EXPLORING BARRIERS TO ANTIRETROVIRAL THERAPY ADHERENCE AMONG PREGNANT WOMEN: A SCOPING LITERATURE REVIEW

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Key Words: Factors OR Barriers; pregnant women living with HIV; Adherence to antiretroviral therapy ART.

SYNOPSIS: ART adherence barriers in pregnant women includes side-effects, efficacy doubts, social-economic status, unsupportive partners, HIV status non-disclosure, stigma, discrimination, domestic violence, cultural and religious beliefs.

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ABSTRACT

Background: Antiretroviral therapy (ART) is one of the most effective ways of preventing HIV-related maternal mortality. However, the rates of retention in care and long-term adherence remain extremely low.

Objective: The aim of this study was to explore barriers to antiretroviral therapy adherence among pregnant women.

Search strategy: The search for articles was conducted using EBSCO Host, PubMed, Google scholar, and Cumulative Index of Nursing and Allied Health Literature (CINAHL).

Selection criteria: The studies included were conducted between 2000 and 2020 and covered barriers to antiretroviral therapy.

Data collection and analysis: Data was collected from 8 selected articles and analyzed using Arksey and O'Malley five stages framework.

Main results: Barriers to antiretroviral therapy adherence included side effects of the therapy and financial constraints limiting access to food, transport, and medication. Other barriers included cultural and religious factors, lack of spouse support, stigma, and discrimination.

Conclusion: There is need to support pregnant women undergoing antiretroviral therapy to mitigate barriers associated with the uptake of the therapy.

BACKGROUND

There has been significant global progress in the fight against maternal mortality over the years [1]. For instance, MMR's global maternal mortality ratio was estimated at 211 in 2017, representing a 38% decline since 2000 [2]. Despite this progress, the consistency and the pace of progress are what is of concern. If the pace of progress accelerates enough to achieve the Sustainable Development Goal target (reducing global MMR to less than 70 per 100 000 live births), it will save the lives of at least one million women [2]. However, globally, HIV and complications related to pregnancy remain among the causes of death for women of reproductive age [3, 4]. In 2013 HIV accounted for maternal deaths with approximately 12 percent of deaths during pregnancy and up to 1-year postpartum in regions with a 2% HIV prevalence among pregnant women [5]. The percentage of deaths quoted above rises to 50% in regions with a prevalence of 15% [5]. In addition, pregnant women living with HIV are ten times at risk of dying during pregnancy and postpartum than pregnant women living without HIV [5]. In 2011, HIV-related causes contributed to between 19 000 and 56 000 maternal deaths [6], accounting for between 6% and 20% of maternal deaths globally.

In HIV pregnant women, the use of antiretroviral therapy (ART) is one of the most effective ways of preventing HIV-related maternal mortality [7]. Adherence to ART of 95% is required to achieve effective viral suppression [8,9,10] and lower the rate of opportunistic infections [11]. Non-adherence is related to the development of ART resistance [12], progression to AIDS [13], and death [14]. According to United Nations Joint Programme on HIV/AIDS [15], between 2010 and 2018, 1.4 million HIV

infections among children were prevented due to PMTCT intervention, and adherence to ART by the mother was at the core of the interventions.

Although ART is increasingly available in the public health facilities of most countries with improvement in access to treatment, the rates of retention in care and long-term adherence remain extremely low [16, 17]. Hence the advocacy for adherence to ART for reduction of HIV - related maternal mortality to be realized. Without adherence, the impact of ART in the elimination of HIV- related maternal mortality will not be feasible.

The majority of maternal deaths are preventable through appropriate management of pregnancy and care at birth, including antenatal care by trained health providers [2]. Pregnant women experience more contact time with health care providers from the time conception is confirmed till delivery [2]. However, despite this seemingly sufficient time when health challenges could be managed, these women continue to die from HIV-related causes (as indicated in statistics above). According to Lozano. R et al. [6] many of these deaths can be prevented with the implementation of high-quality obstetric care, prevention and treatment of common co-infections, and treatment of HIV with ART. In light of the above assertions of this study were set to explore barriers to antiretroviral therapy adherence among pregnant women.

2. MATERIALS AND METHODS

We conducted a scoping review of both qualitative and quantitative evidence of factors affecting adherence to antiretroviral therapy in pregnant women using Arksey

and O'Malley five stages framework to guide the scoping review [18]. The five stages followed are:

1. Identification of the research question;
2. Identification of relevant studies;
3. Selection of studies;
4. Data abstraction (charting of the data); and
5. Data analysis and reporting of results.

The review was conducted in June and July 2021 using the following subject databases: EBSCO Host, PubMed, Google scholar, and Cumulative Index. Both peer-reviewed journal articles and gray literature were searched to identify eligible studies while using key terms to ensure consistency of searches in each database: Population of interest (i.e., pregnant women living with HIV); Intervention of interest (i.e., Antiretroviral therapy); Outcomes of interest (i.e., adherence). Two limiters were applied in all the databases. These included the use of the English language and articles published in the last 20 years.

To maximize the breadth of the study findings, included articles were those that reported empirical qualitative or quantitative findings relevant to the review topic, "barriers to antiretroviral therapy adherence among pregnant women."

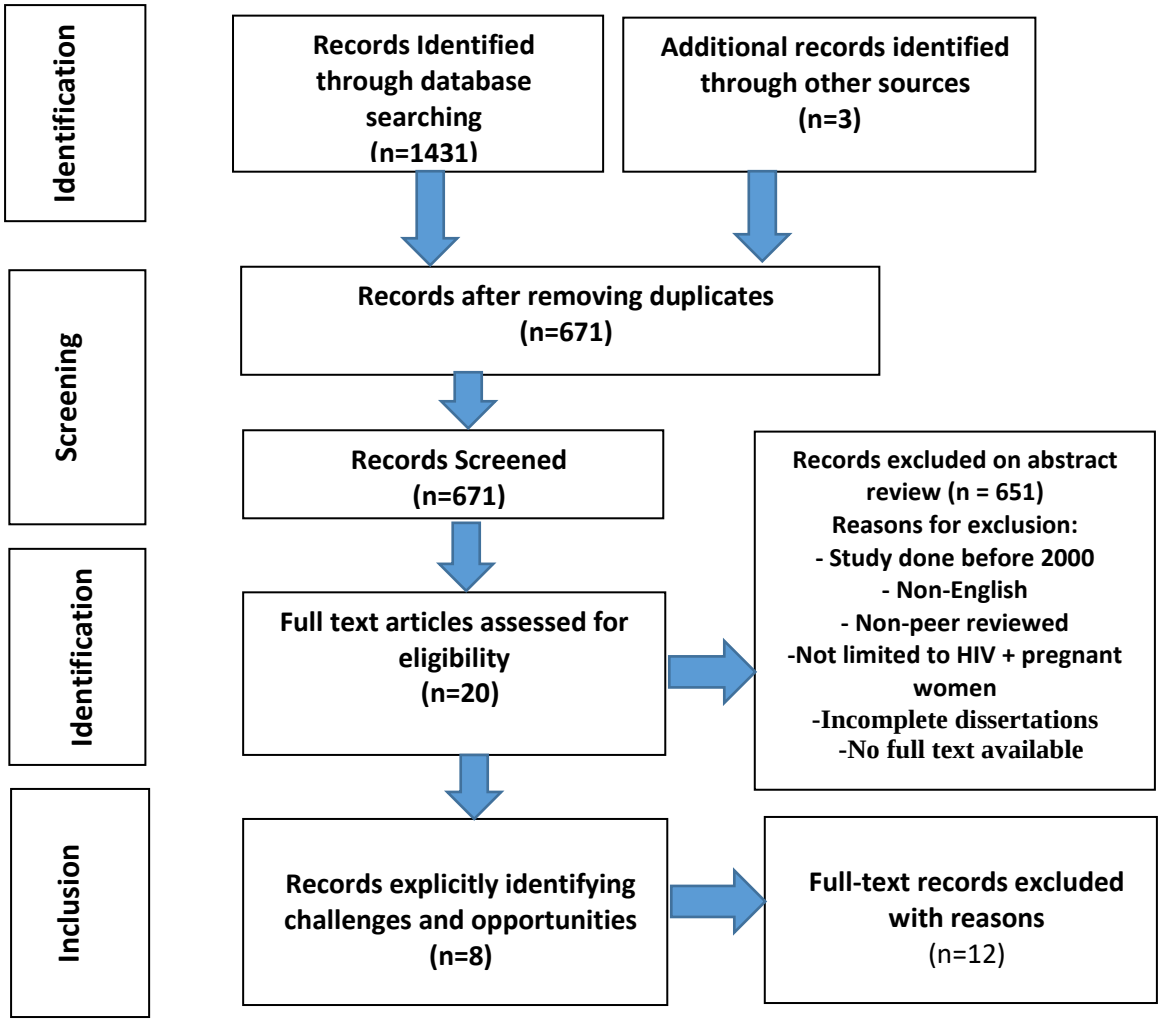
- Studies from low, middle-income as well as high-income countries around the globe were included; both studies were conducted in community or health system settings.
- Studies that were conducted between 2000 and 2020.
- Studies that described health systems-related factors as well as community (from the woman's perspective or experience) related factors.

Studies were excluded if;

- They were done on broader cohorts of people living with HIV despite reporting relevant factors affecting adherence to antiretroviral therapy.
- They were done on pregnant women living with HIV but did not report of factors affecting adherence to antiretroviral therapy.

Studies were selected for review in two stages. The first two authors aggregated a total of 1,431 literature obtained from the database search. Three records were further identified from gray literature. Following the removal of duplicates, the pool was left with 671 articles, which were considered for the scoping review. All the abstracts of the considered articles were screened, which resulted in the exclusion of 651 articles. The remaining 20 articles were identified as relevant for use in the scoping review. The third authors matched them against the inclusion and exclusion criteria, identified discrepancies, discussed with the other authors, and resolved them. A total of eight articles were judged to meet the prescribed criteria after screening the full articles. The PRISMA diagram in Figure 1 outlines the stages involved in the process of literature search and the subsequent results.

Figure 1: PRISMA Flow of Literature Search and Selection Process



Upon completion of the study selection process, data abstraction was initiated by the first author and verified by the second author. Discrepancies in the results were resolved by the other two author. Table 1 below shows the characteristics of the included studies. The majority of the articles were from Africa n = 5 (62.5%), one was from Indonesia, one from Guyana and the United States of America. The majority of the articles were qualitative n = 6 (75%); n=1 (12.5%) was quantitative, while the remaining one was mixed-methods.

Table 1. Characteristics of studies in the literature review (n = 8)

Authors	Country	Phenomena of Interest	Methods	Key Informants
Chadambuka et al. (2018)	Zimbabwe	Acceptability of lifelong treatment among HIV-positive pregnant and breastfeeding women	Qualitative (n= not specified)	Mothers living with HIV/ Health care workers
Kim et al. (2016)	Malawi	Barriers and Facilitators to uptake and Adherence to ART in Option B+ HIV Care	Qualitative (n= 65)	Mothers living with HIV
Lumbantoruan et al. (2018)	Indonesia	Understanding women's uptake and adherence in Option B+ for prevention of mother-to-child HIV transmission	Qualitative (n= 40)	Mothers living with HIV / Health care workers
Mepham et al. (2011)	South Africa, Kenya & Bukina faso	Factors affecting adherence to antiretroviral therapy among pregnant women	RCT (n= 143)	Mothers living with HIV
Opondo et al. (2011)	Kenya	Reasoning and deciding PMTCT-adherence during pregnancy among women living with HIV	Qualitative (n= 28)	Mothers living with HIV
Sariah et al. (2019)	Tanzania	Perspective of women lost to follow-up in Option B+ HIV care	Qualitative (n= 30)	Mothers living with HIV
Vitalis et al. (2017)	Guyana	Antiretroviral Adherence Perspectives of Pregnant and Postpartum Women	Qualitative (n= 24)	Mothers living with HIV / Health care workers
Zahedi et al. (2018)	USA	Perceived Barriers to Antepartum HIV Medication Adherence	Quantitative (n= 45)	Mothers living with HIV

The barriers identified were categorized thematically within an Excel template (Table 2): individual, interpersonal, and community. The review authors reviewed this template for accuracy and comprehensiveness. The intention of the analysis process

was to group factors as they have been reported as affecting adherence to ART outcomes for pregnant women. The intention, therefore, is not to provide a rich explanatory model for how each of these factors might work or develop a global theory of factors that affect adherence to ART [19]. Rather, the analysis is intended to provide policymakers and practitioners with a roadmap for how to think about and where to look for the factors that might shape pregnant women's access to ART. Articles were -coded on this template to help align the contribution they made to the specific themes [20].

Table 1 above provides information on each of the studies reviewed, including each study's location, population size, type of study, and key informants. Six studies used qualitative methods, one used quantitative methods, and one employed both qualitative and quantitative methods. Most study participants were pregnant women living with HIV or postpartum women, while three studies included responses from health care workers who provide ART to pregnant women. All the studies utilized data from in-depth interviews (IDIs) from key informants (KIs), while two added the use of focus group discussions (FGDs), and one added the aspect of observation of clinical charts and review of clinical records. Despite the methodological differences and geographical locations of the studies analyzed, a common thread was noted throughout the phenomena of interest identified, as shown in Table 2 below.

Similar barriers emerged from a variety of settings repeatedly and reflected commonalities across population groups. Therefore, we identified seven themes from the studies, which include Severe ART side effects; Low socio-economic status; Cultural & religious beliefs; Unsupportive partners; Non-disclosure of HIV status; Stigma & discrimination, and distance to the health facility.

Table 2. Summary of Barriers to ART therapy adherence in pregnant women, by category and outcome of interest themes.

Author	Individual related barriers				Interpersonal level barriers			Community related barriers
	Severe ART Side effects	Doubts about ART Efficacy	Low socio-economic status	Cultural &Religious beliefs	Unsupportive partners	Non-disclosure of HIV status	Domestic Violence	Stigma & Discrimination
Chadambuka et al. (2018)	✓				✓	✓		
Kim et al. (2016)	✓	✓	✓	✓	✓			✓
Lumbantoruan et al. (2018)	✓	✓			✓	✓	✓	✓
Mepham et al. (2011)			✓		✓	✓	✓	✓
Opondo et al. (2011)					✓			✓
Sariah et al. (2019)	✓		✓	✓	✓	✓	✓	✓
Vitalis et al. (2017)	✓		✓	✓		✓		✓
Zahedi et al. (2018)	✓	✓	✓					

3 RESULTS

The study revealed that the common barriers to antiretroviral adherence include Severe ART side effects, Low socioeconomic status, cultural and religious beliefs, Unsupportive partners, Non-disclosure of HIV status, Domestic violence, and HIV stigma & discrimination. Table 2 provides a succinct analysis of the identified themes and each study contribution. The themes of severe ART side effects, Low socio-economic status and stigma and discrimination were found in nearly all articles n=6 (75%), while that of distance to the health facility was not that prominent n=2 (25%).

Theme 1: Severe side effects of antiretroviral therapy

The most commonly investigated barrier in articles under review n=6 (75%) was severe side effects of the antiretroviral therapy (ART). Medication side effects were one of the primary reasons given for non-adherence, and all the six studies women

indicated that side effects were intolerable, ranging from mild or moderate (feeling faint, drowsiness, headache, and upset stomach) to quite severe (vomiting, diarrhea, feeling intoxicated, and nightmares) [20-26]. Some women stopped taking the medication (ART) in a particular study because side effects made them feel worse than before they started treatment. And this made them question the efficacy of ART. One woman, for instance, felt that the medicine made her feel so weak that she was unable to do basic household chores [21]. Additionally, others were worried about the outcome of their financial status because they could not continue engaging in income-generating activities due to medication side effects which could not allow them to work [23].

Theme 2: Doubts about ART Efficacy

Three articles revealed that lack of confidence in ART efficacy promoted non adherence to the therapy [23, 24, 28]. Some women believed that ART was harmful to themselves and their unborn babies [28] and some women discontinued the therapy after experiencing ART side effects, leading to doubts in the efficacy of the treatment [23]. In a different study, it was observed that while the women accepted ART, members of the community demonstrated lack of information about its benefits and consequently discriminated against those who took up the therapy [21].

Theme 3: Low socio-economic status

Most articles n=5 (62.5%) reported similar views regarding low socio-economic status contributing to antiretroviral therapy adherence failure. In two articles, some participants were unemployed, and they could not afford transport to go and have a refill for their medication [20,23]. Others complained about the inability to buy food because of the poor economic status [21, 23, 25, 27]. With a shortage of food, they

could not take their medication as required. One article, however had a unique presentation of low socio-economic status in the form of lack of insurance to cover the medication [26]. Both patients and health care staff indicated that inadequate food and lack of finances were deterrents to adherence [23].

Theme 4: Cultural &Religious beliefs

In three articles, religious faith was mentioned as one of the reasons that made other participants stop taking their medications and attending the clinic. These women believed that only prayers could cure them of HIV infection [21, 23, 25]. In addition, one article revealed that a few women believed that there was an indigenous cure, as a pregnant woman hoped to travel to the hinterland to be cured by an indigenous person (Amerindian), but only once the baby was born in case the ‘‘cure’’ was harmful [23]. Some postpartum women’s beliefs that religion would cure them resulted in non-adherence to their medication. These women hoped to be healed by God and attended churches where pastors boasted of their ability to heal those having the disease, as described by a health care provider [25]. One woman stopped ART for one year to try healing through prayers. She explained that after reading a biblical verse about God’s ability to heal, she “decided that God would be the one to heal [21].

Theme 5: Unsupportive partners

Another important barrier to ART adherence exhibited in more than half n = 6 (75%) of the included articles was the lack of partner support [21 - 25, 29]. Some women reported fear of disclosing their status to their husbands because of their obstructive behavior, such as throwing away the pills [23]. In one study, a participant explained how influential male partners are in making decisions in women’s lives. When men

do not understand ART, they may try to force their female partners to make incorrect decisions. Men may tell their spouses to stop taking HIV medicine if they think they look healthy [21]. Although partner support was factored into women's decision-making, in most cases, it was not the main consideration for one article [23]. Many women did not return to the clinic even though their partners accepted their status. One woman, for instance, took the money her husband gave her for transport to the clinic and spent it on other things [23].

Theme 6: Non-disclosure of HIV status

Non-disclosure of women's HIV status to their partners or significant others was a weightier matter cutting across five articles resulting in a cascade of other perceived barriers [21, 24 -25, 27, 29]. In a study done by Vitalis et al., [27], health care providers explained that non-disclosure contributed to non-adherence. One had to hide and sneak to use the medication whenever there are people who are not aware of the HIV status. Out of fear of rejection and HIV-related stigma, some participants explained that they stopped taking their medication because they had not disclosed to their male partners or other family members about their HIV-positive status [25]. The lack of disclosure made it difficult to continue taking the medication or attending the clinic without being noticed or asked questions by their male partners or other family members.

Theme 7: Stigma & Discrimination

The majority of articles, reported that stigma and discrimination played a role in women's poor adherence to ART. Most of them cited the fact that some clients (pregnant women living with HIV) stopped ART because they were scared of being identified and labeled as HIV-positive by their family members and neighbors, which

could have led to stigma and discrimination [22 - 25, 27, 29]. Some had to travel to the farthest health facility away from their residencies just to avoid meeting people who would recognize them [25]. Interestingly one article noted that stigma and discrimination were not generally a common barrier in that setting. In fact, it reported that many participants felt that ART alleviated physical symptoms of being HIV-positive to an extent that they were much less visible [21]. And that in itself broke the distinction that necessitate stigma and discrimination based on patient appearance [21].

Theme 8: Domestic Violence

Three studies reported how domestic violence or family conflicts have contributed to women's sub-optimal adherence to ART [24, 25, 29]. One study cited, for example, how conflicts between a patient and her in-laws led to anger that finally resulted in stopping the treatment [25]. Furthermore, in cases of discordant couples (case in point, male being HIV negative while the woman is HIV positive), some male partners brought conflicts in the family, leading to couple separation and spouse neglect. Once the couple was separated, the women could not afford to cater for their daily needs, including food and transport fees to the clinic; hence they dropped out of the ART [25].

4 DISCUSSION

This review identified a wide range of individual, interpersonal, and community-related barriers that affect antiretroviral therapy (ART) adherence in pregnant women living with HIV. The findings suggested broad areas of intervention for this population, and these are discussed below.

Many studies reported a lack of adherence related to side effects of antiretroviral drugs. For example, some participants expressed their displeasure with their terrible experiences after starting ART [25]. This review did not assess whether women received adequate counseling on side effects of ART prior to starting, therefore making no general finding about counseling thereof. This review made an inference that there is a gap in inadequate counselling on side effects of ART prior to starting, and this continues to act as a barrier to critical adherence and highlights the need for improving the provision of adequate information to clients seeking ART during adherence counselling sessions. Though this indirect barrier is there, a promising way forward, is strengthening adherence counselling, especially on anticipating side effects of the drugs. This is considered one of the most effective interventions to achieve significant adherence levels [2,30].

Closely related to the problem of side-effects was the issue of lack of confidence in ART efficacy. This study revealed that lack of knowledge of the benefits of ART was one of the barriers to adherence to the therapy. Similarly, [31] found that HIV positive women deficient in PMCT and ART knowledge recorded a significantly higher default rate than those with sufficient knowledge [31] also found that HIV, PMCT and ARTs knowledge coupled with practices affected motivation and uptake of ART and concluded that the level of ART and PMCT education among HIV positive women was a factor in adherence to ART. In view of the above, community health workers must embark on raising awareness about the benefits of ART [21]. A program to monitor and encourage application of ART knowledge is also recommended.

Another common individual-related barrier was low socio-economic status, which included aspects of failure to obtain adequate food supplements to make up a good diet to support treatment, failure to afford transport costs to and fro the health facility, and inability to sustain health insurance scheme. Our findings indicate that women would greatly benefit from the support that would develop linkages to organizations, such as non-governmental organizations and faith-based organizations that help provide social amenities and empower communities with skills and knowledge on self-reliance. If harnessed properly, these skills are sustainable and will empower these women for a lifetime and subsequently ameliorate poverty.

Other barriers under this category included religious and cultural beliefs. Some participants expressed the value in prayer to heal their ailments and the ability of traditional healers to cure HIV. This barrier in this review was only reported by three studies that were done in Africa. One of the studies indicated that participants who cited this barrier later abandoned their choice (following religion instead of ART) later and started treatment upon experiencing opportunistic infections that deteriorated their health [25] Religion and cultural issues are most contentious therefore, there is a need to explore this subject further in order to understand how they impact adherence to treatment.

This review showed that, “non-supportive partners” was another crucial barrier. Having a non-supportive partner was a recipe for domestic violence, which negatively affected adherence to ART. However, domestic violence was perpetrated by other family members too. With some participants it was fueled by disclosure of HIV status; therefore some participants in some studies opted not to disclose their

HIV status to partners because they feared significant negative consequences. This meant that these women would only use clandestine ways to carry out their daily treatment plans, which proved very difficult in most cases. We assumed that women who chose to disclose to their partners already had stronger support systems in comparison to those who did not. And that these stronger support systems in themselves arguably promote ART adherence. There were limited interventions identified in this review that specifically addressed the role of stronger cohesion among families as well as interpersonal relationships. Therefore, there is a need to institute interventions to focus on supporting counseling for women who have challenges disclosing their status to their partners and couple counseling, which would foster communication among couples [32].

At community level, stigma and discrimination both experienced and perceived was another barrier to ART adherence among pregnant women. Other reviews have also found stigma to significantly influence on ART initiation and adherence [33]. These findings could be influenced by basic misunderstandings about HIV and AIDS that still persist globally; case in point, UNAIDS' 2010 Global Report on the AIDS Epidemic found that, in 15 of the 25 countries with the highest HIV prevalence rates, less than half of young people could answer five basic questions about HIV correctly [15]. Against such a background, we assert that misunderstandings about HIV/AIDS and subsequently the value of ART may contribute to stigma and discrimination towards women living with HIV in the community. These findings highlight the need for aggressive interventions focused on raising awareness about the dreadful impact of stigma and discrimination towards pregnant women living with HIV [34, 35].

The strengths of this review lie in the design, which included an inclusive search strategy that broadened coverage, data extraction done by several researchers, and iterative analysis. Limitations in the review design include the non-inclusion of studies done in languages other than English. Another limitation is time resources which prevented more exhaustive searches of the gray literature that could have yielded more valuable information. Finally, studies reviewed constituted views of participants recruited from current clinic attendees as well as health care providers but did not include the views of women who had dropped out of care or those that did not even enroll in the ART program. These groups of women would more likely have been confronted with different barriers than those described here.

In this scoping review, most studies only highlighted mainly barriers that are patient-related. However, there is a need to explore factors that relate to the health institution systems as well. In addition, the studies that enlisted individual religious and cultural factors exhibited a narrow examination of alternative treatment-seeking, which is largely influenced by health and religious beliefs. Alternative treatment-seeking, particularly for traditional medicine, is widely practiced in many countries with high HIV prevalence [36], but these choices were not fully addressed within the reviewed studies; therefore future studies should focus on this area.

This scoping review has highlighted how some barriers such as severe side effects of ARVs may be addressed. For example using a multi-sectoral approach to confront the barriers where the client is at the center in making decisions. There is a need to continue strengthening ART in routine Antenatal care and linkages with other sectors in the community.

The use of ART to prevent avoidable maternal mortality among pregnant women living with HIV will succeed if; factors that derail its progress are clearly identified, strategies to manage these barriers are put in place, implemented, and then monitoring the outcomes. Such strategies should be locally acceptable by the end user (pregnant women living with HIV) and are responsive to their needs.

Author Contributions

Mwamba Kalungwe (Corresponding author): Contributed to the design of the work, data search, result analysis, and discussion of findings. Drafted and revised the article. Approved final version and agrees to be accountable for all aspects of this work and ensure that questions related to the accuracy and integrity of any part of the work are appropriately investigated and resolved.

Mbalinda Scovia Nalugo: Contributed to the design of the work, revised the article and approved final version and agrees to be accountable for all aspects of this work and ensure that questions related to the accuracy and integrity of any part of the work are appropriately investigated and resolved.

Karonga Thamary: Contributed to the design and drafting the work, discussion of findings, revision and approved final version and agrees to be accountable for all aspects of this work and ensure that questions related to the accuracy and integrity of any part of the work are appropriately investigated and resolved.

Simwanza Rean Niza: Contributed to the design and drafting the work, discussion of findings, revision and approved final version and agrees to be accountable for all aspects of this work and ensure that questions related to the accuracy and integrity of any part of the work are appropriately investigated and resolved.

Mtambo M. Mumba Catherine: Contributed to the design and drafting the work,

discussion of findings, revision and approved final version and agrees to be accountable for all aspects of this work and ensure that questions related to the accuracy and integrity of any part of the work are appropriately investigated and resolved.

Nyashanu Mathew: Contributed to the design of the work, drafted and revised the article. Approved final version and agrees to be accountable for all aspects of this work and ensure that questions related to the accuracy and integrity of any part of the work are appropriately investigated and resolved.

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Conflict of interest

The authors declare no potential conflict of interest with respect to this research, authorship and publication of this article.

References

1. World Health Organization. Health Topics [WHO website] Statistics 2017. https://www.who.int/health-topics/maternal-health#tab=tab_1 Accessed June 2, 2021.
2. World Health Organization. Trends in maternal mortality [WHO website] 2019. https://apps.who.int/iris/bitstream/handle/10665/327596/WHO-RHR-19.23-eng.pdf?ua=1. Accessed June 2, 2021.
3. Abdool-Karim Q, Abouzahr C, Dehne K, Mangiaterra V, Moodley J, Rollins N, Say L, Schaffer N, Rosen JE, de Zoysa I. HIV and maternal mortality: turning the tide. Lancet. 2010 Jun 5;375(9730):1948-9. doi: 10.1016/S0140-6736(10)60747-7. PMID: 20569827.
4. Avert. Global information and education on HIV and AIDS [Avert website] 2020. https://www.avert.org/professionals/hiv-social-issues/key-affected-populations/women. Accessed June 5, 2021.
5. Calvert, Clara, and Carine Ronsmans. “The contribution of HIV to pregnancy-related mortality: a systematic review and meta-analysis.” AIDS (London, England) vol. 27, 10 (2013): 1631-9. doi:10.1097/QAD.0b013e32835fd940
6. Lozano R, Wang H, Foreman KJ, Rajaratnam JK, Naghavi M, Marcus JR, et al. Progress towards Millennium Development Goals 4 and 5 on maternal and child mortality: an updated systematic analysis. Lancet. 2011; 378(9797):1139–65. [PubMed: 21937100]

7. Liotta G, Mancinelli S, Nielsen-Saines K, Gennaro E, Scarcella P, et al. (2013) Reduction of Maternal Mortality with Highly Active Antiretroviral Therapy in a Large Cohort of HIV-Infected Pregnant Women in Malawi and Mozambique. PLoS ONE 8: e71653
8. Turner BJ. Adherence to antiretroviral therapy by human immunodeficiency virus-infected patients. J Infect Dis. 2002;185 Suppl 2:S143-S151. doi:10.1086/340197
9. Haas AD, Msukwa MT, Egger M, et al. Adherence to Antiretroviral Therapy During and After Pregnancy: Cohort Study on Women Receiving Care in Malawi's Option B+ Program. Clin Infect Dis. 2016; 63(9):1227-1235. doi:10.1093/cid/ciw500
10. Bisson GP, Gross R, Bellamy S, Chittams J, Hislop M, Regensberg L, Frank I, Maartens G, Nachega JB. Pharmacy refill adherence compared with CD4 count changes for monitoring HIV-infected adults on antiretroviral therapy. PLoS Med. 2008 May 20;5(5):e109. doi: 10.1371/journal.pmed.0050109. PMID: 18494555; PMCID: PMC2386831.
11. Paterson DL, Swindells S, Mohr J, et al. Adherence to protease inhibitor therapy and outcomes in patients with HIV infection [published correction appears in Ann Intern Med 2002 Feb 5;136(3):253]. Ann Intern Med. 2000;133(1):21-30. doi:10.7326/0003-4819-133-1-200007040-00004
12. Harrigan PR, Hogg RS, Dong WW, et al. Predictors of HIV drug-resistance mutations in a large antiretroviral-naive cohort initiating triple antiretroviral therapy. J Infect Dis. 2005;191(3):339-347. doi:10.1086/427192
13. Bangsberg DR, Perry S, Charlebois ED, Clark RA, Roberston M, Zolopa AR, Moss A. Non-adherence to highly active antiretroviral therapy predicts

progression to AIDS. AIDS. 2001 Jun 15;15(9):1181-3. doi: 10.1097/00002030-200106150-00015. PMID: 11416722.

14. Hogg RS, Heath K, Bangsberg D, et al. Intermittent use of triple-combination therapy is predictive of mortality at baseline and after 1 year of follow-up. AIDS. 2002;16(7):1051-1058. doi:10.1097/00002030-200205030-00012
15. UNAIDS (2018) Miles to go: global AIDS update 2018. https://www.unaids.org/sites/default/files/media_asset/miles-to-go_en.pdf
16. Moodley D, Esterhuizen T, Reddy L, Moodley P, Singh B, et al. (2011) Incident HIV infection in pregnant and lactating women and its effect on mother-to-child transmission in South Africa. J Infect Dis 203: 1231–1234.
17. Moodley J, Pattinson RC, Baxter C, Sibeko S, Abdool Karim Q (2011) Strengthening HIV services for pregnant women: an opportunity to reduce maternal mortality rates in Southern Africa/sub-Saharan Africa. BJOG 118: 219–225
18. Hilary Arksey & Lisa O'Malley (2005) Scoping studies: towards a methodological framework, International Journal of Social Research Methodology, 8:1, 19-32, DOI: 10.1080/1364557032000119616
19. Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101. https://doi.org/10.1191/1478088706qp063oa
20. Aveyard, H, Sharp, P (2013) A Beginner's Guide to Evidence Based Practice in Health and Social Care. Maidenhead, UK: Open University Press. Google Scholar
21. Chadambuka A, Katirayi L, Muchedzi A, Tumbare E, Musarandega R, Mahomva AI and Woelk G (2018) Acceptability of lifelong treatment among

HIV-positive pregnant and breastfeeding women (Option B+) in selected health facilities in Zimbabwe: a qualitative study. BMC Public Health 18:57 DOI 10.1186/s12889-017-4611-2

22. Awiti U O, Ekstro¨ma MA, Ilakob F, Indaloc D, Wamalwad D and Rubenson B (2011) Reasoning and deciding PMTCT-adherence during pregnancy among women living with HIV in Kenya. Taylor & Francis DOI: 10.1080/13691058.2011.583682 http://www.informaworld.com

23. Kim MH, Zhou A, Mazenga A, Ahmed S, Markham C, Zomba G, et al. (2016) Why Did I Stop? Barriers and Facilitators to Uptake and Adherence to ART in Option B+ HIV Care in Lilongwe, Malawi. PLoS ONE 11(2): e0149527. doi:10.1371/journal.

24. Lumbantoruan C, Kermode M, Giyai A, Ang A, Kelaher M (2018) Understanding women's uptake and adherence in Option B+ for prevention of mother-to-child HIV transmission in Papua, Indonesia: A qualitative study. PLoS ONE 13(6):e0198329. https://doi.org/10.1371/journal.pone.0198329

25. Sariah A , Rugemalila J, Protas J, Aris E, Siril H, Tarimo E and Urassa D (2019) Why did I stop? And why did I restart? Perspectives of women lost to follow-up in option B+ HIV care in Dar es Salaam, Tanzania. BMC Public Health 19:1172 https://doi.org/10.1186/s12889-019-7518-2

26. Adeniyi, O.V., Ajayi, A.I., Ter Goon, D. et al. Factors affecting adherence to antiretroviral therapy among pregnant women in the Eastern Cape, South Africa. BMC Infect Dis 18, 175 (2018). https://doi.org/10.1186/s12879-018-3087-8

27. Vitalis D, Hill Z. Antiretroviral Adherence Perspectives of Pregnant and Postpartum Women in Guyana. J Int Assoc Provid AIDS Care. 2017

Mar/Apr;16(2):180-188. doi: 10.1177/2325957416680297. Epub 2016 Dec 19. PMID: 28325130.

28. Zahedi-Spung L, Young M, Haddad LB, Badell ML. Perceived Barriers to Antepartum HIV Medication Adherence in HIV Infected Pregnant Women. Infect Dis Obstet Gynecol. 2018 Oct 16;2018:4049212. doi: 10.1155/2018/4049212. PMID: 30410301; PMCID: PMC6206578.
29. Mephama S, Zondia Z, Mbuyazia A, Mkhwanazia N and Newella M L (2011) Challenges in PMTCT antiretroviral adherence in northern KwaZulu-Natal, South Africa. Taylor & Francis DOI: 10.1080/09540121.2010.516341. http://www.informaworld.com
30. Zambia Consolidated Guidelines for Treatment and Prevention of HIV Infection (2020) Ministry of Health, Lusaka., Zambia
31. Boateng, D., Kwapong, G.D. & Agyei-Baffour, P. Knowledge, perception about antiretroviral therapy (ART) and prevention of mother-to-child-transmission (PMTCT) and adherence to ART among HIV positive women in the Ashanti Region, Ghana: a cross-sectional study. BMC Women's Health 13, 2 (2013). https://doi.org/10.1186/1472-6874-13-2
32. Burton J, Darbes LA, Operario D (2010) Couples-focused behavioral interventions for prevention of HIV: systematic review of the state of evidence. Aids and Behavior 14: 1–10.
33. Turan JM, Hatcher AH, Medema-Wijnveen J, Onono M, Miller S, et al. (2012) The role of HIV-related stigma in utilization of skilled childbirth services in rural Kenya: a prospective mixed-methods study. PLoS Med 9: e1001295

34. Sengupta S, Banks B, Jonas D, Miles MS, Smith GC (2011) HIV interventions to reduce HIV/AIDS stigma: a systematic review. Aids and Behavior 15: 1075–1087
35. Skevington SM, Sovetkina EC, Gillison FB (2013) A systematic review to quantitatively evaluate 'Stepping Stones': a participatory community-based HIV/AIDS prevention intervention. Aids and Behavior 17: 1025–1039.
36. Peltzer K. Utilization and practice of traditional/complementary/alternative medicine (TM/CAM) in South Africa. Afr J Tradit Complement Altern Med. 2009 Mar 7;6(2):175-85. PMID: 20209010; PMCID: PMC2816568.