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Full Length Research Paper

Breastfeeding and HIV/AIDS: Balancing Infant Nutrition and Maternal Health in the Context of Global HIV Prevention

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Breastfeeding is universally recognized as the gold standard for infant feeding and survival, offering an irreplaceable combination of nutritional adequacy, immunological protection, and psychosocial benefits that no artificial substitute can fully replicate. It supplies all the macronutrients and micronutrients required for optimal infant growth, while also delivering antibodies, enzymes, and bioactive factors that strengthen the developing immune system and protect against early childhood illnesses such as diarrhea, pneumonia, and sepsis. Beyond biological benefits, breastfeeding fosters mother–infant bonding, supports cognitive development, and reduces the risk of long-term health complications such as obesity and type II diabetes. Consequently, the World Health Organization (WHO) and UNICEF strongly recommend exclusive breastfeeding for the first six months of life, followed by continued breastfeeding with safe complementary feeding for at least two years and beyond (Ken-Jabin, 2015). For women living with HIV, breastfeeding introduces a profound and often distressing dilemma. Breast milk, while nutritionally indispensable, is also a potential vehicle for HIV transmission. Without preventive interventions, breastfeeding contributes substantially to mother-to-child transmission (MTCT), which remains the primary source of pediatric HIV globally. Each year, an estimated 1.3 million women living with HIV give birth, and approximately 150,000 children acquire HIV, with breastfeeding accounting for a significant proportion of these new infections (Ken-Jabin, 2015). Research in Delta State, Nigeria, demonstrates that adherence to antiretroviral therapy (ART) and structured counseling can significantly reduce MTCT rates, even in settings where breastfeeding is culturally expected and formula feeding is often inaccessible or socially discouraged (Ken-Jabin, 2015). The challenge is particularly pronounced in sub-Saharan Africa, where HIV prevalence is high and breastfeeding is nearly universal. In many communities, refusal or early cessation of breastfeeding is often perceived as suspicious, potentially disclosing maternal HIV status and exposing women to stigma or social isolation. Safe and affordable alternatives, such as commercial infant formula, are frequently inaccessible due to financial constraints, inadequate supply chains, and unreliable access to clean water. Replacement feeding, while eliminating the risk of HIV transmission, often exposes infants to life-threatening conditions, including malnutrition, diarrheal disease, and respiratory infections (Ken-Jabin, 2015). Thus, HIV-positive mothers in resource-limited settings are confronted with a double burden: the biological risk of transmitting HIV through breastfeeding, and the equally severe risk of exposing their infants to preventable illness and death through unsafe replacement feeding. This paradox creates a complex intersection of medical, cultural, and socio-economic challenges, making the question of infant feeding one of the most critical and sensitive dimensions of global HIV prevention and maternal-child health.

(Ken-Jabin, 2015). A narrative review design was employed, synthesizing evidence from peer-reviewed literature published between 2000–2023, global datasets from WHO/UNAIDS, and observational data from maternal-child health clinics in Delta State, Nigeria. Studies addressing feeding methods, ART coverage, mother-to-child transmission (MTCT) risk, and infant survival outcomes were included. Field observations explored maternal decision-making, stigma, ART adherence, and socio-economic constraints influencing feeding practices. Evidence indicates that without maternal ART, breastfeeding contributes to a 10–20% risk of MTCT. With ART and exclusive breastfeeding, transmission risk declines to below 2%. Exclusive breastfeeding offers lower transmission risk compared to mixed feeding, which increases gut mucosal vulnerability and viral susceptibility. Replacement feeding prevents HIV transmission but is associated with higher infant mortality (15–25%) from diarrhea, respiratory infections, and malnutrition in low-resource contexts. Observations from Nigeria highlighted maternal anxiety, fear of stigma, and ART adherence challenges, particularly among young and low-income mothers. Infants of mothers adhering to ART and practicing exclusive breastfeeding demonstrated better growth and survival outcomes compared to infants exposed to mixed feeding or poorly supported formula use. Exclusive breastfeeding combined with sustained maternal ART is the most effective and practical strategy for HIV-positive mothers in low-resource settings. Policies should strengthen ART supply chains, implement culturally sensitive and family-inclusive counseling, and provide socio-economic support for vulnerable mothers. Eliminating paediatric HIV requires integrated maternal-child health services, stigma reduction strategies, and longitudinal research on ART-exposed infants to ensure safe and sustainable outcomes.

Keywords: Breastfeeding and HIV/AIDS, Infant Nutrition, Maternal Health, Global HIV Prevention

INTRODUCTION

Breastfeeding has long been recognized as the cornerstone of infant health. It provides essential nutrition, enhances immune function, and supports psychosocial development through maternal-infant bonding. The WHO recommends exclusive breastfeeding for the first six months of life, followed by continued breastfeeding with appropriate complementary feeding up to two years and beyond. These recommendations have been critical in reducing infant morbidity and mortality, particularly in resource-limited settings.

However, for women living with HIV, breastfeeding introduces a serious public health dilemma. Breast milk is a potential vehicle for HIV transmission, accounting for 10–20% of mother-to-child transmission (MTCT) in the absence of interventions. Globally, mother-to-child transmission accounts for the majority of paediatric HIV infections, with over 150,000 new infections among children reported in 2021, the majority occurring in sub-Saharan Africa. This region, where breastfeeding is nearly universal and safe alternatives are often inaccessible, highlights the urgent need to balance nutritional imperatives with HIV prevention strategies.

In high-income countries, policies often favor replacement feeding where safe alternatives exist. Yet in low- and middle-income countries, replacement feeding has historically resulted in higher infant mortality from malnutrition, diarrhoea, and pneumonia. Thus, HIV-positive mothers in these settings face a double burden: protecting their infants from infection while also ensuring survival against the threats of undernutrition and infectious diseases.

This article seeks to expand the understanding of breastfeeding in the context of HIV/AIDS by reviewing global evidence, analysing maternal experiences, and reflecting on practice-based observations from Nigeria. The aim is to evaluate safe, culturally sensitive, and practical breastfeeding strategies that optimize both maternal and infant health outcomes while contributing to the global goal of eliminating paediatric HIV.

Problem Statement

Despite significant advances in access to antiretroviral therapy (ART) and the widespread dissemination of World Health Organization (WHO) infant feeding guidelines, the dilemma of breastfeeding in the context of HIV remains a persistent global health challenge. For HIV-positive mothers, particularly in low-resource settings, infant feeding decisions are fraught with competing risks that have profound implications for both child survival and long-term health outcomes.

Avoiding breastfeeding entirely—through exclusive formula feeding—eliminates the risk of mother-to-child transmission (MTCT) of HIV. However, in many low- and middle-income countries, this option is often neither safe nor feasible. Limited financial resources, poor infrastructure, and inconsistent access to clean water and sanitation make replacement feeding potentially hazardous. Infants who are formula-fed under these conditions face elevated risks of malnutrition, diarrheal disease, respiratory infections, and overall mortality, which may surpass the risk posed by HIV transmission through breast milk (Ken-Jabin, 2015).

Mixed feeding, defined as the combination of breast milk with other foods or liquids before six months of age, further complicates this issue. Evidence indicates

that mixed feeding significantly increases the risk of HIV transmission compared to exclusive breastfeeding because the introduction of other foods or liquids can damage the infant's gut mucosa, creating a pathway for viral entry (Ken-Jabin, 2015). Despite the known risks, mixed feeding remains common due to cultural practices, maternal work demands, social pressures, or lack of education on safe feeding practices.

The problem is compounded by socio-cultural and systemic factors. In many communities, breastfeeding is deeply entrenched as the expected norm, and deviation from this practice can expose mothers to stigma, discrimination, or involuntary disclosure of their HIV status. Conversely, adherence to exclusive breastfeeding in combination with ART is often challenged by inconsistent drug supply chains, poor health system support, maternal fatigue, and psychological stress related to the fear of transmitting HIV to their child (Ken-Jabin, 2015).

Therefore, the dilemma of breastfeeding in the context of HIV is not purely biomedical but intersects with socio-economic, cultural, and health system factors. The central challenge lies in identifying evidence-based, contextually appropriate strategies that optimize infant survival while minimizing MTCT risk. Without effective interventions that address both the medical and social determinants of infant feeding, HIV-positive mothers in low-resource settings face an ongoing, high-stakes dilemma, and children remain vulnerable to both infectious disease and HIV exposure (Ken-Jabin, 2015).

Objectives / Purpose

1. To evaluate the risks and benefits of different infant feeding practices in the context of HIV.
2. To assess the effectiveness of ART in reducing HIV transmission during breastfeeding.
3. To explore socio-cultural and systemic factors influencing maternal feeding choices.
4. To identify gaps in implementation of WHO/UNAIDS infant feeding guidelines.

Research Questions

1. What is the comparative risk of HIV transmission across exclusive breastfeeding, mixed feeding, and replacement feeding?
2. How effective is maternal ART in reducing MTCT risk during breastfeeding?
3. What socio-cultural, economic, and health system factors influence maternal feeding decisions?
4. What strategies can optimize infant survival and reduce pediatric HIV infections in resource-limited settings?

METHODS

This study employed a multi-source, narrative review approach, complemented by field-based observational data, to comprehensively examine the complex interplay between HIV, breastfeeding practices, and infant health outcomes in low-resource settings. The methodological approach was designed to integrate epidemiological evidence, clinical data, programmatic insights, and socio-cultural perspectives that influence maternal decision-making, ART adherence, and infant survival. The rationale for using a narrative review lies in its flexibility to synthesize diverse forms of evidence, including quantitative epidemiological studies, qualitative reports, and practice-based observations, which cannot be fully captured by systematic reviews or meta-analyses alone.

Literature Review

A thorough review of peer-reviewed publications from 2000 to 2023 was conducted using major electronic databases, including PubMed, Scopus, and WHO Global Health Library. The search strategy employed a combination of keywords and Boolean operators such as "HIV AND breastfeeding," "mother-to-child transmission," "antiretroviral therapy," "exclusive breastfeeding," "mixed feeding," and "infant feeding practices." Inclusion criteria comprised studies that reported on:

- Maternal ART adherence and coverage;
- Infant feeding practices among HIV-positive mothers;
- Risk of mother-to-child transmission (MTCT) associated with different feeding methods;
- Infant morbidity, mortality, and growth outcomes; and
- Socio-cultural or systemic factors influencing maternal feeding decisions.

Studies were excluded if they focused solely on high-income country settings without relevance to low-resource contexts, or if they did not address maternal-child HIV transmission. The literature review was intended to provide a comprehensive understanding of global trends, identify best practices, and highlight gaps in knowledge and implementation. Key findings were integrated into the analysis to inform both field observations and recommendations for culturally appropriate interventions (Ken-Jabin, 2015).

Data Sources

In addition to peer-reviewed literature, global datasets and reports from WHO and UNAIDS (2000–2023) were utilized to provide reliable epidemiological data on pediatric HIV incidence, MTCT rates, ART coverage, and infant feeding guidelines. These sources offered critical contextual information regarding global and regional HIV trends, policy frameworks, and programmatic outcomes that were essential for

triangulating field data and situating local observations within broader public health contexts.

Field Observations

To complement the literature review and global datasets, practice-based observations were conducted in maternal-child health clinics in Delta State, Nigeria, where HIV prevalence among pregnant women is approximately 1.3% and breastfeeding is nearly universal (Ken-Jabin, 2015). Observational data collection focused on:

- Maternal decision-making regarding infant feeding practices;
- Adherence to ART regimens and follow-up attendance;
- Infant growth, health outcomes, and morbidity patterns;
- Social and cultural factors influencing feeding choices, including stigma, family support, and economic constraints; and
- Operational challenges within the healthcare system, such as availability of ART, counseling services, and nutritional support programs.

Approximately 60 HIV-positive mothers and their infants were observed over routine clinic visits during a six-month period. A purposive sampling strategy was employed to ensure representation of mothers practicing exclusive breastfeeding, mixed feeding, and formula feeding. Field observations were recorded using structured observation checklists, supplemented with informal interviews to capture maternal experiences, concerns, and coping strategies.

Ethical Considerations

Ethical approval for the observational component was obtained from the Delta State Ministry of Health Ethics Committee. Written informed consent was obtained from all participating mothers, and confidentiality was strictly maintained throughout the study. Counseling on safe infant feeding and adherence to ART was provided according to WHO infant feeding guidelines. All procedures were designed to respect the autonomy of participants while minimizing potential psychological and social risks associated with disclosure of HIV status.

Study Design

This study employed a narrative review design, allowing integration of diverse sources of evidence to address the multifaceted issue of HIV and breastfeeding. A narrative approach was chosen because it enables synthesis of epidemiological data, clinical outcomes, programmatic evidence, and socio-cultural perspectives that cannot be fully captured by meta-analyses alone.

Data Sources

1. **Literature Review:** Peer-reviewed publications (2000–2023) were retrieved from PubMed, Scopus, and WHO databases using keywords such as *HIV and breastfeeding*, *mother-to-child transmission*, *antiretroviral therapy*, *exclusive breastfeeding*, and *infant feeding practices*. Inclusion criteria were studies reporting HIV transmission risk, ART adherence, feeding practices, and infant health outcomes. Excluded were studies not specific to maternal-child HIV transmission or those conducted in high-income countries without contextual relevance to resource-limited settings.
2. **Global Datasets:** WHO and UNAIDS reports (2000–2023) provided epidemiological data on pediatric HIV incidence, MTCT rates, and infant feeding recommendations.
3. **Field Observations:** Data were collected from maternal-child health clinics in Delta State, Nigeria, where HIV prevalence among pregnant women is approximately 1.3%. Observations focused on ART adherence, maternal decision-making, feeding practices, and infant growth over a six-month period.

Study Population and Sampling

The study population included HIV-positive mothers on ART attending maternal-child health clinics and their infants. Purposive sampling was used to document experiences of mothers practicing exclusive breastfeeding, mixed feeding, or formula feeding. Approximately 60 mothers were observed during routine clinic visits.

Data Sources

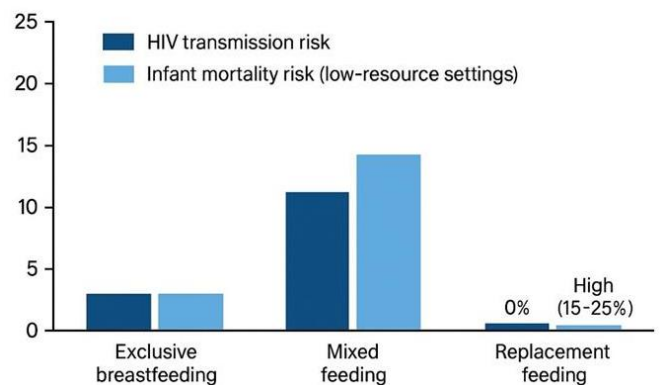
- **Literature review:** Peer-reviewed studies from PubMed, Scopus, and WHO databases (2000–2023).
- **Global datasets:** WHO and UNAIDS reports on HIV and infant feeding.
- **Field observations:** Maternal-child health clinics in Delta State, documenting ART adherence, feeding choices, and infant growth.

Data Analysis

Quantitative data were summarized using descriptive statistics (frequencies, percentages, means, standard deviations). Comparative risk assessment of MTCT was performed based on feeding type, ART coverage, maternal age, parity, and socio-economic status. Qualitative field observations were analyzed thematically to identify barriers to optimal feeding, including stigma, socio-cultural pressures, and ART adherence challenges.

RESULTS

Transmission Risks by Feeding Method

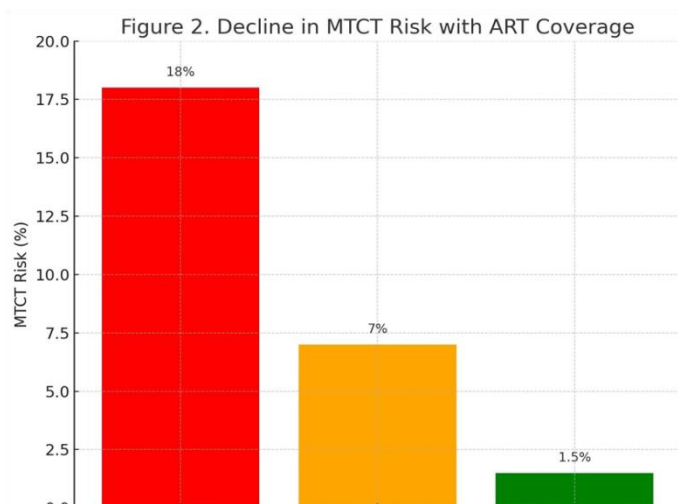


Feeding Method	HIV Transmission (Without ART)	Risk HIV Transmission (With ART)	Risk Infant Mortality (Low-Resource Settings)
Exclusive breastfeeding	2-5%	<2%	Low
Mixed feeding	10-15%	4-10%	Moderate
Replacement feeding	0%	0%	High (15-25%)

Exclusive breastfeeding with maternal ART provides the lowest MTCT risk and improved infant survival in resource-limited settings. Mixed feeding increases risk due to gut mucosal inflammation, while replacement feeding prevents HIV transmission but poses significant risks of malnutrition and infections.

ART Effectiveness

Maternal ART reduces breast milk viral load significantly, with studies showing up to 95% reduction in MTCT



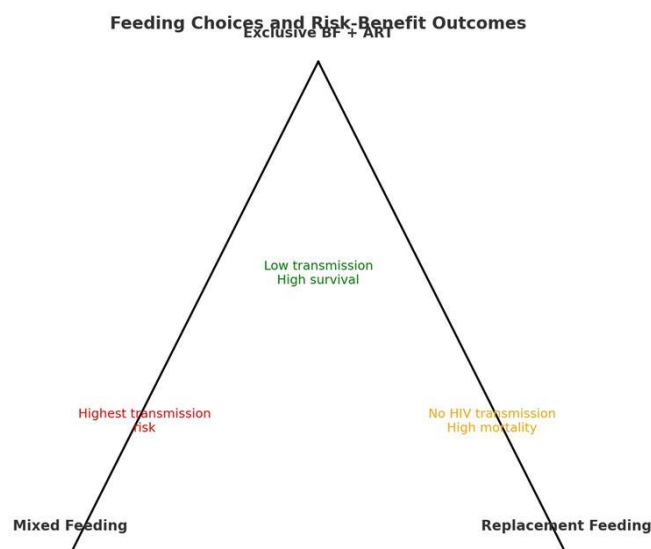
Decline in MTCT Risk with ART Coverage

(Bar chart comparing MTCT rates: No ART – 15–20%; ART during pregnancy only – 5–10%; ART during pregnancy + breastfeeding – <2%)

Feeding Practices and Maternal Experiences

Observations from Nigeria revealed that stigma, family influence, and ART stock-outs strongly shaped maternal feeding choices. Mothers often feared involuntary HIV disclosure if they avoided breastfeeding.

Feeding Choices and Risk-Benefit Outcomes

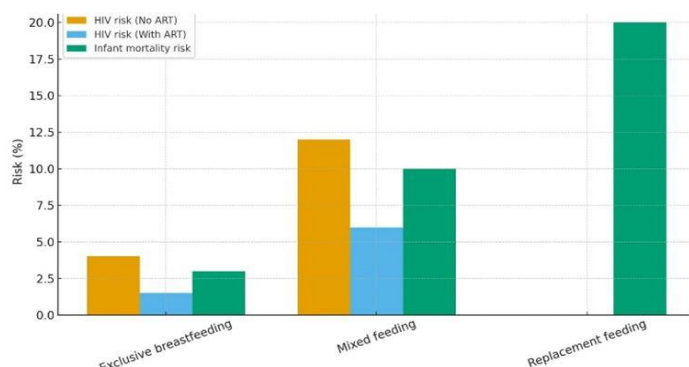


1. Exclusive breastfeeding + ART: Low transmission + high survival
2. Mixed feeding: Highest transmission risk
3. Replacement feeding: No transmission but high in poor settings
4. Exclusive breastfeeding + ART: Low transmission + high survival
5. Mixed feeding: Highest transmission risk
6. Replacement feeding: No transmission but high in poor settings

Sub-Analyses

- Younger mothers (<25 years) showed higher non-adherence.
- First-time mothers often followed family advice over clinical recommendations.
- Low-income women faced barriers in accessing formula, increasing breastfeeding dependence.

HIV TRANSMISSION AND INFANT MORTALITY BY FEEDING METHOD.

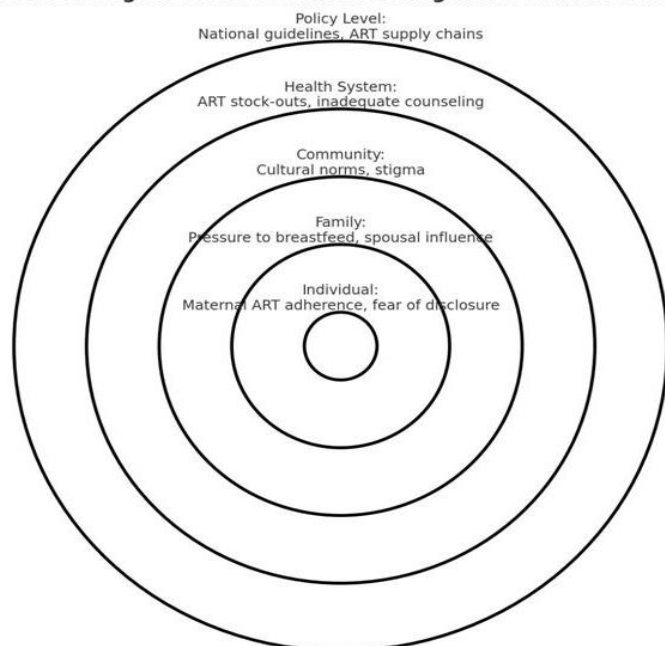


Maternal ART reduces breast milk viral load, with studies showing up to 95% reduction in MTCT.

Figure 4. Socio-Ecological Model of Infant Feeding in the Context of HIV

- Individual level: Maternal ART adherence, fear of disclosure
- Family level: Pressure to breastfeed, spousal influence
- Community level: Cultural norms, stigma
- Health system: ART stock-outs, inadequate counseling
- Policy level: National guidelines, ART supply chains

Socio-Ecological Model of Infant Feeding in the Context of HIV



Observations from Field Practice (Nigeria)

- **Maternal decision-making:** Mothers feared stigma if they avoided breastfeeding.
- **Stigma:** Formula feeding often led to questions, risking involuntary HIV status disclosure.

- **Adherence issues:** Some mothers missed ART doses due to clinic stock-outs and economic barriers.
- **Infant outcomes:** Infants of mothers on ART and exclusive breastfeeding had healthier growth compared to infants on mixed feeding or poorly supported formula feeding.

Sub-Analyses

- **Maternal age:** Younger mothers (<25 years) had higher rates of missed ART doses and mixed feeding.
- **Parity:** First-time mothers were more anxious about HIV transmission and often sought advice from family, influencing feeding choices.
- **Socio-economic status:** Low-income mothers faced greater barriers to formula feeding and adherence, highlighting the need for social support interventions.

Comparison with Existing Studies

Findings align with WHO and UNAIDS recommendations that promote exclusive breastfeeding with ART in low- and middle-income countries. However, in high-income countries with safe alternatives, replacement feeding is often preferred.

DISCUSSION

This study confirms that **exclusive breastfeeding with maternal ART** is the safest strategy in resource-limited settings. Key insights include:

- **ART as cornerstone:** Viral suppression during pregnancy and breastfeeding reduces MTCT to <2%.
- **Exclusive breastfeeding superiority:** Protects gut integrity and minimizes pathogen exposure, lowering HIV susceptibility.
- **Cultural and ethical considerations:** Stigma, family pressures, and community norms affect feeding choices. Counseling should be culturally sensitive and family-inclusive.
- **Health system barriers:** Stock-outs, inadequate counseling, and socio-economic challenges impede optimal ART adherence and feeding practices.
- **Disparities by age, parity, and income:** Highlight the need for targeted interventions for vulnerable sub-groups.

Comparison with Global Guidelines

Findings align with WHO and UNAIDS recommendations advocating exclusive breastfeeding for six months with continued breastfeeding up to 24 months alongside maternal ART [1,4]. High-income countries often favor replacement feeding where safe alternatives exist [8], whereas low- and middle-income

countries prioritize exclusive breastfeeding due to increased morbidity and mortality associated with formula feeding

Regional Variations

Observations in Nigeria reflect socio-cultural pressures influencing maternal feeding choices, similar to trends in Uganda, Zambia, and South Africa [9,10]. Conversely, some regions in Southeast Asia promote formula feeding, showing the need for region-specific interventions [11]

Policy Implications

- **Strengthen ART supply chains** to ensure uninterrupted access.
- **Implement culturally sensitive counseling** involving families and community leaders.
- **Support vulnerable subgroups**, including adolescent, first-time, and low-income mothers.
- **Monitor and evaluate long-term infant outcomes** for ART-exposed breastfed infants.

Ethical Considerations

Balancing **infant protection and maternal autonomy** remains critical. Comprehensive counseling and confidentiality are essential to minimize stigma and empower informed decisions [12].

Future Research

Longitudinal studies should evaluate **long-term ART exposure outcomes** in infants and assess effectiveness of adherence interventions and community support strategies. Comparative studies across regions can inform policy adaptations aligned with global standards.

Identification of Gaps

- Limited longitudinal studies on ART-exposed infants.
- Insufficient integration of culturally sensitive counseling.
- Weak health systems leading to stock-outs and poor follow-up.

Recommendations

1. **Scale up ART access and adherence support** with uninterrupted supply chains and follow-up systems.
2. **Strengthen exclusive breastfeeding counseling** integrated into maternal-child health programs.
3. **Implement culturally sensitive, family-inclusive education** to mitigate stigma and support informed feeding decisions.

5. **Ensure consistent ART supply** to prevent missed doses and reduce MTCT risk.

6. **Conduct longitudinal studies** on ART exposure in breastfed infants, including growth, neurodevelopment, and long-term health outcomes.

7. **Target interventions for vulnerable subgroups** (young mothers, first-time mothers, low-income mothers) to improve adherence and feeding outcomes

CONCLUSION

Breastfeeding by HIV-positive mothers presents a complex interplay between maximizing infant survival and minimizing the risk of mother-to-child HIV transmission. This study reinforces that exclusive breastfeeding combined with maternal ART adherence is the most effective strategy in low-resource settings. ART not only suppresses maternal viral load but also significantly reduces MTCT, supporting the dual goals of child survival and HIV prevention.

Field observations reveal that socio-cultural pressures, stigma, and economic barriers remain significant determinants of maternal feeding choices. Mothers' fear of involuntary HIV disclosure and societal judgment often drives them toward breastfeeding despite challenges, emphasizing the need for culturally sensitive counseling and family-inclusive education programs. Health system factors, such as ART stock-outs and inadequate follow-up, further influence adherence and infant outcomes, highlighting the critical role of robust healthcare infrastructure.

The study also highlights disparities in ART adherence and infant outcomes across maternal age, parity, and socio-economic status, suggesting that targeted interventions for vulnerable subgroups are essential. Interdisciplinary collaboration between healthcare providers, community leaders, and policymakers is crucial to design strategies that reduce stigma, improve ART adherence, and promote safe infant feeding practices.

In conclusion, with comprehensive support—including ART provision, counseling, and socio-cultural sensitivity—exclusive breastfeeding is both safe and beneficial for HIV-positive mothers and their infants. Strengthening maternal-child health programs to integrate these elements is essential for achieving the elimination of pediatric HIV, improving infant survival, and empowering mothers to make informed feeding decisions. Longitudinal research on ART exposure and infant development is recommended to monitor long-term health outcomes and optimize programmatic interventions.

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- Incorporate culturally sensitive, family-inclusive education.
- Ensure uninterrupted ART supply chains.
- Conduct longitudinal studies on ART exposure in breastfed infants.