

Infant Feeding Practices of HIV Positive Mothers in Lagos, South-western Nigeria

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ABSTRACT

Introduction: Infant feeding choices made by mothers in the context of HIV infection depend on a number of factors. In our environment, the relative contribution of some of these factors is not known. **Methods:** The infant feeding practices of HIV positive mothers seen over a decade (July 2004 and December 2015) at a large HIV treatment centre in Lagos, South-western Nigeria were reviewed. Information on maternal socio-economic characteristics, obstetric, HIV treatment history and infant feeding choices were extracted from the program data base for analysis with SPSS version 20. **Results:** Exclusive formula feeding (EFF) was the most common feeding practice of the mothers (86.4%). However, it decreased from 95.3 % before 2010 to 79.5% after 2010. Exclusive breastfeeding (EBF) was practised by only 9.0% of the mothers. Mixed breastfeeding practice increased from 1.1% pre-2010 to 4.1% post-2010. The provision of free infant formula was found not to influence significantly the EFF or EBF rates but the MBF rate. MBF rate decreased from 3.0% pre-free formula to 1.7% after the introduction of free infant formula. **Conclusion:** Exclusive formula feeding was the most practised infant feeding method in this study (86.4%). Change in infant feeding guidelines was found to influence the infant feeding choice of HIV positive mothers. Health workers implementing PMTCT programs in our setting should be made aware of the risk of mixed breastfeeding with the new guidelines and educate mothers on its dangers at every contact with the health system.

Key words: Breastfeeding, infant feeding, infant formula, HIV, mixed feeding

INTRODUCTION

Breastfeeding promotion is a key component of infant health policy globally because of its known health benefits. These benefits include provision of optimal nutrition, prevention of common childhood illnesses and improvement of child spacing (Abiona *et al.*, 2006; Kalu *et al.*, 2014). Breastfeeding is practised widely in sub-Saharan Africa including Nigeria. It is both socially and culturally acceptable (Abiona *et al.*, 2006; Adejuigbe *et al.*, 2008,

Kalu *et al.*, 2014). However, in the present context of the HIV epidemic, breastfeeding has become a public health dilemma because of its contribution to the burden of paediatric HIV/AIDS in sub-Saharan Africa (Adejuigbe *et al.*, 2008; Ezechi *et al.*, 2013; Oladokun, Brown & Osinusi, 2010). Breast milk transmission of HIV mainly occurs in the first four months of life, a time when replacement feeding carries the greatest risk of increasing infectious disease morbidity and the benefits of

breastfeeding are maximal (Sadoh *et al.*, 2008; WHO, 2000). Mothers living with HIV infection are thus confronted with the dilemma of making a choice on which infant feeding method to adopt (Kalu *et al.*, 2014; Sadoh *et al.*, 2008).

The WHO and national HIV programs including that of Nigeria came up with infant feeding guidelines in the context of HIV/AIDS to assist mothers to make safe infant feeding decisions (FMOH, 2011, WHO, 2011; Doherty *et al.*, 2011). Health workers at facility level counsel HIV positive mothers using these guidelines. Available evidence shows that the infant feeding choices made by these women are dependent on a variety of issues and factors such as operational infant feeding guidelines, non-affordability of alternative feeding, non-availability of potable water, the quality of counselling, bias of the health workers, culture, HIV associated stigma and peer pressure on the mother (Ezechi *et al.*, 2008; Sadoh & Sadoh, 2009). This study was conducted to determine the feeding practices of HIV positive mothers in a large HIV treatment program in the South-western Nigerian city of Lagos.

METHODS

Study setting and design

The study was conducted at the HIV treatment centre, Nigerian Institute of Medical Research, Lagos. HIV positive pregnant women are seen and registered for services at the Prevention of Mother to Child (PMTCT) Clinic. Infant feeding counselling services start at booking and continues until mother-infant pair are discharged at 18 months post-delivery. On each of the post-partum follow up visits, information on infant feeding practices is collected while infant feeding counselling is reinforced.

Study population

All mother-infant pairs that received PMTCT services at the HIV treatment

centre, between July 2004 and December 2015 were eligible for the study. Excluded were mothers who were lost on follow up, had no live birth or neonatal death.

Infant feeding policy and guidelines during the study period

The infant feeding counselling strategy changed over time as the Nigerian infant feeding policy/guidelines changed (Doherty *et al.*, 2011; FMOH, 2011; WHO, 2000). Before 2010, mothers were counselled based on AFASS criteria (Acceptable, Feasible, Affordable, Sustainable and Safe) (Ezechi *et al.*, 2008; FMOH, 2011). At the beginning of 2011 a new guideline became operational in the country, "Mothers known to be HIV-infected (and whose infants are HIV uninfected or of unknown HIV status) should be counselled to exclusively breastfeed their infants for the first 6 months of life, introducing appropriate complementary foods thereafter" (Ezechi *et al.*, 2013; FMOH, 2011; WHO, 2011). In all cases, mixed feeding was discouraged and the choice of the mother was supported. Also between August 2007 and February 2009 appropriate and adequate commercial infant formula for age was made available to mothers who opted to exclusively formula feed but could not afford infant formula.

Data management

Information on maternal socio-demographic characteristics, gestational age at PMTCT enrolment and delivery, birth weight and sex of the child were extracted from the PMTCT Database. Information on CD4 count, viral load, HIV disclosure status and partner's HIV status were also extracted.

Data were analysed using the SPSS software for Windows version 20.0 (SPSS Inc., Chicago, IL). Frequency tables were generated. For this analysis, infant feeding practices were categorised into Exclusive breastfeeding (EBF), Exclusive Formula

Feeding (EFF), Replacement Feeding (RF) and Mixed Breast Feeding (MBF).

Definition of terms

WHO infant feeding definitions (WHO 2000):

- a. Exclusive breastfeeding: Giving the infant breast milk only and any minerals, vitamins and prescribed medicines if needed, for the first six months
- b. Replacement feeding: The process of feeding a child who is not receiving any breast milk; a diet that provides all the nutrients the child needs until the child is fully fed on family foods.
- c. Mixed breastfeeding: Giving the infant breast milk and other fluids and solids.
- d. Exclusive formula feeding: Giving the infant only commercial infant formula milk for the first six months of life

Ethical issues

Approval for the study was obtained from the Institutional Review Board. Written informed consent was obtained from all patients in the HIV treatment program at enrolment for the use of their data for research. Those that declined the use of their data for research were provided care but excluded from research studies.

RESULTS

A total of 5,888 mothers registered for PMTCT services during the study period. Of these, 5,034 (85.5%) mother-infant pairs fulfilled the eligibility criteria for inclusion in the study.

Mother-infant pair characteristics

The socio-demographic characteristics of mothers are shown in Table 1. The majority of the women were in the age group 20-29 years (46.3%), married (80.3%), completed at least a secondary education (73.1%), practised the Christian religion (60.7%), of low socio-economic background (60.4%) and belonged to the two major southern Nigerian tribes of Igbo and Yoruba (60.9%).

Over three-quarters of the mothers were gainfully employed (75.4%), and less than 20% of the mothers resided in a rural community (18.9%).

The obstetric and infant characteristics of mother-infant pair in the study are shown in Table 2. The parity of the mothers at delivery ranged from 1 – 8 with a median of 2 (IQR: 1– 3). The majority of mothers had at least two previous deliveries (74.6%), registered for PMTCT services after first trimester (81.9%), and delivered at term (78.5%) and through vaginal delivery (59.7%). The majority of the babies were males (50.5%) and weighed above 2.5kg (90.8%) at birth.

HIV related characteristics of the mothers in the study

The HIV related characteristics of the mothers at or near delivery are shown in Table 3. The majority of the mothers had CD4 counts of above 500 cells/mm³ (57.1%), a viral load of less than 1000 copies (86.7%) and were on HAART (62.7%). While the majority of the mothers had disclosed their HIV status (83.9%), only one-third of the mothers had a spouse with HIV positive status (33.9%).

Infant feeding practices

The infant feeding practices of the mothers and the effect of the provision of free infant formula are shown in Table 4. Of the 5034 mothers in the study, 4349 (86.4%) mothers practised exclusive formula feeding. Others practised either exclusive breastfeeding (9.0%), replacement feeding (1.8%) or mixed feeding (2.8%).

The effect of the provision of free infant formula on infant feeding practises of the mothers during the study periods is shown in Table 4. The proportion of mothers who practised exclusive breastfeeding decreased from 9.0% during the no free infant formula period to 8.8 % during the period of free infant formula. The difference was, however, not statistically

Table 1. Socio-demographic and biologic characteristics of the 5034 mothers in the study

Characteristics	Number of participants (%)
Age	
Less than 20	126 (2.5)
20-29	1737 (34.5)
30-39	3005 (59.7)
>40	166 (3.3)
Range	14 - 41
Median age	24.3± 5.7
IOR	28-34
Educational status	
Less than secondary	1354 (26.9)
At least secondary	3680 (73.1)
Region	
Christianity	3056 (60.7)
Islam	1908 (37.9)
Other	70 (1.4)
Marital status	
Married	4042 (80.3)
Unmarried	992 (19.7)
Social class	
I and II	710 (14.1)
III	1284 (25.5)
IV & V	3040 (60.4)
Ethnic group	
Southern majority	3066 (60.9)
Northern tribes	921 (18.3)
Southern minority	1027 (20.4)
Others	20 (0.4)
Area of residence	
Urban	1701 (33.8)
Urban Slum	2381 (47.3)
Rural	951 (18.9)
Employment status	
Employed	3796 (75.4)
Not employed	1238 (24.6)

significant ($p=0.71$). There was also a non statistically significant decrease ($p=0.33$) in the proportion of mothers who practised replacement feeding (1.9%) during the period of no free formula compared to 1.4% replacement feeding rate during the free formula period. Mixed breastfeeding rate, however, significantly decreased ($p=0.03$) from 3.0% during the no free infant formula period to 1.7% during the free infant formula period.

Table 5 shows the results of the effect of change of the infant feeding policy on the infant feeding practices of mothers in the study. While the proportion of mothers who practised exclusive formula feeding decreased from 95.3% to 79.5% ($P=0.00$), the proportion of mothers who practised exclusive breastfeeding increased from 3.4% to 13.4%), replacement feeding increased from 0.2% to 3.0% and mixed breastfeeding increased from 1.1% to 4.1%

Table 2. Obstetric and infant characteristics in the study

Characteristics	Number of participants (%)
Parity	
1	1279(25.4)
2-3	2844(56.5)
4 and above	902(18.1)
Range	1 – 8
Median	2
IQR .	1 – 3
Gestational age at booking weeks	
First trimester (0-13)	941(18.7)
Second Trimester (> 13-26)	1802(35.8)
Third Trimester (>26)	2291(45.5)
Range	4 – 41
Median	22
IQR	17 – 29
Gestation age at delivery (weeks)	
Preterm (28- 37)	489(9.7)
Term (38-41)	3952(78.5)
Post-term(42 and above)	593(11.8)
Range	28- 43
Median	38
IQR	38 – 40
Mode of delivery	
Vaginal delivery	3004(59.7)
Caesarean Section	2030(40.3)
Sex of baby	
Male	2542(50.5)
Female	2492(49.5)
Birth weight	
< 2500g	463(9.2%)
≥ 2500	4571(90.8)
Range	0.95 – 4.5

after the change in the pre-2010 guidelines. The observed differences were also statistically significant ($P=0.00$).

DISCUSSION

A number of studies in our environment had studied infant feeding choice and/or practices in the context of HIV infection, and in the general population (Abiona *et al.*, 2006; Adejuigbe *et al.*, 2008; Anojie *et al.*, 2012; Ezechi *et al.*, 2008; Maru *et al.*, 2009; Ogbo, Agho & Page, 2015; Sadoh *et al.*, 2008; Sadoh & Sadoh 2009). However none of the studies had reviewed these choices or practices in the context of the

changing policies and provision of free infant formula. Also, in some of these previous studies, the sample sizes were small and the studies were conducted within a monolithic population while others had methodological issues, making result generalisation rather difficult.

In this study, we not only determined the infant feeding choices using a large sample of mother-infant pairs, we in addition determined the effect of the changing infant feeding policy and provision of free infant formula on these choices and/or practices. Thus this study provides information on infant feeding

Table 3. HIV-related characteristics of 5034 mothers at/near delivery in the study

Characteristics	Number of mothers (%)
CD4 cell Count	
< 200	1113 (10.3)
200 - 499	2180 (36.6)
500 and above	1742 (57.1)
Viral load	
<1000	2245 (13.5)
≥ 1,000	2789 (86.7)
Antiretroviral drug status	
Monotherapy	498 (9.9)
Dual therapy	1379 (27.4)
HAART	3156 (62.7)
Partner's HIV status	
Positive	1707 (33.9)
Negative	3348 (66.5)
Unknown	946 (18.8)
HIV status disclosure	
Disclosed	4224 (83.9)
Not disclosed	810 (16.1)

experience and practices of HIV positive mothers within a large programmatic setting, allowing for generalisation of the findings. Previously such information was merely speculative.

Overall, exclusive formula feeding (86.4%) was the preferred infant feeding method practised by the mothers during the study period. With the change in the guideline, the EFF rate decreased from 95.3 % to 79.5%. The proportion of mothers practising other infant feeding methods including mixed breastfeeding increased, but exclusive formula feeding remained the method of choice. On the other hand the provision of free infant formula did not significantly change EFF, EBF and RF rates but mixed feeding rate decreased ($p=0.03$).

The findings in this study of exclusive formula feeding being the most common infant feeding practise is in agreement with other previous studies in our environment and elsewhere (Abiona *et al.*, 2006; Oladokun *et al.*, 2010; Sadoh *et al.*, 2008; Maru *et al.*, 2009; Leshabari, Blystad & Moland, 2007). Our finding,

however, differs from the findings of others (Adejuigbe *et al.*, 2008; Anoje *et al.*, 2012) who reported a 60 - 80% exclusive breast-feeding rate. The difference in infant feeding method practised by the mothers in the various settings may be related to the socio-demographic differences of the mothers. Our study and that of Oladokun *et al.* (2010) and Maru *et al.* (2009) were conducted in cosmopolitan cities of Lagos, Ibadan and Jos, Nigeria. A larger percentage of the mothers in our study compared to that of Ibadan and Jos have at least secondary education and were gainfully employed compared to the population in the setting where Adejuigbe *et al.* (2008) and Anoje *et al.* (2012) conducted their studies. Their study settings were mainly rural and the mothers of lower socio-economic levels. Previous studies based on our environment have also shown that exclusive breastfeeding rates in urban cities are generally lower than the rates in rural cities (Abiona *et al.*, 2006; Sadoh & Sadoh, 2009). Obviously the high EFF rate in our study may be due to the income, social

Table 4. Infant feeding practices of mothers and effect of provision of free formula feeding on the practice (2004 – 2015)

<i>Infant feeding practice</i>	<i>All mothers N= 5034(%)</i>	<i>Period of No free formula (July 2004 – July 2007 and March 2009 - Dec 2015) n= 4250(%)</i>	<i>Period of Free formula (Aug.2007 – Feb. 2009) n= 784(%)</i>	<i>P value</i>
Exclusive Breastfeeding	453 (9.0)	384 (9.0)	69 (8.8)	0..71
Exclusive Formula Feeding	4349 (86.4)	3658 (86.1)	691 (88.1)	Ref
Replacement Feeding	91 (1.8)	80 (1.9)	11 (1.4)	0.33
Mixed Breastfeeding	141 (2.8)	128 (3.0)	13 (1.7)	0.03

Table 5. Effect of infant feeding policy in the context of HIV infection on the infant feeding practices of mothers in the study

<i>Infant feeding practice</i>	<i>All mothers N= 5034(%)</i>	<i>2004 -2010 N= 2215(%)</i>	<i>2011-2015 N= 2819(%)</i>	<i>P value</i>
Exclusive Breastfeeding	453 (9.0)	75 (3.4)	378 (13.4)	0.00
Exclusive Formula Feeding	4349 (86.4)	2111 (95.3)	2241 (79.5)	0.00
Replacement Feeding	91 (1.8)	4 (0.2)	85 (3.0)	0.00
Mixed Breastfeeding	141 (2.8)	24 (1.1)	116 (4.1)	0.00

and employment status of the mothers (Agho *et al.*, 2011; Agunbiade & Ogunleye, 2012; Okolo, Adewunni & Okonji, 1999; Oche & Umar 2008; Ogbo *et al.*, 2015). The overwhelming choice of EFF in this study could also be attributed to the success achieved in the PMTCT in this centre. Before the introduction of the Nigerian 2010 infant feeding guidelines, EFF was the infant feeding method of choice and yet the MTCT rate was less than 1 % (Ezechi *et al.*, 2013). Over the years there are mothers in our centre who have had HIV negative babies based on the old guidelines, changing their mind set to make a choice of the unknown instead of what worked for them in the immediate past. As noted in this study, a 10% increase in exclusive breastfeeding rate since the new guideline was introduced suggests that all hope is not lost. What is required is sustained education of mothers on the new policy which will ultimately lead to a gradual but steady shift from EFF to EBF over time. Worrisome, however, is the increase in the rate of mixed breastfeeding from 1.1% to 4.3% following the change in guidelines. This should be seriously addressed as it has the potential to erode the gains made over the years in the reduction of MTCT rate and infant mortality. Specifically, the dangers of mixed breastfeeding should be addressed at each contact with pregnant or HIV positive mothers. Fortunately, the rate of mixed feeding in this study is lower than the rates reported by other studies in our environment (Abiona *et al.*, 2006; Adejuigbe *et al.*, 2008; Maru *et al.*, 2009). Considering the implications of mixed feeding in the context of HIV infection, counselling should be intensified among all pregnant HIV positive mothers during and after pregnancy until the child is weaned successfully.

Over the years there have been ongoing discussions on the role of free infant formula on the implementation of infant feeding in the context of HIV infection (Coutsoudis *et al.*, 2002; Coovadia

& Kindra 2008). In Nigeria and some other countries, its use was stopped by HIV programs and funding agencies because of its potential to compromise mothers infant feeding choice. As there was no evidence in the country, in support or otherwise, of the practice, we analysed the infant feeding practices of the mothers in this study based on the availability of free infant formula. From our data, we did not find any association between the provision of free infant formula and mothers' infant feeding practices. The only change noticed was a positive one, as the mixed feeding rate decreased significantly ($p=0.03$). The reasons are not obvious but it may be that the provision of infant formula is not sufficient to influence the choice of mothers. The few mothers who did not want to exclusively breastfeed their children but were forced by their economic situation had no choice but to practise mixed feeding because of their inability to afford infant formula.

CONCLUSION

Exclusive formula feeding was the most practised infant feeding method in this study (86.4%). Change in infant feeding policy and guidelines was found to influence the infant feeding choice of HIV positive mothers, with an increase in mixed breastfeeding rate. Mixed breastfeeding rate decreased with provision of free infant formula. Health workers implementing PMTCT programs in our setting should be made aware of the risk of mixed breastfeeding with the new guidelines and educate mothers on its dangers at every contact with the health system.

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