

Prevention of Mother-to-Child Transmission of HIV in Delta State of Nigeria: Evaluation of the Early Infant Diagnosis Program

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Abstract

Background: The global public health issue of Mother-to-Child Transmission (MTCT) of HIV is being addressed with Prevention of MTCT (PMTCT) strategy. A narrative review has recently been published. **Objective:** The aim of this study was to determine from an early infant diagnosis program in Delta State if there is reduction in MTCT of HIV. **Methods:** This was a retrospective study. Three health institutions comprising of one from each of the three senatorial district in Delta State were used for the study. The records of 1080 prenatally exposed babies that had DNA PCR tests between 6 weeks to 18 months were evaluated descriptively. Data mining was from the period of August 2009 to December, 2016. Child follow-up register was reviewed for information that included, age the child had PCR done, commencement of Antiretroviral Therapy (ART) at birth, if mother was on ART, result of PCR and test done at 18 months. **Results:** 98.0% of HIV positive mothers were on ART during pregnancy, 98.9% of the infants were on ART at birth, and 93.1% were exclusively breast fed. The outcome of the PMTCT program obtained shows that compared to 100% effectiveness among infants who were compulsorily treated on the basis of their mothers being on treatment, there is 89% efficiency among those who either themselves or their mothers received treatment; but only 17% efficiency was achieved where neither mother nor child is receiving treatment. **Conclusion:** This study shows that with effective PMTCT intervention, reducing MTCT of HIV is being achieved by the public health service.

Keywords: Early Identification, Infant HIV, PMTCT Efficiency

1. Introduction

The agenda for Mother-to-Child Transmission (MTCT) of Human Immunodeficiency Virus (HIV) revolves around the vertical infection of HIV from mother to her child¹. MTCT is by far the most common way that children become infected with HIV². MTCT of HIV is known to be able to occur any time from conception to delivery and breastfeeding³. The World Health Organization (WHO) guidelines recommend that pregnant mothers who are HIV-positive should be treated with a regimen of three Antiretroviral drugs (ARV) as soon as possible- and

stay on these drugs until their infant is born and breastfeeding concluded^{4,5}.

The prevalence of MTCT is up to 45%; but it is believed that this rate of infection can be reduced to below 5% with effective interventions⁶⁻⁸, which include prevention of vertical infection during pregnancy and appropriate breastfeeding practices⁹. MTCT of HIV is one of the biggest challenges of the HIV/AIDS management especially in resource constrained settings¹⁰⁻¹². Africa has the highest burden of the disease accounting for about 90 percent of paediatric HIV infections¹³⁻¹⁵. In 2009 approximately 370,000 children

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became infected with HIV globally and most of these infections occurred through MTCT¹⁵.

It is acknowledged that Nigeria accounts for 30% of the burden of MTCT of HIV in the world^{14,16}. This justifies why Nigeria is one of the 22 focus countries of the Global Plan to Eliminate MTCT^{1,17,18}. Though the Nigerian Government has implemented PMTCT of HIV program, evidence on the effectiveness of PMTCT remains limited¹⁴. Yet, evidence of the effectiveness of PMTCT has been clearly demonstrated in large scale programs that are integrated into routine antenatal care¹⁹.

Early Infant Diagnosis (EID) is part of the PMTCT program. This involves EID testing directly for HIV DNA by Polymerase Chain Reaction (PCR) method. EID makes it possible for early identification and referral of HIV-positive infants. This enables the infants to receive early clinical evaluation and antibiotic prophylaxis against opportunistic infections as well as Antiretroviral Therapy (ART)²⁰⁻²³. Furthermore, a review of HIV test results in an EID program provides a unique opportunity for evaluating the success of the PMTCT program and reducing MTCT¹⁴.

Thus, this research seeks to examine an EID program in Delta State of Nigeria with a view to determine the level of reduction of MTCT of HIV. A narrative literature review has previously been performed as background to this work¹⁶. Another study has also examined EID program in two other Southern States of Nigeria¹⁴. Through descriptive statistics, the study will evaluate the effectiveness of the PMTCT interventions program in Delta state, Nigeria and any challenges in follow-up. Specifically, the aim of this study is to determine the:

- Effectiveness of PMTCT of HIV program.
- Challenges of follow-up of care for HIV-positive mothers and their exposed babies.

2. Methods

2.1 Study Design and Setting

This was a descriptive retrospective study aimed at evaluating data from early infant diagnosis program in Delta State, Nigeria. Delta State consists of 25 local government areas. The state had three national senatorial districts-Delta South, Delta North and Delta Central. The study was conducted in the three senatorial district- Delta South, Delta North and Delta Central. For the purpose of

the study, the purposive sampling method was adopted in the selection of three facilities comprising one per senatorial district. Hence the selected facilities were the Central Hospitals at (1) Agbor in Delta North Senatorial District, (2) Ughelli in Delta Central Senatorial District, and (3) Warri in Delta South Senatorial District. Similar to the method of Anoje *et. al.*, (2012), data inclusion criteria were based on the HIV exposed infants being aged six weeks to 18 months, Dried Blood Spot (DBS) samples taken for a DNA PCR tests and a complete set of record available.

2.2 Data Collection

The information was collected through data mining of the archived records. Specifically, the primary data source of collection was hospital records, which were stored in hard copy register. The data were retrieved from medical record department with the support of medical record officer and PMTCT Focal Person. All data were de-identified by the data miners such that no set of information is traceable to any individual. Data collected included information on infants and their mothers as follows

- Infants: age, gender, dates of tests, results of tests, HIV drug, age-at-testing, type of feeding, outcome of infant at eighteen months.
- Mothers: if mother was on HIV drugs or not.

2.3 Ethical Considerations

The facilities were clearly informed about the study in order to gain their consent. Anonymity, privacy, and confidentiality were maintained throughout the study. This was achieved by a letter of introduction for the commencement of the study which was written to the ethical board of the respective hospitals and ministry of health Delta State. Ethics approvals were given by Delta State hospital management board (Protocol number CHW/ECC VOL 1/145) and the Ministry of Health (Ref number: HM/596/154) before the study was conducted. Letter of introduction was collected from Department of Public and Community Health, College of Health Sciences, Novena University Ogume, Delta State.

2.4 Data Analysis

Microsoft excel spreadsheet and SPSS version 21 were used for data management and statistical analysis, respec-

tively. This was designed to be a descriptive study without hypothesis, and as such, analysis was done using frequency counts and percentage.

2.5 Limitations of the Study

The selection of only three sites that offer EID services in the State may have led to bias. Two of the facilities used could not provide records from the beginning of the program. Some available records were not properly documented.

This study was done as a Master of Public Health dissertation, which was bound by time limit. Getting ethical approval from the respective hospitals was a big problem. It took more than 6 weeks to get both ethical approvals from Ministry of Health Asaba and Central Hospital Warri. Approval from Ministry of Health Asaba was obtained on 27th of October 2017 and that of Central Hospital Warri was obtained on 2nd of November 2017. Although, the medical record officer and PMTCT focal person made it possible for quick collection of data for analysis to meet up with the school's set-time, this was only possible about 2 to 3 weeks to the deadline of submission of the project work. As result of the delay, there

was no time to crosscheck or make further investigations on the data collected, especially to know the reasons for loss to follow up.

3. Results

From August 2009 to December 2016 of the DBS records, a total sample size of 1080 cases that had a well-documented data was collected for analysis. Beside the 'N=1080'; another thirteen infants and their mothers were not on ART at time of first test, which were included in assessment of PMTCT efficiency.

The results show that 49.8% of the babies were males, 98.0% of the mothers were on anti-retroviral drugs while 2.0% (22 mothers) of them were not. For the infants, 98.9% of them were on anti-retroviral drugs while 1.1% (12 infants) of them was not – thus a total of 25 infants were not on treatment at time of first test. Further, 93.1% of the infants were on exclusive breastfeeding while 6.3% were not breast feed at all (Table 1). In terms of age at first test, 87.9% of the infants had their first DBS samples collected within the age of 6 weeks to 5 months while 0.7% were collected at 15 months or more (Figure 1).

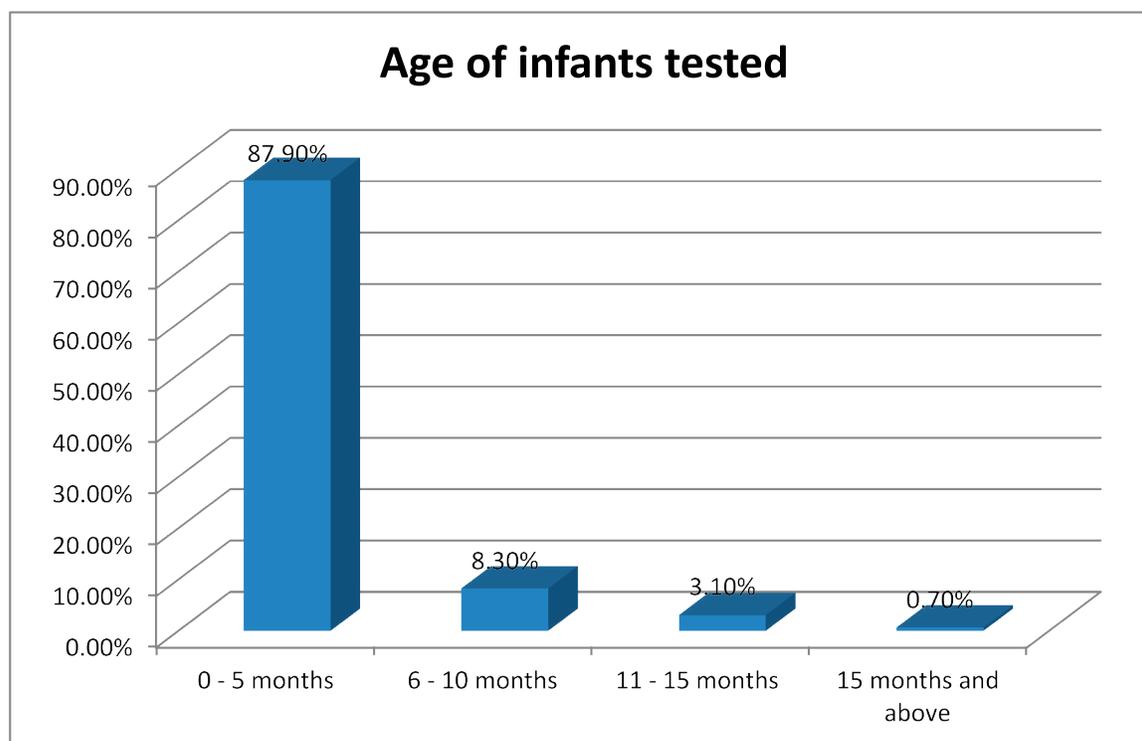


Figure 1. Frequency bar chart showing the age of infants at time of 1st BDS tested.

Table 1. Percentage of participants on anti-retroviral drug and breastfeeding

Measures	Response	Frequency	Percentage
Number of infants tested*	1080		
Mothers on anti-retroviral drug	Yes	1058	98
Infants on anti-retroviral drugs	Yes	1068	98.9
	Exclusive breastfeeding	1005	93.1
Type of infant feeding	Mixed feeding	7	0.6
	Nil breastfeeding	68	6.3

*Excluding thirteen infants and their mothers who were not on ART at time of first test

On analysis of Question 1 – evidence of reduction in MTCT of HIV: result shows that 95.6% of the infant tested negative at first screening test. At 18 months follow-up, 95.6% of the infants were apparently healthy, 3.8% were referred for ART, 0.4% died, while 0.3% were *lost to follow up* (Table 2).

Among the 25 infants who were not on treatment at time of first test; they were categorized into dichotomous groups based on mothers treated vs. untreated. In a reverse analysis, 22 mothers were not on treatment at time of first infant test; and were also categorized into dichotomous groups based on infants treated versus untreated. The result of analysis shows 100% effectiveness among infants who were compulsorily treated and less than 20% where neither mother nor child is receiving treatment.

The level of negative results is the same at 18 months relative to results of tests done before 1 year (Figure 2).

4. Discussion

Effective PMTCT program requires mother-infant pair to have access to a cascade of interventions beginning with HIV counseling and testing at the antenatal clinic; receiving ART prophylaxis if they are HIV positive; and follow-up on safe infant feeding practices¹⁴. In this study, result obtained shows that 2% of the mothers did not receive ART prophylaxis for PMTCT (Table 1). These mothers did not seek antenatal care in the facilities that have PMTCT program as such they were not counseled and tested during antenatal period. In Delta

Table 2. Outcome of the HIV PCR tests and follow-up of infants

		Frequency	Percentage
Infantstested at first (N = 1080)	Positive	48	4.4
	Negative	1032	95.6
	Apparently healthy*	1032	95.6
Findings at follow-up(N = 1080)	Referred to ART**	41	3.8
	Dead	4	0.4
	Lost cases	3	0.3

*All negative at 18th month test;

**3 cases in this subpopulation appeared negative at 18th month test and were being treated as equivocal results for further repeat

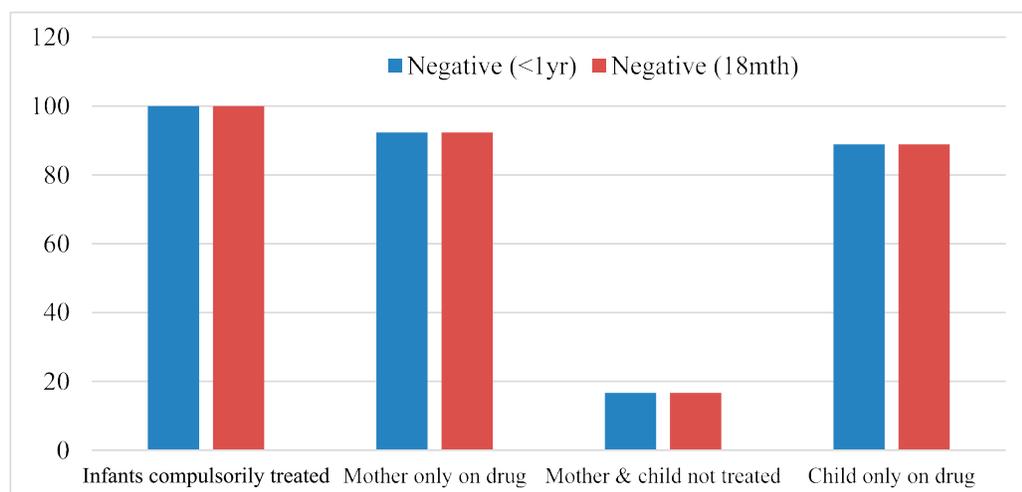


Figure 2. Evaluation of treatment efficiency based on negative results in subpopulation.

State, Government owned hospital integrated PMTCT into the regular antenatal clinic. All expectant mothers seeking antenatal care receive Provider Initiated Testing and Counseling (PITC). This is in line with the national guidelines on PMTCT of HIV in Nigeria²⁴. This finding compares reasonably well relative to the report of attendance and acceptance of PMTCT in Zambia that support mass therapy as a policy²⁵, and Ivory Coast where more than 80% mother-and-baby pair were on ARV prophylaxis²⁶.

In this study, 98.9% of the exposed babies were placed on anti-retroviral drugs within 72 hours of birth till 6 weeks before the first PCR test is done at 6 week while 1.1% of the exposed babes were not on drugs. This is a reflection of the level of utilization of PMTCT into regular antenatal clinic (Table 1). However, this is better than the report from another part of the Southern Nigeria where over 33% of the mothers-infant pair did not receive any ART for PMTCT of HIV¹⁴.

Results from this study reveal that 87.9% of the infant had their first DBS sample collected within the age of 6 weeks to 5 months (Figure 1). In Nigeria, the national PMTCT guidelines stipulate that the first DNA PCR test should be conducted at six weeks of age for all exposed infants¹⁴. However, it was observed that over 50% of the infants came for DBS test after 6 weeks. This is similar to findings where over 70% of infant had their first PCR done after 6 weeks¹⁴.

The result obtained from this study reveals that 95.6% of infant tested negative to HIV using DNA PCR within

6 weeks to 5 months. This finding is in agreement with the report of a related study done at Asaba in Delta State of Nigeria which showed 86.3% of babies' HIV status based on PCR test were negative²⁷. This result also indicates that there is reduction in MTCT of HIV in Delta State. Further, the general outcome of the exposed infant shows that 95.5% of the infants were well and alive at 18 months and they tested Negative to HIV. Among the remaining 4.5%, recorded indicated that 0.4% died before the 18 months probably due to positive HIV complications, 0.3% were *lost to follow up* after the first PCR test done; while the rest 3.8% (41 cases) positives were all duly referred to ART clinic as at 18th month for further management in line with the PMTCT guideline in Nigeria (Table 2).

There has been expectation that perinatal HIV remission and cure is possible in infants²⁸, and few cases are beginning to emerge²⁹. In this study, 7% (3/41; Table 2) of the positives that were re-tested at the 18th month appeared equivocally negative and earmarked for further retesting. A related study on children with HIV in South Africa showed that early diagnosis and ART-intervention can enhance reduction in early infant mortality rates and viral load to 7.7% and 81.4% respectively. Hence it is cautioned that interruptions to ART should be undertaken with care³⁰⁻³².

The negative results obtain at the 6 weeks and 18th month appears to be the same for all the infants who were not on treatment at time of first test (Figure 2). The result of analysis shows two striking observations. First is that compared to 100% effectiveness among infants who were

compulsorily treated on the basis of their mothers being on treatment, there is 89% efficiency among those who either themselves or their mothers received treatment; but only 17% where neither mother nor child is receiving treatment. Second is the level of negative results (i.e., efficiency). While 4.4% of infants on ART tested positive at first test with indication of reduction at 18th month (Table 2), up to 83% of the subpopulation of ‘mother-and-child’ who were suspected to miss early start of PMTCT (i.e., indicated by not being on ART) tested positive at both initial and 18th month tests. Other studies have previously acknowledged or implied the effectiveness of PMTCT services in Nigeria^{33–36}, and availability of the service in Delta State¹⁶. What this report adds to the body of literature is evidence of efficiency of the EID program in Delta State.

It is observed during this study that the data were not properly documented and some of the report tools cannot be found. All documentation was on paper and none was on electronic soft copy format. It is known that data collection, analysis, and usage constitute part of the ongoing challenges confronting the processes of monitoring and evaluation of PMTCT program³⁷. In this regard, follow-up of participants is problematic³⁸, and the challenge of poor record keeping constitutes a major barrier³⁹. While it has been acknowledged that improvement in recording of PMTCT data is imperative⁴⁰, this report highlights the need in Delta State of Nigeria.

5. Conclusion

The results from this study demonstrate that there is reduction in MTCT of HIV in Delta State and that EID program is an effective PMTCT intervention. There is indication that testing and counseling of the expectant mother in antenatal clinic, as well as early initiation of ART to HIV positive mother and compulsory treatment of the exposed infant are practices that enhance success. This implies that effective tracking and monitoring of mother-baby pair is very important to PMTCT, which in turn calls for the need to improve on documentation protocols and resources. Public health officers can use this report as educational tool to intensify awareness campaign on the level of efficiency of the PMTCT. The public health officers may need to be equipped to scale up the campaign to the general public. Further, PMTCT services should be expanded to Primary Health Centers to enable pregnant mothers to access the service, especially in rural communities.

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