as pregnancy tests become more available such requirements may reduce.

Health services may not address women's FP needs even after they have overcome a multitude of barriers – whether opposition from husbands and families, their own fears of contraception, problems of access, or economic constraints. Quite often postpartum and postnatal services including postpartum FP are not implemented to the full extent as indicated in policies and service guidelines. Sometimes the range of contraceptives available to postpartum women at the point of care may be limited. The WHO's *Medical Eligibility Criteria for Contraceptive Use* recommends the use of different contraceptives in the first year postpartum depending on whether the woman is nursing or not and the time since delivery.²⁰ The latest edition of WHO's *Medical Eligibility Criteria* includes the PVR from 4 weeks after birth and up to a year afterward. In addition, from birth up to 6 months afterward, a woman who is exclusively breastfeeding can use the lactational amenorrhea method. There are other options available for breastfeeding women and includes the copper intrauterine device (IUD), which can be inserted immediately or up to 48 hours after birth, or any time after 4 weeks postpartum; progestin-only implants can be used without restriction after 6 weeks; female sterilization can be performed immediately after birth or up to 4 days after birth, or any time after 6 weeks postpartum. However, these clinical methods require a trained health provider at the health facility where the woman is seeking services. In contrast, the PVR, while providing contraceptive effect comparable to that of IUD, does not require the service of a skilled provider in inserting or removing it. In most cases, the only choice that a breastfeeding woman has, if a trained health care provider is not present, is progesterone-only pills that can be commenced 6 weeks after birth. In many sub-Saharan countries, injectables are preferred because they can be used discreetly and covertly from the male partner. Similar results have been reported by many researchers including a recent study in which Ghanaian women were reported to prefer injectables for the same reasons.²¹ However, with injectables there is a reliance on trained providers and the need to return for re-injection. As the PVR is woman-initiated and -controlled, it would provide women with a better alternative when eventually introduced. Barrier methods such as condoms can be used immediately after birth and diaphragms and cervical caps after 6 weeks but in general these methods are rarely used. Although there are a number of advantages of the PVR over

other contraceptives available for postpartum contraception, there are some side effects. Being a progesterone-based contraceptive, some users may sometimes experience spotting; other side effects that have been reported include vaginal discharge and non-specific vaginitis. Of greater relevance is that some women may feel the ring slipping leading to either partial or full expulsion; ring slippage is most likely to occur if the ring is not placed high enough in the vagina.

In some countries, low use of FP services in the general population does affect the uptake of these services among postpartum women. For instance, as shown in a recent study, over half of women having unmet need for FP in Senegal did not intend to use FP in the future and this was consistent across all population strata. Reasons for nonuse included widespread opposition to the use of modern contraception mainly due to unfamiliarity and lack of information, low levels of adult education, and suspicion of contraception.²² The authors recommend that positive endorsement of FP by political, religious, and traditional leaders as well as strengthening mass media messages and community-based informational efforts may reduce lack of knowledge of methods and widespread opposition. They also pointed out that the high level of unmet need among breastfeeding women required a sharper focus on postpartum contraception.

Similarly, in Nigeria, the postpartum contraceptive use and the contraceptive prevalence rate “CPR” are also low at 13% and 10%, respectively.²³ Although the Government of Nigeria is committed to raising the CPR from the current level of 10% to 36% by 2018, the authors point out that for this to succeed, the range of contraceptive options for women including those methods that are suitable for breastfeeding mothers (such as the PVR) must be made available. Another challenge is that since only 22% of rural women deliver in health facilities under the care of skilled providers alternate ways of reaching such women at the community level will be required.²³ Furthermore, postpartum and postnatal services including postpartum FP should be implemented to the full extent as indicated in policies and service guidelines.

Postpartum women may not necessarily receive contraceptive counseling or services even if appropriate methods and health care providers are present. A small study from Malawi illustrates how these gaps occur; women who had delivered at a district hospital 6–12 months prior were interviewed about the services they had received and if they were using contraceptives. Although a number of women were using contraceptives in the postpartum period, it was striking

that very few reported that they had been told about return to fertility post pregnancy, or how to space their pregnancies, or how to transition from the lactational amenorrhea method to modern contraceptives.²⁴ Field notes from program managers in Nigeria too indicate that counseling on postpartum FP is not routinely discussed during antenatal or postnatal visits.²⁵ Clearly, there are many missed opportunities for providing women with postpartum family services given that there are multiple points of contact with the health system – at antenatal care (ANC), delivery, postnatal care, growth monitoring, and immunization, which are at present not well utilized.

Accumulated evidence over the past decade regarding patterns of postpartum contraception shows that there are other factors besides the availability of providers and appropriate contraceptives. For example, a recent analysis of postpartum contraception covering 21 sub-Saharan African countries reported that rates of contraceptive use range from a low of 3% in Sierra Leone to 77% in Zimbabwe in the 9–11 month period after childbirth.²⁶ In 13 of the 21 countries studied, 13 had postpartum contraception of less than 30%. In general, postpartum contraception was positively associated with urban residence, wealth quintile, education, achievement of desired family size, and current fertility desires.

Further review of the findings reveals that overall countries in West Africa recorded the lowest contraception use compared with Eastern, Central, and Southern Africa countries.

New contraceptive for breastfeeding women

The PVR was designed to address a myriad of challenges at both the user and health system ends as described earlier. The PVR is a fairly new contraceptive designed specifically for use by breastfeeding women to extend the period of lactational amenorrhea and promote birth spacing. It was developed by the Population Council in partnership with scientists and collaborators from several countries; safety and efficacy studies were conducted, and the technology was transferred to a manufacturer in Chile. The PVR is composed of silicone elastomer with progesterone dispersed throughout the ring matrix. Each ring delivers a daily dose of 10 mg of progesterone and can be used continuously for up to 3 months (90 days) with a user being able to continue it for up to 1 year (four rings used consecutively). The studies conducted with the PVR included women who either fully breast-fed or had at least

four breastfeeding episodes per day and the results indicate that it is as effective as an IUD provided breastfeeding is continued.^{27,28} Since progesterone is inactivated quickly when ingested orally, the infant is not exposed to this hormone if a small amount is secreted in breastmilk.^{28,29} The efficacy of the PVR relies on the women breastfeeding at least four times a day; hence, the breastfeeding requirement has attendant benefits for infant nutrition and enhancing child survival. Also, it has been demonstrated that levels of progesterone circulating in the blood of women using the PVR are lower than what they would produce when ovulating.^{30,31} The studies with the PVR have also shown that this reversible new method is easy to use by women and does not require a trained health provider for insertion and removal. Because it reduces the dependence on a health professional, it has the potential to be distributed through other channels, such as pharmacists and community-based distributors.

The PVR is currently registered in Chile and several other Central American and Latin American countries under the brand name of Progering®. It is sold through pharmacies with a prescription from a gynecologist. Until now, its provision has remained in the private sector based on the marketing strategy used by the manufacturer for product placement.

The PVR has the potential to address the unmet needs of breastfeeding women in sub-Saharan Africa given that breastfeeding is near universal with fairly long durations in this setting. Since it can be self-inserted after counseling and that it can be distributed by frontline FP providers, it relieves the stress of service delivery on weak health systems. Service approaches will need to be tailored to fit the program, service, and user contexts of sub-Saharan Africa including robust community information and education about this new technology.

Discussion

As in other regions around the world, norms and behaviors related to childbearing, contraceptive use, breastfeeding, and sexual abstinence are changing in sub-Saharan Africa. In particular, couples desire smaller families and contraceptive use is beginning to rise across the region with variations across countries. Other behaviors such as breastfeeding and sexual abstinence that have an effect on fertility are also changing. Mothers are breastfeeding for shorter durations and less exclusively and sexual abstinence after a delivery is also reducing thereby raising the probability of a pregnancy in the absence of contraception. Given the

changing patterns of behavior, there have been calls for health programs to encourage mothers to breastfeed longer and adopt appropriate contraception.³² A contraceptive such as the PVR provides a safe and effective solution for both breastfeeding and contraceptive needs. Since its efficacy relies on at least four breastfeeding episodes per day, it offers contraceptive protection while promoting breastfeeding at the same time, and hence addresses the needs of mothers and their babies.

From a programmatic perspective, further analysis of the various patterns of postpartum contraception noted earlier showed that women who had used either maternal or child health services were found to be likely using contraception.²⁶

Similar findings of the association between health care utilization and postpartum contraception have been reported from contexts as varied as Kenya, Uganda and Zambia in east and southern Africa to Nigeria and Senegal in west Africa.^{16,33–35}

From a service delivery and program perspective, there is evidence to suggest that integrated MCH and FP services could offer women and their babies with multiple services when they are in contact with the health system. For instance, integrating FP services with antenatal, delivery, postnatal, and child health services such as immunization have been suggested as ways of reaching postpartum women with contraceptive information and services.³⁶ In this paper, we argue that in order to effectively introduce PVR into targeted health care markets, policy makers and program managers ought to advocate for the integration of FP and immunization services for mothers and their newborns starting from pregnancy, delivery up to the first year post childbirth. Thus, the continuum of care approach does present an opportunity where information and counseling services on PVR can be shared with potential clients during ANC visits, at birth (0–48 hours); and during postnatal–maternal and infant care visits (48 hours–12 months) through midwives, nurses, doctors, vaccinators, or through outreach workers across the public and private health sectors.

The premise is that women have multiple opportunities over the course of the pregnancy, delivery, postpartum period, and while seeking child health services through which they can make contacts to access various services. Research from urban Senegal supports this premise. Women who had been given FP information at the time they had delivered their child were more likely to be using contraceptives in the 2 years postpartum than others who had not received such information.¹⁶

Several countries including Kenya, Nigeria, and Senegal are overcoming persistent problems of limited and over-stretched health workforce by adopting task-sharing/task-shifting policies for essential reproductive health services.^{37,38} Task-sharing/task-shifting as applied to FP services implies that lower level health cadres such as community health workers and community midwives can assist frontline FP providers in service delivery, especially counseling and/or dispensing. Furthermore, since the PVR does not require extensive clinical training and health care workers are familiar with other progestin methods, it is easier to integrate it into existing health systems and at lower levels of the health pyramid.

The extent to which women adopt and use PVR and continue on the method depends on its acceptability not only to women themselves, but also to their partners and the wider community. Preliminary results from acceptability studies conducted in Kenya, Nigeria, and Senegal with the PVR indicate that many women who had used the method found it acceptable and their partners supported its use.³⁹ Once the PVR will have been registered and made available in the market in Kenya, Malawi, Nigeria, Senegal, and Zambia, demand creation will need to accompany efforts to introduce the contraceptive into the health system. In particular, including the PVR into voucher-based programs that cover ANC, maternity, and postnatal care will not only increase utilization of critical MCH services such as skilled deliveries but also educate and promote breastfeeding and contraception. The recent inclusion of the PVR into the WHO Essential Medicine list⁴⁰ and WHO *Medical Eligibility Criteria for Contraceptive Use*⁴¹ provides opportunities for countries, donors, and private sector players to make the product available and accessible to women not only in Africa but also in other countries where women tend to breastfeed for longer periods.

The PVR has the promise of enhancing contraceptive choice and enabling countries to meet their FP2020 commitments by addressing the unmet need for contraception among postpartum women.

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Author contributions

All authors made substantial contributions to the paper in terms of conception, design, writing, and review. All authors approved the final paper and agree to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in this work.

References

1. World Health Organization. *Programming Strategies for Postpartum Family Planning*. ISBN 978 92 4 150649 6 (NLM classification: WA 550). Geneva: World Health Organization; 2013.
2. World Health Organization. *Report of a WHO Technical Consultation on Birth Spacing*. Geneva, Switzerland, June 13–15, 2005. Department of Making Pregnancy Safer (MPS); Department of Reproductive Health and Research (RHR). Geneva: World Health Organization; 2006.
3. Cleland J, Conde-Agudelo A, Peterson H, Ross J, Tsui A. Contraception and health. *Lancet*. 2012;380(9837):149–156.
4. Gaffield ME, Egan S, Temmerman M. It's about time: WHO and partners release programming strategies for postpartum family planning. *Global Health Sci Pract*. 2014;2(1):4–9. Available from: <http://dx.doi.org/10.9745/GHSP-D13-00156>.
5. Ross JA, Winfrey WL. Contraceptive use, intention to use and unmet need during the extended postpartum period. *Int Fam Plan Perspect*. 2001;27(1):20–27.
6. Moore Z, Pfitzer A, Gubin R, Charurat E, Elliott L, Croft T. Missed opportunities for family planning: an analysis of pregnancy risk and contraceptive method use among postpartum women in 21 low and middle income countries. *Contraception*. 2015;92(1):31–39. Doi:10.1016/j.contraception.2015.03.007.
7. Borda MR, Winfrey W, McKaig C. Return to sexual activity and modern family planning use in the extended postpartum period: an analysis of findings from seventeen countries. *Afr J Reprod Health*. 2010;14(4):75–82.
8. Diaz S, Rodriguez G, Peralta O, et al. Lactational amenorrhea and the recovery of ovulation and fertility in fully nursing Chilean women. *Contraception*. 1988;38(1):53–67.
9. Eleje GU, Ezebialu IU, Eke NO. Inter-pregnancy interval (IPI): what is the ideal? *Afr J*. 2011;2(1):36–38.
10. DaVanzo J, Hale L, Razzaque A, Rahman M. Effects of inter-pregnancy interval and outcome of the preceding pregnancy on pregnancy outcomes in Matlab, Bangladesh. *BJOG*. 2007;114(9):1079–1087.
11. Darroch JE, Sedgh G, Ball H. *Contraceptive Technologies: Responding to Women's Needs*. New York: Guttmacher Institute; 2011.
12. Rossier C, Hellen J. Traditional birth spacing practices and uptake of family planning during the postpartum period in Ouagadougou: qualitative results. *Int Perspect Sex Reprod Health*. 2014;40(2):87–94.
13. Adeyemi AB, Ijadunola KT, Orji EO, Kuti O, Alabi MA. The unmet need for contraception among Nigerian women in the first year post-partum. *Eur J Contracept Reprod Health Care*. 2005;10(4):229–234.
14. Desgrées-du-Loû A, Brou H. Resumption of sexual relations following childbirth: Norms, practices and reproductive health issues in Abidjan, Côte d'Ivoire. *Reprod Health Matters*. 2005;13(25):155–163.
15. Ali MM, Cleland JG. The link between postnatal abstinence and extra-marital sex in Côte d'Ivoire. *Stud Fam Plan*. 2001;32(3):214–219.
16. Speizer IS, Fotso JC, Okigbo C, Faye CM, Seck C. Influence of integrated services on postpartum family planning use: a cross-sectional survey from urban Senegal. *BMC Public Health*. 2013;13:752. Available from: <http://www.biomedcentral.com/1471-2458/13/752>.

17. Ndugwa RP, Cleland J, Madise NJ, Fotso JC, Zulu EM. Menstrual pattern, sexual behaviors, and contraceptive use among postpartum women in Nairobi urban slums. *J Urban Health*. 2011;88(Suppl 2): S341–S355.
18. FHI360. *Postpartum Family Planning: New Research Findings and Program Implications*; 2012. Available from: <http://www.fhi360.org/sites/default/files/media/documents/.pdf>. Accessed April 20, 2015.
19. Greene E, Stanback J. Old barriers need not apply: opening doors for new contraceptives in the developing world. *Contraception*. 2012;85(1): 11–14.
20. World Health Organization. *Medical Eligibility Criteria for Contraceptive Use*. 4th ed. Geneva: World Health Organization; 2010.
21. Eliason S, Baiden F, Quansah-Asare G, et al. Factors influencing the intention of women in rural Ghana to adopt postpartum family planning. *Reprod Health*. 2013;10:34.
22. Machiyama K, Cleland J. “*Insights into Unmet Need in Senegal*,” *STEP UP Research Report*. London: London School of Hygiene and Tropical Medicine; 2013.
23. Unumeri G, Ishaku S. *Delivering Contraceptive Vaginal Rings: Tasking-Shifting and Task-Sharing Policies and Practices in Nigeria*. Abuja: Population Council; 2014.
24. Bwazi C, Maluwa A, Chimwaza A, Pindani M. Utilization of postpartum family planning services between six and twelve months of delivery at Ntchisi District Hospital, Malawi. *Health*. 2014;6(14):1724–1737.
25. Unumeri G, Ishaku S. *Delivering Contraceptive Vaginal Rings: Review of Postpartum and Postnatal Care Programs in Nigeria*. Abuja: Population Council; 2015.
26. Winfrey W, Rakesh K. *Use of Family Planning in the Postpartum Period. DHS Comparative Report No 36*. Rockville, MD: ICF International; 2014.
27. Sivin I, Diaz S, Croxatto HB, et al. Contraceptives for lactating women: a comparative trial of a progesterone-releasing vaginal ring and the Copper T 380A IUD. *Contraception*. 1997;55(4):225–232.
28. Massai R, Miranda P, Valdes P, et al. Preregistration study on the safety and contraceptive efficacy of a progesterone-releasing vaginal ring in Chilean nursing women. *Contraception*. 1999;60(1):9–14.
29. Massai R, Diaz S, Jackanicz T, Croxatto HB. Vaginal rings for contraception in lactating women. *Steroids*. 2000;65:703–707.
30. Diaz S, Jackanicz TM, Herreros C, et al. Fertility regulation in nursing women: VIII. Progesterone plasma levels and contraceptive efficacy of a progesterone-releasing vaginal ring. *Contraception*. 1985;32(6):603–622.
31. Croxatto HB, Diaz S. The place of progesterone in human contraception. *J Steroid Biochem*. 1987;27(4–6):991–994.
32. Gebreselassie T, Rutstein SO, Mishra V. *Contraceptive Use, Breastfeeding, Amenorrhea and Abstinence During the Postpartum Period: An Analysis of Four Countries. DHS Analytical Studies No 14*. Calverton, MD: Macro International Inc.
33. Do M, Hotchkiss D. *Relationships Between Maternal Health Care and Postpartum Modern Contraceptive Use in Kenya and Zambia*. Chapel Hill, NC: Carolina Population Center, University of North Carolina at Chapel Hill; 2011.
34. Rutaremwa G, Kabagenyi A, Wandera SO, Jhamba T, Akiror E, Nviiri HL. Predictors of modern contraceptive use during the postpartum period among women in Uganda: a population-based cross sectional study. *BMC Public Health*. 2015;15(2):262.
35. Akinlo A, Bisiriyu A, Esimai O. *Influence of Use of Maternal Health Care on Postpartum Contraception in Nigeria*. Calverton, MD: ICF International; 2013.
36. Chattopadhyay I, Townsend JW, RamaRao S. *Offering Progesterone Vaginal Rings (PVR) for Postpartum Women Through Integrated Family Planning and Immunization (FP/I) Services*. Washington, DC: Population Council; 2014.
37. Liambila W, RamaRao S, Clark H. *Delivering Contraceptive Vaginal Rings: Task-Shifting and Task-Sharing Experiences in the Provision of Family Planning Services in Kenya*. Nairobi: Population Council; 2014.
38. Mané B, Diop N, RamaRao S. *Delivering Contraceptive Vaginal Rings: Tasking-Shifting and Task-Sharing in Family Planning Programs Experiences from Senegal*. Dakar: Population Council; 2014.
39. Liambila W. *Assessing Acceptability of Progesterone Vaginal Ring (PVR) as a New Contraceptive Option in sub-Saharan Africa—Presented at the Annual Conference of the Kenya Obstetrical and Gynaecological Society, 19th–21st February 2014*. Green Hills Hotel: Nyeri, Kenya.
40. World Health Organization. *Essential Medicine. 19th WHO model list of essential medicine*. Geneva: World Health Organization; 2015.
41. World Health Organization. *Medical Eligibility Criteria for Contraceptive Use. Executive Summary*. 5th ed. Geneva: World Health Organization; 2015.

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