

Full Length Research Paper

# Gaps in preventing mother to child transmission (PMTCT) and human immune deficiency virus (HIV) exposure among infants in a Nigerian City: Implications for health systems strengthening

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In many countries, paediatric human immune deficiency virus (HIV) has been virtually eliminated. Nigeria however still records an unacceptably high number of HIV positive births. This study aims to identify HIV exposure rates among infants and to quantify gaps in preventing mother to child transmission (PMTCT) services in a major Nigerian city. A cross-sectional design was used to assess the prevalence of HIV sero-positivity in infants and use of PMTCT services among mothers in routine immunization clinics across the city. A total of 2,125 mother-infant pairs from 53 Primary Health Care Facilities were studied. More mothers who had received Ante natal care (ANC) services from orthodox health facilities were screened for HIV; 77.5% compared to 42.5% of those who used non-orthodox care providers ( $p < 0.001$ ). In all, 0.6% of mothers were people living with HIV/AIDS (PLWHA). Overall, 0.9% of infants tested positive for HIV, only one infant was confirmed by DNA polymerase chain reaction (PCR) to be HIV infected. Only one of the 18 mothers of the HIV exposed infants had been previously diagnosed as having HIV infection. Among the newly diagnosed HIV positive mothers, 58.8% had received antenatal care from an orthodox health facility and 35.3% had been screened for HIV in pregnancy. Most mothers had practiced mixed feeding of their babies. The low HIV exposure rates among infants indicate progress in limiting mother-to-child transmission of HIV infections in Nigeria. However, the achievement of National PMTCT targets will need joint action of all stakeholders to reach those women without access to orthodox health facilities.

**Key words:** Human immune deficiency virus (HIV), polymerase chain reaction, preventing mother to child transmission.

## INTRODUCTION

Sub-Saharan Africa is home to 2.3 million out of the 2.5 million children living with HIV worldwide with Nigeria contributing 14% of the total African burden of paediatric Human immune deficiency virus (HIV) (World health organization, 2010). In many developed countries, paediatric HIV has been virtually eliminated. Many high burden, low-resource countries have also made significant progress in preventing new paediatric infections. Although some progress has been reported in scaling up

of access to prevention of mother to child transmission of HIV (PMTCT) services in Nigeria, with an annual HIV positive births of 56,681, much work remains to be done (NACA Fact Sheet, 2011). In response to the UNAIDS 'getting to zero' strategy, Nigeria had renewed commitments to expand the coverage of PMTCT services with the aim of eliminating the transmission of HIV from mother to child during pregnancy, labour and breast feeding (NACA Fact Sheet, 2011). Even in countries with

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**Table 1.** Mothers' and Infants' demographic characteristics.

Characteristic	N=2125 (%)
<b>Age of infant (weeks)</b>	
<6	420 (19.8)
6-11	730(34.4)
12-23	442(20.8)
24 and above	533(25.1)
<b>Sex</b>	
Male	1051 (49.5)
Female	1074 (50.5)
<b>Mothers demographics</b>	
<b>Marital status</b>	
Married	2110 (99.3)
Not married*	15(0.7)
<b>Educational level</b>	
No formal education	37 (1.7)
Primary	522 (24.6)
Secondary	1118 (52.6)
Post secondary	447 (21.0)
<b>Social class</b>	
I	7 (0.3)
II	585 (27.5)
III	1266 (59.6)
IV	267 (12.6)

\*Not married includes separated, widowed, single

strong PMTCT programmes, some level of complacency has been recorded. As such, one of the strategic visions of the World Health Organization is to track programme performance and impact on MTCT rates (World health organization, 2010).

In Nigeria, availability of early infant diagnosis (EID) at PMTCT sites and children hospitals have been identified as a challenge to the effectiveness of PMTCT in the country (NACA Fact Sheet, 2011). To inform recommendations on the scale of EID services, it becomes necessary to provide information on HIV exposure rates among infants in Nigeria. At present, only a small number of studies exist on community estimates of HIV exposure rate and new infections in infants in Nigeria. This study aims to bridge this knowledge gap by identifying HIV exposure rates among infants and to quantify gaps in PMTCT services in a major Nigerian city.

## METHODOLOGY

This study was conducted in Ibadan, the largest and capital city of Oyo State, South western Nigeria. The latest sentinel survey put HIV prevalence for Oyo state at 3% (Federal Ministry of Health,

2010a). Of the 1,169 health facilities of which 667 are primary health centres (PHCs), 10 offer comprehensive PMTCT services while 5 of these are private-owned health facilities. All of these PMTCT centres are located in secondary and tertiary centres. However, many primary health centres are able to screen for HIV.

A cross-sectional design was used to assess the prevalence of sero-positive HIV infants and use of PMTCT services among mothers in routine immunization clinics across the city. Half of the PHCs (minimum 4) in each local government area were randomly selected, by balloting, to be included in the study. Children  $\leq$  1 year (infants) presenting for immunization, were consecutively enrolled into the study between December, 2010 and June, 2011. Mothers were interviewed on PMTCT services accessed in pregnancy such as HIV counselling and testing, anti-retroviral therapy if indicated, infant feeding and counselling. Mothers were offered voluntary HIV counselling and HIV testing for their babies. Pre- and post- HIV test counselling were performed by trained personnel using the "opt out" method as recommended in the World Health Organization (WHO) and National PMTCT guidelines. Post-test counselling was provided individually in private rooms for confidentiality.

Infant HIV status was assessed using Determine<sup>R</sup> and Unigold<sup>R</sup> rapid antibody testing method in series. Results were disclosed on the same day during post-test counselling. Mothers whose infants tested positive were subsequently screened using Determine<sup>R</sup> and Unigold<sup>R</sup>. Infants with positive rapid screening test results were then referred for follow-up in the existing PMTCT programme at the University College Hospital, Ibadan where DNA polymerase chain reaction (PCR) was carried out to confirm HIV status. Infants with positive rapid screening tests who were aged less than six weeks at the time of the study had their DNA PCR confirmatory test at 6 weeks of age. Mothers testing positive with the rapid tests were linked up with the adult HIV care programme in the University College Hospital. A structured questionnaire was used to collect socio-demographic, pregnancy, delivery, postpartum and HIV testing data.

## Definition of outcome

1. HIV exposed infant were those infants positive to HIV rapid antibody tests;
2. HIV infection in infant was defined as being positive to DNA PCR
3. HIV infection in mother as positive test result for HIV rapid antibody tests.

Sample size was calculated based on the HIV prevalence rate in Oyo state which is 3.0% from the most recent sentinel survey (Federal Ministry of Health, 2010b). Using a standard deviation of 1.96 which corresponds to 95% confidence interval and a level of precision of 2%, the desired sample size for the study was 2125. Data were analysed with statistical package for social sciences (SPSS) version 15.0 (SPSS Inc., Chicago, Illinois, USA). Proportions were compared with the Chi square and Fisher's exact tests. Significance level was set at 0.05 level. Permission and ethical approval was obtained from the Oyo state Ethical Review Board. Screening for HIV was preceded by counselling and consent of the mother. Mothers were assured that refusal of consent would not result in their child being denied appropriate management in the PHC.

## RESULTS

A total of 2,125 mother-infant pairs from 53 PHCs were studied. The median age of the infants was 12 weeks (range: 0.1 to 55 weeks). Table 1 shows that infants aged 6 to 11 weeks were the largest proportion of the infants

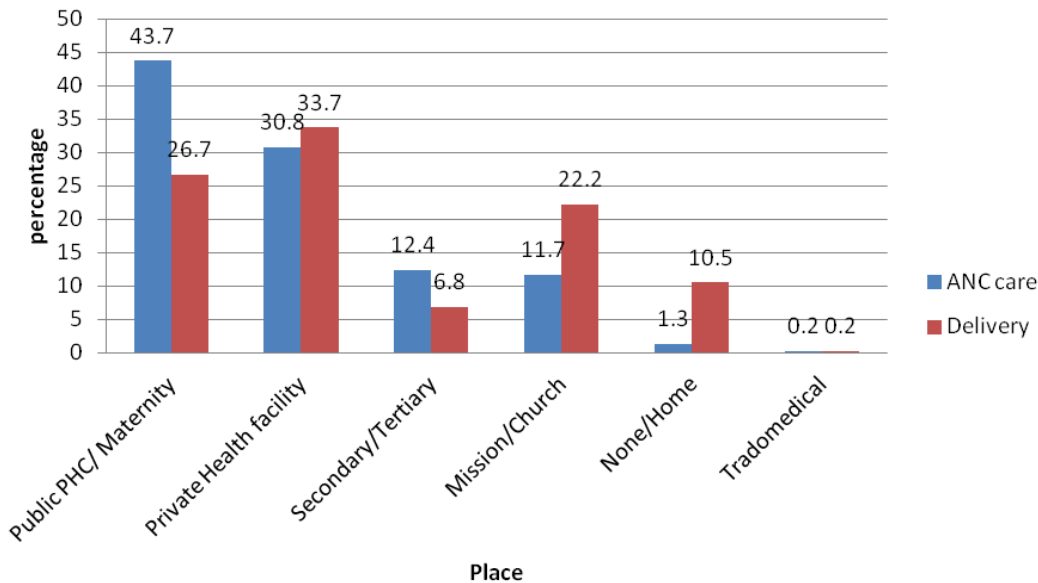


Figure 1. Antenatal care and place of delivery.

(34.4%). The sex ratio was 0.9: 1. Almost all the mothers were married with many (73.6%) having at least secondary level education. More than half (59.6%) were from social class III. The use of Ante-Natal Centre (ANC) services and the place of delivery of index infant are shown in Figure 1. While many (43.7%) mothers received antenatal care at the public PHCs, fewer mothers (26.7%) actually delivered their babies at the PHCs. About a tenth (10.5%) of mothers delivered their babies at home.

Comparison of the PMTCT services received during antenatal care reveal a significantly higher proportion of those receiving ANC services from orthodox health facilities screened for HIV which is 77.5% compared to 42.5% of those who used non-orthodox care providers ( $p < 0.001$ ). HIV detection rate and ARV prophylaxis for seropositive mothers did not differ significantly. There was also no significant difference in the use of ARV prophylaxis for children of seropositive mothers when the place of delivery was compared. In all, 0.6% of mothers were PLWHA (Table 2).

### HIV exposure and infection among Infants

Overall, 19 of the Infants tested positive for HIV rapid antibody tests, only 1 infant was confirmed by DNA PCR to be HIV infected (Table 3). All (18) mothers of HIV exposed infants also tested positive to HIV rapid antibody tests. One mother had died from symptoms suggestive of HIV infection but was unconfirmed. The infant of the mother who had died was the only confirmed HIV infected infant. He was aged 10 weeks and had symptoms of HIV disease. Only one of the 18 HIV infected mothers had been previously diagnosed as having HIV infection

and the infant had received ARV prophylaxis at birth. Among newly diagnosed HIV positive mothers, 10(58.8%) had received antenatal care from an orthodox health facility, 8(47.1%) had delivered at an orthodox facility. Overall, 14(82.4%) had a skilled attendant during delivery. HIV testing in pregnancy was reported by 6(35.3%) of the mothers, none of the mothers had received ART and only one mother reported ARV prophylaxis being given to her baby at birth. 13 of the mothers had practiced mixed feeding of their babies (Table 4).

### DISCUSSION

The HIV exposure rate among infants attending routine immunization clinics in the city of Ibadan was low. 19 infants were found to be exposed to HIV while 1 was confirmed to be infected. Although few local studies have assessed HIV exposure in infants from a well-child clinic such as a routine immunization clinic, still these rates are much lower than previous reports (UNICEF, 2010). This confirms the downward trend in HIV infections in the country, as National estimates have also shown (NACA Fact Sheet, 2011).

In a similar vein, this is additional evidence of improved PMTCT coverage. Over three quarters of women using orthodox health service had received HIV testing during the index pregnancy compared to less than 20% reported for Oyo state in previous studies (Bashorun et al., 2010). More of the women without access to PMTCT services are those already marginalized populations unable or unwilling to access orthodox health care providers. This is not an uncommon finding (Bashorun et al., 2010).

However, the fact that many of those with HIV exposed babies were those using non-orthodox care providers

**Table 2.** Comparison of PMTCT services received from antenatal care provider.

PMTCT service	ANC provider utilized in pregnancy		Chi-square	p-value
	Orthodox health facility	Non-orthodox health facility		
<b>HIV testing during index pregnancy</b>				
Yes	1428(77.5)	119(42.5)	150.459	<0.001*
No	415(22.5)	161(57.5)		
<b>Reported HIV detection rate for mothers</b>				
Sero-positive	10(0.5)	3(1.1)	1.093	0.296
Sero-negative	1833(99.5)	279(98.9)		
<b>ARV prophylaxis for seropositive mothers (N=13)</b>				
Yes	2(20)	1(33.3)	Fisher's exact test	1.000
No	8(80)	2(66.7)		
<b>Place of delivery</b>				
	Orthodox health facility	Non-orthodox health facility		
<b>ARV prophylaxis for baby (N=13)</b>				
None	1 (11.1)	1 (25.0)	Fisher's exact test	1.000
NVP and AZT	8 (88.9)	3 (75.0)		

NVP – Nevirapine, AZT – Zidovudine, \*significant.

**Table 3.** HIV Test results of infants attending immunization clinics in Ibadan.

Test result	Infant	
	Determine+unigold (N=2125)	DNA PCR (N=19)
Seropositive	19 (0.9)	1 (5.2)**
Seronegative	2106 (99.1)	15 (79.0)
Not done	0 (0.0)	3 (15.8)

implies that this population remains an important one to target for PMTCT interventions. More than half of those who had accessed ANC from non-orthodox providers were not screened for HIV compared to about one fifth of those who had used orthodox providers. Extending PMTCT coverage to other community based providers might help to improve coverage since the inaccessibility to health services seems to be the major risk factor for unidentified, HIV-exposed and HIV-infected children (Braun et al., 2011).

By and large, it appears that the optimism about eliminating all cases of mother-to-child transmission of HIV infections in Nigeria is not misplaced, provided the same progress in limiting MTCT is recorded and maintained in other states of the country. However, the achievement of national and global PMTCT targets will only be dependent on the joint action of health services, communities and the wider society to reach those women beyond the reach of the orthodox health facilities (Richter, 2012).

HIV screening of all infants at immunization clinics has

been suggested as an acceptable and feasible method to monitor the impact of PMTCT programmes on peripartum infection and to provide surveillance data on paediatric HIV (Rollins et al., 2009). The opportunity to detect those women who might have fallen through the cracks of the health system through screening of their infants may afford another justification than the opportunity to diagnose HIV infection in infants and children missed within the health system. However, the low yield demonstrated by this study questions the cost effectiveness of this approach in a low prevalence site as in Ibadan. The recommendation for routine screening of all infants as reported in a South African study where routine HIV testing of infants revealed prevalence of more than 20% among tested infants may need to be appropriately contextualised (Rollins et al., 2009). A more targeted approach such as limiting screening of infants to only those with mothers with unknown HIV status as recommended by an American study (Shah et al., 2011) may be more appropriate in this setting.

**Table 4.** Exposure to PMTCT among newly diagnosed HIV positive mothers.

Variable	N=17(%)
<b>Place of ANC</b>	
Orthodox HF	10(58.8)
Non-orthodox facility	7(41.2)
<b>Place of delivery</b>	
Orthodox HF	8(47.1)
Non-orthodox facility	9(52.9)
<b>Skilled attendant at delivery</b>	
Yes	14 (82.4)
No	3 (17.6)
<b>Screening in pregnancy</b>	
Yes	6(35.3)
No	11(64.7)
<b>ARV prophylaxis in mother</b>	
0(0)	
<b>ARV prophylaxis for infant</b>	
None	16(94.1)
NVP and AZT	1(5.9)
<b>Feeding pattern</b>	
Exclusive breastfeeding (with no water, herbal medicine, etc)	4(23.5)
Mixed feeding	13(76.5)
Formula	(0)

## LIMITATIONS

This study is beset by some limitations. The level of acceptance or uptake of infant HIV testing among the mothers was not measured because of the opt-out method used to enrol infants for HIV screening. In addition, PMTCT coverage was based on self-reports which could not be verified and could have been over or underestimated.

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