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Mother-to-child transmission outcomes of HIV-exposed infants followed up in Jos North-central Nigeria

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Abstract

Objective: Since 2010, Nigeria adopted World Health Organization (WHO) 'Option B' which required administration of triple antiretroviral prophylaxis or treatment (ART) to all HIV-infected pregnant women. We studied the transmission outcomes of HIV-exposed children up to 18 months of age.

Design: This was a retrospective, observational study of HIV-infected pregnant women and their exposed infants that accessed prevention of mother to child transmission (PMTCT) services at Jos University Teaching Hospital, Jos, North-central Nigeria.

Methods: HIV-infected women were enrolled during antenatal care or at labor/delivery between January 1, 2010 and December 31, 2012. Antiretroviral (ARV) prophylaxis/therapy was provided according to the 2010 Nigerian PMTCT guidelines (adapted WHO 2010 guidelines); Infant HIV diagnosis was performed at 6 weeks and at 6 months. HIV antibody diagnosis was used for exposed children at 18 months.

Results: A total of 996 HIV-exposed children were followed up. Of those children, 140 (14.1%) were lost to follow up by 18 months of age. Twelve children (1.4%) died (all HIV negative) before 18 months of age and six infants (0.7%) were confirmed to be HIV-infected (4 by the age of 6 months and 2 thereafter) and were referred for treatment. A total of 838 (84.1%) children tested HIV negative at 18 months and were discharged. Mother-to-child transmission (MTCT) of HIV by 18 months was lower among women on ART before pregnancy compared to those women who started ART/Triple ARV prophylaxis during pregnancy/delivery. (0.4%; 3/700 vs 2.0%; 3/150 P=0.05) Home delivery was associated with higher transmission than facility delivery (p=0.03).

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Mode of delivery or method of infant feeding had no significant impact on vertical transmission by 18 months.

Conclusions: In North-central Nigeria where HIV is prevalent, ART started before pregnancy is enormously effective in preventing mother-to-child transmission. Adoption of WHO 'Option B+' deserves serious consideration in such settings.

Keywords

HIV; prevention; MTCT; ART; Nigeria

Introduction

Human immunodeficiency virus (HIV) infection remains a major contributor to infant mortality in sub-Saharan Africa. [1, 2] More than 90% of pediatric HIV infections occur through mother-to-child transmission (MTCT), either during pregnancy, labor/delivery, or post-natally through breastfeeding. Without intervention, approximately one in three children born to mothers living with HIV will become infected in breastfeeding populations. [3, 4]

Antiretrovirals (ARV) remain the mainstay of prevention of mother-to-child transmission (PMTCT) of HIV interventions. The breakthrough came in 1994 with the acquired immune deficiency syndrome (AIDS) clinical trials group (ACTG) 076 study [5] which reported a 67% decline in MTCT rates following zidovudine monotherapy regimen. In 1999, the HIVNET 012 study [6] in Kampala, Uganda, reported the efficacy of intrapartum and neonatal single-dose nevirapine (NVP) for PMTCT.A combination of antepartum zidovudine plus single dose intrapartum NVP, evaluated in Thailand [7] further reduced MTCT to below 5%. Since 2010, triple ARV prophylaxis/treatment to all pregnant HIV infected women was introduced with MTCT rates falling below 2%. [8] Providing ARV prophylaxis for PMTCT has prevented more than 350,000 children from acquiring HIV infection globally each year between 1995 and 2010, and 86% of those children who avoided infection, live in sub-Saharan Africa, the region with the highest prevalence of HIV infection among women of reproductive age. [9]

The Global Plan towards Elimination of new HIV infections among children by 2015 reported that since 2009, new HIV infections among children have reduced by over 50% in many African countries. In Nigeria, however, the rate of new infection in children has remained largely unchanged.[9] In 2012, Nigeria had ARV coverage of 17%, MTCT rate (including breastfeeding) of 30% and nearly 60 000 new HIV infections among children, highest incidence in a single country globally.[9] PMTCT programs in Nigeria commenced in 2002 yet the interventions have never been nationally evaluated. In a country where HIV is prevalent and prolonged breastfeeding is the norm, very little is known about the effectiveness of PMTCT interventions when exposure to breast milk has ended. There are concerns that many children do not benefit from PMTCT programs because of unacceptably high loss to follow-up (LTFU) of infants from most programs. [10]

The Jos University Teaching Hospital (JUTH) PMTCT clinic in Jos, North-central Nigeria has been providing services since 2002 to clients in Plateau State and neighboring States of the region. From October 2010, triple ARV prophylaxis became the first line Nigerian national recommendation for all HIV-infected pregnant women in settings where this provision is feasible. [11] This was implemented in the JUTH PMTCT clinic.This study examines the outcomes of HIV-exposed infants whose mothers received ART or World Health Organization (WHO) 'Option B' triple ARV prophylaxis for PMTCT and were followed up to 18 months of age. We hope that the findings will contribute to knowledge in this field and guide intervention strategies for eliminating infant HIV infection in the country.

Methods

Study Design and Participants

We conducted a retrospective, observational study of HIV-infected pregnant women and HIV-exposed infants, enrolled in the PMTCT program at JUTH, Jos, North-central Nigeria between January 1, 2010 and December 31, 2012. The JUTH PMTCT Program like other HIV treatment and care programs at JUTH was designed to facilitate outcomes research. Jos is the capital city of Plateau State with a culturally diverse population of about 900,000 people. [12] The study site was part of the Nigerian National PMTCT and Antiretroviral Therapy (ART) programs, which commenced in 2002, with support from the President's Emergency Plan for AIDS Relief (PEPFAR) from 2004.

HIV infected pregnant women were identified through testing and counseling services provided at the antenatal clinic and at the labor ward of JUTH. HIV infected pregnant women were also referred from the adult HIV treatment clinic at JUTH and from other health facilities in the area. All HIV-infected women were continued or started on ART, either for prophylaxis (i.e. CD4 count > 350) or for life-long treatment (CD4 ≤ 350) as recommended by the 2010 national PMTCT guidelines. [11] The preferred regimen was zidovudine + lamivudine + (NVP or efavirenz) and the alternate regimen in the presence of Hepatitis B co-infection or anemia was tenofovir + (lamivudine or emtricitabine) + (NVP or efavirenz). Other combinations of ART were employed as stipulated by the national guidelines. [11]Women who were already on ART for treatment of their own HIV disease before pregnancy were also enrolled at the PMTCT clinic. All women gave written informed consent, which was subject to ethical review by the Institutional Review Boards of JUTH and the Harvard School of Public Health (HSPH), Boston USA.

Immediately after birth, all HIV exposed infants were expected to received daily doses of NVP for 6 weeks. Postpartum, mothers and their babies were seen at the Pediatric Infectious Disease Clinic (PIDC) every two weeks for the first eight weeks. From 2010, exclusive breastfeeding for the first 6 months with subsequent introduction of supplementary foods and continuing breastfeeding for up to one year of age was promoted at the PMTCT clinic as optimum nutrition for HIV exposed children. The infant's blood sample was obtained at 6 weeks and 24 weeks of age for HIV testing using whole blood DNA polymerase chain reaction (PCR). Subsequent visits were as prescribed by the National PMTCT guidelines[11]. HIV infected infants were referred to the PIDC for treatment while negative infants were

followed up until discharge following a negative HIV antibody test at 18 months of age. Only mothers who were registered at the JUTH PMTCT clinic between January 1, 2010 and December 31, 2012 who were already on ART before pregnancy, or started on ART or triple ARV prophylaxis, and whose babies were either HIV DNA PCR positive at 6 and/or 24 weeks or were discharged at 18 months of age with documented HIV status were included as participants in this study.

HIV Diagnosis

The national serial algorithm which involved the use of rapid HIV test kits included testing with Determine (Alere Medical Co., Ltd.,357 Matsudo-shi, Chiba, 270-22140 Japan.), followed by Unigold (Trinity Biotech PLC,IDA Business Park, Bray, Co Wicklow, Ireland). TheStatpak assay(Chembio Diagnostic Systems, INC.,3661 Horseblock Road,) served as a tie breaker, the testing algorithm was implemented for HIV screening at ANC and at labour/delivery.[11] HIV diagnosis in infants was performed by DNA PCR (Amplicor v.1.5, Roche Diagnostics, Branchburg, NJ, USA) on whole blood samples, following the National PMTCT guidelines on HIV detection in infants. [11]

Data Collection

Paper based national registers and electronic data collection instruments developed for the Harvard/APIN PEPFAR program was employed at JUTH. All data were entered and maintained in program-developed database using FileMaker Pro at JUTH. The data collected included demographic (mother's age, educational status and delivery site) and clinical data such as gestational age at time of delivery, maternal prophylaxis regimen received, CD4+ cell count and plasma viral load (VL) near time of delivery, mode of delivery, infant birth weight, infant feeding method, infant HIV status at 6 weeks, 24 weeks and 18 months of age, and child outcome variables. A confidential register of all discharged HIV-exposed babies showing mother's contact details and babies HIV status on discharge was maintained at the clinic.

Data Analysis

Infant HIV status either by positive HIV DNA PCR at 6 and/or 24 weeks or serology at 18 months was the outcome variable and all other variables were considered as independent variables. The association between each independent variable and the outcome variable was examined using the Chi squared test or Fisher's exact test for categorical variables while the Mann-Whitney test was used for comparison of two medians. The variables associated with the outcome in this initial analysis were then used for the unadjusted logistic regression analysis. Those variables associated with the outcome in the unadjusted logistic regression at $p < 0.5$ were then fit into a logistic regression model using a forward step-wise strategy. Results were expressed as odds ratios (OR) with their 95% confidence intervals (CIs). All analyses were performed using Stata software version 10.0 (Stata Corporation, College Station, Texas, USA) and all tests were two-sided with a p-value of <0.05 considered statistically significant.

RESULTS

Between January 1, 2010 and December 31, 2012, 6,643 pregnant women were tested and counseled at the JUTH antenatal clinic and 176 (2.6%) were diagnosed with HIV. Out of those, 150 women returned to be enrolled in the PMTCT program after individual post-test counseling. The remaining 26 women (14.8%) were lost to follow up. During this period, 996 HIV-infected pregnant women who enrolled at the PMTCT clinic delivered in our program. These mothers comprised of 806 (80.9%) who were already on ART before pregnancy and 188 (18.9%) who started ART/Triple ARV prophylaxis during the index pregnancy while 2 (0.2%) had some missing information. .

A total of 140 of the 996 (14.1%) HIV-exposed infants were lost to follow up between birth and 18 months of age. Twelve children (12/856, 1.4%) died, all with documented HIV negative status near the time of death. Six infants (6/856, 0.7%) were confirmed to be HIV-infected (4 by the age of 6 months and 2 thereafter) and were referred to the JUTH PIDC for treatment. A total of 838 (84.1%) children tested HIV negative by serology at 18 months and were discharged. Infant deaths were attributed to non-HIV causes: Acute respiratory infection (2, 16%) meningitis (1, 8%), diarrhoeal disease (1, 8%), measles (1, 8%), febrile convulsion (1, 8%) and febrile illness (2, 16%), unknown cause (4, 32%). A sensitivity analysis that considered infants that had died yielded a transmission of 1.9%.

The infants' median gestational age was 38 weeks (IQR, 38-38) and the proportion of males to females was similar (503/493). The majority of the mothers had antenatal care (86.2%) and postnatal care (87.5%) at PEPFAR-supported facilities and 42.7% delivered in these facilities. Most of the deliveries (43.1%) took place at primary health center (PHC) facilities while a few (8.3%) occurred at home. (Table 1)Spontaneous vertex delivery was the major mode of delivery (74.1%). The median birth weight was 3 kg (IQR, 2.6-3.2). The majority of the infants were reported to have taken ARV prophylaxis (99.4%). Exclusive breast feeding was the predominant mode of feeding in the infants (73.4%).

The median age of mothers at the time of delivery was 32 years (IQR, 29-35). The majority had secondary school education (56.6%) and most of them were Christians (76.5%). Among 806 PMTCT enrollee mothers who were on ART before pregnancy, 106 were LTFU by 18 months so, only 700 (82.3%) were analyzed, while among 188 enrollee mothers, who started ART/Triple ARV prophylaxis during the index pregnancy, 36 were LTFU by 18 months and 151 (18.7%) were analyzed. Most women (86.4%) were eligible for ARTbefore pregnancy with the median duration of treatment for those receiving ART being 45 months (IQR, 24-64). The median viral load and CD4+ cell count of the mothers was200 copies/ mL (IQR, 200-836) and 393 cells/ μL (IQR, 264-534) respectively. (Table 1)

In the unadjusted logistic regression, infants whose mothers did not receive ART before pregnancy were 5 times more likely to be HIV seropositive by 18 months of age compared to those mothers wereon ART, (Odds Ratio (OR) 4.71 (0.94-23.56))p=0.05. Infants whose mothers were not eligible for ART (CD4+ cell count >350 at enrollment) were about 7 times more likely to be HIV seropositive by 18 months of age compared to those whose mothers were eligible (On ART before pregnancy or CD4+ cell count ≤350 at enrollment), (OR=6.75

(1.34-33.87) p = 0.02. Mothers who delivered at tertiary health facility and at PHC had a 99.9% and a 99.8% reduction in the odds of their infants being seropositive by 18 months of age compared to those mothers who delivered at home, OR=0.07 (0.01-0.73);p=0.03 and OR=0.12 (0.02-0.76);p=0.02 respectively (Table2). But in the adjusted logistic regression model, only mother's ART eligibility was significantly associated with infant HIV infection by 18 months, with the risk of an infant being seropositive by 18 months of age being 6 times higher in infants of mothers who were not ART eligible compared to mothers who were eligible. Adjusted Odds Ratio (AOR) 6.22 (1.23-31.43) p=0.03. (Table 2) A comparison of the characteristics (ART eligibility, ART before pregnancy and delivery site) of HIV infected women that were lost to follow-up with those that completed the study, showed no significant differences (Table 3)

Discussion

The main findings of this study are that the majority of HIV positive pregnant women receiving PMTCT interventions in Jos were already on ART before conception and that implementing the WHO 'Option B' [8] in such setting can reduce MTCT by 18 months to below 1 percent. This is despite the promotion of exclusive breastfeeding for the first 6 months with gradual introduction of supplementary foods and continuing breastfeeding for up to 12 months. Triple ARV prophylaxis/ART given to pregnant women in the context of WHO 'Option B' for PMTCT has been shown to significantly reduce maternal viral load and increase CD4+ cell count. [13]The European Collaborative Study [14] showed that maternal viral load was the key risk factor for mother-to-child transmission of HIV and that the suppression of viral replication through administration of potent combinations of ARV drugs markedly reduced the risk of MTCT. The effectiveness of ART in reducing MTCT to below 1 percent has been reported in Europe [14,15], other countries in sub-Saharan Africa[16,17, 18] and South-eastern Nigeria[19]. In this study, a vertical transmission rate of 0.7% (6/856) by 18 months of age was obtained and it compared favorably with transmission rates following combinations recommended in British guidelines of 0.7% (17/2286) for highly active antiretroviral therapy with planned Caesarean section, and 0.7% (4/559) for highly active antiretroviral therapy with planned vaginal delivery. [15]A target of 5 percent MTCT rate by 2015 was set by the Global Plan for the elimination of infant HIV infection. [20] Clearly, in-country PMTCT programs offering triple ARV prophylaxis/ART to all pregnant women can achieve such a target, the challenge would be bringing these interventions to scale by increasing coverage from 17% currently [9] to the 90% required for elimination.

The finding that vertical transmission rates were much lower among ART-eligible mothers who were already on ART before conception than mothers who started ART/triple ARV prophylaxis during pregnancy/delivery (0.4%, 3/700 vs 2.0%, 3/151 P=0.05), may be indicative of the effect of longer duration of therapy, possibly ensuring virologic suppression through the period of pregnancy and breastfeeding. The median peripartum viral load of mothers of HIV-infected children compared to that of mothers of HIV negative children (13031 copies versus 200 copies P=0.17) also seems to lend support to this suggestion. Triple ARV in the context of PMTCT WHO 'Option B' has been shown to significantly reduce viral load, [13] which is the most likely mechanism of blocking MTCT. In a cohort

studied in Johannesburg, South Africa, it was also reported that MTCT rates were lower in women who became pregnant on ART than those initiating ART during pregnancy (0.7% versus 5.7%; p=0.01) [21]. What this scenario implies is that as more mothers are cumulatively placed on life-long ART for PMTCT using the WHO 'Option B+' (Life-long ART for all HIV positive pregnant women) MTCT rates will progressively decline.

In this study, there was no difference in vertical transmission rates by 18 months of age with mode of delivery. Transmission with elective Caesarean section (CS) 0.6% [1/177] versus vaginal delivery 0.8% [5/631] p=1.00) was also similar to findings reported elsewhere. [15, 19] The European collaborative study between 2001 and 2003 reported a vertical transmission rate of 0.99% with ART but found that among women with undetectable viral load, elective CS was associated with a 90% reduction in MTCT risk (odds ratio, 0.10; 95% CI, 0.03 - 0.33), compared with vaginal delivery or emergency CS. [14] Clearly, there is no viral load at which MTCT cannot occur. The findings in this study demonstrated that in a setting where all HIV-infected pregnant women receive triple ARV/ART, the additional risk of MTCT attributed to vaginal delivery was small and must be weighed against the risks associated with CS. The decision to offer elective CS for PMTCT in the triple ARV/ART era in the absence of compelling new evidence will be increasingly difficult to justify. This is more so in resource-constrained environments with cost and safety issues, and substantial aversion to CS [22, 23]

The nutritional and psychological superiority of breastfeeding over the use of infant formula in the context of HIV is no longer in doubt. [24] In the present study, MTCT rates by 18 months among exclusively breast fed (EBF) and formula or breast milk substitute (BMS) fed children were 0.6% (4/625) and 0.9% (2/227) respectively. (p= 0.5) For mothers on triple ARV/ART throughout the period of breastfeeding, the result of this study supports the promotion of breastfeeding as currently recommended by the Nigerian PMTCT guidelines. [11] There was also no difference in mortality rates between BMS and EBF groups by 18 months of age. Of note, mortality among the HIV-exposed children was non-HIV related as HIV diagnosis done forthese acutely ill children who eventually died confirmed their HIV negative status. The current policy of early detection and treatment of all HIV infected children [11] is yielding survival benefits as all six HIV-infected babies in our cohort were alive by 18 months.

Maternal age, educational status and religion did not have any significant impact on HIV status at 18 months of age. Similarly, gestational age at delivery, baby's sex or birth weight had no demonstrable impact on the child's HIV status by 18 months. About 40 percent of pregnant women in the Jos area still plan to deliver at home. [25] Among HIV positive mothers, this practice persists despite intense counseling to the contrary in our HIV program. The root causes are probably more deep seated, although, cost of facility delivery, unfriendly attitude of health workers and unexpected labour have frequently been mentioned. [25] Our study highlighted one of the unfortunate consequences of home deliveries in higher rates of MTCT than in HIV-infected mothers delivered in health facility.

There was substantial attrition between antenatal HIV diagnosis and enrollment in the PMTCT clinic (26/176, 14.8%) and between delivery and postnatal follow up to 18

months (140/996, 14.1%). When these LTFU rates are compared to similar pooled rates in several sub-Saharan African setting of 49.08% (39.6–60.9%) antenatal attrition and 33.86% (27.6-41.6%) [26] of postnatal LTFU by 3 months, our rates were lower. The lower LTFU rates in this study may be attributed to a tracking strategy that combined telephone calls and home visitations. It may also be reflective of the cohort studied, all of whom picked up monthly doses of ARVs. Results from the Malawian Option B + program indicate encouraging retention of 77% after 12 months of the program [27].

Although nearly 60,000 new HIV infections occurred in children in Nigeria in 2012 [20], the findings from this study portends a promising future despite remaining challenges. Poor coverage of maternal ARV for PMTCT is a core issue. Decentralizing PMTCT services to primary healthcare clinics is a principal component of the President's Comprehensive Response Plan for HIV/AIDS in Nigeria. [28] It is hoped that through this budgetary framework, additional in-country resources will become available to support implementation. Serious consideration should be given to the adoption of WHO 'Option B+' [29] because of its programmatic simplicity, scalability, effectiveness and future PMTCT benefits. Operational research to promote adherence to treatment should be prioritized. Already, the MoMent Nigeria Study [30] is exploring the impact of Mentor Mothers (trained HIV positive peers) as adherence counselors in secondary and primary health care settings in Nigeria.

Study Limitations

The retrospective study design increased the number of participants in the study that were lost to follow-up by 18 months. Occasional cases of poor data capture led to missing records, which impacted data analysis. Among women who delivered elsewhere, some of the infant nevirapine prophylaxis were self-reported. While 15% of the original 996 enrolled HIV infected women did not complete follow-up with their infants at 18 months of age, we compared women that were lost to follow-up with those that completed the study. We did not find significant differences in ART eligibility ($p = 0.03$), ART prior to pregnancy ($p = 0.07$) or delivery site ($p = 0.06$) (Table 3).

The 2010 ethno-religious crisis in Jos City and the subsequent movement of the teaching hospital 12 kilometers out of town negatively affected antenatal attendance. Despite these challenges, the dedication of our site tracking team and the meticulous handling of the PMTCT baby's discharge register largely helped to reduce loss to follow-up.

Conclusions

In North-central Nigeria where HIV is prevalent, ART started before pregnancy is enormously effective in preventing mother-to-child transmission. Adoption of WHO 'Option B+' deserves serious consideration in such settings. As many more HIV-infected women receive ART before pregnancy, the truism in the phrase among HIV experts that 'treatment is prevention' would become more apparent.

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Table 1.

Baseline characteristics of subjects with their HIV status by 18 months after birth in a retrospective observational study in Jos North-central Nigeria between 2010 and 2014

Characteristics	HIV Status			P value
	Total (%)	Positive	Negative	
		N (%)	N (%)	
Gestational age at delivery				
Median (IQR)	38 (38-38)	38 (38-39)	38 (38-38)	0.31
Sex				1.00
Male	503 (50.5)	3 (50)	419 (49.5)	
Female	493 (49.5)	3 (50)	427 (50.5)	
Had ANC at PEPFAR facility				0.19
Yes	733 (86.2)	4 (66.7)	729 (86.4)	
No	117 (13.8)	2 (33.3)	115 (13.6)	
Delivered at PEPFAR facility				0.25
Yes	363 (42.7)	1 (16.7)	362 (42.9)	
No	487 (57.3)	5 (83.3)	482 (57.1)	
Had PNC at PEPFAR facility				1.00
Yes	744 (87.5)	6 (100)	738 (87.4)	
No	106 (12.5)	0 (0.00)	106 (12.6)	
Mother had HAART before pregnancy				0.07
Yes	700 (82.3)	3 (50.0)	697 (82.5)	
No	151(17.7)	3 (50.0)	148 (17.5)	
Mother HAART eligible				0.03
Yes	739 (86.4)	3 (50.0)	736 (87.1)	
No	112 (13.6)	3 (50.0)	109 (12.9)	
Duration of HAART (Months)				
Median (IQR)	45 (24-64)	43 (5-83)	23 (5-64.5)	0.98
CD4 count (cells/ μL)				
Median (IQR)	393 (264-534)	363 (236-502)	395 (267-545)	0.66
Viral load(copies/ mL))				
Median (IQR)	200 (200-836)	13031 (200-74831)	200 (200-754)	0.17
Mother's age at delivery (Years)				
Median (IQR)	32 (29-35)	30 (27-32)	32 (29-36)	0.23
Mother's education level				
Primary	53 (11.0)	1 (25.0)	52 (10.9)	0.56
Secondary	272 (56.6)	2 (50.0)	270 (56.6)	
Tertiary	156 (32.4)	1 (25.0)	155 (32.5)	
Mother's religion				0.43
Christianity	651 (76.5)	4 (66.7)	647 (76.6)	
Islam	200 (23.5)	2 (33.3)	198 (23.4)	

Characteristics	HIV Status			P value
	Total (%)	Positive	Negative	
		N (%)	N (%)	
Delivery site				0.03
Primary health facility	367 (43.1)	1 (33.3)	365 (43.2)	
Secondary health facility	112 (13.1)	0 (0.00)	112 (13.2)	
Tertiary health facility	302 (35.5)	1 (16.7)	301 (35.6)	
Home	71 (8.3)	3 (50.0)	68 (8.0)	
Birth weight (Kg)				
Median (IQR)	3 (2.6-3.2)	2.8 (2.6-2.8)	3 (2.6-3.2)	0.30
Mode of delivery				1.00
Elective CS	177 (20.8)	1 (16.7)	176 (20.8)	
Emergency CS	43 (5.1)	0 (0.00)	43 (5.1)	
SVD	631 (74.1)	5 (83.3)	626 (74.1)	
Infant prophylaxis				1.00
Yes	847 (99.4)	6 (100.0)	841 (99.4)	
No	5 (0.6)	0 (0.00)	5 (0.6)	
Infant feeding options				0.50
BMS	227 (26.6)	2 (33.3)	225 (26.6)	
EBF	625 (73.4)	4 (66.7)	621 (73.4)	
Survival at 18 months of age				1.00
Survived	838 (98.6)	6 (100.0)	832 (98.6)	
Died	12 (1.4)	0 (0.00)	12 (1.4)	

ANC = Antenatal care. PNC = Postnatal care. CS =Caesarian section. SVD = Spontaneous vaginal delivery. BMS = Breast milk substitute. EBF = Exclusive breast feeding. PCR = Polymerase chain reaction.

Data are presented as No. (%) or median (interquartile range).

* P value for Chi squared or Fisher's exact test for the association between a variable and death; and Mann-Whitney test for comparison of two medians

Table 2.

Factors associated with being HIV seropositive by 18 months of age in a retrospective observational study in Jos North-central Nigeria between 2010 and 2014

Characteristics	Odds ratio (95% CI)	P value	Adjusted Odds ratio	P value
Gestational age of child (per week increase in age)	1.24 (0.67-2.28)	0.49	1.20 (0.65-2.20)	0.56
Sex				
Male	1.00 (Ref)		1.00(Ref)	
Female	0.98 (0.19-4.89)	0.98	0.99 (0.20-5.02)	0.99
Mother had HAART before pregnancy				
Yes	1.00 (Ref)			
No	4.71 (0.94-23.56)	0.05		
Mother HAART eligible				
Yes	1.00 (Ref)		1.00 (Ref)	
No	6.75 (1.34-33.87)	0.02	6.22 (1.23-31.43)	0.03
Delivery site				
Home	1.00 (Ref)			
Primary health facility	0.12 (0.02-0.76)	0.02		
Secondary health facility	-	-		
Tertiary health facility	0.07 (0.01-0.73)	0.03		

Table 3.

Comparison of the characteristics of HIV infected women that were lost to follow-up with those that completed the study in a retrospective observational study in Jos North-central Nigeria between 2010 and 2014

Characteristics	Women lost to follow-up N (%)	Women who completed study N %)	Total	P value
Mother on ART before pregnancy				0.07
Yes	108 (75.5)	700 (82.3)	808 (81.3)	
No	35 (24.5)	151 (17.7)	186 (18.7)	
Total	143 (100)	851 (100)	994 (100)	
Mother ART eligible				0.03
Yes	114 (79.7)	739 (86.8)	853 (85.8)	
No	29 (20.3)	112 (13.2)	141 (14.2)	
Total	143 (100)	851 (100)	994 (100)	
Delivery site				0.06
Primary health facility	65 (45.1)	367 (43.2)	432 (43.5)	
Secondary health facility	21 (14.6)	112(13.1)	133 (13.3)	
Tertiary health facility	38 (26.4)	302 (35.4)	340 (34.1)	
Home	20 (13.9)	71 (8.3)	91 (9.1)	
Total	144 (100)	852 (100)	996 (100)	