IMPT for Reproductive Health

Strategic Evaluation Framework (SEF) for MPTs
Strategic Target Profile context summaries

Introduction

A Strategic Evaluation Framework (SEF) aims to shape product development programs through marketplace need to create products with high health impact. An SEF is comprised of three key components: the Target Market Profile (TMP), the Strategic Target Profile (STP), and the Target Product Profile (TPP). In previous work conducted in FY15, the IMPT laid the foundation for an SEF for the development and introduction of multipurpose prevention technologies (MPTs). This document included a TMP summary and the identification of ten market-based STP attributes on which to anchor minimal and optimal targets: health impact, market segmentation, value proposition, tolerated toxicity/side effects, acceptability, uptake and adherence, costs, accessibility, and community/market engagement.

Building upon this groundwork, the IMPT initiated the next steps to create an STP for the dominant MPT product strategies in development: daily oral tablets; on-demand, intermediate acting (e.g., gel, film, vaginal insert, barrier method); long-acting topical (e.g., patch, intravaginal ring [IVR]); and ultra-long-acting systemic (e.g., implant, injectable, intrauterine device [IUD]). This exercise aimed to synthesize learnings from end-user research in HIV prevention, family planning, and MPT development to inform target-setting around the ten identified STP attributes.

Methods

The IMPT expanded the scope of the comprehensive literature review conducted in FY15 to include all geographic settings and studies from the family planning field. This second literature review was conducted between January and April 2017 using the following online databases: PubMed, Academic Search Premier, Cochrane, and Google Scholar. Key search term themes included: HIV prevention/HIV prevention product/sexual and reproductive health; contraception/family planning/reproductive health; acceptability/preference; market study/research; demand forecast; uptake; and adherence. The citation lists of selected articles and websites of known sexual and reproductive health organizations for grey literature were screened.

Strategic Target Profile (STP) Context Summaries

The Strategic Target Profile (STP) of the Strategic Evaluation Framework (SEF) describes the ideal product by listing optimal and minimal targets for market-based attributes. In this report, each STP attribute is outlined with a brief description followed by summarized results and additional context from published projects in the HIV prevention, family planning, and MPT fields to better inform product development program target-setting. Attribute context summaries have been stratified by MPT product type when possible and appropriate.

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Health Impact

Description

Demonstration of potential health impact through modelling of realistic scenarios plays a central role in determining cost effectiveness and justification of scale-up. Health impact is not simply the efficacy of a drug, but it also requires correct and consistent use in a real-world setting among target populations (i.e., effectiveness).

Target-setting context

To set optimal and minimal health impact targets, proportional thresholds for product efficacy (in averting unintended pregnancies and HIV infections) as well as for product uptake must be determined.

MPT efficacy targets may be set using clinical data from existing HIV prevention and contraceptive products, but these targets will vary by product type:

- Efficacy for **long-acting topical MPTs** has been previously suggested in a generalized TPP for MPT IVRs to target of >50% for prevention of HIV infection (per the ASPIRE trial) and >90% for prevention of unintended pregnancy (per NuvaRing efficacy). Optimal efficacy targets for long-acting topicals would be >70% (per oral Truvada efficacy).
- Efficacy for **ultra-long-acting systemic MPTs** has been previously suggested in a generalized TPP for MPT long-acting injectables to target >75% for prevention of HIV infection (per Partners PrEP) and >95% for prevention of unintended pregnancy (per DepoProvera efficacy).

Researchers have consistently asserted that highly efficacious products with limited use will have a smaller health impact than a less efficacious product with high levels of use.(1) Regulatory agencies, however, currently will not approve new products without superior or non-inferior efficacy to existing products.

Market Segmentation

Description

Market segmentation highlights key segments of the market to which product development and introduction strategies are tailored for impact. For MPT development, women's product preferences and use will vary by a range of demographic, epidemiological, and behavioral factors, among others.

Target-setting context

Published data to inform market segmentation in this context are limited. Factors that have been explored in contraceptive studies and HIV prevention trials include:

- Employment status (2)

- Age, with particular attention to women younger than 25 (3–6)
- Geographic context (4,7–9)
- Relationship status (e.g., married/unmarried, in stable relationship/single) (9,10)
- Unmet need for contraception (10)
- Use history of a given product type (e.g., non-hormonal contraceptive) (9,11)
- Socioeconomic status (4,10,11)
- Race/ethnicity and cultural context (8,12)

Suggested factors in the literature with limited or no supporting data include religion (2) and distance to a health center or clinic (2).

Value Proposition

Description

The value a product holds for a person with a health intervention need, and why this product may be desirable, includes her perceived importance of the public health risk addressed, the spectrum of potential benefits, and the extent to which the product is advantageous over other products. The value proposition exists alongside daily competing priorities; context must be understood and incorporated into product development strategies to achieve impact. An important part of this balance is that prevention requires appealing to otherwise healthy end-users. A comprehensive understanding of the value proposition for a product's target population should inform product design, development, and introduction strategies. Notably, the value proposition of using a product within a trial setting will also be different from that in the real-world.

Target-setting context

The value proposition in an STP for MPT development might be conceptualized as a descriptive threshold, inclusive of a range of factors for each established market segment. Factors that may influence product value include:

- Efficacy, whether proven, perceived or potential, as cited in articles on clinical trials of **long-acting topical** methods [vaginal rings (13–15)] and **on-demand, intermediate acting** methods [gels(16–18) and a diaphragm with gel (19,20)]
- Dual or multipurpose products, as value may be additive across indications, such as an HIV prevention product that also served as a contraceptive (20–23)
- However, positioning a multipurpose prevention product (MPT) as a contraceptive may not detract potential end-users who are satisfied with their current family planning methods (9,24)
- Potential risks of unintended pregnancy and HIV infection from an unprotected sex act are significantly different, with the latter at least a ten-fold lower risk (25)
- Perceived risk of unintended pregnancy and/or HIV infection (26)
- Medical benefits other than pregnancy or HIV prevention, (e.g., hormonal contraception lightening menstrual bleeding and mitigating health conditions such as endometriosis and polycystic ovarian syndrome)(27)

- Perceived product effect on own or partner's sexual well-being, including interference or enhancement of pleasure (1,23,27,28)
- Perceived harms or side effects (see next section)

Tolerated Toxicity/Side Effects
Description
The threshold for side effect tolerance from the end-user perspective is not well understood, though in the prevention context it is thought to be low.
Target-setting context
Side effects, whether proven, perceived (including myths circulating in the community), or potential, are commonly cited as barriers impacting uptake of both HIV prevention and contraceptive products (3,10,29–32). The intolerable side effects most commonly cited in the family planning field that can lead to product discontinuation, particularly for **ultra-long-acting systemic** hormonal contraceptive methods, are impacts on menstrual bleeding patterns (e.g., amenorrhea, spotting, heavy bleeding, etc.)(2,24,27,33–35). Additionally, **daily oral** contraceptive pills have been known to diminish libido (27), and IUDs can be perceived to cause pain (33) and infertility (24).

Preferred Dosing Form Features
Description
Data on end-user preferences for product dosing form features, such as shape, color, and size, must be collected and integrated early into the product development process in tandem with TPP dosage form and product description targets.
Target-setting context
End-user preferences for HIV prevention and contraception dosing form features vary enormously by context, including preferences around menstrual bleeding patterns, 'dry' or 'wet' sexual intercourse, and partner involvement in decision-making around method choice (1,12,36). Overall, many women prefer products that are: • Easy to use and comfortable (37–39,31,40) • Amenable to the hygienic practices of the setting (18,41,42) • Odorless and flavorless (43) • Weekly or monthly dosage when compared to daily dosage (4,26) • Longer-acting (13,44) • Discrete (9,45) • Female-controlled (6,9,12,23) • Quick return to fertility after removal (12,24)

More product type-specific cited preferred features include:

- For **on-demand, intermediate acting** products (i.e., vaginal inserts, vaginal gels, and barriers with gels), many women preferred: minimal to no product leakage (15,41,45–48), quick-dissolving (49), less 'wetness' (48,50), more 'natural lubrication' consistency/viscosity (51), continuous use
- For **long-acting topical** products, they should be smooth in texture (17,41,42), small/thin in size (42,43), flexible (52)

It is critical to note, however, that there were also women whose preferences differ from those outlined above. These diverse preferences underscore the need for market segmentation as part of the MPT product development and introduction process as well as, at a higher level, the importance of a method mix to provide women with a suite of options. Many researchers also recognize the importance of the sexual partner's use experience with the method and preference for product features in whether or not the product is used correctly and consistently (40).

Acceptability

Description

Product acceptability is an important contributor to public health impact, but the causal pathway from stated user product acceptability to product uptake and impact among users is complex. A product and its range of features, benefits, and side effects may be theoretically acceptable to an end-user, but acceptability may change with actual product use. Moreover, product acceptability as a predictor of uptake is difficult to establish and understand using current methodologies in product development and clinical trial contexts.

Target-setting context

Acceptability is best demonstrated by long-term use; some researchers assert at least a year or more of correct and consistent use, with at least two functional methods to choose from (1). It is thus difficult to truly test acceptability on a product that is not yet on the market, such as an MPT (53), but researchers can better understand the acceptability of a product through studies involving sensory perceptions and experience around use (36).

There are a range of factors that can influence the acceptability of a product and should be considered:

- Potential or imagined partners, friends and family, health care providers, health system managers (1)
- Repeated use of and familiarity with a product may improve acceptability (4,7)
- Education around sexual health and female anatomy may also improve acceptability (9,10)

Uptake and Adherence
Description
Adherence and uptake are difficult to predict and understand, particularly across diverse populations. Robust biological and psychometric measures of adherence to establish more objective and accurate adherence rates for HIV prevention products and MPTs in trials have not been uniformly established and are themselves still under development. Additionally, the relationship between adherence in a clinical trial versus real-world setting is complex.
Target-setting context
Target-setting for MPT uptake and adherence should be intertwined with targets set for health impact (see above). Reported potential facilitators of uptake and adherence in HIV prevention trials include reduced duration and/or frequency of clinic visits (30,42) and support from a study counselor (54). Uptake and consistent use of contraception is also influenced by the quality of family planning service provision (55). Service-based interventions to improve contraceptive adherence have produced mixed results: two out of five counseling interventions were successful (one with special counseling and phone calls for **daily oral pills**, the other for structured counseling and **long-acting injectable** DMPA), and one out of four 'reminder' interventions was successful (the one that improved adherence was a daily text message reminder for **daily oral pills**) (55).

Costs
Description
Product cost tends to be a dominant factor in go/no-go decision making throughout the product development process. Considering the range and complexity of cost determinants across the product development timeline, there is debate over the utility and/or feasibility of emphasizing the importance of cost in the beginning of development.
Target-setting context
The most common economic metric used in global health is cost effectiveness. In lower resource settings, cost effective HIV prevention interventions have historically ranged between 5 USD to 18 USD per DALY gained, but cost effectiveness data for HIV prevention and MPT products in development are limited (56). In the family planning field, a commonly used metric is cost per couple-years of protection; a recent family planning market report cited the highest method cost was approximately 62 USD per couple-years of protection for female condoms, and the lowest cost was 0.10 USD per couple-years for IUDs (44). Suggested cost effectiveness input considerations include the level of product use, efficacy, product lifespan, comparison with other methods over time, the cost of delivery, and the cost of packaging (9). There is some debate around whether global health products should be provided free of charge or at a subsidized cost and how this price may impact product uptake (6,9).

Accessibility (at all access points)
Description
Product accessibility after its introduction to the market is a complex issue, particularly for multi-indication products that could involve navigating autonomously operating types of health care settings such as family planning and HIV. Given potential patient populations within at-capacity health care systems, accessibility should be considered in tandem with product development (e.g., what would make it easier for a provider to add the product to their portfolio?).
Target-setting context
For a contraceptive and HIV prevention MPT, the product will likely be delivered by prescription-only, at least when first introduced. This poses a major accessibility challenge for those who do not live nearby to a healthcare facility (2), and research has indicated that for a range of SRH products, women prefer over-the-counter delivery (57). Possible strategies to mitigate this barrier could include mobile medical unit outreach (58), and integrated approaches to service delivery, comprised of services related to HIV, family planning, antenatal care, and maternal health/postnatal care (9).

Community and Market Engagement
Description
While not strictly a product attribute, engaging stakeholders who influence product acceptability, accessibility, and use during the product development process will not only generate demand for the product but will also help to facilitate product access and uptake when introduced.
Target-setting context
The extent to which a product development program works to create a market for their product, in collaboration with other stakeholders early in the product development process, is an attribute that should be measured and evaluated. Key groups to engage include: • Sensitizing potential MPT users should be of highest priority, including conducting awareness campaigns using innovative platforms and messaging and other social-behavior change communication methods (26). • Research clearly demonstrates the importance of engaging sexual partners to the success of an HIV and contraceptive product (28,59). This includes education for both men and women around the product, sexual health, the importance of prevention, and healthy relationships (24). • Healthcare providers are also an important group to educate around MPTs as the future gatekeepers of these products (60). • At the community-level, strategies to mitigate stigma surrounding sex, pre-marital sex, infection status, and unintended pregnancy may also facilitate higher levels of future MPT uptake and adherence (3,24).

Next Steps

MPT product development programs should consider the context summaries for each outlined market-based STP attribute when creating their own, product-specific STPs. As the MPT field continues to grow alongside the HIV prevention and family planning fields, more robust data may be available to inform optimal and minimal target setting around market-based attributes and complete generalized STPs for each MPT product type.

Work Cited

1. Severy LJ, Newcomer S. Critical Issues in Contraceptive and STI Acceptability Research. J Soc Issues. 2005 Mar 1;61(1):45–65.

2. Abaasa A, Gafos M, Anywaine Z, Nunn A, Crook A, Levin J, et al. Uptake of hormonal contraceptives and correlates of uptake in a phase III clinical trial in rural South Western Uganda. Reprod Health. 2017;14(1):36.

3. Askew I, Castle, Sarah. Contraceptive Discontinuation: Reasons, Challenges, and Solutions [Internet]. FP2020; 2015 Dec. Available from: http://ec2-54-210-230-186.compute-1.amazonaws.com/wp-content/uploads/2015/12/FP2020_ContraceptiveDiscontinuation_SinglePage_Final_12.08.15.pdf

4. Luecke EH, Cheng H, Woeber K, Nakyanzi T, Mudekunye-Mahaka IC, van der Straten A. Stated product formulation preferences for HIV pre-exposure prophylaxis among women in the VOICE-D (MTN-003D) study. J Int AIDS Soc [Internet]. 2016 May 30 [cited 2017 Oct 2];19(1). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4887458/

5. McLellan-Lemal E, Gust DA, Gvetadze R, Furtado M, Otieno FO, Desai M, et al. Characteristics of women screened for a contraceptive intravaginal ring study in Kisumu, Kenya, 2014. Res J Womens Health [Internet]. 2016 [cited 2017 Oct 2];3. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4946642/

6. Stockman JK, Syvertsen JL, Robertson AM, Ludwig-Barron NT, Bergmann JN, Palinkas LA. Women's Perspectives on Female-Initiated Barrier Methods for the Prevention of HIV in the Context of Methamphetamine Use and Partner Violence. Womens Health Issues. 2014 Jul 1;24(4):e397–405.

7. Coffey PS, Kilbourne-Brook M, Beksinska M, Thongkrajai E. Short-term acceptability of a single-size diaphragm among couples in South Africa and Thailand. J Fam Plann Reprod Health Care. 2008 Oct;34(4):233–6.

8. Giguere R, Carballo-Diéguez A, Ventuneac A, Mabragaña M, Dolezal C, Chen BA, et al. Variations in microbicide gel acceptability among young women in the USA and Puerto Rico. Cult Health Sex. 2012;14(2):151–66.

9. Milford C, Rambally L, Moore L, Beksinska M, Kubeka M, Smit J. Assessment of opportunities and challenges for potential introduction of the SILCS diaphragm in South Africa. [Internet]. 2016 Oct [cited 2017 Oct 2]. Available from: https://www.popline.org/node/666970

10. Sedgh G, Hussain R. Reasons for Contraceptive Nonuse among Women Having Unmet Need for Contraception in Developing Countries. Stud Fam Plann. 2014 Jun 1;45(2):151–69.

11. Reiff M, Wade C, Chao MT, Kronenberg F, Cushman LF. Health Practices and Vaginal Microbicide Acceptability among Urban Black Women. J Womens Health. 2008 Sep 14;17(8):1345–51.

12. Jackson AV, Karasek D, Dehlendorf C, Foster DG. Racial and ethnic differences in women's preferences for features of contraceptive methods. Contraception. 2016 May 1;93(5):406–11.

13. Smith DJ, Wakasiaka S, Hoang TDM, Bwayo JJ, del Rio C, Priddy FH. An Evaluation of Intravaginal Rings as a Potential HIV Prevention Device in Urban Kenya: Behaviors and Attitudes That Might Influence Uptake within a High-Risk Population. J Womens Health. 2008 Jul 1;17(6):1025–34.

14. Straten A van der, Montgomery ET, Cheng H, Wegner L, Masenga G, Mollendorf C von, et al. High Acceptability of a Vaginal Ring Intended as a Microbicide Delivery Method for HIV Prevention in African Women. AIDS Behav. 2012 Oct 1;16(7):1775–86.

15. Nel A, Bekker L-G, Bukusi E, Hellström E, Kotze P, Louw C, et al. Safety, Acceptability and Adherence of Dapivirine Vaginal Ring in a Microbicide Clinical Trial Conducted in Multiple Countries in Sub-Saharan Africa. PLoS ONE [Internet]. 2016 Mar 10 [cited 2017 Oct 4];11(3). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4786336/

16. van der Straten A, Stadler J, Montgomery E, Hartmann M, Magazi B, Mathebula F, et al. Women's experiences with oral and vaginal pre-exposure prophylaxis: the VOICE-C qualitative study in Johannesburg, South Africa. PloS One. 2014;9(2):e89118.

17. Becker J, Dabash R, McGory E, Copper D, Harries J, Hoffman M, et al. Paving the path: preparing for microbicide introduction report of a qualitative study in South Africa. 2004 Jan 1 [cited 2016 Apr 19]; Available from: https://www.scienceopen.com/document?vid=52bc3172-e2c4-479b-947b-faa9c1980091

18. Bentley ME, Fullem AM, Tolley EE, Kelly CW, Jogelkar N, Srirak N, et al. Acceptability of a Microbicide Among Women and Their Partners in a 4-Country Phase I Trial. Am J Public Health. 2004 Jul;94(7):1159–64.

19. van der Straten A, Moore J, Napierala S, Clouse K, Mauck C, Hammond N, et al. Consistent use of a combination product versus a single product in a safety trial of the diaphragm and microbicide in Harare, Zimbabwe. Contraception. 2008 Jun 1;77(6):435–43.

20. Terris-Prestholt F, Hanson K, MacPhail C, Vickerman P, Rees H, Watts C. How Much Demand for New HIV Prevention Technologies Can We Really Expect? Results from a Discrete Choice Experiment in South Africa. PLOS ONE. 2013 Dec 30;8(12):e83193.

21. Woodsong C, Musara P, Chandipwisa A, Montgomery E, Alleman P, Chirenje M, et al. Interest in multipurpose prevention of HIV and pregnancy: perspectives of women, men, health professionals and community stakeholders in two vaginal gel studies in southern Africa. BJOG Int J Obstet Gynaecol. 2014 Oct;121 Suppl 5:45–52.

22. van der Straten A, Kang MS, Posner SF, Kamba M, Chipato T, Padian NS. Predictors of diaphragm use as a potential sexually transmitted disease/HIV prevention method in Zimbabwe. Sex Transm Dis. 2005 Jan;32(1):64–71.

23. Straten A van der, Sahin-Hodoglugil N, Clouse K, Mtetwa S, Chirenje MZ. Feasibility and potential acceptability of three cervical barriers among vulnerable young women in Zimbabwe. J Fam Plann Reprod Health Care. 2010 Jan 1;36(1):13–9.

24. Williamson LM, Parkes A, Wight D, Petticrew M, Hart GJ. Limits to modern contraceptive use among young women in developing countries: a systematic review of qualitative research. Reprod Health. 2009 Feb 19;6:3.

25. Hardon AP. The needs of women versus the interests of family planning personnel, policy-makers and researchers: Conflicting views on safety and acceptability of contraceptives. Soc Sci Med. 1992 Sep 1;35(6):753–66.

26. Reza-Paul S, Lazarus L, Doshi M, Rahman SHU, Ramaiah M, Maiya R, et al. Prioritizing Risk in Preparation for a Demonstration Project: A Mixed Methods Feasibility Study of Oral Pre-Exposure Prophylaxis (PREP) among Female Sex Workers in South India. PLOS ONE. 2016 Nov 23;11(11):e0166889.

27. Higgins JA, Smith NK. The Sexual Acceptability of Contraception: Reviewing the Literature and Building a New Concept. J Sex Res. 2016 May 3;53(4–5):417–56.

28. RHSC. Third Youth Consultation on Reproductive Health Supplies [Internet]. RHSC; 2016 Dec. Available from: https://www.rhsupplies.org/uploads/tx_rhscpublications/Third_Youth_Consultation_on_Reproductive_Health_Supplies.pdf

29. Eisingerich AB, Wheelock A, Gomez GB, Garnett GP, Dybul MR, Piot PK. Attitudes and Acceptance of Oral and Parenteral HIV Preexposure Prophylaxis among Potential User Groups: A Multinational Study. PLoS ONE. 2012 Jan 11;7(1):e28238.

30. Tolley EE, McKenna K, Mackenzie C, Ngabo F, Munyambanza E, Arcara J, et al. Preferences for a potential longer-acting injectable contraceptive: perspectives from women, providers, and policy makers in Kenya and Rwanda. Glob Health Sci Pract. 2014 Mar 26;2(2):182–94.

31. Woodsong C, Musara P, Chandipwisa A, Montgomery E, Alleman P, Chirenje M, et al. Interest in multipurpose prevention of HIV and pregnancy: perspectives of women, men, health professionals and community stakeholders in two vaginal gel studies in southern Africa. BJOG Int J Obstet Gynaecol. 2014 Oct 1;121:45–52.

32. Corneli A, Perry B, McKenna K, Agot K, Ahmed K, Taylor J, et al. Participants' Explanations for Nonadherence in the FEM-PrEP Clinical Trial. J Acquir Immune Defic Syndr 1999. 2016 Apr 1;71(4):452–61.

33. French R, Sorhaindo AM, Van Vliet HA, Mansour DD, Robinson AA, Logan S, et al. Progestogen-releasing intrauterine systems versus other forms of reversible contraceptives for contraception. In: Cochrane Database of Systematic Reviews [Internet]. John Wiley & Sons, Ltd; 2004 [cited 2017 Oct 2]. Available from: http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD001776.pub2/abstract

34. Power J, French R, Cowan FM. Subdermal implantable contraceptives versus other forms of reversible contraceptives or other implants as effective methods for preventing pregnancy. In: Cochrane Database of Systematic Reviews [Internet]. John Wiley & Sons, Ltd; 2007 [cited 2017 Oct 2]. Available from: http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD001326.pub2/abstract

35. Burke HM, Mueller MP, Perry B, Packer C, Bufumbo L, Mbengue D, et al. Observational study of the acceptability of Sayana® Press among intramuscular DMPA users in Uganda and Senegal. Contraception. 2014 May;89(5):361–7.

36. Tolley EE, Morrow KM, Owen DH. Designing a multipurpose technology for acceptability and adherence. Antiviral Res. 2013 Dec 1;100(Supplement):S54–9.

37. Sahin-Hodoglugil NN, Montgomery E, Kacanek D, Morar N, Mtetwa S, Nkala B, et al. User experiences and acceptability attributes of the diaphragm and lubricant gel in an HIV prevention trial in southern Africa. AIDS Care. 2011 Aug 1;23(8):1026–34.

38. Montgomery ET, Straten A van der, Cheng H, Wegner L, Masenga G, Mollendorf C von, et al. Vaginal Ring Adherence in Sub-Saharan Africa: Expulsion, Removal, and Perfect Use. AIDS Behav. 2012 Jul 13;16(7):1787–98.

39. Nel, A., Kamupira, M., Woodsong, C., van der Straten, A., Montgomery, E., van Niekerk, N., & Nuttal, J. (2012). Safety, acceptability and pharmacokinetic assessment (adherence) of monthly dapivirine vaginal microbicide rings (Ring-004) for HIV prevention. 19th Conference on Retroviruses and Opportunistic Infections (CROI), Seattle, WA, USA.

40. Joglekar NS, Joshi SN, Navlakha SN, Katti UR, Mehendale SM. Acceptability of Praneem polyherbal vaginal tablet among HIV uninfected women & their male partners in Pune, India--Phase I study. Indian J Med Res. 2006 Apr;123(4):547–52.

41. Morrow K, Rosen R, Richter L, Emans A, Forbes A, Day J, et al. The Acceptability of an Investigational Vaginal Microbicide, PRO 2000 Gel, among Women in a Phase I Clinical Trial. J Womens Health. 2003 Sep 1;12(7):655–66.

42. Smith DJ, Wakasiaka S, Hoang TDM, Bwayo JJ, del Rio C, Priddy FH. An Evaluation of Intravaginal Rings as a Potential HIV Prevention Device in Urban Kenya: Behaviors and Attitudes That Might Influence Uptake within a High-Risk Population. J Womens Health. 2008 Jul;17(6):1025–34.

43. Fan MD, Kramzer LF, Hillier SL, Chang JC, Meyn LA, Rohan LC. Preferred Physical Characteristics of Vaginal Film Microbicides for HIV Prevention in Pittsburgh Women. Arch Sex Behav. 2017 May;46(4):1111–9.

44. CHAI. 2016 CHAI Family Planning Market Report [Internet]. [cited 2017 Oct 2]. Available from: https://www.rhsupplies.org/activities-resources/webinars/video/2016-chai-family-planning-market-report-57/

45. Woodsong C, Holt JDS. Acceptability and preferences for vaginal dosage forms intended for prevention of HIV or HIV and pregnancy. Adv Drug Deliv Rev. 2015 Sep 15;92(Supplement C):146–54.

46. Moon MW, Khumalo-Sakutukwa GN, Heiman JE, Mbizvo MT, Padian NS. Vaginal microbicides for HIV/STI prevention in Zimbabwe: what key informants say. J Transcult Nurs Off J Transcult Nurs Soc Transcult Nurs Soc. 2002 Jan;13(1):19–23.

47. Jones DL, Weiss SM, Chitalu N, Bwalya V, Villar O. Acceptability of Microbicidal Surrogates Among Zambian Women. Sex Transm Dis. 2008 Feb;35(2):147–53.

48. Frezieres RG, Walsh T, Kilbourne-Brook M, Coffey PS. Couples' acceptability of the SILCS diaphragm for microbicide delivery. Contraception. 2012 Jan;85(1):99–107.

49. Nel AM, Mitchnick LB, Risha P, Muungo LTM, Norick PM. Acceptability of Vaginal Film, Soft-Gel Capsule, and Tablet as Potential Microbicide Delivery Methods Among African Women. J Womens Health. 2011 Jul 20;20(8):1207–14.

50. Vallely A, Fitzgerald L, Fiya V, Aeno H, Kelly A, Sauk J, et al. Intravaginal practices and microbicide acceptability in Papua New Guinea: implications for HIV prevention in a moderate-prevalence setting. BMC Res Notes. 2012 Nov 1;5:613.

51. Whitehead SJ, Kilmarx PH, Blanchard K, Manopaiboon C, Chaikummao S, Friedland B, et al. Acceptability of Carraguard vaginal gel use among Thai couples. AIDS. 2006 Nov 14;20(17):2141–2148.

52. Rosen RK, van den Berg JJ, Vargas SE, Senocak N, Shaw JG, Buckheit RW, et al. Meaning-making matters in product design: users' sensory perceptions and experience evaluations of long-acting vaginal gels and intravaginal rings. Contraception. 2015 Dec;92(6):596–601.

53. Lin AH, Breger TL, Barnhart M, Kim A, Vangsgaard C, Harris E. Learning from the private sector: towards a keener understanding of the end-user for microbicide introduction planning. J Int AIDS Soc [Internet]. 2014 Sep 8 [cited 2017 Oct 2];17(3Suppl 2). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4163992/

54. Ware NC, Wyatt MA, Haberer JE, Baeten JM, Kintu A, Psaros C, et al. What's Love Got to Do With It? Explaining Adherence to Oral Antiretroviral Pre-exposure Prophylaxis (PrEP) for HIV Serodiscordant Couples. J Acquir Immune Defic Syndr 1999 [Internet]. 2012 Apr 15 [cited 2016 May 11];59(5). Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3826169/

55. Halpern V, Lopez LM, Grimes DA, Stockton LL, Gallo MF. Strategies to improve adherence and acceptability of hormonal methods of contraception. In: Cochrane Database of Systematic Reviews [Internet]. John Wiley & Sons, Ltd; 2013 [cited 2017 Oct 2]. Available from: http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD004317.pub4/abstract

56. Jha P, Nagelkerke JD, Ngugi EN, Prasada Rao JV, Willbond B, Moses S, et al. Public health. Reducing HIV transmission in developing countries. Science. 2001 Apr 13;292(5515):224–5.

57. Holt BY, Morwitz VG, Ngo L, Harrison PF, Whaley KJ, Pettifor A, et al. Microbicide Preference among Young Women in California. J Womens Health. 2006 Apr 1;15(3):281–94.

58. Meyers K, Golub SA. Planning ahead for implementation of long acting HIV prevention: challenges and opportunities. Curr Opin HIV AIDS. 2015 Jul;10(4):290–5.

59. Short MB, Rosenthal SL, Auslander BA, Succop PA. Relationship Context Associated with Microbicide-like Product Use. J Pediatr Adolesc Gynecol. 2009 Oct 1;22(5):313–7.

60. Etokidem AJ, Ogaji DS, Okokon IB. Knowledge and perception of microbicides among healthcare providers in Calabar, Nigeria. Afr Health Sci. 2014 Jan 1;14(2):281–7.