

Full Length Research Paper

Examining Socioeconomic, Cultural, and Counselling Barriers to Exclusive Breastfeeding in HIV-Positive Mothers Across Sub-Saharan Africa

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The World Health Organization (WHO) recommends exclusive breast-feeding (EBF) for HIV exposed infants for six months; this is considered best practice for reducing mother-to-child transmission of HIV in the postpartum period. This is a scoping review of the barriers affecting women's decision-making and choice to sustain the practice of EBF in sub-Saharan Africa (SSA). An online literature search via PubMed, Science Direct, Google Scholar, WHO and Joint United Nations Programme on HIV and AIDS (UNAIDS) websites identified research studies and reports that explored socio-economic, cultural and infant feeding counselling-related barriers to EBF among HIV-positive mothers in SSA. A total of 341 relevant articles were identified only 35 (23 qualitative, 3 quantitative and 9 mixed methods) met the inclusion criteria. Findings reveal that key barriers to choice and sustained practice of EBF are healthcare workers' personal biases, inadequate counselling skills and guideline knowledge, a culture of mixed feeding norms, and maternal lack of decision-making power and fear of vertical transmission. Transmission of HIV programs in countries where major challenges persist should evaluate and address the identified healthcare worker and community-level factors impeding EBF.

Key words: Africa South of the Sahara, breastfeeding, counselling, cultural norms, socioeconomic, HIV seropositivity, mothers.

INTRODUCTION

In 2014, an estimated 190,000 children were newly-infected with HIV in sub-Saharan Africa (SSA) (USAID, 2015). Mother-to-Child Transmission of HIV (MTCT) occurs during pregnancy, delivery, or post-delivery via

breastfeeding. In the absence of anti-retroviral therapy (ART), prolonged breast-feeding up to 24 months has an estimated 10-16% risk of postnatal transmission (Mioti et al., 1999; Nduati et al., 2000; Berhan et al., 2014). The

World Health Organization (WHO) defines mixed feeding as “breastfeeding with the addition of fluids, solid foods and/or non-human milks such as formula” (WHO, 2008) (Table 1). Mixed feeding is considered responsible for 28 to 50% of HIV infections in children (WHO, 2008; Rollins et al., 2012; USAID, 2013), and is the most common mode of MTCT of HIV in breastfeeding populations (Coutsoudis et al., 2004). Whilst mixed feeding is associated with the highest risk of MTCT (Coovadia et al., 2007; Kuhn et al., 2007), Exclusive Formula Feeding (EFF) still carries the highest risk of infant mortality in low- resource settings (Coovadia et al., 2007; Kagaayi et al., 2008).

Exclusive Breast Feeding (EBF) has the lowest risk of MTCT (Coovadia et al., 2007; Natchu et al., 2012), and is important for the survival of both HIV-exposed and HIV-unexposed infants (Kagaayi et al., 2008; Mwiru et al., 2011; Natchu et al., 2012). The WHO recommend EBF for HIV-exposed infants in low-resource settings for 6 months; and that EBF be combined with complementary feeding from age 6 to 12 months (WHO, 2006; 2010; 2013). These infant feeding recommendations should be practiced in conjunction with maternal ART, whether for infant prophylaxis only or for lifelong maternal treatment.

Although breastfeeding is the usual infant feeding practice across SSA, EBF however is not necessarily the norm and makes adherence to the practice difficult for HIV-positive mothers (Musa, 2011; Chinkonde et al., 2012). Women in SSA breastfeed their infants for an average of 14 to 19 months, but only 30% to 46% of them practice EBF for the first 6 months postpartum (Bbaale, 2014; Traore et al., 2014; Kimani-Murage et al., 2015). In order to promote infant feeding practices that will significantly reduce MTCT, Prevention of Mother-to-Child Transmission of HIV (PMTCT) programs have to transcend simply informing mothers about feeding practices and documenting their choices. These programs will need to accommodate the socio-economic and cultural contexts within which infant feeding decisions are made and practiced. Previous reviews on HIV and infant feeding in SSA have explored associations between breastfeeding and postnatal transmission, and the benefits of EBF versus the health hazards of EFF in low- resource settings (Musa, 2011; Seth, 2012). However only 3 reviews expanded their scope to include social determinants affecting infant feeding practices (Laar et al., 2013; Lazarus et al., 2013; Tuthill et al., 2014). The first review was limited only to South Africa (Lazarus et al., 2013), while the other 2 were systematic reviews conducted with respect to SSA (Laar et al., 2013; Tuthill et al., 2014). In this scoping review, an expanded examination of socioeconomic, cultural and infant feeding counselling-related barriers to the WHO –

recommended EBF was performed. This includes data from the period between the release of the first WHO guidelines on infant feeding (WHO, 2000) and after the consolidated WHO guidelines (WHO, 2015).

METHODOLOGY

This paper is based on an in-depth review of peer-reviewed publications and reports from key international organisations. The review covers the period October 1, 2000 to July 31, 2015. Relevant publications on infant feeding practices and HIV from the websites of the WHO and Joint United Nations Programme on HIV and AIDS (UNAIDS) were included. The literature search was carried out in PubMed, Science Direct and Google scholar. Search key words/terms were as follows: *HIV and exclusive breast feeding; exclusive breastfeeding and cultural factors and HIV and sub-Saharan Africa; healthcare workers and HIV infant feeding; exclusive breastfeeding and cultural factors and HIV and sub-Saharan Africa; infant feeding and socio economic factors and HIV and sub-Saharan Africa; socio economic factors and breastfeeding and HIV; healthcare workers and breastfeeding and HIV*. A total of 341 articles were identified (Figure 1).

Inclusion criteria

Titles of articles were included if the study was conducted in SSA, published between October 1, 2000 and July 31, 2015, and had clearly stated objectives and research methodology. Studies included had at least one, or a combination of the following study participants: Healthcare Workers (HCWs) providing infant feeding counselling in PMTCT programs, HIV-positive mothers, HIV-positive pregnant women, mothers of unknown HIV status, HIV-positive men, men of unknown HIV status, male partners of HIV-positive women or women of unknown HIV status, and family members of unknown HIV status. Retrieved references were imported into a reference manager, and duplicates were excluded. Only literature published in English were included.

Exclusion criteria

Articles were excluded from the selection if they were duplicates, review papers, irrelevant to the study topic or objectives, conducted outside SSA, or published outside the study period. No studies were excluded based on quality; however, limitations of the included studies and of the review findings are highlighted in the discussion section. This paper reviewed existing literature and did not require ethical approval.

RESULTS

Thirty-five (35) articles, comprising 3 quantitative, 23 qualitative and 9 mixed methods met inclusion criteria (Figure 1). Findings were categorized into five major themes: Infant Feeding Guidelines and Counselling Content, Cultural Norms, Socioeconomic Vulnerability,

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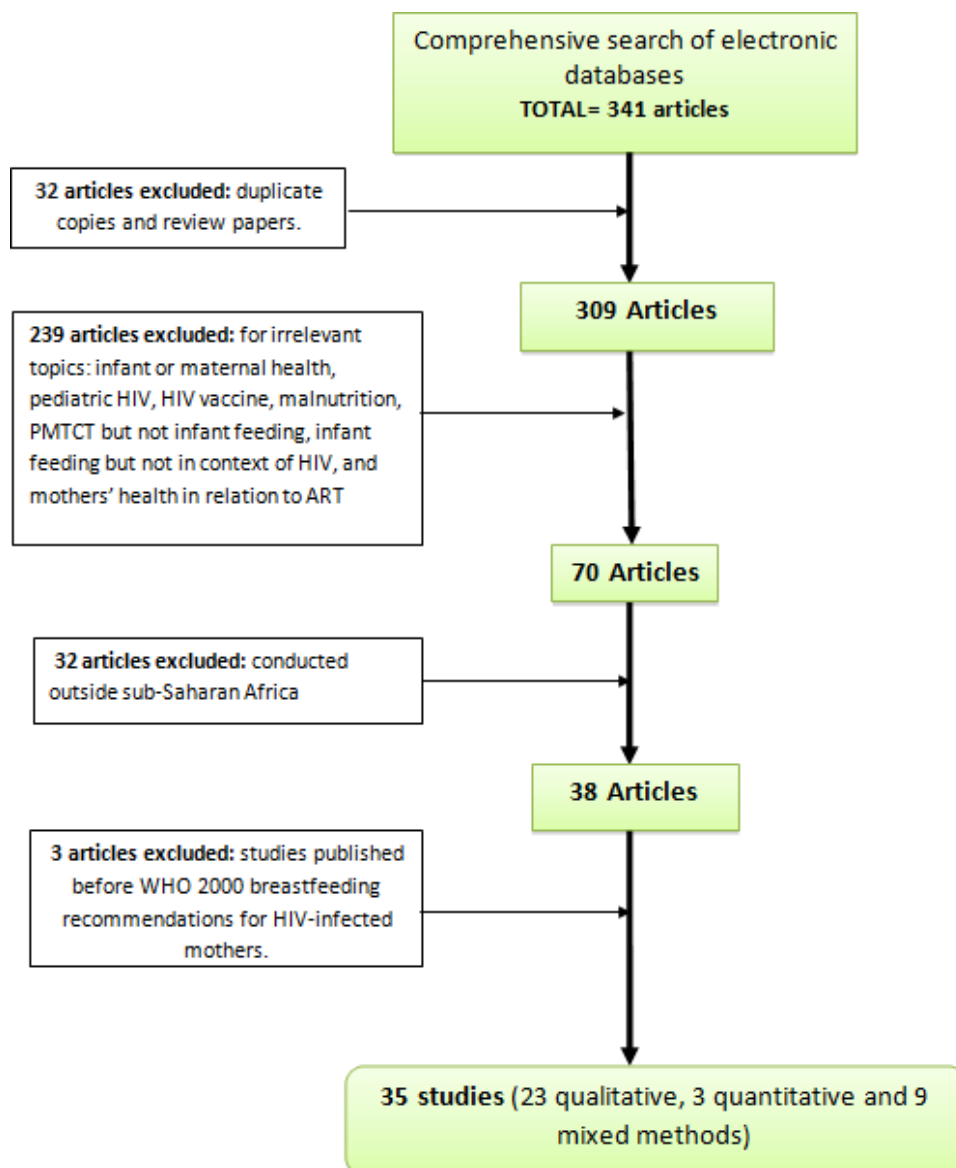


Figure 1. Article Selection Process

Maternal Health, and Maternal Knowledge of Infant Feeding.

Theme 1: Infant feeding guidelines and counselling content

The first WHO guidelines on the use of ARVs in pregnancy and on infant feeding were released in 2000 (WHO, 2000). Major changes with respect to infant feeding in the subsequent WHO guidelines of 2006 and 2010 reflect successive updates based on scientific evidence on HIV and infant feeding (WHO, 2007, 2010). These infant feeding recommendations have not changed

since 2010; though new HIV management guidelines have been developed in 2013 (WHO, 2010, 2013, 2015). In the 2000 guidelines, EBF was recommended within the first few months postpartum (number of months not specified), followed by “abrupt weaning” (WHO, 2007). In both the 2000 and 2006 guidelines the conditions necessary for the practice of EFF were referred to as „Acceptable“, Feasible, „Affordable“, “Sustainable” and „Safe” (AFASS), but the terms not clearly defined (WHO, 2007, 2010). The 2010 guidelines made the “AFASS” criteria clear by defining them in terms of family support, sufficient formula supply, hygienic preparation, and access to safe water and healthcare services. The 2010 guidelines also de-emphasized AFASS, and touted EBF

as the single best infant feeding option for low-resource settings (WHO, 2010). While appropriate, the significantly changing content at relatively short intervals between WHO guidelines afforded little time for country-wide Implementation in resource-limited SSA countries. This included time for changing the previous guideline practices and updating training for health workers. Since the scientific rationale behind these updates are often not eloquently explained to HCWs during training (Shayo et al., 2014), some HCWs were reluctant to change counselling messages either because they did not feel comfortable with the new guidelines or were concerned about losing the women's trust (Chinkonde et al., 2010; Koricho et al., 2010).

Content of healthcare worker-provided infant feeding counselling

Studies have shown that HCWs are likely to give adapted messages based on what they believe to be the best feeding choice for mothers (Tijou- Traore et al., 2009; Wachira et al., 2009; Madiba et al., 2013). For example, some studies have found that EFF was suggested for women of high socio-economic status while EBF was recommended for mothers of low socio-economic status (Koricho et al., 2010; Chinkonde et al., 2012). Research in South Africa and Tanzania also highlight that HCWs were concerned that EBF would be challenging for women they perceived as undernourished (Buskens et al., 2007; Leshabari et al., 2007). Furthermore, in Uganda and Tanzania, HCWs did not advocate EBF for 6 months since they believed the practice was unfeasible for many women who would be leaving their infants at home with caregivers when they resumed work in early postpartum (Leshabari et al., 2006, 2007; Fadnes et al., 2010). Additionally, in Tanzania and Kenya, HCWs advised mothers to practice EBF for only the first 2-3 months postpartum believing that such instructions would keep mothers away from practicing mixed feeding (Leshabari et al., 2006; Wachira et al., 2009). In Ethiopia and Tanzania, HCWs encouraged mothers to choose EFF to prevent MTCT (Koricho et al., 2010).

Message delivery style: Counselling versus instruction on infant feeding

The norm in most developing country healthcare settings is for HCWs to give instructional advice to women, therefore counselling is perceived as a new and challenging concept for both mothers and HCWs (Leshabari et al., 2007). In addition, counselling requires specialised skills and more time for HCW-mother interaction that is difficult to accommodate in healthcare centres that are often understaffed (Chopra et al., 2009; Chinkonde et al., 2010; Fadnes et al., 2010). A number of studies have found that HCWs in Tanzania, Zambia,

Cameroon and Burkina Faso, recommended or simply instructed mothers to practice EFF (Fadnes et al., 2009; Tijou-Traore et al., 2009; Chisenga et al., 2011). A study in Kenya, Malawi and Zambia found that HCW training on infant feeding in PMTCT was biased against breastfeeding (Chopra et al., 2009). Furthermore, insufficient training of HCWs and a lack of reference materials lead to suboptimal delivery of infant feeding counselling with non-standardized messages (Chinkonde et al., 2010; Fadnes et al., 2010).

Mixed messages on infant feeding

Infant feeding guidelines are often complicated for HCWs to understand, so it is expected to be even more confusing for laywomen who may have little formal education. For example, HIV-positive women were informed that breastfeeding is a mode of MTCT, while EBF is a means of prevention, without a clear explanation on the exact risk of transmission through breastfeeding with and without ARVs (Tijou-Traore et al., 2009; Fadnes et al., 2010; Ostergaard et al., 2010). In South Africa, HIV-positive mothers believed breastfeeding and formula feeding could complement one another after observing posters illustrating both breastfeeding and bottle-feeding within the same hospital (Doherty et al., 2006a). In addition, the timing for infant feeding counselling should be considered carefully and not given for example at the time of a new HIV diagnosis (Doherty et al., 2006a; Leshabari et al., 2006). Furthermore, mothers may receive inconsistent information or advice on infant feeding practices from various HCWs in different departments within the same health facility (Doherty et al., 2006a; Chisenga et al., 2011; Chinkonde et al., 2012; Madiba et al., 2013).

Healthcare workers' influence on mothers' choice of infant feeding

Counselling sessions with HCWs are recognised as the primary platforms for mothers to obtain HIV-related information and infant feeding recommendations (Doherty et al., 2006a; Maman et al., 2012). Therefore, HCWs can have a significant influence on mothers' initial feeding choice and practice (Chisenga et al., 2011; Kafulafula et al., 2014). However, studies have found that a significant number of HCWs, including those with relevant training, presented the possibility of MTCT through breastfeeding as a certainty and not a risk, resulting in infant feeding counselling that downplayed EBF (Buskens et al., 2007; Chopra et al., 2009; Kafulafula et al., 2014). The overestimation of breastfeeding-related postnatal MTCT risk by HCWs in several SSA countries either discouraged mothers from practicing EBF, or encouraged them to switch from EBF to EFF in the early postpartum period (Doherty et al., 2006b; Koricho et al., 2010;

Table 1. Definitions of infant feeding methods according to the WHO^a.

Feeding method	WHO definition
Exclusive breast feeding (EBF)	Means an infant receives no other food or drink, not even water, other than breast milk (which can include expressed breast milk), with the exception of drops or syrups consisting of vitamins, mineral supplements or medicines.
Exclusive formula feeding (EFF)	Involves the use of commercial infant formula that is formulated industrially in accordance with applicable Codex Alimentarius standards to satisfy the nutritional requirements of infants during the first months of life up to the introduction of complementary foods.
Mixed feeding	Refers to breastfeeding with the addition of fluids, solid foods and/or non-human milks such as formula.

Reproduced from WHO 2008 HIV Transmission through Breastfeeding: A Review of Available Evidence 2007 Update.

Maman et al., 2012). In Tanzania, except for HCWs that had prior training in HIV and infant feeding policy, all counsellors were in favor of EFF for HIV-exposed infants (Leshabari et al., 2007). Poor-quality infant feeding counselling could result in inappropriate feeding choices among mothers leading to a significantly increased risk of postnatal transmission and infant mortality (Doherty et al., 2007).

Theme 2: Cultural norms

Mixed feeding and influence from family members

A woman's informed choice is not the only factor for successful infant feeding practice in SSA, as male partners and other family members will often weigh in with their own views on what is acceptable or not (Tijou- Traore et al., 2009; Cames et al., 2010; Marembo et al., 2014). A majority of women choose EBF over EFF because of the culturally acceptable norm of breastfeeding, and for mother-infant bonding (Buskens et al., 2007; Hofmann et al., 2009). Nonetheless, adhering to EBF is challenging for many women. Although breastfeeding is a highly valued practice, mixed feeding (see definitions in Table 1), is the norm in most of SSA (Tijou-Traore et al., 2009; Chinkonde et al., 2010; Fadnes et al., 2010). It is therefore not surprising to find that women are often strongly encouraged and even pressurised by family members to follow this practice (Koricho et al., 2010; Madiba et al., 2013; Mataya et al., 2013). In South Africa, 80% of mothers practicing EBF resorted to mixed feeding within the first month postpartum as a consequence of family pressure (Doherty et al., 2006a). Likewise, in Cameroon and Burkina Faso, social pressure made women who initiated EBF, resort to mixed feeding early postpartum (Desclaux et al., 2009). Similarly in Nigeria, pressure from family members accounted for mixed feeding among 43% of 42 women surveyed (Lawani et al., 2014).

Social pressure to mix-feed may extend beyond family.

In Zambia, Chisenga et al. (2011) reported that out of 20 HIV-positive mothers interviewed, 6 (a third) admitted that relatives and neighbors influenced their feeding practices with suggestions that were in contradiction to recommendations from health facilities. Ultimately, mothers who were able to adhere to EBF despite societal pressures either did not fully disclose their EBF practice or developed plausible explanations for not practicing mixed feeding (Tijou-Traore et al., 2009; Madiba et al., 2013; Mataya et al., 2013).

Influence of grandmothers and other matriarchs

Grandmothers and other matriarchs have a strong influence on infant feeding in SSA (Buskens et al., 2007; Cames et al., 2010). Unfortunately, matriarchal advice on mixed feeding is usually given without the awareness of HIV infection and the risk of MTCT (Hofmann et al., 2009; Maru et al., 2009). As such, women living with their mothers or mothers-in-law are more likely to mix feed (Doherty et al., 2006a; Falnes et al., 2011). Factors that help mothers resist mixed feeding advice include disclosing HIV status to partners and mothers-in-law, attending peer support groups, and living in urban areas away from matriarchs (Ostergaard et al., 2010; Falnes et al., 2011; Mataya et al., 2013;).

Mother-infant separation and other cultural beliefs

In situations where individuals other than mothers care for infants, feeding tends to include cow's milk, formula milk or traditionally-prepared liquids (Burke, 2004; Doherty et al., 2006b; Webb-Girard et al., 2012). In Malawi, it was assumed that the infant's consumption of a traditional concoction (kachasu) would kill the HIV virus and render mixed feeding a safe practice (Mataya et al., 2013). In South Africa and Malawi, mother-infant separation for a substantial amount of time during the day was believed to make breast milk poisonous and

unfit for infant consumption (Buskens et al., 2007; Mataya et al., 2013). Thus to prevent the child from falling “ill,” breastfeeding was either suspended until the following morning or the “poisonous” milk had to be expelled from the breast first (Buskens et al., 2007; Mataya et al., 2013).

Theme 3: Socioeconomic vulnerability

Effect of financial dependence

A number of studies have found that women who were financially dependent on a family member were more likely to practice mixed feeding (Desclaux et al., 2009; Cames et al., 2010). Other studies have in the same light reported that women who were financially independent, living within a nuclear family setting or supported by an HIV-positive partner were more likely to exclusively breastfeed (Doherty et al., 2006b; Desclaux et al., 2009; Ostergaard et al., 2010; Mataya et al., 2013).

Effect of non-disclosure of HIV status

Financial vulnerability can result in nondisclosure of HIV status due to fear of stigma and losing social and/or financial support (Hofmann et al., 2009; Fadnes et al., 2010). In a setting of non-disclosure, the practice of EBF would be a greater challenge and perhaps non-negotiable (Ostergaard et al., 2010). This is even more challenging in societies where EBF is known to be a recommended feeding practice for HIV-positive mothers (Thairu et al., 2005; Buskens et al., 2007). Conversely, HIV status disclosure to a partner and/or family members gave women the needed support to practice EBF, whilst non-disclosure was associated with the practice of mixed feeding within 6 months postpartum (Fadnes et al., 2010; Marembo et al., 2014; Onono et al., 2014).

Theme 4: Maternal health

Maternal health, food insecurity and insufficient breast milk syndrome

A number of studies suggest that women may resort to mixed feeding when they have concerns about insufficient breast milk, or if they perceive practicing EBF to be detrimental to their own health (Kimani-Murage et al., 2011; Ostergaard et al., 2010; Webb-Girard et al., 2012). Women who were food secure were more confident in their breast milk production, and were more likely to adhere to EBF than food-insecure women (Ostergaard et al., 2010; Webb-Girard et al., 2012; Mataya et al., 2013). In Malawi, some women believed practicing EBF would improve their own feeding

and health status, while other women believed EBF would be detrimental to an HIV-positive mothers’ health (Kafulafula et al., 2014). In Nigeria, participants in one study believed that HIV-positive mothers might be too ill to breastfeed exclusively (Abiona et al., 2006). Studies from South Africa, Malawi and Kenya, also suggest that many women will practice mixed feeding with solids or semi-solid foods because they do not consider breast milk to be food and therefore question its nutritional value (Buskens et al., 2007; Wachira et al., 2009; Mataya et al., 2013). Furthermore, mixed feeding is adopted in some instances when colic is associated with hunger and inadequate breast milk (Thairu et al., 2005; Webb-Girard et al., 2012; Madiba et al., 2013). In some parts of Nigeria and Uganda however, breast milk is considered food, however water is considered a necessary supplement (Abiona et al., 2006; Fadnes et al., 2010). There were similar findings in Kenya where water is considered as “necessary for life” (Webb-Girard et al., 2012).

Theme 5: Maternal knowledge on infant feeding practices

Mothers’ perception of vertical transmission through breastfeeding

Overestimation of MTCT risk through breastfeeding in HCW-provided counselling may influence women to choose EFF over EBF (Kafulafula et al., 2014; Koricho et al., 2010). Women who chose EFF or switched from EBF to EFF early postpartum expressed the desire to protect their infants from HIV infection as paramount to their decision (Thairu et al., 2005; Doherty et al., 2006b; Maman et al., 2012;). Studies from South Africa, Burkina Faso, Cameroon, and Ethiopia all reveal that in the context of formula availability and prior knowledge of EFF as a feeding option, mothers preferred EFF due to fear of infecting their infants with HIV (de Paoli et al., 2002; Hofmann et al., 2009; Koricho et al., 2010). When mothers perceive their breast milk as “poisonous” due to HIV infection, they wean their infants early postpartum, believing that such a practice would minimize infant exposure to HIV (Thairu et al., 2005; Koricho et al., 2010; Maman et al., 2012). However, a study from Nigeria revealed a contrary finding: mothers chose EFF not for fear of HIV transmission, but because of the desire to be identified among the upper socio-economic class who could afford infant formula (Abiona et al., 2006).

Mothers’ experience and their knowledge and perception of exclusive breastfeeding

Mothers who practice mixed feeding and subsequently have an HIV-positive child tend to practice EBF with subsequent infants (Ostergaard et al., 2010; Chinkonde

et al., 2012; Maman et al., 2012). On the other hand, previous experience with breastfeeding, being knowledgeable about the nutritional benefits of breast milk, and associating infant mortality with formula feeding influenced mothers to choose EBF (Thairu et al., 2005; Hofmann et al., 2009; Tijou-Traore et al., 2009). Mothers with a clear understanding on how EBF may reduce postnatal transmission were more willing to choose and adhere to the practice compared to mothers who did not have such privileged knowledge (Thairu et al., 2005; Kafulafula et al., 2014; Mataya et al., 2013). On the contrary, in Zambia, even though mothers understood the dangers of mixed feeding, they found it difficult to avoid the practice (Chisenga et al., 2011). Similarly, in rural settings of Namibia, Swaziland and South Africa, the lack of pre-existing cultural norms for EBF made its practice for 6 months difficult to accept and sustain (Buskens et al., 2007).

DISCUSSION

This review sheds light on the complexities of EBF as an infant feeding choice and practice against the backdrop of socio-economic context cultural norms and biases and HCW beliefs, skills and knowledge. HIV-positive women have to navigate and/or overcome their own lack of knowledge, MTCT concerns, socioeconomic vulnerability, societal and family pressures, and vague, contradictory or biased healthcare worker messages to make the best and most feasible feeding choice for their infants. The pressure to practice EFF or mixed feeding where ART is available is particularly inappropriate for the many African women who cannot afford sustained EFF nor the negative outcomes of mixedfeeding.

Women in SSA will often practice a particular feeding method in an attempt to conceal their HIV status to avoid stigma, family conflict or the loss of socioeconomic family support. This suggests that any future interventions should consider working with grandmothers, mothers-in-law, other influential matriarchs and household/ community members to ensure that women are supported to practice the safest feeding method with or without HIV infection (Alder et al., 2004; Susin, 2005). As illustrated by Sibeko et al, (2009), it will also be important to encourage mothers to disclose their HIV-status to partners and family members so as to gain support on the safest feeding practice. Self-stigma or the fear of community stigma that often leads to non-disclosure of HIV has to be tackled from a community perspective, making sure to engage people living with HIV (PLHIV) in the sensitization process. Participation in PLHIV-friendly support groups can help women to cope with stigma and external pressure when making and sustaining appropriate infant feeding choices, particularly EBF.

Regardless of the risk of HIV through breastfeeding, it is still a well-entrenched infant feeding practice in SSA and guidelines on infant feeding will have to continue to

take this into consideration.

However, since breastfeeding is largely practiced within the context of mixed feeding, SSA continues to have challenges especially where much-needed ARVs to mitigate the MTCT risk may not be consistently available. The single most critical action is therefore to ensure that there are consistent supplies of ARVs for maximal, sustained coverage to HIV-infected women of child-bearing age, whether non-pregnant, pregnant, or breastfeeding. Second most important is to ensure that the rationale for infant feeding recommendations is explained to HCWs in training as well as to HIV-positive women in counselling sessions. Third, community-level education and sensitization, ideally involving PLHIV, community leaders and matriarchs, should be done on a continuous basis for sensitization, and to render living with HIV, and EBF as a feeding choice less stigmatizing.

STRENGTHS AND LIMITATIONS

The major limitation of this review is that the majority of articles included were qualitative studies with small sample sizes (ranging from 10 to 80), using purposeful sampling as the main participant selection strategy.

Despite the fact that in most of the studies, HIV-positive women were recruited from PMTCT programs, this review could not evaluate the exact infant feeding counselling delivery and content. It is highly likely that the counselling content varied significantly among studies even within the same country (Doherty et al., 2006b). This review initially intended to select articles that exclusively focused on HIV-positive women so as to explore issues experienced only by this target population; however the number of articles was few. Nine (9) of the articles identified included participants who were HIV- negative or of unknown HIV status. Studies including participants whose HIV status was negative or unknown were included because of the paucity of literature limited to HIV-positive women only.

RECOMMENDATIONS

For Ministries of Health and PMTCT implementing partners:

1. Disseminate community-wide messages on infant feeding and stigma reduction, ideally facilitated by sensitized community gatekeepers, traditional leaders, and peer PLHIV counsellors, to reinforce appropriate infant feeding guidelines Ensure that HCWs receive structured training on counselling skills with standardized messages on quantified risk of postnatal transmission of HIV through breastfeeding.
2. Ensure that HCWs encourage and support all women to breastfeed regardless of HIV status.

For healthcare facilities, baby- friendly initiative programs and community-based organizations:

1. Encourage HIV-positive mothers to join HIV mother support groups, to gain the confidence to overcome external pressures to practice inappropriate infant feeding.
2. Educate women on maintaining a healthy diet using cheap local ingredients so that mothers can sustain EBF and minimize the „insufficient breast milk” syndrome.

For researchers and research funding sponsors:

1. Geographically research into determinants of infant feeding choice in the context of HIV, and to include more studies at specific country and district level.
2. Increase both qualitative and quantitative research studies with larger samples to identify infant feeding decisions and strategies in women with HIV.
3. More up-to-date research into the topic of infant feeding, especially in an era where Option B+ is steadily being adopted and implemented by SSA countries.

Conflict of interests

The authors have not declared any conflict of interests.

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REFERENCES

- Abiona TC, Onayade AA, Ijadunola KT, Obiajunwa PO, Aina OI, Thairu LN (2006). Acceptability, feasibility and affordability of infant feeding options for HIV-infected women: a qualitative study in south-west Nigeria. *Matern. Child Nutr.* 2(3):135-144.
- Alder EM, Williams FL, Anderson AS, Forsyth S, Florey Cdu V, Van Der Velde P (2004). What influences the timing of the introduction of solid food to infants? *Br. J. Nutr.* 92(3):527-531.
- Bbaale E (2014). Determinants of early initiation, exclusiveness, and duration of breastfeeding in Uganda. *J. Health Popul. Nutr.* 32(2):249-260.
- Berhan Z, Abebe F, Gedefaw M, Tesfa M, Assefa M, Tafere Y (2014). Risk of HIV and associated factors among infants born to HIV positive women in Amhara region, Ethiopia: a facility based retrospective study. *BMC Res. Notes* 7:876.
- Burke J (2004). Infant HIV infection: acceptability of prevention strategies in central Tanzania. *AIDS Educ. Prev.* 16(5):415-425.
- Buskens I, Jaffe A, Mkhathshwa H (2007). Infant feeding practices: realities and mind sets of mothers in Southern Africa. *AIDS Care* 19(9):1101-1109.
- Cames C, Saher A, Ayassou KA, Cournil A, Meda N, Simondon KB (2010). Acceptability and feasibility of infant-feeding options: experiences of HIV-infected mothers in the World Health Organization Kesho Bora mother-to-child transmission prevention (PMTCT) trial in Burkina Faso. *Matern. Child Nutr.* 6(3):253-265.
- Chinkonde JR, Hem MH, Sundby J (2012). HIV and infant feeding in Malawi: public health simplicity in complex social and cultural contexts. *BMC Public Health* 12:700.
- Chinkonde JR, Sundby J, De Paoli M, Thorsen VC (2010). The difficulty with responding to policy changes for HIV and infant feeding in Malawi. *Int. Breastfeed J.* 5:11.
- Chisenga M, Siame J, Baisley K, Kasonka L, Filteau S (2011). Determinants of infant feeding choices by Zambian mothers: a mixed quantitative and qualitative study. *Matern. Child Nutr.* 7(2):148-159.
- Chopra M, Doherty T, Mehatru S, Tomlinson M (2009). Rapid assessment of infant feeding support to HIV-positive women accessing prevention of mother-to-child transmission services in Kenya, Malawi and Zambia. *Public Health Nutr.* 12(12):2323-2328.
- Coovadia HM, Bland RM (2007). Preserving breastfeeding practice through the HIV pandemic. *Trop. Med. Int. Health* 12(9):1116-1133.
- Coutsoudis A, Dabis F, Fawzi W, Gaillard P, Haverkamp G, Harris DR, Jackson JB, Leroy V, Meda N, Msellati P, Newell ML, Nsuati R, Read JS, Wiktor S (2004). Late postnatal transmission of HIV-1 in breast-fed children: an individual patient data meta-analysis. *J. Infect. Dis.* 189(12):2154-2166.
- De Paoli MM, Manongi R, Klepp KI (2002). Counsellors' perspectives on antenatal HIV testing and infant feeding dilemmas facing women with HIV in northern Tanzania. *Reprod Health Matters* 10(20):144-156.
- Desclaux A, Alfieri C (2009). Counseling and choosing between infant-feeding options: overall limits and local interpretations by health care providers and women living with HIV in resource-poor countries (Burkina Faso, Cambodia, Cameroon). *Soc. Sci. Med.* 69(6):821-829.
- Doherty T, Chopra M, Jackson D, Goga A, Colvin M, Persson LA (2007). Effectiveness of the WHO/UNICEF guidelines on infant feeding for HIV-positive women: results from a prospective cohort study in South Africa. *AIDS* 21(13):1791-1797.
- Doherty T, Chopra M, Nkonki L, Jackson D, Greiner T (2006a). Effect of the HIV epidemic on infant feeding in South Africa: "When they see me coming with the tins they laugh at me". *Bull. World Health Organ.* 84(2):90-96.
- Doherty T, Chopra M, Nkonki L, Jackson D, Persson LA (2006b). A longitudinal qualitative study of infant-feeding decision making and practices among HIV-positive women in South Africa. *J. Nutr.* 136(9):2421-2426.
- Fadnes LT, Engebretsen IM, Moland KM, Nankunda J, Tumwine JK, Tylleskar T (2010). Infant feeding counselling in Uganda in a changing environment with focus on the general population and HIV-positive mothers - a mixed method approach. *BMC Health Serv. Res* 10:260.
- Fadnes LT, Engebretsen IM, Wamani H, Wangisi J, Tumwine JK, Tylleskar T (2009). Need to optimise infant feeding counselling: a cross-sectional survey among HIV-positive mothers in Eastern Uganda. *BMC Pediatr.* 9:2.
- Falnes EF, Moland KM, Tylleskar T, De Paoli MM, Leshabari SC, Engebretsen IM (2011). The potential role of mother-in-law in prevention of mother-to-child transmission of HIV: a mixed methods study from the Kilimanjaro region, northern Tanzania. *BMC Public Health* 11:551.
- Gourlay A, Birdthistle I, Mburu G, Iorpenda K, Wringe A (2013). Barriers and facilitating factors to the uptake of antiretroviral drugs for prevention of mother-to-child transmission of HIV in sub-Saharan Africa: a systematic review. *J. Int. AIDS Soc.* 16:18588.
- Hofmann J, De Allegri M, Sarker M, Sanon M, Bohler T (2009). Breast milk as the "water that supports and preserves life"--socio-cultural constructions of breastfeeding and their implications for the prevention of mother to child transmission of HIV in sub-Saharan Africa. *Health Policy* 89(3):322-328.
- Joint United Nations Program on HIV/AIDS (UNAIDS) (2013). Global Report; UNAIDS report on global AIDS epidemic.
- Joint United Nations Program on HIV/AIDS (UNAIDS) (2014). 2014 Progress report on global plan: towards the elimination of new infections among children by 2015 and keeping their mothers alive.
- Joint United Nations Program on HIV/AIDS (UNAIDS) (2015). Fact sheet 2015. World AIDS day 2015.
- Kafulafula UK, Hutchinson MK, Gennaro S, Guttmacher S (2014).

- Maternal and health care workers' perceptions of the effects of exclusive breastfeeding by HIV positive mothers on maternal and infant health in Blantyre, Malawi. *BMC Pregnancy Childbirth* 14:247.
- Kagaayi J, Gray RH, Brahmabhatt H, Kigozi G, Nalugoda F, Wabwire-Mangen F, Serwadda D, Sewankambo N, Ddungu V, Ssebagala D, Sekasanyu J, Kigozi G, Makumbi F, Kiwanuka N, Lutalo T, Reynolds SJ, Wawer MJ (2008). Survival of infants born to HIV-positive mothers by feeding modality, in Rakai, Uganda. *PLoS ONE* 3(12):e3877.
- Kimani-Murage EW, Madise NJ, Fotso JC, Kyobutungi C, Mutua MK, Gitau TM, Yatch N (2011). Patterns and determinants of breastfeeding and complementary feeding practices in urban informal settlements, Nairobi Kenya. *BMC Public Health* 11:396.
- Kimani-Murage EW, Wekesah F, Wanjohi M, Kyobutungi C, Ezech AC, Musoke RN, Norris SA, Madise NJ, Griffiths P (2015). Factors affecting actualisation of the WHO breastfeeding recommendations in urban poor settings in Kenya. *Matern. Child Nutr.* 11(3):314-332.
- Koricho AT, Moland KM, Blystad A (2010). Poisonous milk and sinful mothers: the changing meaning of breastfeeding in the wake of the HIV epidemic in Addis Ababa, Ethiopia. *Int. Breastfeed J.* 5:12.
- Kuhn L, Sinkala M, Kankasa C, Semrau K, Kasonde P, Scott N, Mwiya M, Vwalika C, Walter J, Tsai WY, Aldrovandi GM, Thea DM (2007). High uptake of exclusive breastfeeding and reduced early post-natal HIV transmission. *PLoS One* 2(12):e1363.
- Laar AS, Veloshnee G (2013). Individual and Community Perspectives, Attitudes, and Practices to Mother-to-Child-Transmission and Infant Feeding among HIV-Positive Mothers in Sub-Saharan Africa: A Systematic Literature Review. *International Journal of MCH and AIDS*, 2(1):152-162.
- Lawani LO, Onyebuchi AK, Iyoke CA, Onoh RC, Nkwo PO (2014). The challenges of adherence to infant feeding choices in prevention of mother-to-child transmission of HIV infections in South East Nigeria. *Patient Prefer. Adherence* 8:377-381.
- Lazarus R, Struthers H, Violari A (2013). Promoting safe infant feeding practices - the importance of structural, social and contextual factors in Southern Africa. *J. Int. AIDS Soc.* 16:18037.
- Leshabari SC, Blystad A, De Paoli M, Moland KM (2007). HIV and infant feeding counselling: challenges faced by nurse-counsellors in northern Tanzania. *Hum. Resour. Health* 5:18.
- Leshabari SC, Koniz-Booher P, Astrom AN, De Paoli MM, Moland KM (2006). Translating global recommendations on HIV and infant feeding to the local context: the development of culturally sensitive counselling tools in the Kilimanjaro Region, Tanzania. *Implement Sci.* 1:22.
- Madiba S, Letsoalo R (2013). HIV Disclosure to Partners and Family among Women Enrolled in Prevention of Mother to Child Transmission of HIV Program: Implications for Infant Feeding in Poor Resourced Communities in South Africa. *Glob. J. Health Sci.* 5(4):1-13.
- Maman S, Cathcart R, Burkhardt G, Omba S, Thompson D, Behets F (2012). The infant feeding choices and experiences of women living with HIV in Kinshasa, Democratic Republic of Congo. *AIDS Care* 24(2):259-265.
- Marengo J, Zvinavashe M, Nyamakura R, Shaibu S, Mogobe KD (2014). Factors influencing infant-feeding choices selected by HIV- infected mothers: perspectives from Zimbabwe. *Jpn. J. Nurs. Sci.* 11(4):259-267.
- Maru S, Datong P, Selleng D, Mang E, Inyang B, Ajene A, Guyit R, Charurat M, Abimiku A (2009). Social determinants of mixed feeding behavior among HIV-infected mothers in Jos, Nigeria. *AIDS Care* 21(9):1114-1123.
- Mataya R, Mathanga D, Chinkhumba J, Chibwana A, Chikaphupha K, Cardiello J (2013). A qualitative study exploring attitudes and perceptions of HIV positive women who stopped breastfeeding at six months to prevent transmission of HIV to their children. *Malawi Med. J.* 25(1):15-19.
- Miotti PG, Taha TE, Kumwenda NI, Broadhead R, Mtimavalye LA, Van der Hoeven L, Chipangwi JD, Liomba G, Biggar RJ (1999). HIV transmission through breastfeeding: a study in Malawi. *JAMA* 282(8):744-749.
- Musa J (2011). Withholding breast milk for HIV exposed infants in sub-Saharan Africa: benefit or harm? *Afr. Health Sci.* 11(4):602-604.
- Mwai GW, Mburu G, Torpey K, Frost P, Ford N, Seeley J (2013). Role and outcomes of community health workers in HIV care in sub-Saharan Africa: a systematic review. *J. Int. AIDS Soc.* 16:18586.
- Mwiru RS, Spiegelman D, Duggan C, Peterson K, Liu E, Msamanga G, Aboud S, Fawzi WW (2011). Relationship of exclusive breast-feeding to infections and growth of Tanzanian children born to HIV-infected women. *Public Health Nutr.* 14(7):1251-1258.
- Natchu UC, Liu E, Duggan C, Msamanga G, Peterson K, Aboud S, Spiegelman D, Fawzi WW (2012). Exclusive breastfeeding reduces risk of mortality in infants up to 6 mo of age born to HIV-positive Tanzanian women. *Am. J. Clin. Nutr.* 96(5):1071-1078.
- Nduati R, John G, Mbori-Ngacha D, Richardson B, Overbaugh J, Mwatha A, Ndinya-Achola J, Bwayo J, Onyango FE, Hughes J, Kreiss J (2000). Effect of breastfeeding and formula feeding on transmission of HIV-1: a randomized clinical trial. *JAMA* 283(9):1167-1174.
- Onono MA, Cohen CR, Jerop M, Bukusi EA, Turan JM. (2014). HIV serostatus and disclosure: implications for infant feeding practice in rural south Nyanza, Kenya. *BMC Public Health* 14:390.
- Ostergaard LR, Bula A (2010). "They call our children "Nevirapine babies?": A qualitative study about exclusive breastfeeding among HIV positive mothers in Malawi. *Afr. J. Reprod. Health* 14(3):213-222.
- Rollins N, Mahy M, Becquet R, Kuhn L, Creek T, Mofenson L (2012). Estimates of peripartum and postnatal mother-to-child transmission probabilities of HIV for use in Spectrum and other population-based models. *Sex Transm. Infect.* 88 Suppl 2:44-51.
- Seth A (2012). Care of the HIV-exposed child--to breast feed or not? *Indian J. Pediatr.* 79(11):1501-1505.
- Shayo EH, Vaga BB, Moland KM, Kamuzora P, Blystad A (2014). Challenges of disseminating clinical practice guidelines in a weak health system: the case of HIV and infant feeding recommendations in Tanzania. *Int. Breastfeed J.* 9(1):188.
- Sibeko L, Coutsooudis A, Nzuza S, Gray-Donald K (2009). Mothers' infant feeding experiences: constraints and supports for optimal feeding in an HIV-impacted urban community in South Africa. *Public Health Nutr.* 12(11):1983-1990.
- Susin LRO, Giugliani ERJ, Kummer SC (2005). Influence of grandmothers on breastfeeding Practices. *Rev. Saude Publica* 39(2):1-6.
- Thairu LN, Pelto GH, Rollins NC, Bland RM, Ntshangase N (2005). Sociocultural influences on infant feeding decisions among HIV-infected women in rural Kwa-Zulu Natal, South Africa. *Matern Child Nutr.* 1(1):2-10.
- Tijou-Traore A, Querre M, Brou H, Leroy V, Desclaux A, Desgreess-Du-Lou A (2009). Couples, PMTCT programs and infant feeding decision-making in Ivory Coast. *Soc. Sci. Med.* 69(6):830-837.
- Traore M, Sangho H, Diagne MC, Faye A, Sidibe A, Kone K, Sangho F (2014). Factors associated with exclusive breastfeeding among mothers of children 24 months in Bamako. *Sante Publique* 26(2):259-265.
- Tuthill E, McGrath J, Young S (2014). Commonalities and differences in infant feeding attitudes and practices in the context of HIV in sub-Saharan Africa: a metasynthesis. *AIDS Care* 26(2):214-225.
- Wachira J, Otieno-Nyunya B, Ballidawa J, & Braitstein P. (2009). Assessment of knowledge, attitudes and practices of infant feeding in the context of HIV: a case study from western Kenya. *SAHARA J.* 6(3):120-126.
- Webb-Girard A, Cherobon A, Mbugua S, Kamau-Mbuthia E, Amin A, Sellen DW (2012). Food insecurity is associated with attitudes towards exclusive breastfeeding among women in urban Kenya. *Matern. Child Nutr.* 8(2):199-214.
- World Health Organization (WHO) (2007). HIV and infant feeding: new evidence and programmatic experience. Report of a technical consultation.
- World Health Organization (WHO) (2008) HIV transmission through breastfeeding. A review of available evidence 2007 update.
- World Health Organization (WHO) (2010). Guidelines on HIV and Infantfeeding 2010. Principles and recommendations for infant feeding in the context of HIV and a summary of evidence.
- World Health Organization (WHO) (2013). Consolidated guidelines on the use of Antiretroviral drugs for treating and preventing HIV infection. Recommendations for a public health approach June 2013.

World Health Organization (WHO) (2015). Guideline on when to start antiretroviral therapy and on pre-exposure prophylaxis for HIV.