

The Effect of Training on Traditional Birth Attendants' PMTCT Related Knowledge and Care Practices in Nigeria

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Abstract

Introduction: As much as 60% of children born in Nigeria are delivered by unskilled traditional birth attendants. It imperative for traditional birth attendants and similar cadre of health care providers in resource-limited settings to be knowledgeable and have the ability to deploy evidence based practices in the prevention of mother to child transmission of HIV if the goal of an AIDS free generation will be achieved. The successful linkage of evidence with practice in sub-Saharan Africa and other resource limited settings will translate into the reduction of MTCT of HIV as has been achieved in other parts of the world.

Methods: A cross-sectional survey of 142 traditional birth attendants. The research was based on diffusion of innovation theory. Practices related to prevention of mother to child transmission of HIV were evaluated relative to national guidelines. Linear mixed modelling was used to evaluate the association between PMTCT practices and training on prevention of mother to child transmission of HIV.

Results: Most traditional birth attendants were knowledgeable and had good practices relating to prevention of mother to child transmission of HIV. However, significant gaps in HIV exposed infant care; infant feeding practices and harmful traditional practices exist.

Conclusions: Traditional birth attendants have a role in the prevention of mother to child transmission of HIV. Evidence-based practices that are related to maternal HIV transmission are being taken from research and policy into patient care domains; though there are some gaps in vital practices. Innovative strategic interventions are very essential to enhance participation of TBAs in the PMTCT of HIV.

Keywords: Breastfeeding; Counselling and testing; Diffusion of innovation; HIV exposed infants; HIV transmission; Traditional birth attendants

Abbreviations: AFASS: Acceptable, Feasible, Affordable, Sustainable, And Safe Feeding Criteria; AIDS: Acquired Immunodeficiency Syndrome; DOI: Diffusion Of Innovation; FBO: Faith Based Organisation; HIV: Human Immunodeficiency Virus; MOH: Ministry Of Health; MTCT: Maternal To Child Transmission; NANTMP: National Association Of Nigerian Traditional Medicine Practitioners; PCR: Polymerase Chain Reaction; PHC: Primary Health Care; PMTCT: Prevention Of Mother To Child Transmission; TBA: Traditional Birth Attendant; UNAIDS: Joint United Nations Programme On HIV/AIDS

Introduction

Ever since the first cases of infant HIV infection were described in the early 1980s, a lot of progress has been made in the understanding of risk factors for mother-to-child transmission (MTCT) of HIV, as well as effective interventions for the prevention of mother-to-child transmission (PMTCT). MTCT of HIV type 1 occurs during pregnancy especially in the third trimester, during the intra-partum period, and for infants exposed to HIV, who are breastfed, throughout the period of lactation [1]. The risk of MTCT among breastfeeding population is about 35%. Among HIV-infected breastfeeding populations, about 20% to 25% of infections occurred in-utero based on positive PCRs at birth; 35% to 50% intra-partum; and another 25% to 35% of infants negative at birth and in the first 6 weeks became infected later through breast milk [2].

The burden of MTCT transmission of human immunodeficiency virus (HIV) is highest in sub-Saharan Africa where majority of the estimated 350,000 infants who acquired HIV infection from their mothers reside [3,4]. Nigeria accounts for about 30% of the overall global burden of MTCT with more than 210,000 children living with HIV and an estimated 56,681 annual HIV positive births [5]. PMTCT is therefore a major public health issue in Nigeria. The successful linkage of evidence with practice in sub-Saharan Africa and other resource limited settings will translate into the reduction of MTCT of HIV as has been achieved in other parts of the world. Guidelines for the PMTCT which are based on up to date evidences exist all across sub-Saharan Africa including Nigeria [3]. However, it is pertinent for these guidelines to be strictly adhered to in order to make substantial progress towards the Joint United Nations Programme on HIV/AIDS (UNAIDS) goal of eliminating vertical MTCT by the end of 2015.

The Nigerian health system is based on primary health care

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(PHC) model. However, PMTCT services in Nigeria are still largely concentrated at tertiary health facilities, with less than desirable collaboration with PHC centres or community support services [6]. As much as 60% of children born in Nigeria are delivered by unskilled traditional birth attendants (TBAs) [7] who speak the local languages, engage in traditional practices, and are usually trusted and respected by the community [8]. Many of these deliveries occur at home with the use of unhygienic surfaces, unclean kitchen equipment for cord cutting, leading to higher risk of infection for both mother and child [9]. The TBAs offer a wide range of services including family planning, antenatal, delivery and postnatal services. In recognition of the strategic role of the TBAs, various governmental and nongovernmental agencies have facilitated training programs in order to improve their practices of PMTCT of HIV. This has led to a broadening in the role of TBAs as care providers for mothers living with HIV in Nigeria. It is imperative for TBAs and similar cadre of health care providers in resource-limited settings to be knowledgeable and have the ability to deploy evidence-based care practices in PMTCT if the UNAIDS goal of an AIDS free generation will be achieved [3].

There is a paucity of research into evidence based practices of TBAs in Nigeria partly because majority of health workers do not recognize this category of staff because the Nigerian health system does not define a clear role for them, hence TBAs are highly unregulated. The aim of this study is to investigate the link between evidence and practices related to PMTCT among TBAs in Nigeria.

Methods

Study design

The study is a cross-sectional survey of 142 duly registered TBAs in Ogun State, one of the 36 States in Nigeria.

Theoretical framework

This research was based on the diffusion of innovation (DOI) theory. DOI is a social science theory developed by EM Rogers with origin in communication which explains how, a new idea is propagated and spread through a specific population or human system. Diffusion results in people adopting the new idea. DOI has been used extensively to investigate how evidence-based ideas are transmitted from research results to policy and actual practice. The model has five major components. First, relative advantage; the degree to which a new idea is seen as better than the original idea it replaces. Second, compatibility: the consistency of the innovation with the practices of the potential adopters. Third, complexity; how difficult the innovation is to understand and/or use. Fourth, trialability: the extent to which the innovation can be tested or experimented with before a commitment to adopt is made. Lastly, observability: the extent to which a new idea provides results. In public health, DOI theory is used to accelerate the adoption of public health programs which typically aim to change the behavior of a human system. Successful adoption of public health programs result from understanding the target population and factors that influence their rate of adoption [3,10,11].

Sample

The sample for the study was drawn from a sampling frame of all duly registered TBAs in Ogun State, Nigeria. Sample Size was determined using the formula for estimating proportions in prevalence studies [12]. The aim was to achieve results at 95% confidence interval, confer 80% power and a desired degree of accuracy of 5%. The estimated proportion was taken as 8.6% which was the proportion of TBAs with

the correct knowledge of HIV transmission from mother-to-child in Lagos State, Nigeria [8]. 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 each of the zones based on the number of duly registered TBAs in each of the selected zones (Ijebu- 65, Remo 80). Systematic random sampling was then used to select participants from a list of all duly registered TBAs in the zones.

Data collection

Data collection instrument was adopted from a similar study among nurses in Nigeria [3]. Three Reproductive health specialists assessed the instrument for content validity. The specialists made suggestions which were incorporated into the instrument. There was consensus among the specialists on the suitability of the instrument for use in the study context. The questionnaire was translated into Yoruba (the local language) and back into English. The questionnaire was then pretested among 15 TBAs in the Yewa health zone of Ogun State. Necessary adjustments were made. Questionnaire administration was carried out by trained research assistants at the TBA facilities. Questionnaire administration was done both in Yoruba and English language which were the languages the TBAs were conversant with. Data was collected over a 13 week period (between January and March, 2013). The questionnaire consisted of sections that assessed demographics; knowledge related to PMTCT; and care practices related to PMTCT. The PMTCT care practice scale consists of 14 items. The items were rated 0 (never) to 4 (always) based on how often the TBAs engaged in the practice. The scale included practices related to newborn care, infant feeding, maternal testing and screening; adherence to treatment before and after delivery, and availability and use of personal protective equipment for universal precautions by TBAs. The minimum and maximum scores were 0 and 56 respectively. Cronbach α for the PMTCT care practice scale was 0.712, which was consistent with other HIV known knowledge scales [3,11]

Data analysis

Data analysis was carried out using SPSS version 18. The data was cleaned. Relevant descriptive statistics (frequency, mean and standard deviation) were used to describe the variables. knowledge about prevention of maternal to child transmission of HIV and the proportion of TBAs participating in training were analysed. Differences in socio-demographic characteristics TBAs receiving PMTCT training were evaluated using the student's *t*-test or chi-square test. The Student's *t*-test was used to evaluate mean differences in age. Chi-square and Fischer's exact test (for those having less than five in a group) were applied for bivariate analysis of age group, sex, education, duration of practice, source and duration of practice PMTCT knowledge score. Finally, multilevel modelling (bivariate and multivariable linear mixed models) was used to identify the possible predictors of PMTCT care practice. The level of significance was set at 0.05.

Ethical considerations

Ethical clearance was obtained from the Babcock University Human Research Ethical Committee. Permission and cooperation was obtained from the National Association of Nigerian Traditional Medicine Practitioners (NANTMP), which is the umbrella body for all The TBAs and FBOs providing health care. Informed consent was obtained from the selected TBAs. Only TBAs who gave their consent

were interviewed. One hundred and forty two TBAs consented to the study, giving a response rate of 97.9%. Confidentiality was ensured at all stages of the research. The names of the participants were not required throughout the study.

Results

Sample characteristics

The mean age of the participants was 49.56 ± 12.66 years with about one-third (31.0%) of them aged between 41 and 50 years. The males constituted 42.3% (60) of the participants while there were 82 (57.7%) females. More than half (52.2%) of the TBAs completed secondary school while 32.5% completed primary school education only. There were 16 (11.3%) of the TBAs that completed tertiary education. About half (50.7%) of them were Muslims while 35.2% were Christians. The remaining 14.1% were traditional worshippers.

One hundred and sixteen 116 (81.7%) of the 142 participating TBAs had had training on PMTCT. About half (47.9%) of the participants had between 1 and 10 years of practice as TBAs; 31.0% had practiced for between 11 and 20 years; 16.9% of participants had practiced for between 21 and 30 years while only 4.2% had more than 30 years of practice as TBAs. The mean duration of practice was 13.25 ± 8.78 years. Majority (57.7%) of the participants had their basic TBA trainings by their relatives while 42.3% were trained by non relatives. 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. The participants' knowledge of PMTCT was quite good. The mean score was 12.31 (±1.29) with a range of 10 to 14 out of a possible maximum of 14. Thirty eight (26.8%) participants each scored 12 and 13 while 18 (12.7%) scored 10 and 11 each. Thirty participants (21.1%) scored 14. The TBAs were predominantly (98.6%) of the Yoruba ethnic group.

Table 1 shows that having had training in PMTCT was significantly associated with higher MTCT knowledge scores ($P < 0.05$). It was also associated with duration of practice. Age, sex, educational status, source and duration of basic training were not related to having had training in PMTCT ($P > 0.05$).

The participants' mean PMTCT practice score was 45.85 (SD=9.48) and ranged between 0 and 56. Table 2 shows that on average, the PMTCT care practice scale scores were higher for TBAs who received training in PMTCT, with a mean of 48.07 (SD=4.83) compared to those without training, with a mean of 35.92 (SD=16.56). This was statistically significant ($P=0.000$). The mean PMTCT practice score increased with age of respondents. Respondents who were older than 60 years had the highest mean score of 49.47 (SD=9.48) while the lowest mean score of 40.25 (SD=17.57) were recorded by those aged 21 to 30 years ($P=0.026$). There was also statistically significant association between mean PMTCT scores and duration of practice ($P=0.000$). Those who had practiced for more than 30 years had the lowest score of 25.67 (SD=13.87) while those whose duration of practice ranged between 11 and 20 years had the highest score of 47.64 (SD=4.90). This is despite that bivariate analysis showed that respondents who had been practicing for more than 30 years had on the average more clients daily than the other groups ($P=0.034$). The practice score was also significantly related to duration of training. Interestingly, those whose training lasted for between 1 and 10 years had better mean score than those whose training lasted for longer ($P=0.025$).

Most TBAs were able to correctly identify that knowledge of HIV status (94.4%), HIV counselling and testing of pregnant women (98.6%); prompt referral (98.6%) and accompanying of HIV positive women

Demographic characteristics	PMTCT training (116)	No PMTCT training (26)	p value
Age in years			
21-30	10 (62.5%)	6 (37.5%)	
31-40	16 (80.0%)	4 (20.0%)	
41-50	38 (86.4%)	6 (13.6%)	0.249‡
51-60	28 (87.5%)	4 (12.5%)	
>60	24 (98.0%)	6 (20.0%)	
Mean Age (SD)	49.94(SD=12.098) years	47.85 (SD=15.064) years	0.448†
Sex			
Male	50 (83.3%)	10 (16.7%)	0.665†
Female	66 (80.5%)	16 (19.5%)	
Educational status			
None	6 (100.0%)	0 (0.0%)	
Primary	36 (78.3%)	10 (21.7%)	0.555‡
Secondary	60 (81.1%)	14 (18.9%)	
Tertiary	14 (87.5%)	2 (12.5%)	
Duration of Practice			
1 to 10 years	52 (76.5%)	16 (23.5%)	0.000‡
11-20 years	42 (95.5%)	2 (4.5%)	
21-30 years	22 (91.7%)	2 (8.3%)	
> 30 years	0 (0.0%)	6 (100.0%)	
Source of basic training			
Relatives	66 (80.5%)	16 (19.5%)	0.665†
Non relatives	50 (83.3%)	10 (16.7%)	
Duration of basic training			
1 to 10 years	98 (83.1%)	20 (16.9%)	0.253‡
>10 years	18 (75.0%)	6 (25.0%)	
PMTCT knowledge score			
10	10 (55.6%)	8 (44.4%)	
11	12 (66.7%)	6 (33.3%)	
12	32 (84.2%)	6 (15.8%)	0.004‡
13	34 (89.6%)	4 (10.5%)	
14	28 (93.3%)	2 (6.7%)	

† T-test or chi-square test was used; ‡Fisher's exact test was used.

Table 1: TBA demographic characteristics by PMTCT training.

to treatment centres (97.2%) were pertinent to PMTCT of HIV. The TBAs had good knowledge of universal precautions. All of them knew that only sterile instruments should be used for delivery and would use a different pair of gloves with every patient. Most of the TBAs (90.1%) could conduct HIV counselling and testing and correctly interpret the result. On the other hand, several appropriate evidence based practices were not well known. Many TBAs incorrectly reported they would not bath HIV exposed infants after birth (36.6%), and would discourage breastfeeding of HIV-exposed infants when the mother is on drugs (19.7%). Many (29.6%) did not know that use of anti HIV drugs helps in the PMTCT of HIV.

High proportions of TBAs always offer HCT to all pregnant women (88.7%), referral (85.9%) and accompanying (80.3%) of HIV positive pregnant women to treatment centres and observe universal

precautions by always using sterilised instruments for delivery (93.0%); using new gloves for every procedure (97.2%) and use new razor blade to cut every umbilical cord (90.1%).

Significant proportions of TBAs, 22.5%, do not encourage compliance with drug prescribed by health professionals. More than two-fifth (42.3%) of the TBAs would discourage HIV positive mothers from breastfeeding their infants irrespective of whether they are on anti-HIV drugs or not. About one-quarter (25.4%) of TBAs give scarification marks to pregnant women; 41.8% give herbal concoctions to support care of pregnant women and 25.4% would give herbal concoctions to HIV exposed infants in order to prevent HIV transmission.

Finally, multivariable modelling analysis was performed to evaluate the influence of the TBA characteristics on PMTCT care practices. Table 3 showed that age ($b = 1.950$, 95% CI: 0.826, 3.073; $P = 0.001$), experience ($b = -2.453$, 95% CI: -4.070, -0.836; $P = 0.003$), duration of basic training ($b = -3.804$, 95% CI: -7.358, -0.250; $P = 0.036$) and

training in PMTCT ($b = -10.740$, 95% CI: -14.142, -7.338; $P = 0.000$) were significant predictors of PMTCT knowledge scores. On average, TBAs who did not receive training in PMTCT had scores 10.7 lower than those with training. PMTCT practice scores increased with age but decreased with duration of training and practice.

Discussion

Evidence based practice as it relates to PMTCT of HIV is rapidly evolving (2, 3). In spite of the progress made in the PMTCT of HIV in developing countries over the last decade; little is known about the translation of this knowledge into practice especially among the lower cadre of health workers. In the last few years, nongovernmental organizations have partnered with the national and various state governments, including Ogun State; in an attempt to improve the knowledge of TBAs about PMTCT and provide supportive supervision. The Nigerian-adapted curriculum for training TBAs (which is updated based on current guidelines) has been utilised to equip TBAs with requisite knowledge and skills to provide community-based PMTCT services [13]. The Department of Community Medicine of the Babcock University Teaching Hospital partnered with the Association of TBAs in Ogun State to build the capacity of TBAs in PMTCT in 2012 using the national curriculum.

This study investigates the effect of PMTCT training among TBAs on their knowledge and practice. Although TBAs are an essential part of the Nigerian healthcare system, their capacity is weak due to lack of adequate access to the education, relevant experiences, and supportive supervision needed to offer optimum health services. This study identified key gaps in PMTCT knowledge and practices as it relates to maternal pre-partum drug compliance, post-partum infant care, breastfeeding, and harmful traditional practices in the context of HIV. However, the TBAs demonstrated good knowledge and practices of PMTCT of HIV in areas related to universal precautions, HCT and prompt referral of HIV infected mothers.

Certain limitations of this study should be taken into account when interpreting the findings. It was a cross-sectional study; hence, causality cannot be established. Use of self-reported data is prone biases that could affect the validity of the findings. There could be recall biases, self-presentation or even confidentiality concerns. This was, however, mitigated by assuring the TBAs of full confidentiality and conducting the survey in a private environment. However, the sample of TBAs is quite representative and the findings can be generalised to all TBAs in Nigeria.

This study demonstrated that PMTCT training was positively related to PMTCT knowledge and care practices. Similar findings like this have also been found in other countries and among nurses [3,14]. A meta-analysis of sixty studies showed that when TBAs are trained, there is a significant improvement in their knowledge and care practice as it relates to maternal and child health [15]. Besides, training of TBAs in India and Pakistan has resulted in significant decline in neonatal, perinatal and maternal mortality [16,17]. In essence, trained and properly supervised TBAs are a vital resource in the provision of PMTCT services in low and medium income countries.

There are however significant gaps in knowledge and practice. Gaps in practices related to breastfeeding of HIV exposed infants, harmful traditional practices; treatment support and adherence counselling may increase the risk of contracting HIV and compromise the safety of mothers and their newborns.

Table 4 shows how the DOI theory applies to the results of this

Characteristics	Mean practice score (SD)	F (df)	p value
Age in years			
21-30	40.25 (17.57)		
31-40	46.60 (7.74)		
41-50	46.14 (6.89)	2.402 (141) [^]	0.026
51-60	44.38 (10.69)		
>60	49.47 (9.48)		
Sex			
Male	47.07 (5.80)	1.3200 (140) [*]	0.189
Female	44.95 (11.40)		
Educational status			
None	46.67 (4.50)		
Primary	48.09 (2.97)	1.882 (141) [^]	0.135
Secondary	44.08 (12.34)		
Tertiary	47.25 (6.10)		
Duration of Practice			
1 to 10 years	46.09 (10.50)		
11-20 years	47.64 (4.90)	11.962 (141) [^]	0.000
21-30 years	46.92 (5.43)		
> 30 years	25.67 (13.87)		
Source of basic training			
Relatives	45.83 (10.12)	0.0247 (140) [*]	0.980
Non relatives	45.87 (8.62)		
Duration of basic training			
1-10 years	46.64 (8.53)	2.258 (140) [*]	0.026
>10 years	41.92 (12.72)		
PMTCT Training			
Trained in PMTCT	48.07 (4.83)	6.784 (14) [*]	0.000
Not trained in PMTCT	35.92 (16.56)		

[^] F value for one way ANOVA; ^{*}t value for 2 sample t test.

Table 2: PMTCT care practice score by training and demographic characteristics.

Characteristics	b (95% CI)	p value
Age (in years)	1.950 (0.826, -3.073)	0.001
Years of Practice	-2.453 (-4.070, -0.836)	0.003
Duration of basic training	-3.804 (-7.358, -0.250)	0.036
Training in PMTCT	-10.740 (-14.142, -7.338)	0.000

Table 3: Association between PMTCT training and PMTCT care practice using a linear mixed model.

Determinants of adoption	Definition	Related PMTCT practice category	Hypothesized outcome
Relative Advantage	A practice is an improvement over a previous one.	Adherence counselling and treatment support	There was no prior role for TBAs in the treatment of HIV infected mothers. TBAs are close to and have the confidence of people at the grass root. The expectation is that TBAs will provide adequate support for mother on HAART and they will be eager to be involved in HIV treatment. Adoption is expected.
		Breastfeeding	Earlier recommendation was the avoidance of breastfeeding. The expectation of the study is that the recommendation to breastfeed is not perceived to be better than avoiding breastfeeding. Adoption is not expected
Compatibility	The practice is compatible with existing practices	Mobilization of pregnant women for appropriate ANC attendance	Adoption is expected due to desire for increased patient load in order to maximize profitability
		Health education and counselling on safe HIV and PMTCT practices	Adoption is expected because health education is a vital component of services being rendered by the TBAs
		Universal precautions	Adoption is expected.
Complexity	The practice is simple and easy to adopt.	HIV counselling and testing	This is simple and is expected to be adopted
		Breastfeeding	Many changes in recommendations over the last decade, varying from avoiding breastfeeding to providing breastfeeding and mixed feeding makes this quite complex. Adoption is not expected
Trialability	The practice can easily be experimented with as it is being adopted.	Adherence counselling and treatment support	In view of the closeness of TBAs to the community and the confidence reposed in them by pregnant women, adoption of this practice is expected to be positive
Observability	The practice is very visible to and is often communicated among peer others.	Prompt referral of HIV positive mothers	A good referral system is inexistent. Adoption is not expected.

Table 4: PMTCT practice items related to determinants of adoption.

study. TBAs are very close to and have the confidence of mothers in the community. They are a part of the cultural and social life of their immediate community. Their use as treatment supporters and adherence counsellors is a relative advantage and it was expected that this will improve compliance with anti-retroviral treatment. This can also be easily experimented as it is being adopted. The eagerness of the TBAs which has also been demonstrated by other studies [14,18] to participate in the management of HIV infected mothers will mean that the practice is likely to be adopted. Health education, counselling and practice of universal precautions are integral parts of the usual practices of TBA. Therefore PMTCT related education, counselling and practice of universal precautions are compatible with the services being rendered by the TBAs and should be expected to be adapted. Likewise, TBAs should be eager to mobilise pregnant women to access ANC because they would be interested in increasing their client load for pecuniary gains. As demonstrated in this study many of the TBAs know how to undertake HIV counselling and testing. The practice seems simple enough for them, hence, adoption is expected. The absence of a functional referral system and lack of support by professionally trained health workers for TBA is a major reason for the inability of TBAs to effectively contribute to the reduction of maternal mortality [19]. Prompt referral of HIV infected mothers by TBAs is hence, unlikely to be adopted. A lot of attention has been given to training of TBAs in low and mid income countries but the evidence on focusing on training TBAs has shown mixed results in terms of increased referrals for appropriate conditions [20]. There appears to be no impact in urban and peri-urban areas while there is some improvement in rural areas [21]. This improvement has been noted only in places where essential obstetric care services are available. Bergstrom and Goodburn have suggested that that development of essential obstetric care services and referral systems should take priority over training of TBAs on referral [19].

Identified gaps in practice of TBAs related to breastfeeding of HIV exposed infants. A sizeable proportion of the participants felt that avoiding breast milk is best, indicating a lack of relative advantage.

Breastfeeding is not thought to be better than avoiding breastfeeding. Besides, due to the rapid increase in research and change in information about PMTCT, the new evidence relating to breastfeeding is complex and constantly changing. This has caused the diffusion of research to practice to be quite challenging [3]. Initially, the strategy was to avoid breast milk feeding in all HIV-exposed newborns [22]. Replacement feeding was recommended. This was, however, not practicable because of non affordability of replacement feeds and cultural practices that makes breastfeeding unavoidable by mothers. Subsequently, studies showed that the gains in the reductions of MTCT of HIV from replacement feedings were often offset by increases in mortality due to infectious diseases and malnutrition [23,24]. The introduction of the acceptable, feasible, affordable, sustainable, and safe (AFASS) criteria in 2001 by WHO meant that mothers were expected to decide whether to breastfeed their infants or use replacement milk. However, in 2010, the WHO reversed itself and encouraged in country health authorities, to decide on the appropriate feeding practices for their countries [4].

Many of the TBAs in this study would not recommend breastfeeding and preferred to offer replacement feedings, despite prevailing evidence which show that cost and culture may favour breastfeeding above replacement feeds. Failure to recommend breastfeeding was also found among TBAs in Cameroon [25]. It may be due to the knowledge that breastfeeding constitute a significant risk for HIV transmission [26]. This failure to recommend breastfeeding contributes to the nearly 72% of HIV infected women who decide to use replacement feeding at time of discharge from a Nigerian hospital [27,28]. However, most of these newborns are later switched breast milk by the first month and breastfed till 6 months [28]. This often results in mixed feeding, which is associated with a higher risk of HIV transmission compared to exclusive breastfeeding or infant formula [27-29]. Training in PMTCT increases knowledge and improves PMTCT care practice, therefore, continuous TBA training and education are required to bridge the gaps in knowledge. Such training should include advocacy for exclusive breastfeeding, support for women's decisions to exclusively use formula feed (where AFASS), and alerting them to the mixed feeding related

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

Adapted from; Abiodun O, Sotunsa J, Ani F, Olaleye A, Taiwo A. Elimination of Mother-To-Child Transmission of HIV in Nigeria: The Roles, Preparedness and Determinants of Successful Involvement of Traditional Birth Attendants. *J AIDS Clin Res* 6: 481. Table 1, The role of TBAs in the prevention of mother to child transmission of HIV: p2.

Table 5: The role of TBAs in the prevention of mother to child transmission of HIV.

risk of HIV transmission. Studies have also identified other barriers which include inadequate supply of kits and other supplies [18,25]. These did not seem to be barriers among our respondents. If TBAs are equipped with adequate and continuous flow of research evidence and information, age-long practices can be modified and gaps in practice can be addressed.

The findings in this study could be used to boost efforts at PMTCT of HIV by strengthening health workers' ability to provide evidence-based care for HIV-infected mothers and their newborns. TBAs, being a critical group within the health sector because of their bond with people in the communities, have an important role to play. Their roles as outlined in Table 5 [30] must be clearly defined, well understood by them and other members of the health workforce, and they should receive relevant support in order to play the role optimally. TBAs must also understand that gaps exist in their knowledge and practice. They must be enlightened about the gaps and taught the appropriate measures that are required to address these gaps in the light of rapidly changing policy and practice. TBAs also require broad based, intentional and organised supportive supervision. The TBAs must be resolved to subject the traditional practices they engage in to the test of evidence, and subsequently refrain from those that are antithetical to evidence especially the harmful ones. A hindrance to translation of evidence to practice is thought to be tradition-driven health practitioners, especially a few TBAs, who would rather to continue to practice using outdated knowledge [31].

Publishing of evidence from researches is hardly ever enough. These evidences need to be translated to policy and practice. This is especially so in developing countries [3,31]. Evidences from PMTCT researches have influenced global policies and to some extent, the national policy in Nigeria. However, its impact on practice leaves much to be desired. The national policy on PMTCT hardly recommends a role for TBAs in spite of the niche they occupy in healthcare delivery in Nigeria. There is an urgent need to rectify this.

A number of research based recommendations have been made to scale up quality PMTCT program strategies. Implementation research networks and hospital based management teams have been proposed to generate new evidence and improve overall capacity to provide oversight and deliver on PMTCT goals and sustain the cycle of research, policy and practice [3]. These and sundry recommendations need to be broadened to incorporate TBAs. Capacity building and supportive supervision of the TBAs should be scaled up and reflected at all strata of policy making and implementation. There is also a need for the development and institutionalization of an effective referral linkage. The identified gas in knowledge and practice can only be addressed when the TBAs become more receptive of evidence based knowledge. This will only be possible when they are duly recognized and properly regulated.

Regular monitoring and evaluation of PMTCT programs for

accuracy and consistency by ministries of health and other relevant stakeholders including nongovernmental organizations, the NANTMP, and other regulatory bodies would promote compliance and appropriate feedback for further planning.

Conclusions

The current study investigates the effect of training on PMTCT knowledge and care practices among TBAs in Nigeria. TBAs have a role in PMTCT of HIV and have demonstrated that some good practices related to PMTCT as a result of evidence and policies that are communicated to them by trainings and workshops; though there are significant gaps in key practices. The PMTCT knowledge and practice gap was found to be significantly reduced by training. Innovative and strategic interventions which will translate research to policy, and practice are very essential to enhance participation of TBAs in the PMTCT of HIV.

Authors' Contribution

Olumide Abiodun participated in the conceptualisation; implementation; data analysis, and reporting of the data in this manuscript. John Sotunsa participated in the conceptualisation, implementation, data analysis and final editing of this manuscript. Oluwatosin Olu-Abiodun participated in the implementation, data analysis and final editing and undertook the review of this manuscript. Franklin Ani participated in the conceptualisation, implementation and final editing of the manuscript. Agboola Taiwo and Ogechukwu Taiwo participated in the conceptualisation and implementation of the research. All the authors approved the final submission.

Competing Interests

The authors have no competing interests. The authors did not receive any funding for this research work.

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