

# Mother-To-Child Transmission Rate Of HIV At Orlu, South-Eastern Nigeria

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## Abstract

**Background:** More than 90% of paediatric HIV infections occur through mother-to-child transmission. This study was conducted to determine the rate of mother-to-child transmission (MTCT) of HIV and the effect of antenatal antiretroviral therapy at the Imo State University Teaching Hospital (IMSUTH), Orlu. **Methods:** A retrospective analysis of the case records of polymerase chain reaction (PCR) results of babies at 6 weeks of age whose mothers tested positive to Human Immune-deficiency Virus while pregnant at the Imo State University Teaching Hospital (IMSUTH), Orlu from 1<sup>st</sup> April 2008 to 31<sup>st</sup> July 2010 was made. Data on PCR result, baby's sex, attendance at the antenatal clinic and prophylactic antiretroviral therapy (ART) were extracted and analyzed. **Results:** The mother-to-child transmission rate was 13.6%. The mothers of all the positive babies were unbooked and had no form of antenatal care or ART while pregnant. The male:female birth ratio was 1:1.07. Fifty four (66.7%) of the women were unbooked. **Conclusion:** The mother-to-child transmission rate at Orlu is still high. As this transmission was confounded to unbooked patients who had no ART in pregnancy, efforts should be made towards increasing the percentage of booked cases. Also maternities, hospitals and even TBA's should encouraged their clients to go for voluntary counseling and testing. There should also be improvement on interventions to reduce this which should include early booking, adequate antenatal care services, use of prophylactic antiretroviral drugs and modified obstetric practices.

## INTRODUCTION

Sub-Saharan Africa remains the region most heavily affected by HIV. In 2008, sub-Saharan Africa accounted for 67% of HIV infections worldwide, 68% of new HIV infections among adults and 91% of new HIV infections among children. The region also accounted for 72% of the world's AIDS-related deaths in 2008.<sup>1</sup>

Worldwide, about 48% of the adult People Living with HIV/AIDS (PLWHA) are women, while in Nigeria, women constitute 57% of them.<sup>2,3</sup> Thus HIV continues to be progressively feminized mostly in Africa. This has led to an increase in the number of reported paediatric HIV infections due to increased risk of mother-to-child transmission (MTCT) of HIV during pregnancy, labour and breastfeeding.<sup>4</sup>

HIV infection has become one of the most common complications of pregnancy in some developing countries.<sup>5</sup> Different studies in Nigeria have reported a sero-prevalence rate in the range of 2.6-19.1% during pregnancy.<sup>6-12</sup>

In developed countries (like Europe and USA), vertical transmission rate is 10-25%, while it is 25-40% in some

African and Asian studies.<sup>13,14</sup> Twenty to twenty five percent of these occur in-utero, 57-68% occur during Labour/delivery while 10-20% occur during the postpartum period mostly from breast feeding.<sup>15</sup> All children born to HIV positive women test positive themselves at birth because of passive transfer of antibodies from mother to child.<sup>4,16</sup> Each year around 57,000 babies are born with HIV.<sup>17</sup> It is estimated that 360,000 children are living with HIV in Nigeria, most of whom became infected from their mothers.<sup>18</sup> This is an increase from 220,000 that it was in 2007.<sup>19</sup>

Before the age of 18 months, antibody based tests are not useful for the diagnosis of HIV as the antibodies are passively transferred to the baby from the mother. The definitive diagnosis of paediatric HIV infection can only be carried out by the use of antigen based techniques which are indeed not available in many developing countries. This has resulted in the absence of authoritative data on the rate of mother-to-child transmission in these countries.

Polymerase chain reaction (PCR) techniques for the amplification of HIV DNA or RNA are currently employed

in the diagnosis of HIV I & II infections particularly in infants under the age of 2 years. However, until recently, the absence of standardized PCR protocols for the detection of HIV strains in different regions of the world may have contributed to the global variation in the reported rates of MTCT and in the determination of the timing of the infection.<sup>14,20</sup>

The development of a prototype DNA PCR kit by Roche Diagnostics, that incorporates universal primers SSK145 and SKCC1B for the detection of all the Group M HIV-1 viruses, (Version 1.5, Roche Diagnostics Incorporation, Alameda, California, USA) offers the possibility of accurate and timely detection in early infancy. Such early detection is critically important in the evaluation of ARV trials and other interventions aimed at reducing MTCT, as well as for designing early treatment strategies for infected infants.

The present study was therefore carried out to generate some information on the rate of mother to child transmission in Orlu using the polymerase chain reaction (PCR) technique that was done at 6 weeks postpartum period.

## METHODOLOGY

Imo State University Teaching Hospital is located in Umuna, Orlu, in Orlu Local Government Area of Orlu senatorial zone of Imo State. Orlu is the third largest city in Southeast Nigeria's Imo State with an estimated population of 9,636.<sup>21,22</sup> The inhabitants are mainly farmers, traders and civil servants. The teaching hospital is a major referral center serving the whole of Imo State and its environs.

A retrospective analysis of the case records of babies delivered by HIV sero-positive women (both booked and unbooked) at the Imo State University Teaching Hospital (IMSUTH), Orlu from 1<sup>st</sup> April 2008 to 31<sup>st</sup> July 2010 was made. The HIV sero-positive women who had antenatal care received highly active antiretroviral drugs (zidovudine and lamuvudine were given to the women from 28 weeks gestation to onset of labour, while nevirapine was given at labour) and their babies were given nevirapin within 72hours of delivery upto 7 days postpartum. Those who did not have ANC didn't receive it and their babies also received no nevirapin.

At six weeks postpartum, the women and their babies were sent to Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi, to do PCR (as this facility was not available at Orlu) on the child's blood for confirmation of vertical transmission of HIV.

The data obtained included the sex of the babies, PCR result, booking status of the mothers and the use of antiretroviral drugs by the mother during pregnancy and delivery.

## RESULTS

A total of 81 babies did the PCR test at 6 weeks of age. Out of this, 11 (13.6%) were positive, 61 (75.3%) were negative, while there were no results for 9 (11.1%) of the babies. Out of the 11 that were positive, the majority (7) were females, while 4 were male (table 1).

Table 2 shows that 42 (51.9%) of the babies were females while 39 (48.1%) were males, giving a male : female ratio of 1 : 1.07.

Table 3 shows that only 27 (33.3%) of the sero-positive mothers booked for antenatal care and received antiretroviral therapy during pregnancy, while the majority 54 (66.7%) of the women did not.

Table 4 shows that in 11 (100%) of the babies who were PCR positive, their mothers never had any form of antenatal care and never received any antiretroviral therapy during pregnancy, thus mother to child transmission of HIV in this study was significantly found in unbooked patients.  $P=0.039$ .

**Figure 1**

Table 1: PCR Results

PCR Result	No (%)		
	Male	Female	Total
Positive	4(4.9)	7(8.6)	11 (13.6)
Negative	31(38.3)	30(37.0)	61 (75.3)
No Result	4(4.9)	5(6.2)	<u>9 (11.1)</u>
Total	39(48.1)	42(51.9)	81 (100)

**Figure 2**

Table 2: Frequency distribution of the sex of the delivered babies.

Sex of the babies	Frequency (%)	
Male	39	48.1
Female	42	51.9
Total	81	100

**Figure 3**

Table 3: Frequency distribution of the booking status with antiretroviral therapy (ART) of the patients.

ACA + ART	Frequency (%)	
Yes	27	(33.3)
No	54	(66.7)
Total	81	(100)

**Figure 4**

Table 4: Antenatal care attendance with Antiretroviral therapy and PCR result.

ACA +ART	PCR RESULT		
	Positive	Negative	No result
Yes	0	24	3
No	11	37	6
Total	11	61	9

## DISCUSSION

The mother to child transmission (MTCT) rate of HIV in this study is 13.6%. It is lower than the 22% noted in a similar study<sup>23</sup> in Nigeria and also lower than 25-40% reported in some African and Asian studies.<sup>13,14</sup> It must however be noted that there was an intervention (like antiretroviral drugs) in this study. The finding is higher than 4.9% and 12.1% obtained from Brazil<sup>24</sup> and Cuba<sup>25</sup> respectively. This level of MTCT will worsen the already

high rate of paediatric HIV infection via mother to child transmission.

Interventions to prevent mother-to-child transmission of HIV include voluntary counseling and testing (VCT), administration of antiretroviral drugs (ARV), modification of obstetric practices and infant feeding options in HIV infected mothers.

The study shows that in all the babies who tested positive to PCR, their mothers never had any form of antenatal care nor any ART while pregnant. It also shows that none of the babies whose mothers attended antenatal care and received ART was positive to PCR test. These findings supports the fact that offering HIV testing as part of routine antenatal care, combination antiretroviral drug regimens, and elective cesarean section and advising complete avoidance of breastfeeding has cut MTCT transmission of HIV to below 2 percent among HIV-infected women in developed countries. However, in some developing nations where the vast majority of HIV-infected women of childbearing age reside, MTCT rates remain high due to lack of access to feasible and affordable prevention interventions. This is compounded by the nearly universal practice of breastfeeding for prolonged periods of time.<sup>26</sup>

Nigeria's programme to prevent the transmission of HIV from mother to child (PMTCT) started in July 2002.<sup>27</sup> Despite 'considerable efforts' to strengthen PMTCT interventions, by 2007 only 5.3 percent of HIV positive women were receiving antiretroviral drugs to reduce the risk of mother-to-child transmission.<sup>28</sup> This figure had risen to almost 22 percent by 2010, but still remains far short of universal access targets,<sup>28</sup> thus the relatively high rate of MTCT found in this study.

Implementing prevention of mother-to-child transmission (PMTCT) interventions poses significant challenges in resource-poor settings. However, lessons from such diverse countries as Thailand and Uganda, where simpler but effective MTCT interventions have been tested and quickly adapted into national programs, provide evidence that services can be made available to mothers in other middle- and low-income countries.

With close to 2,000 new paediatric HIV infections daily and PMTCT coverage rates as low as 1 percent in some of the countries most affected by HIV/AIDS,<sup>26</sup> the rapid scale-up of PMTCT interventions must be considered an emergency effort. In June 2001, the United Nations General Assembly

Special Session on HIV/AIDS (UNGASS) declared its commitment to reducing the proportion of HIV-infected infants by 20 percent by 2005 and by 50 percent by 2010.<sup>26</sup> This of course is a far cry from the reality in developing countries. Global commitment to increase access to care and treatment for persons infected with HIV, including the United States of America government's Presidential Emergency Plan for AIDS Relief (PEPFAR) and the World Health Organization's "3 by 5" initiative, is growing, and PMTCT is a critical point of entry to care, particularly for HIV-infected women and their families.<sup>26</sup>

This study also showed that the male: female sex ratio of the delivered babies tilted to more females than males. Although this was not statistically significant, it corresponds to a similar study<sup>12</sup> carried out in the same centre which showed a male:female ratio of 1:1.4. Possible explanations to this sex ratio bias include Y-chromosome bearing sperms being faster but less resilient to unfavourable conditions in the mother's reproductive tract than X- chromosome bearing sperms which are slower but survive longer<sup>29,30</sup>; spontaneous abortion may be biased towards males<sup>30</sup> and might in general be more common than abortions of female fetuses.<sup>31,32</sup> However, the ultimate explanations in sex ratio changes include the Trivers-Willard hypothesis,<sup>32</sup> which suggests that if a female is in a poor condition, or of a low social status, it is beneficial to her to invest into the offspring sex that is less vulnerable. The reproductive success of male offspring, in a society where access to breeding partners is limited (through dominance hierarchies and male-male competition) tends to be more variable and resource sensitive. Some males are thus highly successful breeders while others are not. Although females can benefit by investing into the offspring with higher reproductive variance, they will not be able to do so if they lack the resources. Therefore, vertebrate females subjected to physiological and psychological stress like HIV infection, or in worse body conditions gain a selective advantage by producing female offspring, since male offspring are thought to be more costly to produce and raise and are less likely to attain a high social status and lifetime reproductive success if born to a stressed, subordinate female.<sup>32-34</sup> Hence, physiologically stressed females (as in HIV infection), would be better off producing female offspring under conditions of stress, as daughters are more likely to survive than sons.<sup>35</sup> and the reproductive success of daughters is usually not dependent on social status.

If the HIV positive babies are to survive to adulthood, the finding in this study that majority of 7 (63.6%) of the babies

were female support the findings that HIV infection is progressively feminized mostly in Africa.<sup>2,3</sup>

In conclusion, the mother-to-child transmission rate at Orlu is still high. As this transmission was confounded to unbooked patients who had no ART in pregnancy, efforts should be made towards increasing the percentage of booked cases. Also maternities, hospitals and even TBA's should encourage their clients to go for voluntary counseling and testing. There should also be improvement on interventions to reduce this, which should include early booking, adequate antenatal care services, use of prophylactic antiretroviral drugs and modified obstetric practices.

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