







# Barriers and Enablers Influencing Women's Adoption and Continuation of Vaginally Inserted Contraceptive Methods: A Literature Review

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*Most vaginally inserted methods have limited availability and use despite offering characteristics that align with many women's stated preferences (e.g., nonhormonal and/or on demand). The objective of this review was to identify enablers and barriers to women's adoption and continuation of vaginally inserted contraceptive methods in low- and middle-income countries (LMICs). We searched three databases (PubMed, Embase, and Web of Science) and 18 websites using keywords related to five vaginally inserted contraceptive methods (diaphragm, vaginal ring, female condom, copper intrauterine device [IUD], hormonal IUD) and terms associated with their adoption and continuation. Searches were limited to resources published between January 2010 and September 2020. Studies eligible for inclusion in our review presented results on women's use and perspectives on the enablers and barriers to adoption and continuation of the vaginally inserted contraceptive methods of interest in LMICs. Relevant studies among women's partners were also included, but not those of providers or other stakeholders. Data were coded, analyzed, and disaggregated according to a framework grounded in family planning (FP) literature and behavioral theories common to FP research and program implementation. Our initial search yielded 13,848 results, with 182 studies ultimately included in the analysis. Across methods, we found common enablers for method adoption, including quality contraceptive counseling as well as alignment between a woman's preferences and a method's duration of use and side effect profile. Common barriers included a lack of familiarity with the methods and product cost. Notably, vaginal insertion was not a major barrier to adoption in the literature reviewed. Vaginally inserted methods of contraception have the potential to fill a gap in method offerings and expand choice. Programmatic actions should address key barriers and enable voluntary use.*

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## INTRODUCTION

In low- and middle-income countries (LMICs), 218 million women are estimated to have an unmet need for voluntary family planning (FP), and nearly half (49 percent) of pregnancies

are unintended (Sully et al. 2020). As a result of unintended pregnancies, some women and their families experience severe social, economic, and health consequences (Singh, Sedgh, and Hussain 2010). Women cite a number of reasons for not using contraception despite wanting to avoid unintended pregnancy: concerns about side effects and health risks; infrequent sex; opposition to contraception; and breastfeeding and/or delayed menstruation postbirth (Sedgh, Ashford, and Hussain 2016). For some, these reasons for nonuse of contraception may reflect misconceptions, stigma, social norms, or other factors, while for others, these reasons may reflect a lack of access to methods that suit their needs and preferences.

Expanded access to a wide range of modern contraceptive methods is well-established as a global health priority, recognizing that diverse options are needed to meet women's varying contraceptive needs and preferences (WHO 2014). Despite efforts to broaden options, only two or three methods account for most contraceptive use in LMICs. The predominant methods vary by country but include male condoms, oral contraceptives, injectables, implants, copper intrauterine devices (IUDs), female sterilization, and traditional methods such as withdrawal. Although the use of traditional methods has declined over the past decade, these less effective methods represent, on average, 17 percent of the method mix across 113 LMICs. Vaginally inserted contraceptives, which refer to methods that are inserted into the vagina or uterus by the user or a trained provider—such as female condoms, diaphragms, vaginal rings and hormonal IUDs—have limited availability and are used less frequently. An exception is the copper IUD. Copper IUD use is high in some countries but very low in others, including LMICs in sub-Saharan Africa (Bertrand et al. 2020). Until recently, the levonorgestrel (LNG)-releasing IUD (also known as the hormonal IUD, hormonal intrauterine system (IUS) or LNG-IUS) was only available through the private sector in many LMICs. Based on the promising results of several pilot introductions in sub-Saharan Africa, the United States Agency for International Development (USAID) and the United Nations Population Fund (UNFPA) added the hormonal IUD to their procurement catalogs in June 2021, which will facilitate broader access to this method in the future (FP2020 2021).

Research suggests that there may be a market for vaginally inserted contraceptive methods, especially since these options offer benefits that align with the stated preferences of women who have an unmet need for contraception. In LMICs, the most common reasons women cite for nonuse of contraceptives are “health concerns,” which include health risks,

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fear of side effects, interference with menstruation and other bodily processes, and “infrequent sex” (Moreira et al. 2019). Many women also say they want more nonhormonal contraceptive choices and methods with milder or no side effects (Hemmerling, Christopher, and Holt 2020). Others want more “on demand” options that can be used only when needed rather than continuously (Raymond et al. 2014). Diaphragms and female condoms, for example, have minimal side effects (e.g., irritation for a minority of users) and can be used on demand. These two methods, along with the contraceptive vaginal ring, are also woman-controlled self-care options, and two of them (rings and diaphragms) are typically undetectable by the male partner during sex (Novák et al. 2003; Sahin-Hodoglugil et al. 2011). Copper and hormonal IUDs must be inserted by a provider and have some side effects; however, the copper IUD has no hormone-related side effects or contraindications, and the hormonal IUD may have less pronounced side effects than other hormonal contraceptives because of its localized release of hormones in the uterus and lower levels of systemic exposure to these hormones (Reinecke et al. 2018). Vaginal rings may also have some side effects, but similar to the hormonal IUD, they expose users to lower levels of hormones than other methods (van den Heuvel et al. 2005).

Supply- and demand-side factors have limited the market for vaginally inserted contraceptives to date. Regulatory approvals, product costs, the need for provider training, supply chain management challenges, and policies influence product availability. Some reproductive health experts argue that demand for self-inserted vaginal methods is diminished by reluctance, discomfort, embarrassment, or cultural proscriptions related to women touching their genitals, while others assert that low acceptability is a myth contradicted by the evidence base (Latka 2001; Gollub 2000; Peters, Jansen, and van Driel 2010; RamaRao et al. 2018; Roy et al. 2020). With more vaginally inserted contraceptive options under development, including multipurpose prevention technologies (MPTs) such as a vaginal ring that prevents HIV and unintended pregnancy (Bashi et al. 2019), it is important to understand supply- and demand-side factors that could inhibit or facilitate the use of vaginal methods.

This review was conducted to better understand the demand-side factors influencing the market in LMICs for vaginally inserted contraceptives. Past studies and literature reviews have focused on specific contraceptive methods (Mishra et al. 2017; Vargas et al. 2019; Gallo, Kilbourne-Brook, and Coffey 2012) or long-acting reversible contraceptives (LARCs; Coles and Shubkin 2018), but none have examined vaginally inserted methods as a category.

Specifically, this paper aims to (1) identify enablers and barriers to the adoption and continuation of vaginally inserted methods of contraception and (2) discuss opportunities for FP implementers to adjust programs in response to the enablers and barriers identified through this literature review.

## **Description of Vaginally Inserted Methods Reviewed**

Table 1 presents the vaginally inserted contraceptive methods covered in this paper. It is important to note that the scope of the review included MPTs, such as female condoms, that offer protection from HIV as well as unintended pregnancy. However, the review excluded HIV prevention products that do not prevent unintended pregnancy. Even so, the results may be

**TABLE 1 Vaginally inserted contraceptive methods included in this literature review**

Method	Description
Female condoms (also known as internal condoms)	<p>Users insert this barrier method to prevent unintended pregnancy and sexually transmitted infections (STIs), including HIV, during vaginal sex. The method works by preventing bodily fluids from entering the wearer's body. Although internal condoms can also be used inside the anus to protect against STIs, this literature review focused on vaginal insertion.</p> <p>As of 2021, four manufacturers offer female condoms that have been prequalified by the World Health Organization (WHO):</p> <ul style="list-style-type: none"> <li>• Cupid<sup>®</sup> from Cupid Ltd.</li> <li>• FC2<sup>®</sup> (which replaced the earlier-generation FC<sup>®</sup>) from The Female Health Company</li> <li>• Woman's Condom from Shanghai Dahua Medical Apparatus Co. Ltd.</li> <li>• Velvet from HLL Lifecare Ltd.</li> </ul>
Diaphragm	<p>Users insert this barrier method before sex and remove it six or more hours after sex. The product is a thin contraceptive cup that fits over the cervix to prevent sperm from entering the uterus. Contraceptive gel or spermicide is typically used with diaphragms.</p> <p>As of 2021, two manufacturers offered diaphragms with Stringent Regulatory Authority (SRA) approval:</p> <ul style="list-style-type: none"> <li>• Single-size SILCS, marketed as the Caya<sup>®</sup> contoured diaphragm, from Medintim</li> <li>• Millex<sup>®</sup> Wide Seal Omniflex (multiple sizes) from CooperSurgical</li> </ul> <p>The Ortho All-Flex Diaphragm from Janssen Pharmaceuticals Inc., was discontinued in 2013 (Cervical Barrier Advancement Society 2022).</p>
Contraceptive vaginal ring	<p>Users insert this hormonal method into the vagina. Rings that contain progestin and estrogen work mainly by preventing ovulation. They should be worn by the user for three weeks, then removed for one week of each month, during which the client will experience a menstrual period.</p> <p>As of 2021, two manufacturers offer contraceptive vaginal rings with SRA approval:</p> <ul style="list-style-type: none"> <li>• NuvaRing<sup>®</sup> from Merck &amp; Co. Inc. (one ring per menstrual cycle)</li> <li>• Annovera<sup>®</sup> from TherapeuticsMD Inc. (one ring per year)</li> </ul> <p>Breastfeeding women can use the progesterone vaginal ring Progering<sup>®</sup>, which is inserted in the vagina from four weeks postpartum for continuous use for up to three months. Progering<sup>®</sup> has been approved in a number of LMICs but does not yet have WHO prequalification or SRA approval.</p>
Copper IUD	<p>Providers insert this T-shaped copper device through the vagina into the woman's uterus. The copper IUD works by creating a local inflammatory response, in addition to releasing copper that weakens sperm, to prevent sperm from reaching the fallopian tubes for fertilization (FHI 360 1995). Copper IUDs can be used for up to 10–12 years. The TCu380A IUD is the preferred IUD model for public sector procurement on the basis of its safety and efficacy, which is higher than that of prior generations of IUDs (WHO et al. 2011).</p> <p>The Paragard<sup>®</sup> TCu380A IUD, now owned by the Cooper Companies, has SRA approval (US FDA 2019). In addition, six manufacturers offer WHO prequalified TCu380A IUDs as of 2020 (UNFPA 2020).</p>
Hormonal IUD	<p>Providers insert this T-shaped device through the vagina into the woman's uterus. The hormonal IUD releases a low, steady dose of progesterin hormone directly into the uterus. Depending on the product, the hormonal IUD can be used for up to 5–7 years.</p> <p>As of 2021, two hormonal IUD products have SRA approval and are available in LMICs:</p> <ul style="list-style-type: none"> <li>• Avibela<sup>®</sup> from AbbVie and Impact RH360</li> <li>• Mirena<sup>®</sup> from Bayer AG</li> </ul> <p>The International Contraceptive Access Foundation also donates their unbranded hormonal IUD, the LNG-IUS, to LMICs.</p>

relevant to HIV prevention products that are inserted vaginally. Gels, spermicides and foams that are vaginally inserted were excluded from our review due to a lack of relevant literature.

The consumer price of each of the methods described varies based on what specific product is desired and/or available, whether the product is accessible through the public or private sector, and what additional user fees may be layered on top of the commodity (e.g., fees for insertion, including required supplies). For the products available through UNFPA—the female condom, copper and hormonal IUDs—the procurement prices are published online (UNFPA 2021). In the private sector, prices vary widely across and within countries, as documented by the FPwatch Project in select LMICs (PSI 2017).

## **MATERIALS AND METHODS**

### **Search Strategy**

#### *Peer-Reviewed Literature*

We searched three databases—PubMed, Embase and Web of Science—using a combination of keywords related to the vaginally inserted contraceptive methods of interest (diaphragm, vaginal ring, female condom, copper and hormonal IUDs) as well as terms associated with their adoption and continuation. (See Supporting Information for Search Terms.) The search was limited to literature published in English between January 2010 and September 2020, when the search was performed. Given recent improvements in several of the vaginally inserted contraceptive methods included in this review, we limited our search to the last 10 years to capture the most recent and relevant research.

#### *Gray Literature*

To supplement the peer-reviewed literature, we also conducted a manual search of 18 websites that were selected in consultation with subject matter experts. Websites were for organizations and repositories focused on contraceptive introduction, service provision, and research. (See Supporting Information for Gray Literature Websites.) We used a similar, but abbreviated, set of search terms to those used for the peer-reviewed literature. The search was limited to resources published online in English from January 2010 to September 2020, when the search was performed.

### **Inclusion and Exclusion Criteria**

Eligible studies were those describing original research conducted in countries that met the definition of LMICs as defined by the World Bank (The World Bank 2021). Eligible studies focused on demand-side enablers and barriers for the adoption and continuation of the previously identified vaginally inserted methods of contraception. Studies about women's FP use and perspectives on enablers and barriers for contraceptive use were included as well as relevant studies among women's partners. No studies were included that focused solely on provider or other stakeholder perspectives. Studies were excluded if reported findings could not be attributed to one of the specific contraceptive methods of interest. Studies pertaining to the sole use of a method for HIV prevention or the treatment of gynecological disorders

were excluded. Publications that did not present new data (e.g., commentaries, systematic reviews) were also excluded.

## Study Selection

Duplicate references were removed from the initial list of peer-reviewed results. The title and abstract of the remaining results were screened independently by two different authors to determine relevance (DH, AD, or AR). Disagreements were resolved by review from a third author. The full text of the remaining references was then screened by two different authors for relevance (DH, AD, KM, or AR). Again, disagreements were resolved by review from a third author. For the remaining peer-reviewed results, one author (DH, AD, KM, or AR) extracted the relevant data using a template designed for this purpose in Microsoft Excel. Data extraction was then reviewed by a second author for accuracy (DH, AD, KM, or AR). For the gray literature, the full text of each result was screened independently by two authors for inclusion (DH, AD, KM, or AR), with disagreements being resolved by a third author. Data extraction for the gray literature was performed by one author, with review and input from a second author as needed (DH, AD or KM).

## Data Analysis

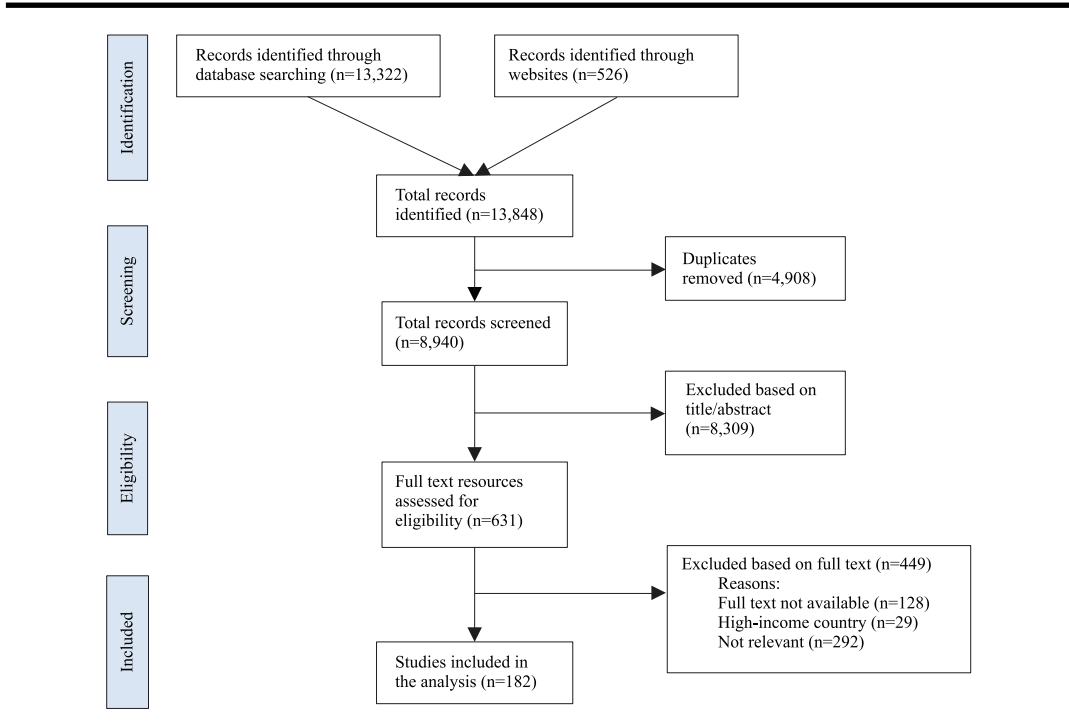
Prior to analyzing the findings, we developed a framework grounded in the FP literature with a list of codes of enablers and barriers that influence contraceptive adoption and continuation. We identified demand-side enablers and barriers from behavioral theories commonly used in FP research and program implementation, including the Health Belief Model (Rosenstock 1974), Transtheoretical Model (LaMorte 2019), Social Cognitive Model (Bandura 1986), Integrative Model (Fishbein and Yzer 2003), and COM-B Model (The Decision Lab 2021). Following data extraction, individual findings were grouped by the contraceptive method in Microsoft Excel, and three authors iteratively refined the codes by testing them on a randomly selected sample of results. The authors then reviewed coding discrepancies together and with the larger group of authors, identified new emergent codes and agreed on a standardized set of definitions for codes to include in the framework. (See Supporting Information for the Code List.) The remaining results were then coded by three authors, with any new emerging codes presented to the larger group and definitions agreed upon by the group. The authors who completed the coding also conducted random spot checks on the other authors' work to ensure continued agreement on the use of codes.

Following the coding, we tabulated the findings by contraceptive method type and code to identify important themes that were common across methods and unique to specific methods. The findings were further disaggregated to examine themes that were relevant as either barriers or enablers to the adoption or continuation of specific methods.

## RESULTS

In total, our search of the peer-reviewed and gray literature yielded 13,848 results. After removing 4,908 duplicates, 8,940 unique results remained for screening by title and abstract. Following screening by title and abstract, 631 results were moved to full text review. In the

FIGURE 1 PRISMA flow diagram



end, 182 studies met the inclusion criteria and were included in the analysis (Figure 1; see Supporting Information for the Included Studies).

Per the inclusion criteria, all studies included in our review were based on research in LMICs. More specifically, 54 percent of the included studies were from sub-Saharan Africa, 27 percent from Southeast Asia, 9 percent from East Asia and the Pacific, 5 percent from Latin America and the Caribbean, 3 percent from the Middle East and North Africa, and 1 percent were from countries in multiple regions.

The top 10 enablers and barriers to the adoption and continuation of three or more vaginally inserted methods of contraception are listed in Table 2.

## Enablers

Counseling by a trained provider or community health worker was the most important enabling factor for women to adopt a vaginally inserted contraceptive method (McDonald-Mosley et al. 2010; Shapiro 2016; Vakilian et al. 2018; Harris and Angel 2020; Miller et al. 2018; Nanda et al. 2018; K. Thapa et al. 2019; Makins et al. 2018; Hayes and Kilbourne-Brook 2016a; Machado et al. 2013; Gottert et al. 2015; Shapiro et al. 2014; Wasim et al. 2018; Zafar et al. 2019; Eluwa et al. 2016; Karra et al. 2019; Somesh Kumar et al. 2014; Huber-Krum et al. 2019). According to the literature reviewed, effective counseling includes a provider reviewing a method's advantages and disadvantages, including potential risks and side effects, and instructions on how to use the method correctly. For lesser-known self-care methods, such as the diaphragm and vaginal ring, providing demonstrations and giving women the

**TABLE 2 Barriers and enablers to the adoption and continuation of vaginally inserted contraception**

	Methods					
	Inserted by user			Inserted by provider		
	Diaphragm	Vaginal ring	Female condom	Copper IUD	Hormonal IUD	
<b>Enablers</b>						
Counseling by a trained provider or community health worker	A	A	A	A	A	A
Duration of use	A, C	A, C		A, C	A, C	A, C
Acceptable side effect profile	A			A	A	A
Nonhormonal method	A		A	A		
Provides dual protection <sup>a</sup>	A	A	A	A	A	A
Reversible method <sup>b</sup>		A	A	A	A	A
Recommended by a friend, family member or health care provider				A	A	A
Satisfaction with use		C	C	C	C	C
Partner sexual satisfaction	C	C	C	C	C	C
Partner attitudes		C	C	C	C	C
Lack of familiarity with the product	A	A	A	A	A	A
Cost, including upfront/recurring costs and the cost of removal	A	A	A	A	A	A
Partner attitudes	A	A, C	A, C	A, C	A, C	A, C
Concerns about insertion	A	A	A	A	A	A
Anticipated and experienced side effects		A, C	A, C	A, C	A, C	A, C
Myths and misconceptions about products			A	A	A	A
Concerns about product performance		A		A	A	A
User sexual satisfaction	A	A, C	C	A, C	A, C	A, C
Partner sexual satisfaction	A	A, C	C	C	C	A
Comfort and fit		C	C	C	C	

<sup>a</sup> The diaphragm and vaginal ring do not currently offer dual protection; however, several research studies included in our review assessed women's potential interest in a multipurpose prevention technology (MPT) version of these methods (e.g., combining the diaphragm or vaginal ring with a microbicide). This accounts for the dual protection results presented for both methods.

<sup>b</sup> Other positive product attributes included acceptable to use while breastfeeding, immediate return to fertility, product design (color, material), and interest in trying a new product.

A, adoption; C, continuation.



chance to practice inserting the method on a pelvic model were particularly helpful (Shapiro et al. 2014; Zafar et al. 2019; Das et al. 2015; Schuyler et al. 2016). Effective counseling also includes the opportunity for women to clarify misconceptions and can be supported using educational videos and leaflets (Gottert et al. 2015; Mack, Grey, Amsterdam, Williamson, et al. 2010; Routes2Results et al. 2019a; Ting, Wong, and Tnay 2018; Aung et al. 2019; Karra et al. 2017; Agot et al. 2019; Weinrib et al. 2018).

Alignment between a method's duration of use and women's preferences facilitated the adoption and continued use of all methods except the female condom, which is a single-use, on demand method (Shapiro 2016; Machado et al. 2013; Shapiro et al. 2014; Somesh Kumar et al. 2014; Das et al. 2015; Minnis et al. 2018; Shapley-Quinn et al. 2019; Sheriar et al. 2014; Van Der Straten et al. 2018; Callahan et al. 2019; Van Der Westhuizen and Hanekom 2016; Ndegwa et al. 2014; Jairaj and Dayyala 2016; Eva et al. 2018; Kakaire et al. 2016; FHI360 and Family Health Options Kenya 2016, 360; FHI 360, SFH Nigeria, and PSI 2020b; USAID 2019; PSI et al. 2019; Population Council 2016c; FHI 360 2012; Routes2Results et al. 2019b; Danna et al. 2019; FHI 360 2017; Van Der Straten et al. 2010; Todd et al. 2012; Bryant et al. 2015; Gutin et al. 2011; Ho and Wheeler 2018; Hubacher et al. 2013; Da Costa et al. 2019; Priyanka, Kaushik, and Paras 2015). For example, many studies found that women appreciated the long-acting nature of copper and hormonal IUDs because they saw this duration as convenient and low maintenance (Nanda et al. 2018; Gottert et al. 2015; Huber-Krum et al. 2019; Mukamuyango et al. 2020; Azmat et al. 2012; Boller et al. 2018; Gedeon et al. 2015; Kakaire et al. 2016; FHI 360 2014; Tilahun et al. 2016).

An acceptable side effect profile was influential for the adoption of three methods: the diaphragm and copper and hormonal IUDs (Shapiro 2016; Harris and Angel 2020; Nanda et al. 2018; Shapiro et al. 2014; Huber-Krum et al. 2019; Callahan et al. 2019; Eva et al. 2018; FHI360 and Family Health Options Kenya 2016; FHI 360, SFH Nigeria, and PSI 2020b; USAID 2019; PSI et al. 2019; 2019b; Danna et al. 2019; FHI 360 2017; Bryant et al. 2015; Hubacher et al. 2013; Priyanka, Kaushik, and Paras 2015; Boller et al. 2018; Marston et al. 2016; A. Kumar et al. 2018; Hayes and Kilbourne-Brook 2016b; Kyamwanga et al. 2014; S. Castle et al. 2019; FHI 360, SFH Nigeria, and PSI 2020a). According to the literature reviewed, women perceived the copper IUD (a nonhormonal method) as having fewer side effects than hormonal contraceptive options (Huber-Krum et al. 2019; Bryant et al. 2015; S. Castle et al. 2019; A. Kumar et al. 2018). For hormonal IUDs, the method's treatment of heavy or painful periods and tendency to reduce menstrual bleeding were positive factors for adoption (Nanda et al. 2018; Boller et al. 2018; Callahan et al. 2019; Eva et al. 2018; FHI360 and Family Health Options Kenya 2016; FHI 360, SFH Nigeria, and PSI 2020b; USAID 2019; FHI 360, SFH Nigeria, and PSI 2020a, 2019a, 2019b; Danna et al. 2019; FHI 360 2017; Hubacher et al. 2013). In addition, women often adopted the diaphragm, female condom, and copper IUD due to a preference for nonhormonal methods (Harris and Angel 2020; Miller et al. 2018; Somesh Kumar et al. 2014; Huber-Krum et al. 2019; Boller et al. 2018; Tilahun et al. 2016; Bryant et al. 2015; Callahan et al. 2019; Da Costa et al. 2019; Blumenthal et al. 2016; Marston et al. 2016; Scavuzzi, Souza, and Amorim 2016; Mahlalela and Maharaj 2015; Jairaj and Dayyala 2016; Hayes and Kilbourne-Brook 2016b; Kyamwanga et al. 2014; Mathenjwa and Maharaj 2012; Van Der Westhuizen and Hanekom 2016). Many women saw the ability to use a method while breastfeeding as a positive factor (Huber-Krum et al. 2019; Eva et al. 2018; Routes2Results et al. 2019b; Danna et al. 2019).

Dual protection and advances in product design were also associated with method adoption. Women liked that the female condom provided dual protection from pregnancy and HIV (as well as some sexually transmitted infections [STIs]; Miller et al. 2018; Schuyler et al. 2016; Mahlalela and Maharaj 2015; Protection Options for Women Product Development Partnership (POW PDP) 2015; Wang et al. 2015; Mathenjwa and Maharaj 2012; Van Dijk et al. 2013; Naidu 2013; Coffey et al. 2013; Mokgetse and Ramukumba 2018) and that the diaphragm and vaginal ring had the potential to offer dual protection in the future (e.g., in combination with a microbicide for the diaphragm, co-formulated vaginal rings; Shapiro 2016; Hayes and Kilbourne-Brook 2016a; Das et al. 2015). Additionally, the literature showed that women considered the reversibility of the vaginally inserted products as a positive attribute (Gottert et al. 2015; Huber-Krum et al. 2019; Van Der Westhuizen and Hanekom 2016; Jairaj and Dayyala 2016; Danna et al. 2019; Todd et al. 2012; Tilahun et al. 2016) and valued methods that offered an immediate return to fertility after discontinuation (Huber-Krum et al. 2019; Eva et al. 2018; Routes2Results et al. 2019b; Todd et al. 2012; USAID 2019; Gutin et al. 2011). Women also noted improved product designs (e.g., material) and their own interest in trying a new product as enablers to adoption (Miller et al. 2018; FHI 360 2017; POW PDP 2015; Beksinska et al. 2019; Bowling et al. 2018; Mokgetse and Ramukumba 2018; Van Dijk et al. 2013).

Receiving a recommendation from a provider, friend, or family member was an important enabler for method adoption, particularly for the female condom, copper IUD, and hormonal IUD (Harris and Angel 2020; Nanda et al. 2018; Gottert et al. 2015; Azmat et al. 2012; Boller et al. 2018; Gedeon et al. 2015; Eva et al. 2018; FHI360 and Family Health Options Kenya 2016, 360; Danna et al. 2019; POW PDP 2015). As expected, user satisfaction with a chosen method was linked to the continuation of most methods (RamaRao et al. 2018; Miller et al. 2018; Nanda et al. 2018; Somesh Kumar et al. 2014; Ting, Wong, and Tnay 2018; Agot et al. 2019; Minnis et al. 2018; Ndegwa et al. 2014; Eva et al. 2018; Kakaire et al. 2016; Azmat et al. 2012; FHI 360, SFH Nigeria, and PSI 2020a; Blumenthal et al. 2016; Scavuzzi, Souza, and Amorim 2016; Van Dijk et al. 2013; Santibenchakul and Jaisamrarn 2016; Sodje et al. 2016; Wanyenze et al. 2011; Bharadwaj 2015; Pandit et al. 2014; Joanis et al. 2011; Kestelyn et al. 2018; Dam et al. 2015; Radwan et al. 2019; Park, Nguyen, and Ngo 2011; Ezegwui et al. 2013; Wu et al. 2019; Moagi, Snyman, and Makin 2019; Das et al. 2016).

Partner sexual satisfaction and support were also commonly cited as enablers for method continuation. Findings about sexual satisfaction ranged from not detecting the method during sex (e.g., the diaphragm, vaginal ring) to feeling like the method enhanced the sexual experience (e.g., using a female instead of a male condom) (POW PDP 2015; Mathenjwa and Maharaj 2012; Van Dijk et al. 2013; Beksinska et al. 2019; Bowling et al. 2018; Minnis et al. 2018; Bharadwaj 2015; Pandit et al. 2014; Sahin-Hodoglugil et al. 2011; Kestelyn et al. 2018). According to the literature, partners' supportive attitudes toward a method also contributed to women's method continuation (Somesh Kumar et al. 2014; Bryant et al. 2015; Pandit et al. 2014; Wanyenze et al. 2011; Soni, Garg, and Bangar 2013; Malik et al. 2014; Mantell et al. 2020).

## Barriers

A lack of awareness about all of the vaginally inserted methods was widespread and posed a barrier to adoption (McDonald-Mosley et al. 2010; Miller et al. 2018; K. Thapa et al. 2019;

Huber-Krum et al. 2019; Das et al. 2015; Mack, Grey, Amsterdam, Williamson, et al. 2010; Agot et al. 2019; Ndegwa et al. 2014; FHI360 and Family Health Options Kenya 2016, 360; FHI 360 2012; Van Der Straten et al. 2010; Gutin et al. 2011; Ho and Wheeler 2018; Gedeon et al. 2015; Marston et al. 2016; Kyamwanga et al. 2014; Scavuzzi, Souza, and Amorim 2016; Mahlalela and Maharaj 2015; POW PDP 2015; Bowling et al. 2018; Mack, Grey, Amsterdam, Matta, et al. 2010; Van Zijl, Morroni, and Van Der Spuy 2010; Nigam et al. 2018; Taapopi and Van Der Westhuizen 2019; Davidson et al. 2017; Eliason et al. 2013; Ezugwu et al. 2020; Beksinska et al. 2020; Robinson et al. 2016; Gambir et al. 2019; Chipfuwa et al. 2014). The literature revealed that few women had heard of the methods included in this review from their providers, friends and relatives, or more mainstream sources, such as the media.

According to the literature, product cost was also a major barrier to adoption across all methods (Das et al. 2015; Mack, Grey, Amsterdam, Williamson, et al. 2010; Routes2Results et al. 2019a; Callahan et al. 2019; FHI360 and Family Health Options Kenya 2016, 360; Population Council 2016c; Routes2Results et al. 2019b; Danna et al. 2019; FHI 360 2017; Gedeon et al. 2015; Kyamwanga et al. 2014; FHI 360, SFH Nigeria, and PSI 2020a; Coffey et al. 2013; Wanyenze et al. 2011; Gambir et al. 2019; Population Council 2016d; 2016e; 2016f; 2016g; Liambila et al. 2015; Rashida et al. 2017; Population Council 2016a; Tibaijuka et al. 2017; Silva-Filho et al. 2016). Costs included upfront and recurring costs (e.g., resupplying gel for diaphragm use, single-use female condoms), those related to removal services for IUDs, and any other incidentals, such as the cost of managing side effects (Population Council 2016c). Cost barriers arose not only in the private sector but also in the public sector in cases where additional fees were charged (Callahan et al. 2019; Population Council 2016d).

Unsupportive partner attitudes or outright disapproval were barriers to adoption and continuation for all methods except the hormonal IUD (for which it was not a prominent barrier) (RamaRao et al. 2018; McDonald-Mosley et al. 2010; K. Thapa et al. 2019; Somesh Kumar et al. 2014; Das et al. 2015; Schuyler et al. 2016; Agot et al. 2019; Shapley-Quinn et al. 2019; Sheriar et al. 2014; Van Der Straten et al. 2018; Ndegwa et al. 2014; Jairaj and Dayyala 2016; Azmat et al. 2012; Gedeon et al. 2015; Tilahun et al. 2016; A. Kumar et al. 2018; S. Castle et al. 2019; Blumenthal et al. 2016; Mahlalela and Maharaj 2015; POW PDP 2015; Coffey et al. 2013; Kestelyn et al. 2018; Ezegwui et al. 2013; Moagi, Snyman, and Makin 2019; Sahin-Hodoglugil et al. 2011; Kestelyn et al. 2018; Malik et al. 2014; Mack, Grey, Amsterdam, Matta, et al. 2010; Nigam et al. 2018; Robinson et al. 2016; Gambir et al. 2019; Chipfuwa et al. 2014; Animen, Lake, and Mekuriaw 2018; Agha 2010; Wang, Liu, and Cheng 2016; Martin et al. 2016; Husain, Husain, and Izhar 2019; Enyindah, Ojule, and Basse 2012; Kathpalia and Mustafa 2015; Huda et al. 2014; Khatri et al. 2019; Teshome et al. 2020; Morineau 2011; Robabi et al. 2016; Divakar et al. 2019; Goswami, Yadav, and Patel 2015; Takele, Degu, and Yitayal 2012; Masvawure et al. 2014; Puri et al. 2020). For some women, this was tied to the covert use of certain methods; of the five methods included in this review, only female condoms are visible to male partners (PSI et al. 2019; Sahin-Hodoglugil et al. 2011).

Another barrier to adoption was women's concerns about insertion. This was true for all methods except the copper IUD, for which insertion fears were not named in the literature as a major barrier (RamaRao et al. 2018; Shapiro 2016; Harris and Angel 2020; Das et al. 2015; Agot et al. 2019; FHI 360, SFH Nigeria, and PSI 2019b, 2020a, 2020b; Hubacher et al. 2013; Kyamwanga et al. 2014; Coffey et al. 2013; Mokgetse and Ramukumba 2018; Kanda and Mash

2018; Van Der Straten et al. 2010). Some specific concerns cited in the literature were the size of the method (e.g., vaginal ring, female condom), whether the method would remain in place or become dislodged during sex or other activities, and whether insertion would be painful. Of the 182 studies included in the analysis, only six found that women explicitly stated their discomfort touching their vaginas to insert the method or that they felt embarrassed about the insertion process, especially if the provider was male (Agot et al. 2019; FHI 360, SFH Nigeria, and PSI 2020b; Van Der Straten et al. 2010; Hubacher et al. 2013; S. Castle et al. 2019; Robinson et al. 2016).

Anticipated (RamaRao et al. 2018; Nanda et al. 2018; K. Thapa et al. 2019; Gottert et al. 2015; Huber-Krum et al. 2019; Das et al. 2015; Agot et al. 2019; Callahan et al. 2019; Van Der Westhuizen and Hanekom 2016; Ndegwa et al. 2014; Jairaj and Dayyala 2016; FHI360 and Family Health Options Kenya 2016; FHI 360, SFH Nigeria, and PSI 2019a, 2019b, 2020b; Danna et al. 2019; FHI 360 2017; Gutin et al. 2011; Ho and Wheeler 2018; Hubacher et al. 2013; Da Costa et al. 2019; Mukamuyango et al. 2020; Gedeon et al. 2015; Tilahun et al. 2016; FHI 360, SFH Nigeria, and PSI 2020a; Kestelyn et al. 2018; Radwan et al. 2019; Kestelyn et al. 2018; Van Zijl, Morroni, and Van Der Spuy 2010; Nigam et al. 2018; Ezugwu et al. 2020; Robinson et al. 2016; Rashida et al. 2017; Animen, Lake, and Mekuriaw 2018; Kathpalia and Mustafa 2015; Khatri et al. 2019; Teshome et al. 2020; Goswami, Yadav, and Patel 2015; Bulto, Zewdie, and Beyen 2014; Luo et al. 2018; Dereje, Engida, and Holland 2020; Asghar, Homayun, and Awan 2016; Rominski et al. 2017; Abdel-Tawab et al. 2020; Monji Builu and Naidoo 2015; Elkhateeb et al. 2020; Mekonnen et al. 2014) and experienced (RamaRao et al. 2018; Shapiro 2016; Nanda et al. 2018; K. Thapa et al. 2019; Wasim et al. 2018; Somesh Kumar et al. 2014; Huber-Krum et al. 2019; Agot et al. 2019; Jairaj and Dayyala 2016; Eva et al. 2018; Kakaire et al. 2016; FHI360 and Family Health Options Kenya 2016, 360; Population Council 2016c; Bryant et al. 2015; Priyanka, Kaushik, and Paras 2015; Azmat et al. 2012; Gedeon et al. 2015; FHI 360 2014; FHI 360, SFH Nigeria, and PSI 2020a; Blumenthal et al. 2016; Santibenchakul and Jaisamrarn 2016; Kestelyn et al. 2018; Dam et al. 2015; Radwan et al. 2019; Park, Nguyen, and Ngo 2011; Ezegwui et al. 2013; Moagi, Snyman, and Makin 2019; Das et al. 2016; Kestelyn et al. 2018; Malik et al. 2014; Enyindah, Ojule, and Basse 2012; Huda et al. 2014; Khatri et al. 2019; Robabi et al. 2016; Divakar et al. 2019; Goswami, Yadav, and Patel 2015; Puri et al. 2020; Abdel-Tawab et al. 2020; Hameed et al. 2015; S. Kumar et al. 2019; Maternal and Child Survival Program [MCSP] 2019; Sharma et al. 2014; S. Thapa et al. 2015; Azmat et al. 2013; Landolt et al. 2013) side effects were barriers to the adoption and continuation of the two hormonal methods (the vaginal ring and hormonal IUD) as well as the copper IUD.

Myths and misconceptions about methods were barriers to the adoption of the female condom, copper and hormonal IUDs (Huber-Krum et al. 2019; Van Der Westhuizen and Hanekom 2016; Ndegwa et al. 2014; FHI360 and Family Health Options Kenya 2016, 360; FHI 360, SFH Nigeria, and PSI 2020b; Bryant et al. 2015; Ho and Wheeler 2018; Gedeon et al. 2015; Tilahun et al. 2016; FHI 360, SFH Nigeria, and PSI 2020a; Naidu 2013; Bulto, Zewdie, and Beyen 2014; Agha 2010; Dereje, Engida, and Holland 2020; Nigam et al. 2018; Taapopi and Van Der Westhuizen 2019; Davidson et al. 2017; Robinson et al. 2016; Radwan et al. 2019; Eshak 2020; Abdel-Tawab et al. 2020; Wedderburn et al. 2011; Monji Builu and Naidoo 2015; Gambir et al. 2019; Tibaijuka et al. 2017; Silva-Filho et al. 2016). For both IUDs, women had misconceptions about their eligibility for use due to age, marital status, and/or parity (which

**TABLE 3** Barriers and enablers to adoption and continuation of the diaphragm

Adoption (n = 10 studies)	Continuation (n = 10 studies)
Enablers	
Acceptable side effect profile	Partner sexual satisfaction
Woman-controlled method	Duration of use
Can be self-inserted and self-removed	Can be used on demand
Barriers	
Lack of familiarity with the product	Duration of use
Requires lubricant	
Concerns about insertion	

may be due to poor or incomplete contraceptive counseling by providers) (Huber-Krum et al. 2019; Van Der Westhuizen and Hanekom 2016; Robinson et al. 2016; Taapopi and Van Der Westhuizen 2019). Fear that the method would move around the body was a particularly common myth cited in the literature (Das et al. 2015; Agot et al. 2019; Van Der Westhuizen and Hanekom 2016; Ndegwa et al. 2014; FHI 360, SFH Nigeria, and PSI 2020b; Bryant et al. 2015; Ho and Wheeler 2018; Gedeon et al. 2015; Tilahun et al. 2016; Radwan et al. 2019; Dereje, Engida, and Holland 2020; Eshak 2020). Relatedly, some women worried about the potential for dislodgment or expulsion with the vaginal ring, copper and hormonal IUDs, which does occur although infrequently (Das et al. 2015; Agot et al. 2019; Callahan et al. 2019; Routes2Results et al. 2019b; FHI 360 2017; Kestelyn et al. 2018; Kestelyn et al. 2018; Mekonnen et al. 2014; Ndegwa et al. 2014; Bulto, Zewdie, and Beyen 2014).

Concerns for both women (RamaRao et al. 2018; Shapiro 2016; Huber-Krum et al. 2019; Callahan et al. 2019; FHI 360 2017; Van Der Straten et al. 2010; FHI 360 2014; Kyamwanga et al. 2014; POW PDP 2015; Coffey et al. 2013; Bharadwaj 2015; Kestelyn et al. 2018; Dam et al. 2015; Park, Nguyen, and Ngo 2011; Das et al. 2016; Kestelyn et al. 2018; Khatri et al. 2019; Bulto, Zewdie, and Beyen 2014; Dereje, Engida, and Holland 2020; Monji Builu and Naidoo 2015; Khan and Shaikh 2013) and their partners (Shapiro 2016; Gottert et al. 2015; Huber-Krum et al. 2019; Agot et al. 2019; Van Der Straten et al. 2010; Kyamwanga et al. 2014; POW PDP 2015; Kestelyn et al. 2018; Dam et al. 2015; Das et al. 2016; X. Wang, Liu, and Cheng 2016; Bulto, Zewdie, and Beyen 2014; Dereje, Engida, and Holland 2020; Khan and Shaikh 2013; Landolt et al. 2013) around sexual satisfaction were mainly focused on methods interfering with sexual activity or pleasure. Some studies noted that women (and their partners) worried that partners would be able to feel the method during sex and may dislike and/or request removal of the method as a result. For the vaginal ring and female condom, physical discomfort with the method—such as feelings of slippage or the sensation of a foreign object inside the vagina—was a barrier to continuation (Bowling et al. 2018; Soni, Garg, and Bangar 2013; Dam et al. 2015; Santibenchakul and Jaisamrarn 2016; Das et al. 2016). Relatedly, some design aspects of the methods, such as the material used for female condoms or copper IUD strings, were barriers to adoption (Schuyler et al. 2016; Naidu 2013; Huda et al. 2014; Zhou et al. 2019).

In the following sections, we identify enablers and barriers to adoption and continuation unique to each of the vaginally inserted methods of contraception reviewed.

## Diaphragm

Diaphragm-specific enablers and barriers to adoption and continuation are listed in Table 3.

### **Enablers**

Similar to the findings for other vaginally inserted methods (Table 2), a lack of side effects due to the absence of hormones was an important enabler for adoption of the diaphragm (Shapiro 2016; Harris and Angel 2020; Shapiro et al. 2014; Kyamwanga et al. 2014; Hayes and Kilbourne-Brook 2016b). Other enabling factors for adoption were that the diaphragm is a woman-controlled method (Shapiro 2016; Shapiro et al. 2014; Hayes and Kilbourne-Brook 2016b; Van Der Straten et al. 2010; Sahin-Hodoglugil et al. 2011) and can be inserted and removed by the woman herself (Van Der Straten et al. 2010; Beksinska et al. 2018). Users liked the diaphragm's duration of use (Van Der Straten et al. 2010; Coffey and Kilbourne-Brook 2010) and that it can be used on demand as needed (Harris and Angel 2020), both of which were linked with method continuation. An important factor that was unique to the diaphragm was the ability to wash and reuse the method for up to two years (Shapiro 2016; Shapiro et al. 2014; Sahin-Hodoglugil et al. 2011). Women's sexual partners appreciated that the diaphragm preserved skin-to-skin contact during sex, and some welcomed the use of a gel (Sahin-Hodoglugil et al. 2011).

### **Barriers**

The most common barrier cited in the literature for adoption of the diaphragm was a lack of familiarity with the product (Kyamwanga et al. 2014; Van Der Straten et al. 2010; Eliason et al. 2013), which is similar to other methods listed in Table 2. The diaphragm is a relatively unfamiliar product category in many LMIC markets. The requirement to use a gel with the diaphragm to facilitate insertion and create a seal between the diaphragm and the vaginal walls is a unique barrier for adoption of this method (Kyamwanga et al. 2014; Van Der Straten et al. 2010; Beksinska et al. 2018). According to the literature, for some women, using gel during sex is not acceptable or desirable (Kyamwanga et al. 2014; Van Der Straten et al. 2010). It also presents a recurring cost (Kyamwanga et al. 2014). Other barriers to adoption were women's concerns about their ability to correctly insert the diaphragm (Shapiro 2016; Harris and Angel 2020; Kyamwanga et al. 2014), the need to touch their vagina to insert it (Van Der Straten et al. 2010), and whether the diaphragm would be comfortable and remain in place (Shapiro 2016; Shapiro et al. 2014; Kyamwanga et al. 2014). Women also had differing opinions about the appeal of wearing the diaphragm continuously versus episodically (Van Straten et al. 2010). Currently, the diaphragm is indicated for episodic use, which means that it must be inserted before sex and removed no sooner than 6 hours after sex (at which point most sperm cells are no longer active).

## **Vaginal Ring**

Vaginal ring-specific enablers and barriers to adoption and continuation are listed in Table 4.

### **Enablers**

In line with the findings for other vaginally inserted methods (Table 2), the availability and quality of in-person counseling on how to use the method (Machado et al. 2013; Das et al. 2015; Das et al. 2016), including educational videos and demonstrations (Das et al. 2015; Agot et al. 2019; Weinrib et al. 2018; Dam et al. 2015), were enablers to adoption of the vaginal ring.

**TABLE 4** Barriers and enablers to adoption and continuation of the vaginal ring

Adoption (n = 13 studies)	Continuation (n = 13 studies)
Enablers	
Use of counseling tools	Satisfaction with use
Counseling by a trained provider or community health worker	Comfort with self-insertion
Duration of use	User sexual satisfaction
Barriers	
Concerns about product performance	Concerns about product performance
Partner attitudes	Comfort and fit
Anticipated side effects	Experienced side effects

The literature revealed that women also appreciate the vaginal ring's one-month duration of use, which alleviates concerns about forgetting to use contraception (Machado et al. 2013; Das et al. 2015; Sheriar et al. 2014). Overall satisfaction with the vaginal ring increased over time and was an enabling factor for continuation of the method (Agot et al. 2019; Das et al. 2016; Dam et al. 2015; Santibenchakul and Jaisamrarn 2016; Minnis et al. 2018; Pandit et al. 2014; Kestelyn et al. 2018; RamaRao et al. 2018). Similarly, users' comfort with self-insertion of the vaginal ring increased over time, with many reporting during endline assessments that insertion was "easy" (Das et al. 2016; Dam et al. 2015; Minnis et al. 2018; Pandit et al. 2014; Kestelyn et al. 2018; RamaRao et al. 2018; Shapley-Quinn et al. 2019; Van Der Straten et al. 2018; Kestelyn et al. 2018; Soni, Garg, and Bangar 2013). According to the literature, most users did not report feeling the vaginal ring during sex (Pandit et al. 2014; Kestelyn et al. 2018; Kestelyn et al. 2018), but some women thought that the ring increased their sexual pleasure (Kestelyn et al. 2018; Kestelyn et al. 2018). Relatedly, some women reported that the ring increased vaginal lubrication (Kestelyn et al. 2018) and viewed this change positively in terms of sexual satisfaction.

### **Barriers**

Concerns about product performance, such as effectiveness and spontaneous expulsion, were the most cited barriers to adoption of the vaginal ring (Das et al. 2015; Agot et al. 2019; Kestelyn et al. 2018; Kestelyn et al. 2018). Women also worried about convincing their partners to try the relatively new method, especially if there was shared decision-making around contraceptive use and the associated costs (Das et al. 2015; Agot et al. 2019; Sheriar et al. 2014; Kestelyn et al. 2018). Since the vaginal ring is a hormonal method, anticipated side effects were also a commonly cited barrier to adoption of the method (Das et al. 2015; Kestelyn et al. 2018; RamaRao et al. 2018; Kestelyn et al. 2018). Ongoing concerns about comfort and fit, such as slippage, expulsion and the sensation of a foreign object in the vagina, were barriers to continuation of the vaginal ring (Agot et al. 2019; Das et al. 2016; Dam et al. 2015; Santibenchakul and Jaisamrarn 2016; Kestelyn et al. 2018; RamaRao et al. 2018; Kestelyn et al. 2018; Soni, Garg, and Bangar 2013), although there were only a few studies documenting women experiencing such events (Roy et al. 2020; Das et al. 2016; Dam et al. 2015; RamaRao et al. 2018; Kestelyn et al. 2018). For women who experienced side effects, such as changes in menstrual bleeding, these effects were a barrier to continuation (Agot et al. 2019; Das et al. 2016; Dam et al. 2015; Santibenchakul and Jaisamrarn 2016; Kestelyn et al. 2018; RamaRao et al. 2018; Kestelyn et al. 2018).

**TABLE 5 Barriers and enablers to adoption and continuation of the female condom**

Adoption (n = 36 studies)	Continuation (n = 21 studies)
Enablers	
Provides dual protection	Partner sexual satisfaction
Woman-controlled method	User sexual satisfaction
Ability to negotiate use with partner	Woman-controlled method
Barriers	
Lack of familiarity with the product	Comfort and fit
Partner attitudes	Partner attitudes
Size of the product	Partner sexual satisfaction

## Female Condom

Female condom-specific enablers and barriers to adoption and continuation are listed in Table 5.

### *Enablers*

User control over the method was a commonly cited enabler for both the adoption and continuation of the female condom (Schuyler et al. 2016; POW PDP 2015; Bowling et al. 2018; Van Dijk et al. 2013; Martin et al. 2016; Kanda and Mash 2018; Wanyenze et al. 2011; Mahlalela and Maharaj 2015; Gambir et al. 2019; Mathenjwa and Maharaj 2012; Masvawure et al. 2014). Other enablers for adoption were the dual protection female condoms provide against both pregnancy and STIs/HIV (Miller et al. 2018; Schuyler et al. 2016; POW PDP 2015; Mokgetse and Ramukumba 2018; Van Dijk et al. 2013; Mahlalela and Maharaj 2015; Mathenjwa and Maharaj 2012; Wang et al. 2015; Naidu 2013; Coffey et al. 2013) and an increased ability to negotiate use with partners due to the woman-controlled nature of the method (Miller et al. 2018; Schuyler et al. 2016; Van Dijk et al. 2013; Martin et al. 2016; Mathenjwa and Maharaj 2012; Mack, Grey, Amsterdam, Matta, et al. 2010; Gomez et al. 2018). Sexual satisfaction during use by both the user (POW PDP 2015; Bowling et al. 2018; Mathenjwa and Maharaj 2012) and the partner (POW PDP 2015; Beksinska et al. 2019; Bowling et al. 2018; Van Dijk et al. 2013; Mathenjwa and Maharaj 2012; Bharadwaj 2015) were benefits that supported continuation. Unlike the findings for other vaginally inserted methods, a lack of side effects was not a theme that appeared frequently in the literature for this method.

### *Barriers*

The most cited barriers to the use of the female condom—lack of familiarity with the product (Miller et al. 2018; Mack, Grey, Amsterdam, Williamson, et al. 2010; POW PDP 2015; Bowling et al. 2018; Mahlalela and Maharaj 2015; Gambir et al. 2019; Mack, Grey, Amsterdam, Matta, et al. 2010; Beksinska et al. 2020; Chipfuwa et al. 2014), partner attitudes (Schuyler et al. 2016; POW PDP 2015; Martin et al. 2016; 2016; Mahlalela and Maharaj 2015; Gambir et al. 2019; Masvawure et al. 2014; Coffey et al. 2013; Mack, Grey, Amsterdam, Matta, et al. 2010; Chipfuwa et al. 2014; Wang, Liu, and Cheng 2016; Morineau 2011), comfort and fit (Schuyler et al. 2016; Naidu 2013; Zhou et al. 2019), and partner's sexual satisfaction (POW PDP 2015; Wang, Liu, and Cheng 2016)—were similar to the other methods listed in Table 2. The size of the product was a barrier for some female condoms, with a common complaint being that the condom and its inner ring (e.g., with FC2) were too large (Schuyler et al. 2016; Mack,



**TABLE 6 Barriers and enablers to adoption and continuation of the copper IUD**

Adoption (n = 90 studies)	Continuation (n = 43 studies)
Enablers	
Counseling by a trained provider or community health worker	Satisfaction with use
Duration of use	Counseling by a trained provider or community health worker
Acceptable side effect profile	Duration of use
Barriers	
Anticipated side effects	Experienced side effects
Myths and misconceptions about product	Concerns about product performance
Partner attitudes	Partner attitudes

Grey, Amsterdam, Williamson, et al. 2010; Mokgetse and Ramukumba 2018; Kanda and Mash 2018; Naidu 2013; Wedderburn et al. 2011). Interestingly, partner sexual satisfaction was cited as both an enabler and barrier to continuation. Issues around the product's size, comfort, and fit may be associated with this finding.

## Copper IUD

Copper IUD-specific enablers and barriers to adoption and continuation are listed in Table 6.

### *Enablers*

Effective in-person contraceptive counseling was an important factor for adoption and a unique enabler for continuation of the copper IUD (McDonald-Mosley et al. 2010; Vakilian et al. 2018; K. Thapa et al. 2019; Makins et al. 2018; Gottert et al. 2015; Wasim et al. 2018; Zafar et al. 2019; Eluwa et al. 2016; Karra et al. 2019; Somesh Kumar et al. 2014; Huber-Krum et al. 2019; Karra et al. 2017; Gedeon et al. 2015; A. Kumar et al. 2018; Malik et al. 2014; Animen, Lake, and Mekuriaw 2018; Blumenthal et al. 2016; Santhya et al. 2014; Azmat et al. 2013; Radwan et al. 2019; Ambadekar, Rathod, and Zodpey 2010; Elkhateeb et al. 2020; Mazzei et al. 2019; Puri et al. 2020). According to the literature, copper IUD users benefited from postadoption touch points with health care workers, who supported continued use through management of side effects, notably heavy bleeding (Huber-Krum et al. 2019). The duration of the product was also important to users for both adopting and continuing the method (Gottert et al. 2015; Somesh Kumar et al. 2014; Huber-Krum et al. 2019; Mukamuyango et al. 2020; Azmat et al. 2012; Gedeon et al. 2015; Kakaire et al. 2016; FHI 360 2014; Tilahun et al. 2016; Bryant et al. 2015; Callahan et al. 2019; FHI 360 2017; Van Der Westhuizen and Hanekom 2016; Jairaj and Dayyala 2016; Gutin et al. 2011; Blumenthal et al. 2016; Ndegwa et al. 2014; Da Costa et al. 2019; Population Council 2016c; Priyanka, Kaushik, and Paras 2015; Ho and Wheeler 2018; FHI 360 2012; Population Council 2016b). For the copper IUD, the 10 years of protection provided many women with "freedom from worry" since they did not have to remember to use contraception more frequently (Gottert et al. 2015). Compared to hormonal methods, the nonhormonal nature of the copper IUD was a benefit to many women (Somesh Kumar et al. 2014; Huber-Krum et al. 2019; Boller et al. 2018; Tilahun et al. 2016; Bryant et al. 2015; Callahan et al. 2019; Van Der Westhuizen and Hanekom 2016; Jairaj and Dayyala 2016; Blumenthal et al. 2016; Da Costa et al. 2019; Marston et al. 2016; Scavuzzi, Souza, and Amorim 2016), who perceive nonhormonal methods to have fewer side effects (Huber-Krum et al. 2019; Boller et al. 2018; Bryant et al. 2015; S. Castle et al. 2019; A. Kumar et al. 2018; FHI 360

2017; Marston et al. 2016; Priyanka, Kaushik, and Paras 2015) (copper IUD side effects differ from hormonal contraceptive side effects). Women also adopted the method to maintain monthly menstruation (Huber-Krum et al. 2019; Boller et al. 2018; Bryant et al. 2015; S. Castle et al. 2019; FHI 360 2017). Satisfaction with the product after adoption was associated with continued use (Somesh Kumar et al. 2014; Azmat et al. 2012; Kakaire et al. 2016; FHI 360, SFH Nigeria, and PSI 2020a; Blumenthal et al. 2016; Radwan et al. 2019; Ndegwa et al. 2014; Sodje et al. 2016; Scavuzzi, Souza, and Amorim 2016; Park, Nguyen, and Ngo 2011; Ezegwui et al. 2013; Moagi, Snyman, and Makin 2019), and women often expressed their satisfaction in their willingness to recommend the copper IUD to others (Azmat et al. 2012; Gedeon et al. 2015; FHI 360, SFH Nigeria, and PSI 2020a; Blumenthal et al. 2016; Sodje et al. 2016; Park, Nguyen, and Ngo 2011; Scavuzzi, Souza, and Amorim 2016).

### **Barriers**

Myths and misconceptions surrounding the copper IUD were significant barriers to adoption (Huber-Krum et al. 2019; Gedeon et al. 2015; Tilahun et al. 2016; Bryant et al. 2015; Van Der Westhuizen and Hanekom 2016; Radwan et al. 2019; Ndegwa et al. 2014; Ho and Wheeler 2018; Bulto, Zewdie, and Beyen 2014; Agha 2010; Dereje, Engida, and Holland 2020; Nigam et al. 2018; Taapopi and Van Der Westhuizen 2019; Davidson et al. 2017; Eshak 2020; Abdel-Tawab et al. 2020; Robinson et al. 2016; Tibaijuka et al. 2017; Monji Builu and Naidoo 2015; Silva-Filho et al. 2016). Common misunderstandings cited in the literature include that the IUD may get lost in the body (Gedeon et al. 2015; Tilahun et al. 2016; Bryant et al. 2015; Van Der Westhuizen and Hanekom 2016; Radwan et al. 2019; Ndegwa et al. 2014; Dereje, Engida, and Holland 2020; Eshak 2020; Ho and Wheeler 2018); it causes cancer (Huber-Krum et al. 2019; Gedeon et al. 2015; Tilahun et al. 2016; Van Der Westhuizen and Hanekom 2016; Ndegwa et al. 2014; Taapopi and Van Der Westhuizen 2019; Dereje, Engida, and Holland 2020; Ho and Wheeler 2018; Davidson et al. 2017); and it is inappropriate for nonparous women (Taapopi and Van Der Westhuizen 2019; Robinson et al. 2016). Side effects, both anticipated (K. Thapa et al. 2019; Gottert et al. 2015; Huber-Krum et al. 2019; Mukamuyango et al. 2020; Gedeon et al. 2015; Tilahun et al. 2016; Callahan et al. 2019; FHI 360 2017; Van Der Westhuizen and Hanekom 2016; Jairaj and Dayyala 2016; Gutin et al. 2011; Animen, Lake, and Mekuriaw 2018; Radwan et al. 2019; Elkhateeb et al. 2020; Ndegwa et al. 2014; Da Costa et al. 2019; Ho and Wheeler 2018; Bulto, Zewdie, and Beyen 2014; Dereje, Engida, and Holland 2020; Nigam et al. 2018; Abdel-Tawab et al. 2020; Robinson et al. 2016; Monji Builu and Naidoo 2015; Van Zijl, Morroni, and Van Der Spuy 2010; Luo et al. 2018; Kathpalia and Mustafa 2015; Khatri et al. 2019; Teshome et al. 2020; Ezugwu et al. 2020; Asghar, Homayun, and Awan 2016; Romin-ski et al. 2017; Rashida et al. 2017; Goswami, Yadav, and Patel 2015; Mekonnen et al. 2014) and experienced (Shapiro 2016; K. Thapa et al. 2019; Wasim et al. 2018; Somesh Kumar et al. 2014; Huber-Krum et al. 2019; Jairaj and Dayyala 2016; Kakaire et al. 2016; Population Council 2016c; Bryant et al. 2015; Priyanka, Kaushik, and Paras 2015; Gedeon et al. 2015; FHI 360 2014; FHI 360, SFH Nigeria, and PSI 2020a; Blumenthal et al. 2016; Malik et al. 2014; Radwan et al. 2019; Abdel-Tawab et al. 2020; Huda et al. 2014; Azmat et al. 2013; Puri et al. 2020; Population Council 2016b; Park, Nguyen, and Ngo 2011; Ezegwui et al. 2013; Moagi, Snyman, and Makin 2019; Khatri et al. 2019; Goswami, Yadav, and Patel 2015; Hameed et al. 2015; S. Kumar et al.

**TABLE 7 Barriers and enablers to adoption and continuation of the hormonal IUD**

Adoption (n = 18 studies)	Continuation (n = 9 studies)
Enablers	
Acceptable side effect profile	Experienced side effects
Duration of use	Sense of empowerment
Effectiveness	Satisfaction with the method
Barriers	
Anticipated side effects	Experienced side effects
Cost	
Concerns about insertion	

2019; Enyindah, Ojule, and Bassey 2012; Sharma et al. 2014; Landolt et al. 2013; Robabi et al. 2016; Divakar et al. 2019), were the most common barriers to the adoption and continuation of the copper IUD. The copper IUD was the only nonhormonal method where side effects played a key role in women's decision not to adopt or continue to use it. Prior to use, women feared pain, bleeding, infertility, increased risk of cancer or other health effects, and the device causing internal damage. Menstrual bleeding changes were the most significant side effects hindering product continuation (Shapiro 2016; K. Thapa et al. 2019; Wasim et al. 2018; Somesh Kumar et al. 2014; Huber-Krum et al. 2019; Jairaj and Dayyala 2016; Population Council 2016c; Priyanka, Kaushik, and Paras 2015; Azmat et al. 2012; FHI 360 2014; FHI 360, SFH Nigeria, and PSI 2020a; Blumenthal et al. 2016; Malik et al. 2014; Radwan et al. 2019; Abdel-Tawab et al. 2020; Huda et al. 2014; Azmat et al. 2013; Puri et al. 2020; Park, Nguyen, and Ngo 2011; Ezegwui et al. 2013; Moagi, Snyman, and Makin 2019; Enyindah, Ojule, and Bassey 2012; Landolt et al. 2013; Robabi et al. 2016). A lack of partner support was a key barrier for both the adoption and continuation of the copper IUD (McDonald-Mosley et al. 2010; K. Thapa et al. 2019; Somesh Kumar et al. 2014; Azmat et al. 2012; Gedeon et al. 2015; Tilahun et al. 2016; S. Castle et al. 2019; A. Kumar et al. 2018; Jairaj and Dayyala 2016; Malik et al. 2014; Animen, Lake, and Mekuriaw 2018; Blumenthal et al. 2016; Puri et al. 2020; Ndegwa et al. 2014; Ezegwui et al. 2013; Moagi, Snyman, and Makin 2019; Agha 2010; Nigam et al. 2018; Robinson et al. 2016; Husain, Husain, and Izhar 2019; Enyindah, Ojule, and Bassey 2012; Kathpalia and Mustafa 2015; Khatri et al. 2019; Teshome et al. 2020; Huda et al. 2014; Robabi et al. 2016; Divakar et al. 2019; Goswami, Yadav, and Patel 2015; Takele, Degu, and Yitayal 2012); however, most studies did not cite specific reasons for partner disapproval. Poor product performance during use (expulsion or migration of the copper IUD) was a barrier unique to the continuation of the copper IUD (K. Thapa et al. 2019; Huber-Krum et al. 2019; Azmat et al. 2012; Gedeon et al. 2015; Jairaj and Dayyala 2016; Radwan et al. 2019; Scavuzzi, Souza, and Amorim 2016; Sodje et al. 2016; Park, Nguyen, and Ngo 2011; Ezegwui et al. 2013; S. Kumar et al. 2019; Enyindah, Ojule, and Bassey 2012; Robabi et al. 2016; Goswami, Yadav, and Patel 2015).

## Hormonal IUD

Hormonal IUD-specific enablers and barriers to adoption and continuation are listed in Table 7.

### **Enablers**

One of the enabling factors for the adoption and continuation of the hormonal IUD was its acceptable side effect profile (Nanda et al. 2018; Boller et al. 2018; Eva et al. 2018; Routes2Results et al. 2019b; Danna et al. 2019; USAID 2019; FHI 360 2017; Hubacher et al. 2013; PSI et al. 2019; Callahan et al. 2019; FHI 360, SFH Nigeria, and PSI 2020b; FHI360 and Family Health Options Kenya 2016; FHI 360, SFH Nigeria, and PSI 2020a). Despite being a hormonal method, many women chose the hormonal IUD because they anticipated fewer side effects than other hormonal methods, such as the implant (Nanda et al. 2018; Hubacher et al. 2013). Reduced menstrual bleeding was considered a benefit to many women (Nanda et al. 2018; Boller et al. 2018; Eva et al. 2018; Routes2Results et al. 2019b; Danna et al. 2019; USAID 2019; FHI 360 2017; Hubacher et al. 2013; PSI et al. 2019; Callahan et al. 2019; FHI 360, SFH Nigeria, and PSI 2020b; FHI360 and Family Health Options Kenya 2016; FHI 360, SFH Nigeria, and PSI 2020a), and some adopted the hormonal IUD as a treatment for heavy or painful periods (Eva et al. 2018; FHI 360 2017; PSI et al. 2019; Callahan et al. 2019; FHI 360, SFH Nigeria, and PSI 2020a). As with other methods, alignment between the method's duration of use and user preferences was an important enabling factor for adoption (Nanda et al. 2018; Eva et al. 2018; Routes2Results et al. 2019b; Danna et al. 2019; USAID 2019; FHI 360 2017; Hubacher et al. 2013; PSI et al. 2019; Callahan et al. 2019; FHI 360, SFH Nigeria, and PSI 2020b; FHI360 and Family Health Options Kenya 2016; Maternal and Child Survival Program [MCSP] 2019). According to the literature, women often chose the hormonal IUD for its long-acting duration, and some preferred the three-to-five-year duration, depending on the specific product, over the 10 years of protection that the copper IUD offers (Nanda et al. 2018; Danna et al. 2019; FHI 360 2017; Hubacher et al. 2013; Callahan et al. 2019). A unique enabling factor for the adoption of the hormonal IUD was its anticipated performance, notably its high efficacy (Nanda et al. 2018; Routes2Results et al. 2019a; Eva et al. 2018; Routes2Results et al. 2019b; Danna et al. 2019; USAID 2019; PSI et al. 2019; Zhao et al. 2014). It is noteworthy that the literature highlighted how women ascribed a higher efficacy to the hormonal IUD over the similarly efficacious copper IUD. The hormonal IUD had two enabling factors that were unique to its continued use. One was an acceptable side effect profile; women frequently cited reduced menses as a benefit of continued use (Nanda et al. 2018; Eva et al. 2018; FHI 360, SFH Nigeria, and PSI 2020a). The other was a feeling of empowerment that women experienced while using the method (Nanda et al. 2018), possibly due to reduced menses.

### **Barriers**

Similar to the copper IUD, both anticipated (Nanda et al. 2018; Routes2Results et al. 2019b; Danna et al. 2019; FHI 360 2017; Hubacher et al. 2013; PSI et al. 2019; Callahan et al. 2019; FHI 360, SFH Nigeria, and PSI 2020b; FHI360 and Family Health Options Kenya 2016; FHI 360, SFH Nigeria, and PSI 2020a) and experienced (Nanda et al. 2018; Eva et al. 2018; FHI360 and Family Health Options Kenya 2016, FHI 360, SFH Nigeria, and PSI 2020a; Maternal and Child Survival Program [MCSP] 2019) side effects were the most common barriers to adoption and continuation of the hormonal IUD. While some women benefited from reduced menses and/or amenorrhea, others viewed this side effect negatively and consequently discontinued the method (Eva et al. 2018; Danna et al. 2019; FHI 360 2017; PSI et al. 2019; 2020b; FHI360

and Family Health Options Kenya 2016, 360; FHI 360, SFH Nigeria, and PSI 2020a). Similar to the findings for other vaginally inserted methods in Table 2, cost was a significant barrier to the adoption of the hormonal IUD (Routes2Results et al. 2019a; Routes2Results et al. 2019b; Danna et al. 2019; FHI360 and Family Health Options Kenya 2016, 360; FHI 360, SFH Nigeria, and PSI 2020a; Silva-Filho et al. 2016). Concerns about vaginal insertion were also a barrier to adoption (Routes2Results et al. 2019b; Hubacher et al. 2013; FHI 360, SFH Nigeria, and PSI 2020b; 2020a), primarily due to fears about pain and, to a lesser extent, modesty (FHI 360, SFH Nigeria, and PSI 2020b). It is interesting to note that while the copper IUD is inserted in a similar fashion, the same concerns about insertion did not emerge as a prominent barrier for copper IUD use. This may reflect differences in the populations of participants who have taken part in research on these two intrauterine methods.

## DISCUSSION

The objective of this literature review was to identify enablers and barriers for women's adoption and continuation of vaginally inserted methods of contraception in LMICs. To our knowledge, this is the first literature review to focus on multiple vaginally inserted methods as the category of inquiry. Previous reviews have limited their focus to specific contraceptive methods (Mishra et al. 2017; Vargas et al. 2019; Gallo, Kilbourne-Brook, and Coffey 2012), other types of method categories, such as LARCs (Coles and Shubkin 2018) or short-acting methods, or specific geographic areas or populations of women (Bain, Amu, and Tarkang 2021).

We found that vaginal insertion—either by the woman herself or a provider—is a barrier to adoption for a minority of women. Only a few of the many studies reviewed found that women were concerned about vaginal insertion, either in terms of discomfort with touching their genitals or concerns about modesty during insertion by a provider. This finding is important because it suggests that some reproductive health experts may have overestimated concerns about vaginal insertion and its impact on the demand for these contraception methods. This finding also complements a wealth of anthropological literature on intravaginal practices, including the insertion of substances into the vagina for a variety of purposes (e.g., cleansing, sexual pleasure, fertility) (Lees et al. 2014; Francis et al. 2012). Additionally, we found that in some cases, discomfort with vaginal self-insertion diminishes over time as women gain more experience and confidence. Furthermore, many women considered a method's duration of use, including the on demand nature of some vaginal methods, to outweigh their perceived drawbacks.

An acceptable side effect profile, however defined by women, was an enabler to adoption for three of the methods reviewed: the diaphragm, copper IUD and hormonal IUD. Side effects are commonly cited in the broader FP literature as a barrier to contraceptive adoption (Moreira et al. 2019) and continuation (Castle and Askew 2015). By design, vaginally inserted methods do not cause high exposure throughout the body to contraceptive hormones: some are barrier methods without side effects, and others have low systemic effects because of local, steady release of hormones in the vagina or uterus (Hofmann et al. 2020). We found that what is considered acceptable in terms of side effects is a highly individualized calculation of the

benefits and drawbacks of any particular method. For example, reduced menstrual bleeding, a common side effect of the hormonal IUD, was seen as an enabler to use for some women and a barrier for others. We also expect that women's definitions of an acceptable side effect profile will change as their needs and preferences for contraception evolve over time.

Counseling by a trained provider or community health worker was the most frequently cited enabling factor for adoption of the vaginally inserted methods reviewed. Effective, client-centered counseling can address women's concerns about trialing vaginally inserted methods, including practicing insertion, alerting women to potential side effects, highlighting important method attributes, countering misconceptions about eligibility and use, and identifying resources to support continued use (or discontinuation and switching, as desired).

There was a widespread lack of awareness about all of the vaginally inserted methods reviewed, which posed a barrier to adoption. It is possible that a lack of awareness among women is linked to provider counseling: providers may not be aware of these methods and, as a result, cannot share information about them with clients. Alternatively, if providers do not have these methods in stock or do not know where they are available for referral, they may choose not to counsel women on them. This situation could change if more vaginally inserted methods are added to FP programs; currently, only three of the five methods (female condoms, copper and hormonal IUDs) are available through UNFPA and USAID. Increasing demand and use of vaginally inserted methods appear to be dependent upon quality provider counseling as well as providers' readiness and ability to provide products.

Product cost was a major barrier to adoption across all methods. While this barrier is not unique to vaginally inserted methods of contraception, there is a paucity of published resources on the cost of vaginally inserted methods and how they compare to other contraceptive methods. We found that cost was a barrier to adoption in both the private and public sectors, where women can access free or subsidized products but may still be required to pay various user fees (e.g., for insertion or removal). More research is needed on who bears the cost of these methods (e.g., consumers, funders, health systems) as well as practical solutions for decreasing costs to increase women's access and expand contraceptive choice.

We were surprised by the disparity in the number of studies related to adoption versus continuation. Since women may consider different factors when deciding to adopt or continue using a method, we presented both perspectives. However, more than two-thirds of our findings (and the literature) focused on method adoption. We suspect that the publication disparity could be related to the complexity of measuring contraceptive continuation (e.g., loss to follow-up in longitudinal studies, analytical questions about whether to classify method switchers as discontinuers).

We also noted a disparity in the number of studies that featured different methods. The diaphragm was the least represented in the literature (12 studies included in the analysis), and the copper IUD was the most represented (100 studies included in the analysis). Given the growing attention of the FP community to self-care products that can be used without the support of a provider, we expect more studies about the diaphragm, vaginal ring and female condom to be published in the future.

## LIMITATIONS

The results presented in Table 2 and in the method-specific tables provide an overview of the most common enablers and barriers found in the literature on the vaginally inserted methods reviewed. However, the absence of a factor in Table 2 or in the method-specific tables for any particular method should not indicate that it is not relevant but only that it was not among those most frequently cited. In this review, we focused on demand-side enablers and barriers to the adoption and continuation of vaginally inserted methods from the perspective of women and, to a lesser extent, their partners. Although our review concentrates on demand-side factors, we acknowledge that there are a variety of other, complex factors that contribute to method availability (e.g., at the system level, such as regulatory approvals and cost) that program planners and policymakers must take into account. Further research is needed to identify provider and other stakeholder perspectives as well as system-level and supply-side factors that influence adoption and continuation. We did not exclude studies with small sample sizes, which could affect the representativeness of the results. Given the small number of studies for some of the methods, the relative importance of some of the enablers and barriers assessed could be over- or underestimated given the lack of available data. In addition, we did not assess geographic clustering of enablers or barriers—it is likely that some factors are more or less important in different geographies based on culture and context.

## CONCLUSION

The results of this review suggest that vaginally inserted methods of contraception play an important role in method offerings by responding to women's diverse contraceptive needs and preferences. Vaginally inserted methods should not be dismissed outright due to program planners' or policymakers' assumptions about demand. Programmatic actions, such as communication activities and quality counseling, can address myths and misconceptions about these methods and contribute to voluntary adoption and continuation. Vaginally inserted methods feature benefits that differ from those of other method options and appeal to a number of women. Women's contraceptive preferences are diverse: a barrier for some women is an enabler for others. As a result, women require a full suite of choice, including a variety of vaginally inserted methods, to meet their changing needs and preferences over their reproductive lives.

## CONFLICTS OF INTEREST

The authors have no conflicts of interest to disclose.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this review are available in the Supporting Information.

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