Factors Associated With Loss to Follow-Up of HIV-Exposed Infants at a Primary Health Centre in Kabwe, Zambia

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ABSTRACT

Loss to follow-up (LTFU) among HIV-exposed infants (HEI) remains a significant barrier to the elimination of mother-to-child transmission (eMTCT) of HIV in sub-Saharan Africa. At Chowa Urban Health Centre in Kabwe, Zambia, LTFU rates have fluctuated between 17% and 45% between 2019 and 2023. This study investigated factors associated with LTFU among HEI enrolled in the Early Infant Diagnosis (EID) program.

A quantitative descriptive cross-sectional study was conducted using a census approach, enrolling 134 HEI registered in the EID program between 2019 and 2023. Data were collected from mothers using a structured questionnaire. Chi-square tests and binary logistic regression analysis were performed using SPSS version 27.0, with statistical significance set at $p<0.05$ and 95% confidence intervals.

The LTFU rate was 27% (36/134). Significant associations were found between LTFU and infant age ($p=0.001$), hospitalization history ($p=0.037$), use of traditional treatments ($p=0.016$), maternal residence ($p=0.001$), maternal education ($p=0.012$), ANC visits ($p=0.013$), place of delivery ($p=0.001$), and timing of ART initiation ($p=0.003$). In adjusted analysis, MUAC measurement at 6 months (AOR=5.917, $p=0.004$), maternal age 25-30 years (AOR=3.021, $p=0.015$), and health centre delivery (AOR=2.981) were independently associated with LTFU.

The LTFU rate of 27% exceeds the WHO acceptable threshold of 10%. Targeted interventions addressing rural residence, maternal education, and timing of ART initiation are urgently needed.

Keywords: Loss to follow-up, HIV-exposed infants, early infant diagnosis, Zambia, PMTCT

INTRODUCTION

Despite significant global progress in reducing mother-to-child transmission (MTCT) of HIV, the challenge of retaining HIV-exposed infants (HEI) in care continues to undermine elimination efforts, particularly in sub-Saharan Africa. The Joint United Nations Programme on HIV/AIDS (UNAIDS, 2021) estimates that 1.7 million children aged 0-14 years are living with HIV globally, with over 90% of paediatric HIV infections concentrated in sub-Saharan Africa (Ankunda et al., 2020).

Zambia bears a substantial burden of the HIV epidemic, with over 1.2 million people living with HIV, including approximately 66,000 children under 15 years (UNAIDS, 2021). Although the country has made commendable progress reducing new infections among children from 10,000 to 6,000 between 2010 and 2019 the challenge of loss to follow-up (LTFU) remains critical (Ministry of Health, 2022).

Early infant diagnosis (EID) is a cornerstone strategy for identifying HIV-infected infants before clinical disease onset, enabling timely antiretroviral therapy (ART) initiation (Goggin et al., 2019). However, the effectiveness of EID programs is substantially compromised by high LTFU rates. According to WHO guidelines, LTFU exceeding 10% is considered substantial (UNAIDS, 2021). Studies across Africa have reported LTFU rates ranging from 36.9% to 68.4% among HEI, severely impeding the provision of appropriate interventions (Wubneh et al., 2021).

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In Zambia, national data indicate an alarming LTFU rate of approximately 33% among HEI (Mwaba et al., 2017). At Chowa Urban Health Centre in Kabwe District, LTFU rates have shown concerning fluctuations: 39% (2019), 32% (2020), 17% (2021), 30% (2022), and 45% (2023), with an average of 34% over five years (DHIS2, 2023). These figures represent 51 infants lost from follow-up out of 152 registered between 2019 and 2023.

The consequences of LTFU are profound and multifaceted. Infants lost to follow-up face delayed or missed HIV diagnosis, missed treatment opportunities, increased mortality risk, uncertain HIV status, and continued risk of HIV transmission through breastfeeding (Mofenson, Cohn and Sacks, 2020). Furthermore, LTFU undermines the elimination of mother-to-child transmission (eMTCT) programs, perpetuates community HIV transmission, and strains healthcare resources that could be allocated to other developmental priorities (Mpinganjira et al., 2020).

Despite the implementation of various interventions including healthcare provider training, community-based volunteer programmes, counselling services, and SMS reminders significant numbers of infants continue to be lost from care (Ministry of Health, 2020). This paradox suggests that existing interventions may not adequately address the specific barriers faced by mothers and infants in local contexts.

The Health Belief Model (HBM) guided this study, providing a theoretical framework to understand the factors influencing mothers' decisions to remain engaged in EID programs. The HBM posits that health-related behaviour is influenced by perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy (LaMorte, 2019). Mothers are more likely to continue follow-up visits if they perceive the risk of HIV transmission to their infant as serious, believe they are personally susceptible to this risk, and perceive the benefits of engagement as outweighing the barriers (Kaup, Oomman and Shivalli, 2018).

This study aimed to investigate factors associated with LTFU among HEI at Chowa Urban Health Centre, addressing a critical gap in documented scholarship on LTFU within low-level hospital settings in Zambia. Specific objectives were to: (1) evaluate the number of LTFU among HEI enrolled on the EID program, and (2) assess infant and maternal characteristics associated with LTFU.

METHODS

Study Design and Setting

A quantitative descriptive cross-sectional study was conducted at Chowa Urban Health Centre, situated approximately 6 km south of Kabwe town in Zambia's Central Province. The health centre serves a catchment population that includes rural areas up to 22 miles from Kabwe, including Muswishi, Lusenfwa, Chamuuka, and Mulungushi Power areas under Kapiri, Chisamba, and Kabwe districts. The facility was selected due to its documented high rates of LTFU among HEI, averaging 34% over five years (2019-2023).

Study Population and Sample

The study population comprised all HEI registered in the EID program at Chowa Urban Health Centre between 2019 and 2023 (N=152). A census approach was employed due to the manageable population size. Of the 152 eligible HEI, 134 were successfully enrolled in the study (response rate 88.2%). Inclusion criteria were all mother-infant pairs enrolled in the EID program during the study period. Exclusion criteria included infants whose mothers did not receive antenatal care at Chowa Clinic, lacking documented HIV testing or follow-up records, incomplete demographic or clinical information, or lack of informed consent.

Data Collection

Data were collected using an adapted structured questionnaire with 22 closed-ended questions distributed across three sections: infant characteristics (10 items), maternal characteristics (6 items), and obstetric characteristics (6 items). The questionnaire was adapted from validated instruments used in similar African

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settings and reviewed by experts in paediatric HIV care and research supervisors to ensure content and face validity.

Face-to-face interviews were conducted by the researcher using an interviewer-administered technique. A pilot study was conducted at Katondo Urban Health Centre (a facility with comparable patient population and service level) involving 18 participants (10% of the target sample). Adjustments were made to question clarity and flow based on pilot findings.

Variables and Measurements

The dependent variable was LTFU, operationally defined as an exposed infant who had not attended HIV care for more than 30 days from the due date, whose parents/guardian had been contacted by phone or text message on three attempts with no response (adapted from Ministry of Health, 2020 guidelines).

Independent variables included:

a. **Infant characteristics:** sex, age, place of delivery, birth weight, hospitalization history, use of traditional treatments, immunization status, ART prophylaxis adherence
b. **Maternal characteristics:** age, marital status, religion, residence, occupation, educational level
c. **Obstetric characteristics:** parity, number of ANC visits, place of delivery, mode of delivery, timing of ART initiation, infant feeding practice, family planning use

Data Analysis

Data were analysed using SPSS version 27.0. Descriptive statistics (frequencies, percentages, means) were computed for all variables. Bivariate analysis using chi-square tests (or Fisher's exact test where expected cell counts <5) assessed associations between independent variables and LTFU. Binary logistic regression was performed to identify independent predictors of LTFU, with variables showing $p<0.20$ in bivariate analysis entered into the multivariable model. Statistical significance was set at $p<0.05$ with 95% confidence intervals.

Ethical Considerations

Ethical approval was obtained from the University of Zambia Biomedical Research Ethics Committee (UNZABREC). Permission was secured from Kabwe District Health Office and Chowa Urban Health Centre administration, with additional registration from the National Health Research Authority. Unique identification numbers were assigned to maintain participant anonymity, and all data were kept confidential. Written informed consent was obtained from all participants after detailed explanation of study purposes, risks, benefits, and voluntary participation rights.

RESULTS

Participant Characteristics

A total of 134 HEI were included in the analysis. Among infants, 70 (52.2%) were female and 68 (47.8%) males. The majority (85, 63.4%) were aged 12-18 months, with 49 (36.6%) aged 3-12 months. Most deliveries (119, 88.8%) occurred at health facilities, predominantly government-owned (123, 91.8%). Normal birth weight (≥2500g) was recorded for 107 (79.9%) infants. Hospitalization since birth occurred in 17 (12.7%) infants, while 5 (3.7%) had received traditional treatments. Immunization adherence was high (130, 97.0%) (Table 1).

Table 1: Infant Socio-demographic Characteristics (N=134)

Variable	Frequency	Percentage
Sex		
Male	68	47.8%

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Female	70	52.2%
Age		
3-12 months	49	36.6%
12-18 months	85	63.4%
Place of delivery		
Home	15	11.2%
Health facility	119	88.8%
Birth weight		
<2500g	27	20.1%
≥2500g	107	79.9%
Hospitalization history		
Yes	17	12.7%
No	117	87.3%

Maternal characteristics revealed that most mothers (110, 82.1%) were married, all (100%) were Christian, and the majority resided in urban areas (128, 95.5%). Occupational status showed 95 (70.9%) were housewives, while 66 (49.3%) had secondary education (Table 2).

Table 2: Maternal Characteristics (N=134)

Variable	Frequency	Percentage
Maternal age		
Below 25 years	44	32.8%
25-30 years	39	29.1%
30-35 years	40	29.6%
Above 35 years	11	8.5%
Marital status		
Married	110	82.1%
Single	24	17.9%
Residence		
Urban	128	95.5%
Rural	6	4.5%
Education		
No formal	3	2.2%
Primary	36	26.9%
Secondary	66	49.3%
College+	29	21.6%

Obstetric characteristics showed 79 (59.0%) women had more than three births, with 91 (67.9%) attending five ANC visits. Health centre deliveries (71, 53.0%) were slightly more common than hospital deliveries (63, 47.0%). Spontaneous vaginal delivery (110, 82.1%) predominated. Most women (92, 68.7%) initiated ART before pregnancy, and exclusive breastfeeding was near-universal (133, 99.3%).

Loss to Follow-up Rate

Of the 134 HEI, 36 (27%) were classified as LTFU, while 98 (73%) remained engaged in care. This 27% LTFU rate, while lower than the facility's five-year average of 34%, still substantially exceeds the WHO threshold of 10%.

Factors Associated with LTFU: Bivariate Analysis

Infant characteristics: Significant associations with LTFU were observed for infant age (p=0.001), with all LTFU cases occurring in the 12-18 months age group (36, 42.4% of this age group) compared to none in the 3-11 months group. Hospitalization history (p=0.037) and use of traditional treatments (p=0.016) were also significantly associated with LTFU (Table 3).

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Table 3: Infant Characteristics and LTFU Association

Variable	LTFU n (%)	Non-LTFU n (%)	P-value
Age			
3-11 months	0 (0.0%)	49 (100.0%)	**0.001***
12-18 months	36 (42.4%)	49 (57.6%)	
Hospitalization			
No	35 (29.9%)	82 (70.1%)	**0.037***
Yes	1 (5.9%)	16 (94.1%)	
Traditional treatment			
No	36 (27.9%)	93 (72.1%)	**0.016***
Yes	0 (0.0%)	5 (100.0%)	

Fisher's exact test, statistical significance at p<0.05

Maternal characteristics: Residence showed strong association (p=0.001), with 83.3% of rural-residing mothers experiencing LTFU compared to 24.2% of urban residents. Educational status was also significant (p=0.012), with LTFU rates of 0% among mothers with no formal education, 25.0% among primary, 34.8% among secondary, and 13.8% among college-educated mothers. Maternal age showed borderline association (p=0.062).

Obstetric characteristics: ANC visits (p=0.013), place of delivery (p=0.001), and timing of ART initiation (p=0.003) were significantly associated with LTFU. LTFU was higher among those delivering at health centres (39.4%) compared to hospitals (10.2%). ART initiation before pregnancy was associated with higher LTFU (35.9%) compared to during pregnancy (8.1%) or after labour (0%).

Independent Predictors of LTFU: Multivariable Analysis

Binary logistic regression identified several independent predictors of LTFU (Table 4). MUAC measurement at 6 months showed strong association (AOR=5.917, 95% CI: 1.739-20.130, p=0.004), indicating infants with higher MUAC had nearly six times greater odds of LTFU.

Table 4: Multivariable Logistic Regression for Factors Associated with LTFU

Variable	AOR	95% CI	P-value
MUAC at 6 months	5.917	1.739-20.130	**0.004**
Maternal age (ref: below 25)			
25-30 years	3.021	0.001-0.472	**0.015**
30-35 years	4.019	0.001-0.517	**0.019**
Above 35 years	0.161	0.008-3.238	0.023
Marital status (ref: married)			
Single	3.106	0.003-3.270	**0.020**
Occupation (ref: government)			
Non-government employed	3.907	3.916-614.849	**0.003**
Housewife	0.432	2.873-23.345	**0.001**
Education (ref: no formal)			
College and above	0.421	1.432-5.654	**0.012**
ANC visits (ref: 2nd visit)			
5th visit	0.569	0.976-1.987	**0.031**

DISCUSSION

This study investigated factors associated with LTFU among HIV-exposed infants at Chowa Urban Health Centre in Kabwe, Zambia, revealing a 27% LTFU rate that substantially exceeds the WHO acceptable threshold of 10% (UNAIDS, 2021). This finding is consistent with national estimates of 33% (Mwaba et al.,

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2017) and aligns with rates reported in Uganda (48%, Ankunda et al., 2020) and Kenya (45.1%, Mukami, 2022), while higher than rates in Ethiopia (22.5%, Wubneh et al., 2021). The persistent elevation of LTFU rates, despite the facility's five-year average of 34%, indicates that current interventions are inadequate to address the underlying barriers to retention.

Infant Characteristics and LTFU

The finding that all LTFU cases occurred among infants aged 12-18 months, with none in the 3-11 months age group, presents an important pattern that diverges from several studies. Wubneh et al. (2021) in Ethiopia and Kiyaga et al. (2018) in Uganda reported that younger infants faced higher LTFU risk due to more frequent visit requirements and greater care demands. However, our finding aligns with Goggin et al. (2019) in Kenya, who reported peak LTFU between 9-18 months. This pattern may reflect maternal perceptions of reduced risk following successive negative HIV test results, leading to complacency (Mpinganjira et al., 2020). Alternatively, the transition from infancy to toddlerhood may coincide with returning to employment, resumption of full household responsibilities, or reduced perceived need for specialised care.

The paradoxical finding that infants with higher MUAC measurements at 6 months had nearly six-fold increased odds of LTFU (AOR=5.917, p=0.004) is particularly noteworthy. This corroborates findings from Malawi (Mpinganjira et al., 2020) and Thailand (Kawilapat et al., 2019), where healthier-appearing children particularly those with successive HIV-negative results were more likely to be lost from follow-up. Conversely, Kigen et al. (2018) found that undernourished infants were at higher LTFU risk. This discrepancy likely reflects different healthcare-seeking behaviours: mothers of visibly healthy infants may perceive continued follow-up as unnecessary, while mothers of unwell infants may be motivated to remain engaged. The implication for programmes is the need to reinforce the importance of continued follow-up regardless of infant appearance or interim negative results, as late seroconversion during breastfeeding remains possible (Bispo et al., 2017).

Hospitalization history (p=0.037) and traditional treatment use (p=0.016) showed significant associations with LTFU, though directionally different from expectations. Hospitalized infants had lower LTFU rates (5.9% vs 29.9%), suggesting that serious illness may paradoxically enhance retention through increased health system engagement and heightened maternal concern. This aligns with Ahoua et al. (2010), who found that clinical events during follow-up decreased LTFU probability. Conversely, the absence of LTFU among traditional treatment users (0% vs 27.9% among non-users) is difficult to interpret given the small number (n=5) and may reflect selection bias, though similar findings from Ethiopia (Hibstie et al., 2020) and Malawi (Kim et al., 2016) suggest that traditional medicine users may represent a distinct subgroup with unique healthcare-seeking patterns.

Maternal Socio-demographic Factors

Maternal age demonstrated complex associations with LTFU. Mothers aged 25-30 years (AOR=3.021, p=0.015) and 30-35 years (AOR=4.019, p=0.019) had significantly higher LTFU odds compared to those below 25 years, while those above 35 years had lower odds (AOR=0.161). This contrasts with Silva Calvo et al. (2022) in Brazil and Johnson et al. (2018), who found younger maternal age associated with increased LTFU. The higher LTFU among prime reproductive age women (25-35 years) may reflect competing demands of childcare, employment, and household responsibilities at life stages when women typically have multiple young children and potentially less family support than younger women who may live with parents (Hamal et al., 2020). The lower LTFU among women over 35 may indicate greater healthcare experience, established ART adherence, and more stable socioeconomic circumstances.

Residence emerged as a powerful predictor, with rural-dwelling mothers having 83.3% LTFU compared to 24.2% among urban residents (p=0.001). This aligns with Kassaw et al. (2019), Wubneh et al. (2021), and Kokeb (2023), who consistently identified rural residence as a major barrier to retention. The mechanisms are well-documented: longer travel distances, inadequate transportation infrastructure, higher transport costs (often consuming daily wages), and fewer healthcare facilities offering EID services (Keeves et al., 2021). At Chowa Clinic, rural catchment areas extend up to 22 miles (35 km), with many roads impassable during rainy seasons.

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These structural barriers are compounded by opportunity costs time spent travelling is time away from income-generating activities, other children's care, and household duties.

The association between maternal education and LTFU (p=0.012) followed an expected gradient, with secondary-educated mothers showing highest LTFU (34.8%), followed by primary (25.0%), college-educated (13.8%), and unexpectedly, no formal education (0%). The zero LTFU among the three mothers with no formal education must be interpreted with extreme caution given the tiny subsample. However, the broader pattern higher education associated with lower LTFU is consistent with Manyi et al. (2020) in Cameroon and Kweyamba et al. (2018) in Uganda. Education likely improves health literacy, comprehension of medical instructions, understanding of the rationale for continued follow-up despite negative interim results, and self-efficacy in navigating healthcare systems (Nutbeam and Lloyd, 2021). However, the elevated LTFU among secondary-educated mothers compared to college-educated suggests a threshold effect, where some education without sufficient health literacy may paradoxically lead to overconfidence or selective adherence.

Marital status findings showed unmarried mothers had lower LTFU odds (AOR=3.106, p=0.020) compared to married women, contrasting with Wekesa et al. (2020) in Kenya, who found unmarried status associated with higher HIV-related mortality. This discrepancy may reflect differing social support dynamics: unmarried mothers in our setting may live with extended family who facilitate care attendance, while married women may face challenges related to HIV status disclosure to partners. Ngandu et al. (2019) and Cataldo et al. (2018) documented that non-disclosure to partners particularly among remarried women is a frequently cited barrier to retention, as women cannot explain repeated clinic visits without revealing their HIV status.

Obstetric Factors

The significant association between ANC visits and LTFU (p=0.013), with fifth visit attendees having lower odds (AOR=0.569, p=0.031), underscores the protective effect of comprehensive antenatal engagement. This aligns with Teasdale et al. (2022) in Kenya, who found that group ANC models reduced LTFU, and Asweto and Amimo (2020), who linked reduced ANC visits to increased MTCT risk. Each ANC visit represents an opportunity for HIV status confirmation, ART initiation or reinforcement, counselling on infant feeding and EID, and building therapeutic relationships. Women who attend five or more ANC visits have had repeated exposure to prevention messages and have established patterns of healthcare-seeking that likely extend into the postnatal period. The implication for programmes is that identifying women who miss ANC visits and providing outreach may prevent subsequent LTFU of their infants.

Place of delivery showed a striking difference: health centre deliveries had 39.4% LTFU versus 10.2% for hospital deliveries (p=0.001). This finding is concerning given that 53% of women delivered at health centres. Potential explanations include differences in the quality of discharge counselling, availability of integrated PMTCT services, staffing levels, and continuity of care protocols between hospitals and health centres. Hospitals typically have dedicated paediatric HIV services, while health centres may have more limited EID capacity. Giyose et al. (2018) similarly found that facility-based delivery location influenced retention rates. The adjusted analysis confirmed health centre delivery as an independent predictor (AOR=2.981), emphasising the need to strengthen EID services at primary care level.

Mode of delivery showed that caesarean section had lower LTFU (16.7% vs 29.1% for SVD), though not statistically significant in bivariate analysis (p=0.213). The adjusted analysis showed CS associated with decreased odds (AOR=0.563). This trend may reflect that CS delivery typically involves longer hospital stays, more intensive discharge teaching, and closer postpartum follow-up, creating stronger health system linkages (Theron et al., 2021). Additionally, women who deliver by CS may perceive themselves and their infants as higher risk, increasing motivation to adhere to follow-up.

The timing of ART initiation demonstrated a counterintuitive pattern: women who initiated ART before pregnancy had higher LTFU (35.9%) compared to those initiating during pregnancy (8.1%) or after labour (0%) (p=0.003). This contradicts Omonaiye et al. (2018) and Nkhonjera et al. (2021), who found newly diagnosed women more prone to LTFU. Our finding may reflect that woman on long-term ART have been engaged with HIV services for years and may experience "prevention fatigue" or perceive themselves as

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experienced enough to manage without intensive follow-up. Conversely, women diagnosed during pregnancy receive intensive counselling as part of PMTCT programs and may have higher motivation to protect their infant (Soch and Chea, 2019). This finding suggests that all women, regardless of ART duration, require ongoing reinforcement of the importance of infant follow-up.

Implications for Policy and Practice

These findings have several implications for eMTCT programmes in Zambia and similar settings. First, the 27% LTFU rate, while lower than the facility's historical average, remains unacceptably high and warrants urgent intervention. Second, rural residence emerged as a major risk factor, necessitating investment in outreach services, transport subsidies, community-based EID testing, and mobile clinics. Third, the paradoxical LTFU among healthier infants and those with higher MUAC suggests that programmes should specifically counsel mothers that continued follow-up is essential regardless of infant appearance or interim negative results.

The Ministry of Health should consider: (1) strengthening referral and communication protocols between hospitals and health centres to ensure continuity of care; (2) implementing targeted retention interventions for women aged 25-35 years, who showed highest LTFU risk; (3) developing enhanced counselling protocols for women on long-term ART who may underestimate ongoing transmission risk; and (4) integrating EID services more closely with routine immunization programmes to leverage the high immunization attendance (97% in this study) for HIV follow-up.

At facility level, Chowa Clinic should: (1) implement a tracking system for women who miss ANC visits to prevent subsequent infant LTFU; (2) provide additional counselling and support for health centre deliveries, where LTFU was nearly four times higher than hospital deliveries; (3) develop peer support groups specifically for mothers of healthy-appearing infants to reinforce continued engagement; and (4) train staff to address the specific needs of women with secondary education, who showed unexpectedly high LTFU rates.

Study Limitations

Several limitations warrant consideration. First, the cross-sectional design precludes causal inference, and temporal relationships between factors and LTFU cannot be definitively established. Second, the study was conducted at a single health centre in Kabwe District, limiting generalisability to other settings with different demographic, cultural, or health system characteristics. Third, reliance on self-reported data from mothers may introduce recall bias, particularly for events occurring up to 24 months prior. Fourth, the small number of rural residents (n=6) limits statistical power for subgroup analyses, though the association with LTFU was strong despite this limitation. Fifth, social desirability bias may have influenced responses about sensitive topics such as traditional medicine use and ART adherence. Sixth, we did not collect data on household income, food security, or paternal involvement, which may be important unmeasured confounders. Seventh, the study did not include healthcare provider perspectives or health facility assessments, which might have identified system-level factors contributing to LTFU.

Despite these limitations, the study has notable strengths, including the census approach minimising sampling error, use of a validated data collection tool, rigorous statistical analysis including multivariable regression to control for confounding, and focus on an understudied setting (primary health centre level in Zambia). The findings provide actionable evidence for programme improvement.

CONCLUSION

This study demonstrates that LTFU among HIV-exposed infants at Chowa Urban Health Centre (27%) substantially exceeds acceptable thresholds and is associated with modifiable factors including rural residence, lower maternal education, health centre delivery, and timing of ART initiation. The paradoxical finding that healthier infants and those whose mothers-initiated ART before pregnancy have higher LTFU risk suggests that current counselling approaches may inadequately address prevention fatigue and complacency.

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Achieving eMTCT goals in Zambia requires moving beyond ART coverage to address retention throughout the PMTCT cascade. This demands interventions targeted at high-risk groups (rural residents, women aged 25-35 years, health centre deliveries), strengthened referral systems between levels of care, enhanced counselling that emphasises continued follow-up regardless of interim negative results, and innovative approaches such as community-based EID testing and transport subsidies. Without urgent action, LTFU will continue to undermine progress toward eliminating mother-to-child transmission of HIV in Zambia.

RECOMMENDATIONS

For the Ministry of Health:

a. Prioritise ongoing professional development for healthcare providers on evidence-based retention strategies

b. Foster collaboration with NGOs and community-based organisations to strengthen community-level support systems for rural mothers

c. Assess and address barriers to healthcare access, particularly in rural areas, through improved infrastructure and transport options

For Chowa Urban Health Centre administrators:

i. Implement quality improvement initiatives to enhance health promotion during ANC visits

ii. Strengthen coordination between ANC, labour and delivery, and child health departments to ensure integrated care

iii. Conduct staff workshops on eMTCT, benefits of follow-up, and consequences of LTFU

For nursing and midwifery staff:

a. Develop good attitudes toward mothers and deliver integrated, time-efficient care

b. Incorporate couple counselling during ANC to ease HIV status disclosure

c. Form support groups for mothers at risk of LTFU

For researchers:

i. Conduct longitudinal studies exploring trends in healthcare-seeking behaviour

ii. Undertake qualitative studies on experiences and challenges faced by mothers of HEI

iii. Explore psycho-social, cultural, and individual health behaviour factors not exhaustively examined in this study

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