

# Elimination of Mother-To-Child Transmission of HIV in Nigeria: The Roles, Preparedness and Determinants of Successful Involvement of Traditional Birth Attendants

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## Abstract

**Background:** Prevention of mother to child transmission of HIV plays a major role in reducing the number of children being infected with HIV. This study provides baseline information about the knowledge, practice and factors that affect PMTCT service provision by traditional birth attendants.

**Methods:** A cross-sectional study of 142 traditional birth attendants in Ogun State, Nigeria carried out between January and March, 2014. Sample selection was by two-staged probability sampling technique. Data collection employed structured pre-tested questionnaires. Data were analysed using SPSS software for Windows (version 18). Uni-variate, bi-variate and multivariate analyses were done.

**Results:** Participants were universally aware of HIV. Participants' ability to correctly identify temporal mode of MTCT of HIV varied from 69.0% for ante-partum; and 76.1% during labour and delivery to 60.6% during breastfeeding. Most of them (81.7%) knew that MTCT of HIV is preventable. Most of them knew that knowledge of HIV status (94.4%); and HCT (98.6%) were important for pregnant women. The mean score for knowledge of MTCT and PMTCT of HIV was  $16.89 \pm 1.89$ . Participants with secondary education or more (AOR = 3.020, 95% CI = 1.362-6.697) were likely to know more about MTCT and PMTCT of HIV. Majority (88.7%) of the TBAs always offer HCT to pregnant women; 122 (85.9%) always refer HIV-positive women to treatment centres; and 126 (88.7%) always provide referral support for patients. The mean score for PMTCT care practice for the participants was high ( $45.85 \pm 9.48$ ).

**Conclusion:** TBAs have a role to play in the e-MTCT of HIV in Nigeria and are poised to do so. They have some knowledge and good practices as it relates to MTCT and PMTCT of HIV. Some misconceptions and bad practices exist especially as it relates to infant feeding practices. These need to be comprehensively addressed.

**Keywords:** Elimination; Care practices; Knowledge; Mother-to-child transmission of HIV/AIDS; Traditional birth attendants

**Abbreviations:** ANC: Antenatal Care; ART: Antiretroviral Treatment; ARV: Antiretroviral; FMoH: Federal Ministry of Health; HCT: HIV Counselling and Testing; HIV: Human Immunodeficiency Virus; HIV/AIDS: Human Immunodeficiency virus and Acquired Immunodeficiency Syndrome; MTCT: Elimination of Mother to Child Transmission; MTCT: Mother to Child Transmission; NANTMP: National Association of Nigerian Traditional Medicine Practitioners; PMTCT: Prevention of Mother to Child Transmission; SBA: Skilled Birth Attendants; SPSS: Statistical Package for Social Science; TBA: Traditional Birth Attendants

## Introduction

Mother-to-child transmission (MTCT), or vertical transmission of HIV infection, is the transmission of the virus from an infected mother to her child during pregnancy, labour, delivery or breastfeeding [1,2]. Greater than 90% of HIV infections among children occur through MTCT; with 90% of MTCT occurring in sub-Saharan Africa. In the absence of appropriate treatment, about half of these children die before their second birthday [3]. The cumulative risk of exposed children acquiring the virus is 20-45% without any intervention if breastfeeding is prolonged to 2 years [4]. The rate of MTCT is dependent on factors which include viral load, mode of delivery, prolonged rupture of membranes, prematurity and breastfeeding [5].

MTCT rates of less than 2% have been reported in high income countries owing to provider-initiated HIV counselling and testing

(HCT), accessibility to antiretroviral (ARV) prophylaxis and safe use of breast milk substitutes [6,7]. This differs significantly from what obtains in sub-Saharan Africa, Nigeria inclusive. HCT and ARV prophylaxis access rates are low (11.7% and 17.1%, respectively) whereas, transmission through breastfeeding is high [3,8,9].

Nigeria accounts for about 30% of the global burden of MTCT; with a MTCT rate of about 32% and about 75,000 new infant HIV infections per annum. The ARV coverage for PMTCT is 22% among the estimated 210,000 annual HIV infections among pregnant women [10-13].

In countries that are rapidly scaling-up PMTCT services, the main challenges are; to offer more effective PMTCT, including provision of antiretroviral treatment (ART) for pregnant women, prophylactic ARV for infants; and to demonstrate the impact of these interventions by decreased paediatric infections, increased HIV-free survival and improved maternal and child health [2,14].

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In Nigeria, PMTCT services are still largely concentrated in health facilities, with less than desirable collaboration with community support services [15]. Whereas, 58% of pregnant women attend antenatal clinic (ANC) at least once, only 35% of births occur in health facilities. In Nigeria, only 39% of deliveries are attended by skilled birth attendants (SBA). Between 49% and 93% of births in different parts of Nigeria occur in the home of traditional birth attendants (TBA) [16]. Ogun State, Nigeria has the highest HIV prevalence rate (3.1%) in south west Nigeria after Lagos. TBA utilization rate in the state is also high (63.6%). It is therefore important to assess the knowledge and practices of TBAs in Ogun State as it relates to MTCT and PMTCT of HIV [17]. The WHO defines TBA as a person who assists the mother during childbirth and who initially acquired her skills by delivering babies herself or through an apprenticeship to other TBA [18]. Despite the role of TBA, they have not been accorded a defined role in the Nigerian health system. They are often perceived as major contributors to the high maternal mortality rate in Nigeria as many of their practices have been found to adversely affect the health of mothers [16]. However, recently, various governmental and nongovernmental agencies have engaged TBA in trainings in PMTCT. The proposed roles of TBA in PMTCT are highlighted in Table 1.

Nigeria endorses the global plan for the elimination of MTCT of HIV infection (e-MTCT) which targets the reduction of paediatric HIV by 90% and reduction of MTCT rate to less than 5%. Nigeria has a commitment to fully implement new scale up plan by 2015; to reduce HIV incidence among women of reproductive age, reduce unmet needs for family planning by 100% and reach 90% of HIV infected women and infants with ARV and ARV prophylaxis [19].

Prevention of mother to child transmission of HIV plays a major role in reducing the number of children being infected with HIV. This study provides baseline information about the knowledge, practice and factors that affect PMTCT service provision by TBA. It should help to identify PMTCT training needs; facilitate quality and efficient health care services to reduce MTCT of HIV infection.

## Methods

### Study design, area and period

A cross-sectional study was conducted in Ogun State, one of the 36 states in Nigeria between January and March 2014. All duly registered TBA were included in the study. The unregistered TBAS were excluded from the study.

### Sampling

The sample was drawn from a sampling frame of all duly registered TBA in Ogun State, Nigeria. Sample Size was determined using the single population proportion formula. The aim was to achieve results at 95% confidence interval, confer 80% power and a desired degree of accuracy of 0.05. The estimated proportion was taken as 8.6% which was the proportion of TBA with the correct knowledge of HIV transmission from mother-to-child in Lagos State, Nigeria [20].

A sample size of 121 was derived. An allowance of 20% was made for non response making a sample size of 145. TBAs are registered in four zones (Egba, Ijebu, Remo and Yewa) in Ogun State, Nigeria. Two (Ijebu and Remo) of the four zones were selected by simple random sampling via balloting. Proportional allocation was used to assign sample size to the zones based on the number of duly registered TBA in the selected zones (Ijebu- 65, Remo 80). Systematic random sampling was then used to select participants from a list of all duly registered TBA in the zones.

### Data collection

The data collection instrument was adapted from a similar study among nurses in Nigeria [21]. Three Reproductive Health Specialists were requested to vet the instrument and establish content validity. The specialists made various suggestions which were taken into account, and necessary corrections were made. The specialists agreed that the instrument was suitable for use in the study context. The questionnaire was translated into Yoruba (the local language) and back into English. Questionnaire administration was done both in Yoruba and English language which were the languages the TBA were conversant with. The questionnaire was then pretested among 15 TBA in the Yewa health zone of Ogun State. Necessary adjustments were made. Questionnaire administration was carried out by trained research assistants at the various TBA facilities. Data was collected between January and March, 2014 over a 13 week period.

The survey consisted of the following sections: demographics; knowledge questions related to MTCT and PMTCT; and a practice scale related to PMTCT care practice. The MTCT and PMTCT knowledge scale consisted of 20 items related to MTCT and its prevention. The items were rated 0 (wrong) and 1 (correct) based on participant's responses. The least and highest possible scores were 0 and 20 respectively. Participants were grouped into having above average knowledge or below average knowledge of MTCT and PMTCT based on whether their total scores were higher or lower than the mean score. The PMTCT practice scale consisted of 14 items related to practices associated with the prevention of maternal to child transmission. The items were rated from 0 (never) to 4 (always) based on how often the TBA engaged in the practice. The scale included evidence-based practices related to newborn care, infant feeding practices, maternal prenatal laboratory testing and screening; maternal adherence to treatment before and after delivery, and availability and use of protective equipment for universal precautions. The least and highest possible scores were 0 and 56 respectively. Participants were classified into having above or below average PMTCT care practices based on whether their total scores were higher or lower than the mean score. Cronbach alpha for the scale was 0.712, consistent with other HIV knowledge scales [20,21].

### Data quality control

One day training was given to ten research assistant about the objectives and procedures of the data collection by the investigators.

Preconception	Health education and counselling on safe HIV and PMTCT practices, HIV counselling and testing, prompt referral of HIV positive individuals for treatment, adherence counselling and treatment support, bridging the gap of unmet needs for family planning, identification and prompt referral of STIs, promotion of consistent and correct condom use
Prenatal	HIV counselling and testing, prompt referral of HIV positive mothers for treatment, adherence counselling and treatment support for mothers, Mobilization of pregnant women for appropriate ANC attendance, Health and Nutrition education. Partner counselling and testing
Perinatal	Safe delivery practices, prompt referral of HIV positive mothers in labour and babies for nevirapine therapy
Postnatal	Adherence counselling, treatment support for mothers and infant prophylaxis, mother and infant follow-up, Nutritional education and support for mother and infant, bridging the gap of unmet needs for family planning

**Table 1:** The role of TBAs in the prevention of mother to child transmission of HIV.

The investigators checked the data for completeness and consistency. Data cleaning and editing took place.

### Data analysis

Data were entered, coded and analysed using SPSS version 18. Relevant descriptive statistics were used to summarize the findings. Associations between dependent and independent variables were assessed by using bi-variate analysis. Multiple logistic regression models were then constructed for variables that were statistically significant. To measure internal consistency, reliability analysis was done. P-values less than 0.05 were considered statistically significant in all cases.

### Ethical consideration

Ethical clearance was obtained from the Babcock University Health Research Ethics Committee. Permission and cooperation was obtained from the National Association of Nigerian Traditional Medicine Practitioners (NANTMP), which is the umbrella body for all The TBA and Faith Based Organizations providing health care in Nigeria. Informed consent was obtained from the selected TBA. Only TBAs who gave their consent were interviewed. 142 TBAs consented to the study, giving a response rate of 97.9%.

### Results

#### Socio-demographic and practice characteristics (Tables 2)

One hundred and forty two TBAs consented to the study, giving a response rate of 97.9%. There were 60 (42.3%) males and 82 (57.7%) females. Most (45.1%) of the participants were within the age group of 45-59 years; while 31.0% were aged between 25 and 44 years. The mean age of the participants was  $49.56 \pm 12.66$  years. The majority, 132 (93.0%), of the participants were married at the time of the survey, while 140 (98.6%) of them were Yoruba by ethnicity. Seventy two (50.7%) participants were Muslims, while 50 (35.2%) were Christians. About one-third, 46 (32.4%), had completed primary, 74 (52.1%) secondary, 16 (11.3%) tertiary education; however, 6 (4.2%) had no formal education. About half (47.9%) of the participants had between 1 and 10 years of practice as TBA; 31.0% had practiced for between 11 and 20 years; 16.9% had practiced for between 21 and 30 years while only 4.2% had more than years of practice as TBA. The mean duration of practice was  $13.25 \pm 8.78$  years. Majority (57.7%) of the participants had their basic TBA trainings by relatives while 42.3% were trained by non relatives. The duration of training was between 1 and 10 years for 83.1% of the participants while 16.9% of them underwent training for more than 10 years. Most (91.5%) participants offer services other than antenatal and delivery services. The services include treatment of infertility (43.7%), family planning (40.8%), and circumcision (38.0%).

#### Knowledge of MTCT and PMTCT of HIV infection among TBA (Figure 1)

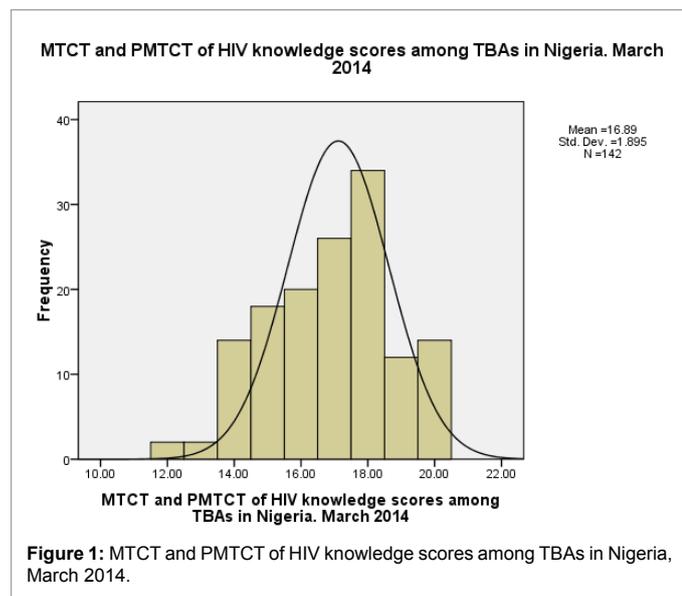
The current study assessed the knowledge of TBA on MTCT of HIV. All of the participants were aware of HIV/AIDS. The major sources of awareness of HIV/AIDS were other health workers (38.1%), the media (31.0%), and workshop/seminars (25.4%). Most (90.8%) of the participants knew about transmission of HIV from infected mother to her child. Participants who could correctly identify the temporal mode of MTCT of HIV varied from 69.0% for ante-partum; 76.1% during labour and delivery to 60.6% during breastfeeding. There were misconceptions that infants could contract HIV through infant formulae feeding (15.5%), herbal concoctions (8.5%) and through demonic attacks (7.0%).

Demographic characteristics	Frequency (n= 142 )	%
Age in years		
25-44	44	31.0
45-59	64	45.1
≥ 60	34	23.9
Sex		
Male	60	42.3
Female	82	57.7
Educational status		
None	6	4.2
Primary	46	32.4
Secondary	74	52.1
Tertiary	16	11.3
Religion		
Christianity	50	35.2
Islam	72	50.7
Traditional African	20	14.1
Ethnicity		
Yoruba	140	98.6
Others	2	1.4
Years of Practice		
1 to 10 years	68	47.9
11-20 years	44	31.0
21-30 years	24	16.9
> 30 years	6	4.2
Source of basic training		
Relatives	82	57.7
Non relatives	60	42.3
Duration of basic training		
1 to 10 years	118	83.1
> 10 years	24	16.9
Average number of deliveries attended per month		
1-5	94	66.2
6-10	26	18.3
>10	22	15.5
Engagement in other work activities		
Yes	130	91.5
No	12	8.5
Other work activities*		
Family Planning	58	40.8
Scarification/incisions	4	2.8
Circumcision	54	38.0
Infertility treatment	62	43.7

\*There are multiple responses; each percentage is relative to total number of participants

**Table 2:** Socio-demographic and occupational characteristics of TBAs in Ogun State, Nigeria March 2014.

The current study also assessed the knowledge on PMTCT of HIV/AIDS of TBA. Majority of them (81.7%) knew that MTCT of HIV is preventable. Majority of the participants knew that knowledge of HIV status (94.4%); and HCT (98.6%) were important for pregnant women. Almost all of them (98.6%) knew a referral centre for care of HIV positive pregnant women. Ninety four (66.2%) of them knew that ART drugs use by HIV-positive pregnant mothers could reduce the risk of HIV transmission. Majority of the participants, 138 (97.2%), knew that a child from HIV-positive mother need follow-up at ART clinic. Among these participants, 32 (22.5%), said that a child need follow-up for six months, 4 (2.8%) for one year and 106 (74.6%) until proven HIV



negative. All the participants knew that the observance of universal precautions during labour and delivery is pertinent to PMTCT of HIV.

More than half (52.1%) thought that discouraging breastfeeding in all HIV positive mothers irrespective of whether they were on drugs or not is the ideal infant feeding option. A few of the participants thought that herbal concoctions, scarification and traditional rituals would be effective in PMTCT of HIV.

The mean knowledge score for MTCT and PMTCT of HIV among the TBAs was  $16.89 \pm 1.89$  with lowest and highest scores of 12 and 20. Figure 1 shows the distribution of the knowledge scores. Eighty six (60.6%) and 56 (39.4%) of the participants had above and below average knowledge of MTCT and PMTCT scores respectively.

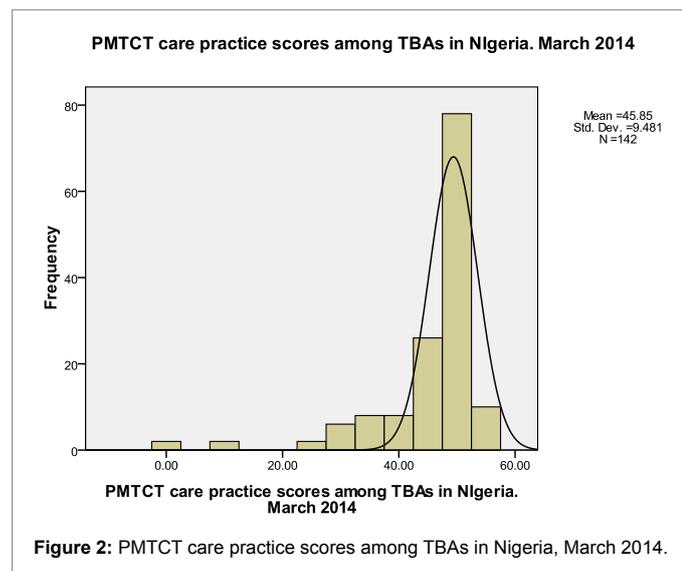
### Association between TBA characteristics and knowledge of MTCT and PMTCT of HIV infection (Table 3)

The bi-variate analysis revealed that sex, religion, source and duration of training, years of experience and the average monthly deliveries attended by the participants did not have significant association with knowledge of MTCT and PMTCT of HIV ( $p > 0.05$ ).

Characteristics	Above average knowledge of MTCT		$\chi^2$ (p value)	AOR (95% CI)
	Yes	No		
Age in years				
Less than 45	32 (72.7)	12 (27.3)	3.950 (0.047)*	1.290 (0.538-3.094)
45 or more	54 (55.1)	44 (44.9)		
Sex				
Male	34 (56.7)	26 (43.3)	0.661 (0.416)	1.286 (0.555-2.981)
Female	52 (63.4)	30 (36.6)		
Educational status				
Primary school or less	22 (42.3)	30 (57.7)	11.448 (0.001)*	3.020 (1.362-6.697)*
Secondary or more	64 (71.1)	26 (28.9)		
Religion				
Christianity	36 (72.0)	14 (28.0)	4.429 (0.109)	2.486 (0.731-8.334)
Islam	40 (55.6)	32 (44.4)		
Traditional	10 (50.0)	10 (50.0)		
Years of Practice				
10 years or less	40 (58.8)	28 (41.2)	0.165 (0.684)	0.448 (0.188-1.069)
More than 10 years	46 (62.2)	28 (37.8)		
Source of basic training				
Relatives	52 (63.4)	30 (36.6)	0.661 (0.416)	1.883 (0.851-4.166)
Non relatives	34 (56.7)	26 (43.3)		
Duration of basic training				
1 to 10 years	72 (61.0)	46 (39.0)	0.060 (0.806)	1.856 (0.634-5.436)
> 10 years	14 (58.3)	10 (41.7)		
Average number of deliveries attended per month				
5 or less	58 (61.7)	36 (38.3)	0.151 (0.698)	0.895 (0.387-2.068)
More than 5	28 (58.3)	20 (41.7)		

\*statistically significant at  $p < 0.05$

**Table 3:** Factors related to good knowledge of MTCT and PMTCT of HIV infection among TBAs in Ogun State, Nigeria, March 2014.



However, age ( $\chi^2 = 3.950$ ,  $p = 0.047$ ) and educational status ( $\chi^2 = 11.448$ ,  $p = 0.001$ ) were associated with knowledge of MTCT and PMTCT of HIV. On multivariate analysis, age was not significantly associated (AOR = 1.290, 95% CI = 0.538-3.094) while participants with at least secondary school education (AOR = 3.020, 95% CI = 1.362-6.697) were like average knowledge of MTCT and PMTCT of HIV.

### Practices of PMTCT of HIV infection among TBA (Figure 2)

Prevention of mother-to-child transmission and factors affecting its practice among the TBA were assessed using the different explanatory variables. One hundred and twenty six (88.7%) of the TBA always offer HCT services to all pregnant women. Majority of them, 122 (85.9%) always refer HIV positive women to treatment centres, while, 126 (88.7%) of them always provide referral support for patients (for any indication).

More than half of the TBA (57.7%) encourage all HIV positive mothers to breastfeed their newborns irrespective of whether they on ART or not. However, 114 (80.3%) of the participants encourage and support HIV positive mothers on ART to breastfeed their infants. One hundred and ten (77.5%) participants encourage and support HIV positive pregnant women; mothers and their infants on ART drugs to comply with their medication; while, 18.3%, 12.3% and 8.7% offer herbal concoctions, scarification and traditional rituals respectively for treatment of HIV positive women. Eighteen participants give babies born to HIV positive mothers herbal concoctions to prevent HIV infection.

Most of the participants always observe universal precautions when caring for pregnant women. Ninety three percent of them always use sterile instruments; 128 (90.1%) always use new razor to cut every umbilical cord and, 138 (97.2%) always use a new pair of sterile glove for each new procedure.

The mean PMTCT care practice score for the participants was 45.85  $\pm$  9.48 with lowest and highest scores of 0 and 56. Figure 2 shows the frequency distribution of the scores. One hundred and four (73.2%) and 38 (26.8%) of the participants had above and below average PMTCT care practice scores respectively.

### Association between TBA characteristics and practices of PMTCT of HIV/AIDS (Table 4)

The bi-variate analysis revealed that age, sex, religion, source and duration of training, years of experience and the average monthly deliveries attended by the participants did not have significant association with PMTCT care practice. Knowledge of MTCT and PMTCT of HIV was also not significantly associated with PMTCT care practice. Educational status ( $\chi^2 = 5.417$ ,  $p = 0.020$ ) was associated with PMTCT care practice. Logistic regression analysis revealed that TBA who had primary school education or none at all were more likely (AOR = 2.750, 95% CI = 1.150-6.574) to have above average PMTCT care practices than those who had secondary school or higher education.

### Discussion

The global goal of eliminating MTCT (e-MTCT) of HIV is most relevant to sub-Saharan Africa where majority of vertical transmission of HIV occur. In Nigeria, where most deliveries and high proportions of antenatal care are attended by TBA, it is important to create awareness

Characteristics	Above average PMTCT care practice		$\chi^2$ (p value)
	Yes	No	
Age in years			
Less than 45	28 (63.6)	16 (36.4)	3.000 (0.083)
45 or more	76 (77.6)	22 (22.4)	
Sex			
Male	42 (70.0)	18 (30.0)	0.556 (0.456)
Female	62 (75.6)	20 (4.4)	
Educational status			
Primary school or less	44 (84.6)	8 (15.4)	5.417 (0.020)*
Secondary or more	60 (66.7)	30 (33.3)	
Religion			
Christianity	32 (64.0)	18 (36.0)	4.251 (0.119)
Islam	58 (80.6)	14 (19.4)	
Traditional	14 (70.0)	6 (30.0)	
Years of Practice			
10 years or less	48 (70.6)	20 (29.4)	0.468 (0.494)
More than 10 years	56 (75.7)	18 (2.3)	
Source of basic training			
Relatives	60 (73.2)	22 (26.8)	0.000 (0.983)
Non relatives	44 (73.3)	16 (26.7)	
Duration of basic training			
1 to 10 years	88 (74.6)	30 (25.4)	0.637 (0.425)
> 10 years	16 (66.7)	8 (33.3)	
Average number of deliveries attended per month			
5 or less	70 (74.5)	24 (25.5)	0.214 (0.644)
More than 5	34 (70.8)	14 (29.2)	
Knowledge of MTCT and PMTCT of HIV			
Above average	68 (79.1)	18 (20.9)	3.782 (0.052)
Below average	36 (64.3)	20 (35.7)	

\*statistically significant at  $p < 0.05$

**Table 4:** Factors related to good practice of PMTCT of HIV infection among TBAs in Ogun State, Nigeria, March 2014.

and enhance PMTCT care practices among this category of health workers.

This current study assessed the knowledge and practices of TBAs in Nigeria as it relates to PMTCT of HIV. The study revealed that while more than 90% of TBAs were aware of MTCT of HIV, three out of every five of them had good knowledge of MTCT and PMTCT of HIV. Misconceptions about the modes of MTCT of HIV and feeding of HIV exposed infants were found to be in existence. While age and level of education completed by the TBAs were related to their knowledge of MTCT and PMTCT of HIV; their knowledge was only predicted by higher level of education. Majority of the TBAs offered HCT, referral and referral support services. Universal precaution was also widely practiced. Breastfeeding and ART adherence support were however not as good. Some of the TBAs give herbal concoctions, scarification marks and perform traditional rituals in order to prevent HIV transmission. Almost three-quarters of the TBAs were found to have good PMTCT practices. PMTCT care practice was predicted by lower level of education.

This study shown that all the TBA are twenty five years or older; they are predominantly married, females with at least primary school education. These socio-demographic findings match the criteria put forward by Federal Ministry of Health for selecting TBA for training in Nigeria [21]. There was universal awareness of HIV/AIDS among the participants. The awareness of MTCT and PMTCT of HIV were not universal. This is similar to findings among TBA and indeed pre and postnatal women in Nigeria and other parts of Africa [2,20,22,23]. However, the level of awareness of MTCT of HIV was higher than that found in Lagos, Nigeria by Balogun et al in 2010 [20]. The sources of information about HIV found in the current study represents a significant shift from what Balogun et al found in 2010 when more than 75% of TBA got information from health workers. Our findings probably reflect the increased interest in the subject with the involvement of the media in the campaign coupled with trainings and workshops for various cadres of health workers including TBA. This may also account for the significantly better knowledge of TBA about MTCT and PMTCT of HIV compared to earlier findings, despite that the level of awareness of PMTCT remained essentially the same [20]. Misconceptions about feeding of HIV exposed infants, use of herbal concoctions and scarification, and the importance of demons and traditional rituals to MTCT of HIV and its prevention still persist. Similar findings have been reported by previous studies [2,20,24]. The knowledge of TBAs about MTCT and PMTCT of HIV is predicted by their level of education. Those with at least secondary school education were likely to have better knowledge of the subject. This is similar to findings in Ethiopia in 2013. Previous studies implied that improvement in women's educational status enables them to have better knowledge on PMTCT that decreases infant mortality and improve their health [2,25-27]. This would seem to lend credence the FMOH's suggested selection criteria of a minimum of secondary education for training of TBA in PMTCT of HIV [21]. However, considering that between one-third and half of TBA have less than secondary school education, excluding them may amount to loss of a huge proportion of the already inadequate human resources for the e-MTCT of HIV.

The PMTCT care practices of the TBA are good when compared with findings from earlier studies in Nigeria [28-30]. These studies however precede the 2010 launching of the national scale up plan towards e-MTCT of HIV in Nigeria by the FMOH. The findings are similar to that of Abajobir and Zeleke in Ethiopia in 2013 [2]. Universal

precautions are largely observed; HCT services are offered to pregnant women with prompt referrals of HIV positive women by majority of the TBA. However, breastfeeding practices and support for patients on ART to ensure compliance are less than desirable. Harmful and unhelpful traditional practices which are erroneously thought to help in PMTCT of HIV still persist among the TBA. These deficiencies and malpractices by the TBA may encourage the spread of HIV while giving a false impression of protection instead of the TBAs employing more valid means of PMTCT of HIV. There is a need to address these deficiencies. The discrepancy in the association level of education predictors with knowledge and practice of PMTCT is surprising. However, this may underscore the known fact that knowledge and practice are not necessarily associated and may be predicted by different factors [31-33].

Certain limitations of this study should be taken into account when interpreting the findings. The study was cross-sectional in design; hence, causality cannot be established. The use of self-reported data is prone to a number of biases that could affect the reliability and validity of the findings. There could be recall biases and self-presentation or confidentiality concerns. This was, however, mitigated by assuring the TBA of full confidentiality and conducting the survey in a private environment. A particular strength of the current study is that the sample of TBA is representative and the findings can be generalised to all TBA in Nigeria. The findings can be scaled up nationally towards the eMTCT of HIV in Nigeria.

## Conclusion

TBAs have a definite role to play in the e-MTCT of HIV in Nigeria and are poised to do so. They have access to a sizeable proportion of pregnant women before, during and after delivery. They have some knowledge and good practices as it relates to MTCT and PMTCT of HIV. It is however, imperative to set up a campaign towards universal awareness of MTCT and PMTCT of HIV among TBA; and to improve their knowledge of the subject through campaigns that use multiple, integrated methods of health education. Misconceptions about MTCT and PMTCT of HIV need to be specifically targeted for an effective engagement of TBA in the e-MTCT of HIV. Innovative health education methods that are focused on those with lower levels of education need to be researched and employed to bridge the knowledge gap that seems to exist as a result of the educational status of the TBA. It is important to clarify the policy guideline as it relate to feeding practices in HIV exposed infants and to support the TBA to adopt and fully integrate the strategies into their practice. Harmful and unhelpful traditional practices need to be discouraged. Interactions with TBA that are best on due recognition may aid in the drive to end these practices.

## Competing Interests

The authors declare that they have no any competing interests.

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