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Challenges and opportunities in HIV pre-exposure prophylaxis use among women globally: A systematic review

Luh Gede Pradnyawati[1], Ady Wirawan[2], Pande Putu Januraga[3]

[1]Department of Public Health and Preventive Medicine, Faculty of Medicine and Health Sciences, Universitas Warmadewa, Bali, Indonesia

[2]Department of Public Health and Preventive Medicine, Faculty of Medicine, Universitas Udayana, Bali, Indonesia

[3]Center for Public Health Innovation, Universitas Udayana, Bali, Indonesia

ARTICLE INFO

Article history:

Received Jan 28, 2025
Revised Feb 1, 2025
Accepted Feb 5, 2025

Keywords:

Challenges
HIV Pre-Exposure
Prophylaxis

ABSTRACT

Prevalence of HIV/AIDS remains high worldwide. Pre-exposure prophylaxis or PrEP is the use of an antiretroviral medication by HIV-negative people to reduce the risk of HIV acquisition. Ths systematic review aimed to analyse chalenge of hiv pre-exposure prophylactic use in low risk population. We conducted a search from the Scopus, Google Scholar, Science Directory and PubMed data bases. A total of 200 articles met the specified keywords, namely HIV, PreP, woman. In conclusion, PrEP is a highly effective HIV prevention tool for women when used consistently and as directed. Adherence, along with addressing behavioral, biological, and social factors, plays a crucial role in its effectiveness. Adherence to PrEP among women is influenced by a combination of factors related to healthcare access, support systems, individual perceptions, and daily routines. By addressing these factors and providing comprehensive support, healthcare providers can help maximize the effectiveness of PrEP in preventing HIV infection among women at risk. While HIV PrEP is highly effective when used correctly, the risk of drug resistance underscores the importance of regular monitoring, adherence support, and comprehensive counseling to maximize its effectiveness in HIV prevention efforts.

Corresponding Author:

Luh Gede Pradnyawati,
Public Health and Preventive Medicine,
Universitas Warmadewa,
Jl. Terompong No.24, Sumerta Kelod, Kec. Denpasar Tim., Kota Denpasar, Bali 80239, Indonesia
Email: pradnyawati86@gmail.com

INTRODUCTION

Pre-exposure prophylaxis or PrEP is the use of an antiretroviral medication by HIV-negative people to reduce the risk of HIV acquisition. As of September 2015, WHO recommends that people at substantial risk of HIV infection should be offered tenofovir disoproxil fumarate (TDF)-based oral PrEP as an additional prevention choice, as part of comprehensive prevention. Oral PrEP is

highly effective at preventing HIV when used as directed. In 2021, WHO recommended that the dapivirine ring may be offered as an additional prevention choice for women at substantial risk of HIV and, in 2022, that long-acting injectable cabotegravir (CAB-LA) may be offered as an additional prevention choice for people at substantial risk of HIV. Other products (e.g., multipurpose prevention products that combine antiretroviral drugs with contraception) are currently studied as additional PrEP options (Eakle et al., 2017).

Pre-exposure prophylaxis (PrEP) is a HIV medication that when used consistently, reduces the risk of HIV infection during sex by over 90%. WHO PrEP guidelines currently recommends the use of PrEP taken daily for both men and women who are at substantial risk of acquiring HIV. Daily PrEP use provides the highest amount of medication in the blood and body tissues and, thus, the highest level of protection. If you take PrEP daily, you may still be protected, even if you miss a dose occasionally. In July 2017, WHO published a tool for implementing PrEP programs with suggestions for the introduction and use of PrEP based on the available evidence and experience. This document includes information not only for clinicians, but for educators and activists, counselors, opinion- makers, pharmacists, regulatory agencies, planners and evaluators, testing providers, PrEP users, and adolescents and young adults (Mugo et al., 2014).

To get a clear picture of the challenges in providing HIV prophylaxis to mothers at low risk, it is necessary to conduct an in-depth search for previous articles or research. A systematic review on HIV PrEP use in women may reveal varying effectiveness rates, challenges in adherence, and differences in outcomes across different populations and settings. It could highlight the need for targeted interventions to improve PrEP uptake and adherence among women, addressing specific barriers such as stigma and access to healthcare.

RESEARCH METHOD

To conduct a systematic review on HIV pre-exposure prophylaxis (PrEP) use in women involves a structured approach to gather, analyze, and synthesize existing research findings (Jiang et al., 2014). Research Question: What is the challenge of HIV PrEP in preventing HIV infection among women?

Search Strategy

We conducted a search from the Scopus, Google Scholar, Science Directory and PubMed data bases. a total of 200 articles met the specified keywords, namely HIV, PreP, woman.

Inclusion Criteria

We made inclusion criteria based on PICO, population in question: healthy woman, intervention: HIV PreP admission, control: untreated, woman at risk on HIV infection, HIV woman, Outcome: HIV infection, compliance, willingness, adherence (Heffron et al., 2018).

Study Selection

We apply inclusion and exclusion criteria to screen studies, then perform initial screening based on titles and abstracts. Conduct full-text assessment of potentially relevant articles (C. Celum et al., 2021).

Data Extraction

We develop a standardized data extraction form. Extract relevant data from included studies (study characteristics, participant demographics, intervention details, outcomes measured).

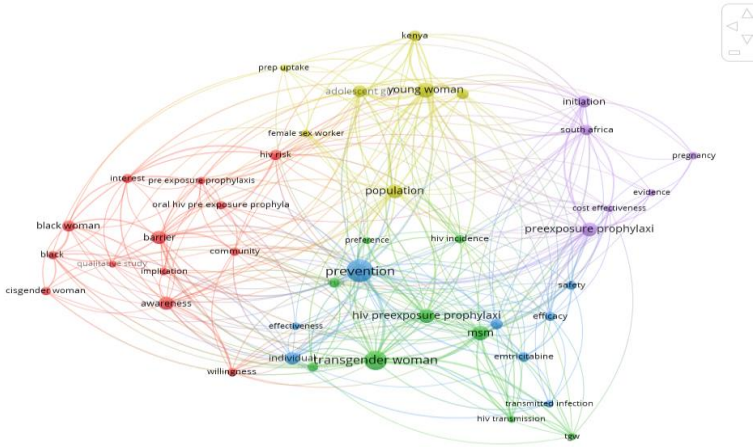

Figure 1. Research mapping base on co-occurrence keyword related to HIV pre-exposure prophylactic among woman worldwide

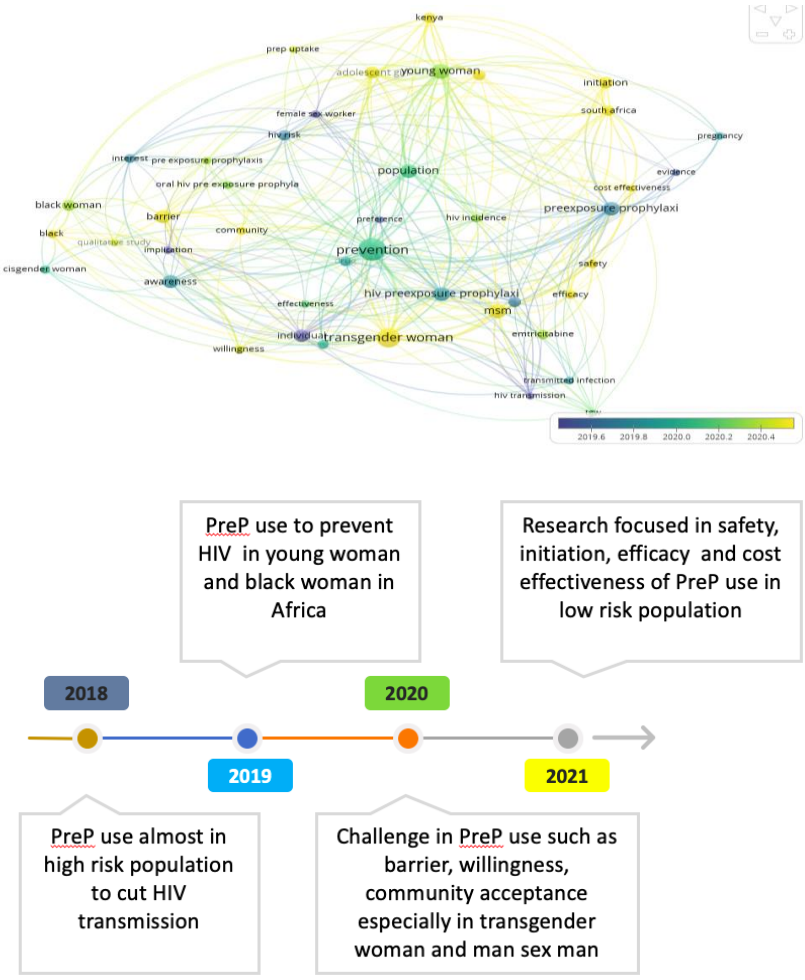

Figure 2. Research timeline of development of research on hiv prep in women

Base on Vos viewer analysis, newest research theme such as: how prep arise barrier in health woman, how community adherence in successions prep programs, how subject willingness

in take prep orally. Based on research mapping, existing research still uses black women, there has been no research on mature women or research located in Southeast Asia (Serota et al., 2020).

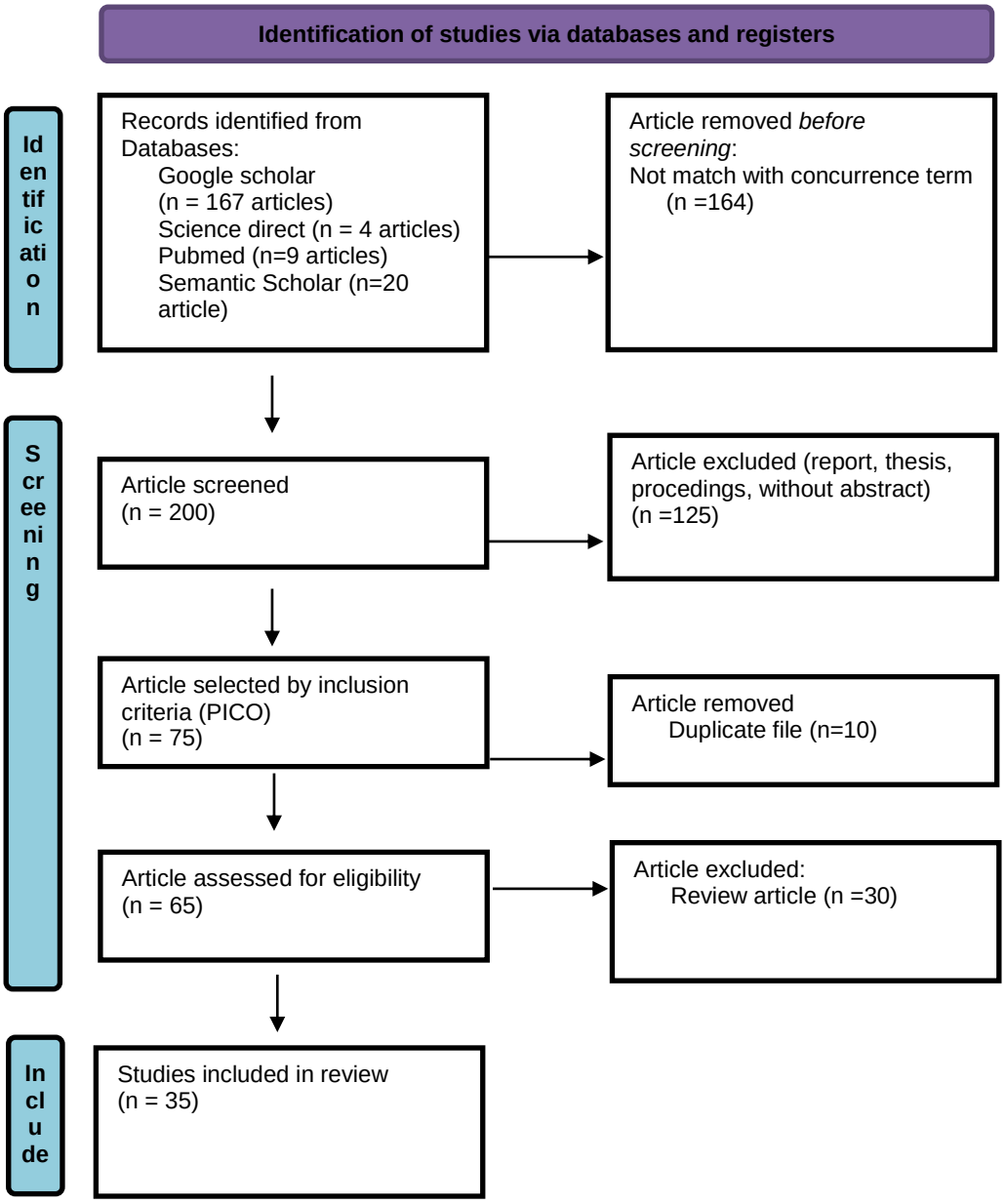

Figure 3. Article screened base on preferred reporting items for systematic reviews (PRISMA)

RESULTS AND DISCUSSIONS

Research into HIV pre-exposure prophylaxis (PrEP) for women involves investigating various aspects related to the effectiveness, safety, adherence, and impact of PrEP specifically tailored to female populations.

Efficacy in Women

Studies are evaluating how well PrEP works in preventing HIV transmission among women, considering factors such as age, hormonal influences, and different risk behaviors. HIV

pre-exposure prophylaxis (PrEP) has been shown to be effective in preventing HIV infection in women when used consistently and correctly (Eakle et al., 2018). Studies have demonstrated that when taken consistently, PrEP can reduce the risk of HIV infection by over 90% in women. Like in any population, the effectiveness of PrEP in women heavily depends on adherence to the prescribed regimen. Missing doses or inconsistent use can significantly reduce its protective benefits. Effectiveness can vary among different groups of women, influenced by factors such as age, socioeconomic status, risk behaviors, and biological factors. There were several factors affecting efficacy of prep in women: first adherence, this is the most critical factor. missing doses or not taking PrEP as prescribed can diminish its protective effect. Biological factors like hormonal changes, particularly related to contraceptives like oral contraceptives or injectables, can potentially affect the pharmacokinetics of PrEP drugs. However, studies have generally shown that hormonal contraception does not significantly impact PrEP efficacy. Risk behaviors such as inconsistent condom use, multiple sexual partners, and substance use can increase the risk of HIV transmission even when on PrEP. Access to healthcare services for regular HIV testing, prescription refills, and counseling on adherence can influence the effectiveness of PrEP. Sexually transmitted infections (STIs) can increase susceptibility to HIV infection. Treating and preventing STIs is important for maximizing PrEP effectiveness. Mental health issues, stigma associated with HIV, and intimate partner violence can affect adherence to PrEP and overall health outcomes. All factor mentioned above produce recommendations: Healthcare providers should monitor adherence and provide support to help women stay adherent to PrEP. Integrating PrEP services with comprehensive sexual and reproductive healthservices can improve outcomes. Providing accurate information and counseling on PrEP, including its benefits and potential side effects, can enhance understanding and adherence.

Adherence Research focuses on understanding the challenges women face in adhering to daily PrEP regimens. This includes investigating barriers such as stigma, side effects, and healthcare access.8 Adherence to HIV pre-exposure prophylaxis (PrEP) among women is crucial for its effectiveness in preventing HIV infection. Adherence refers to how consistently and correctly a person takes their prescribed medication regimen. Here are some factors that can influence adherence to PrEP among women. Factors Influencing Adherence to PrEP included: knowledge and awareness, understanding the purpose and benefits of prep can motivate women to adhere to the regimen. Education about how PrEP works and its effectiveness in preventing HIV can enhance adherence. Easy access to healthcare services for obtaining PrEP prescriptions, regular check-ups, and monitoring can facilitate adherence. Women who face barriers such as transportation, cost, or stigma may struggle with adherence. Supportive and non-judgmental healthcare providers who offer clear instructions, answer questions, and address concerns about PrEP can encourage adherence. Regular follow-up appointments can also reinforce adherence behaviors. Incorporating PrEP into daily routines, such as taking it at the same time each day or associating it with another daily habit, can improve adherence. Conversely, irregular routines or changes in daily life can disrupt adherence. Women may be more likely to adhere to PrEP if they experience minimal or manageable side effects. Healthcare providers should discuss potential side effects and provide strategies for managing them to support adherence. Women who perceive themselves to be at higher risk of HIV infection may be more motivated to adhere to PrEP. Counseling that addresses individual risk factors and provides personalized risk reduction strategies can enhance adherence. Support from partners, friends, or community members who understand and encourage PrEP use can positively influence adherence. Conversely, stigma or lack of support from social circles may undermine adherence. Mental health issues, substance use, and stress can impact adherence. Addressing these factors through counseling or support services may improve adherence outcomes. Some strategies to Improve Adherence include: provide comprehensive education about PrEP, including its benefits, how to take it correctly, and what to expect. Foster a supportive healthcare environment where women feel comfortable discussing their

concerns and asking questions about PrEP. Schedule regular appointments to monitor adherence, assess side effects, and provide ongoing support. Offer adherence tools such as pillboxes, reminder apps, or text message reminders to help women stay on track. Provide counseling that addresses individual barriers to adherence and develops personalized strategies for overcoming them.

Safety

Continual assessment of the safety profile of PrEP medications in women, including potential interactions with hormonal contraceptives and other medications commonly used by women.

The safety of HIV pre-exposure prophylaxis (PrEP) is a critical consideration for healthcare providers and individuals considering its use for HIV prevention. Here are key aspects regarding the safety of PrEP: PrEP medications, typically consisting of tenofovir disoproxil fumarate (TDF) or tenofovir alafenamide (TAF) in combination with emtricitabine (FTC), are generally well-tolerated by most individuals. The most common side effects of PrEP include gastrointestinal symptoms such as nausea, diarrhea, and abdominal discomfort. These are usually mild and tend to improve over time. TDF-based PrEP has been associated with potential kidney toxicity in a small percentage of users. Regular monitoring of renal function is recommended to detect any abnormalities early. TAF, the newer formulation of tenofovir, has a lower risk of kidney toxicity compared to TDF (Kinuthia et al., 2020)(Ngure et al., 2017).

Some studies have suggested a potential decrease in bone mineral density in individuals taking TDF-based PrEP, although the clinical significance of this effect is generally considered minimal. Regular monitoring may be recommended for individuals at higher risk for osteoporosis or bone fractures. PrEP medications may interact with other medications, so it's essential for healthcare providers to review a person's complete medication list to avoid potential interactions. While rare, serious side effects such as severe allergic reactions (e.g., rash, swelling) or liver toxicity can occur. Prompt medical attention is necessary if these symptoms occur. Before initiating PrEP, healthcare providers typically conduct screening tests to ensure that the individual is HIV-negative and does not have pre-existing conditions that might affect the safety of PrEP. Adherence to the prescribed PrEP regimen is crucial for both effectiveness and safety. Missing doses or irregular use can impact both (C. L. Celum et al., 2019)(Hoagland et al., 2017).

PrEP is generally considered safe during pregnancy and breastfeeding, although healthcare providers may consider individual factors when making recommendations. Healthcare providers should provide comprehensive counseling on the benefits, potential side effects, and safety considerations of PrEP to support informed decision-making. Regular follow-up appointments are recommended to monitor for side effects, adherence, and ongoing HIV risk assessment. While HIV PrEP is generally safe and well-tolerated, it is essential for healthcare providers and individuals to be aware of potential side effects and safety considerations. With appropriate screening, monitoring, and adherence support, PrEP can be a valuable tool in HIV prevention strategies.

Implementation Strategies

Research is examining effective strategies for introducing PrEP into healthcare settings that serve women, ensuring equitable access and addressing barriers to uptake (Mugwanya et al., 2016). Implementing HIV pre-exposure prophylaxis (PrEP) effectively among women requires a comprehensive approach that addresses barriers to access, promotes awareness, ensures healthcare provider competence, and supports adherence. Here are key strategies for implementing PrEP in women: conduct targeted outreach campaigns to raise awareness about PrEP among women at high risk of HIV, including those in communities disproportionately affected by HIV. Involve community leaders, organizations, and advocates to promote PrEP awareness and destigmatize its use. Tailor educational materials and messaging to be culturally and linguistically appropriate to resonate with diverse groups of women. Train healthcare providers on the benefits, eligibility

criteria, prescription guidelines, and monitoring protocols for PrEP in women. Ensure healthcare providers are competent in addressing women's specific needs related to sexual health, contraception, and HIV prevention. Integrate PrEP services with existing reproductive health services, including family planning clinics, to reach women seeking comprehensive sexual health care. Advocate for insurance coverage and government subsidies to make PrEP affordable and accessible to women, including those without insurance coverage. Expand PrEP distribution through pharmacies and community health centers to improve convenience and accessibility. Adherence Support such as: Provide counseling on the importance of adherence, potential side effects, and strategies to overcome barriers to. adherence. Offer adherence support tools such as reminder apps, pill organizers, or text message reminders to help women adhere to their PrEP regimen. Implement regular HIV testing every 3 months for women using PrEP to promptly detect any HIV acquisition and provide timely support. Establish systems for timely renewal and refill reminders to minimize interruptions in PrEP use. Collaborate with community-based organizations, women's health groups, and HIV/AIDS service organizations to reach and support women at risk. Advocate for policies that support PrEP implementation in women, including funding for education, access programs, and research. Collect and analyze data on PrEP uptake, adherence rates, and HIV incidence among women to assess program effectiveness and identify areas for improvement. Establish feedback mechanisms to solicit input from women using PrEP and healthcare providers to continuously improve service delivery.

Behavioral Factors

Studies explore how behavior influences PrEP effectiveness among women, including sexual practices, condom use, and relationships dynamics (Desai et al., 2017)(Chan et al., 2016). By employing these strategies, healthcare systems, policymakers, and community stakeholders can work together to effectively implement PrEP among women, reducing their risk of HIV infection and improving overall sexual health outcomes (Roberts et al., 2016)(Lehman et al., 2015).

Long-term Effects

Longitudinal studies are monitoring the long-term effects of PrEP use in women, including resistance patterns, overall health impacts, and sustainability of protection (Bekker et al., 2018).

Cost-effectiveness

Economic evaluations are essential to understand the cost-effectiveness of providing PrEP to women and identifying strategies to optimize resource allocation (Haberer et al., 2015)(Eaton et al., 2017).

HIV Incidence Trends

Monitoring trends in HIV incidence among women in regions where PrEP is implemented to assess the population-level impact of PrEP programs (Siegler et al., 2018).

Drug Resistance

Researching the emergence of HIV drug resistance associated with PrEP use in women and strategies to mitigate this risk (Marins et al., 2019). HIV pre-exposure prophylaxis (PrEP) drug resistance is a concern when considering the long-term effectiveness of PrEP medications. PrEP medications (typically tenofovir disoproxil fumarate (TDF) or tenofovir alafenamide (TAF) in combination with emtricitabine (FTC)) work by inhibiting HIV replication in the body. However, if someone becomes infected with HIV while on PrEP, and if they do not adhere consistently to the medication, there is a risk that the virus can develop resistance mutations against the drugs (McCormack et al., 2016).

Risk Factors for Resistance included: missing doses or not taking PrEP as prescribed can allow HIV to replicate and potentially develop resistance. If someone acquires HIV while on PrEP but does not know it (because they are not regularly tested for HIV), they may inadvertently continue using PrEP, which can lead to the emergence of drug-resistant strains. Factors such as

drug interactions, poor absorption, or metabolism issues can lead to suboptimal drug levels in the body, which may not adequately suppress HIV replication, potentially leading to resistance (Flash et al., 2014)(Fonner et al., 2016). HIV can develop resistance mutations that specifically affect the effectiveness of TDF, TAF, and FTC. These mutations can render these medications less effective or ineffective against the resistant strain of HIV.[27] If someone acquires HIV with resistance to PrEP medications, it can limit their options for HIV treatment in the future. Resistance testing is typically done before starting antiretroviral therapy (ART) to guide the selection of effective HIV medications (Krakower & Mayer, 2015).

There were Prevention and Management of PreP resistance, such as: It is essential for individuals using PrEP to undergo regular HIV testing (typically every 3 months) to promptly detect any HIV infection. Early detection allows for timely discontinuation of PrEP and initiation of appropriate HIV treatment (Deutsch et al., 2015)(Collier et al., 2017). Ensuring consistent adherence to PrEP is critical to maintaining protective drug levels in the body and reducing the risk of HIV acquisition. Healthcare providers should offer comprehensive counseling on the importance of adherence, regular HIV testing, and the risk of drug resistance to support informed decision-making and sustained PrEP use (Marcus et al., 2016). For individuals at high risk of HIV who may have adherence challenges, alternative prevention strategies such as long-acting injectable PrEP or event-driven (on-demand) PrEP may be considered under medical supervision.

Intersectional Approaches

Recognizing and addressing how race, socioeconomic status, geography, and other intersecting identities affect PrEP access, adherence, and outcomes among women (Koechlin et al., 2017)(Liu et al., 2016). Overall, ongoing research is critical to tailor effective PrEP strategies that meet the specific needs of women at risk of HIV, improving health outcomes and reducing HIV transmission in this population. Conducting research on HIV pre-exposure prophylaxis (PrEP) in women involves several strategic considerations to ensure thorough investigation and meaningful outcomes (Beymer et al., 2018). The strategies include define specific research questions and objectives that address gaps in knowledge related to PrEP use in women (Tetteh et al., 2017). This clarity helps in designing focused studies. Choose Appropriate Study Design. Define the target population of women (e.g., age groups, geographic locations, risk profiles) to ensure the findings are relevant and applicable to specific subgroups. Obtain ethical approval and ensure the research respects participant autonomy, confidentiality, and safety. Address sensitive issues such as stigma and discrimination (Cáceres et al., 2015)(Coelho et al., 2019). Collaborate across disciplines (e.g., medicine, public health, social sciences) to incorporate diverse perspectives and methodologies, enhancing the comprehensiveness of research outcomes. Involve community stakeholders, including women at risk of HIV, advocacy groups, and healthcare providers, in study design, implementation, and dissemination (C. Celum et al., 2014)(Seifert et al., 2015). This ensures relevance and uptake of findings. Develop robust methods to monitor adherence to PrEP among study participants, such as electronic monitoring devices, self-reporting tools, and biological markers. Implement systems for monitoring and managing adverse events related to PrEP use among women, including regular clinical assessments and reporting mechanisms (Wood et al., 2017)(Calabrese et al., 2016). Incorporate assessments of behavioral and social determinants influencing PrEP uptake and adherence, such as stigma, gender dynamics, and healthcare access barriers (Walters et al., 2017). Utilize rigorous data analysis techniques appropriate for the study design and ensure timely dissemination of findings through peer-reviewed publications, conferences, and policy briefs. Plan for long-term follow-up of participants to assess sustained effectiveness, safety, and behavioral impacts of PrEP use among women. Strategize resource allocation for research activities, including funding, personnel, and infrastructure, to support the successful implementation of the study (Calabrese et al., 2019)(ANTIRETROVIRAL, 2015). By carefully implementing these strategies, researchers can effectively contribute to the evidence base on HIV PrEP in women, informing policies, clinical guidelines, and interventions aimed at

reducing HIV transmission and improving health outcomes in this population (Montgomery et al., 2016)(Marrazzo et al., 2015).

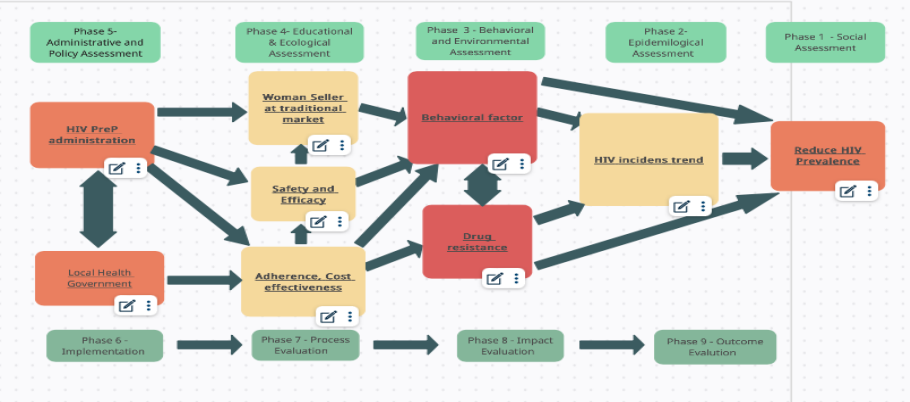

Figure 4. Theorytical model of PreP use among woman

CONCLUSION

In conclusion, PrEP is a highly effective HIV prevention tool for women when used consistently and as directed. Adherence, along with addressing behavioral, biological, and social factors, plays a crucial role in its effectiveness. Adherence to PrEP among women is influenced by a combination of factors related to healthcare access, support systems, individual perceptions, and daily routines. By addressing these factors and providing comprehensive support, healthcare providers can help maximize the effectiveness of PrEP in preventing HIV infection among women at risk. while HIV PrEP is highly effective when used correctly, the risk of drug resistance underscores the importance of regular monitoring, adherence support, and comprehensive counseling to maximize its effectiveness in HIV prevention efforts.

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