Factors associated with non-compliance to exclusive infant formula feeding among HIV-positive mothers in Nairobi, Kenya

Kamenderi M.G[1] , Waudo J.N[1], Otengah W.A.P[2]

1. Kenyatta University
2. Rongo University College

Corresponding author: Kamenderi M.G, Department of Community Health,Kenyatta University,P.O. Box 44068-00100,Nairobi.Email: kamenderim2002@yahoo.com

Summary

In 2007, about 420,000 children globally aged 14 years and below were newly infected with HIV. Over 90% of these newly infected children were babies born to HIV-positive mothers, who acquired the virus during pregnancy, labour or delivery and through mothers' breast milk. In Kenya, a 30% prevalence rate of mixed feeding has been reported in previous studies, posing a serious public health problem since it is associated with a greater risk for HIV transmission. This study aimed to determine the factors associated with non-compliance to exclusive infant formula feeding among HIV-infected mothers at the Pumwani Maternity Hospital. A cross-sectional study was conducted with a sample size of 323. The findings showed that 20.7% of the mothers had ever practiced mixed feeding. The risk factors associated with mixed feeding included: low educational level, visit by relatives, lack of transport to collect the free formula milk, travelling with a baby after delivery and running out of fuel. The findings of this study therefore show that other external factors need to be considered for the success of a free formula feeding program. It is important to ensure that HIV positive mothers have enough resources to support un-interrupted supply of infant formula. Further, HIV/AIDS related stigma and lack of disclosure of one's status to the in-relatives remains to be a major challenge facing HIV positive mothers.

Key words: Non-compliance, formula feeding, PMTCT

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Introduction

In 2007, about 420,000 children globally aged 14 years and below were newly infected with HIV. Over 90% of these newly infected children were babies born to HIV-positive mothers, who acquired the virus during pregnancy, labour or delivery and through mothers' breast milk (UNAIDS/WHO, 2007). The remaining 10% of new HIV infections may have resulted from early initiation of injection drug use (Garfein *et al.*, 1996; Roy *et al.*, 2009), childhood sexual abuse (Ompad *et al.*, 2005; Walton *et al.*, 2011) or blood transfusion (Brown *et al.*, 2013). Almost nine-tenths of mother-to-child HIV transmission occur in sub-Saharan Africa (UNAIDS/WHO, 2007).

The HIV epidemic has significantly altered the context within which women make decisions about how they will feed their infants (Doherty *et al.*, 2006). According to previous research, mothers' adoption of and adherence to recommended feeding methods was found to be a problem (de Paoli *et al.*, 2002; Nduati *et al.*, 2000). A study done in Nairobi, Kenya to determine feeding practices and nutritional status of infants born to HIV-1 infected women reported that 31 percent of the HIV-positive counselled mothers participating in the study had practiced mixed feeding six weeks after delivery (Kiarie *et al.*, , 2004). Another study in Nairobi, Kenya, also showed that 70 percent of women on exclusive infant formula feeding completely avoided breastfeeding, suggesting the difficulty of implementing this type of intervention (Nduati *et al.*, 2000).

One of the major challenges facing women in adopting and adhering to current recommendations is access to accurate information (Chopra *et al.*, 2005; Maman *et al.*, 2012). However, whatever the feeding decision, health services should follow-up all HIV-exposed infants, and continue to offer infant counselling and support, particularly at key points when feeding decision may be reconsidered, such as the time of early infant diagnosis and at six months of age (WHO, 2007). Shortages of the free infant formula may also be a challenge especially in resource poor settings as shown by a South African study where despite providing free formula milk, over one – third of mothers had ran out of formula milk within the first 3 months (Doherty *et al.*, 2006).

Mixed feeding has been associated with social stigma, new-born poor health and lack of family support to accept excusive infant formula feeding (Leroy *et al.*, 2007; MacCarthy *et al.*, 2013; Matovu *et al.*, 2002). The stigma of HIV in developing countries continues to be so heavy that many women fail to adopt formula feeding because doing so will be equivalent to disclosing their HIV status (Kuhn *et al.*, 2004: De Kock *et al.*, 2000). In 2006, WHO recommended that mothers with HIV choose between exclusive breastfeeding for 6 months or exclusive replacement feeding for 6 months if acceptable, feasible, affordable, sustainable and safe (AFASS) (WHO, 2007). The current study therefore sought to gain a better understanding of the unforeseeable challenges facing HIV-infected mothers in disadvantaged resource settings by exploring factors hindering compliance to exclusive infant formula feeding among HIV-positive mothers in Nairobi, Kenya.

Methodology

The study was conducted at Pumwani Maternity Hospital in Nairobi, Kenya. Pumwani Maternity Hospital is the largest maternity health centre in East and Central Africa attending to approximately 36,000 deliveries a year. Majority of its clientele are mothers from resource poor settings since the hospital is located close to Mathare and Korogocho, two of Nairobi's biggest slums. A cross-sectional study was conducted between November 2007 and April 2008 where both qualitative and quantitative data were obtained among 323 mothers. Pumwani Maternity Hospital was sampled purposively being the site mostly preferred by mothers from disadvantaged settings.

The study participants were sampled through systematic random sampling. This probability sampling method was preferred given that only a portion of the total sampling frame of mothers could be sampled. Hence every second mother who met the inclusion criteria was recruited for

the study. The inclusion criteria used was as follows: mothers attending the PMTCT program in Pumwani Maternity Hospital; mothers enrolled to the free formula feeding program; and mothers with infants below six months of age. Recruitment was done on the basis of the mothers' willingness to participate. The respondents were interviewed using a structured interview schedule through a personal interview method where questions were asked in a face-to-face contact during exit. The instrument which had open and closed questions focused on the socio-economic, socio-demographic, and socio-cultural factors hindering compliance to exclusive infant formula feeding. The structured interview schedule provides quantitative data that is objective, scientific, and reliable for hypothesis testing (Ong, 1993). Translation of questions to Kiswahili was done in most cases to enhance communication. A mother identified to have breastfed was referred to the nutritionists and the PMTCT counsellors for further counselling.

Key informants (PMTCT counsellors and the programme nutritionists) were selected through convenient (volunteer) sampling. Having desired to interview all the key informants, only those who consented to participate in the study were interviewed in January 2008. These included 2 program nutritionists and 2 PMTCT counsellors. Their ages ranged between 26 and 38 years. The key informant interview guide covered questions on affordability and challenges facing mothers enrolled to the program. Further, three focus group discussions with 10 participants were also conducted at Pumwani Maternity Hospital in December 2007. Recruitment was done on the basis of cultural background, educational level and employment status. There were 30 FGD participants in total with their ages ranging between 19 and 37 years with an average age of 26.29 years (Table 1).

Table 1. Focus group discussion (participant characteristics)

		FGD1	FGD2	FGD3
Number		10	10	10
Age				
	Range	21-37	19-36	23-34
	Mean	26.32	25.43	27.11
Education				
	Below Secondary level	6	5	4
	Above Secondary level	4	5	6
Employment				
	Employed	5	3	4
	Not employed	5	7	6
Ethnic background				
	Luhya	1	2	1
	Luo	2	1	1

	Kikuyu	1	2	1
	Kamba	2	1	1
	Kisii	1	1	2
	Kalenjin	1	-	1
	Meru	1	1	1
	Embu	1	1	2
	Borana	-	1	-

Participants with an education below secondary level were 15, while those with an education above secondary level were also 15 (Table 1). Participants in employment were 12 while the remaining 18 were not employed (Table 1). Table 1 below summarizes the demographic background for FGD participants. A facilitator directed the discussions which focused on affordability, stigma and socio-cultural influences on exclusive infant formula feeding. Note taking was used to record the responses from the discussions that were later summarised into emerging themes. Employing this method within quantitative research enriches the findings rather than contaminating its methodological quality (Ong, 1993). The interviews were conducted in Kiswahili, the language that was acceptable to the respondents. The responses from the discussions were recorded in Kiswahili and later translated into English. An independent translator was sought to countercheck the translation from Kiswahili to English and any discrepancies were settled together. Compliance to exclusive infant formula feeding was the dependent variable for the study and a mother who had breastfed her infant at least once after enrolment into the program was considered to have practiced mixed feeding.

Permission to carry out the study was given by the relevant authorization bodies: Kenyatta University Graduate School; National Commission for Science, Technology and Innovation; and the Pumwani Maternity Hospital Ethics Review Committee. Informed consent was sought from all the study participants. Anonymity, `confidentiality and privacy of the study participants were safeguarded.

Data were coded, sorted, entered into the computer, processed and analyzed using SPSS software version 17.0. Multivariate logistic regression was used to allow for efficient estimation of measures of association while controlling for a number of confounding factors simultaneously. It assessed the independent predictors of non-compliance to infant formula feeding among HIV-infected mothers. Responses from open-ended questions, key informant interviews and FGDS were analyzed qualitatively through content analysis. The written material from the FGDs and open ended questions were broken down into broad thematic areas within which emerging themes and quotes were generated through carefully designed criteria. This information was then used to supplement, explain and interpret quantitative data.

Results

The respondents' age varied from 15 to 37 years, with a mean age of 27.03 years. About 40.6% of the mothers

were in a monogamous marriage, 4.3% in a polygamous marriage, 17.3% cohabiting, 6.5% separated, 11.5% divorced while 19.8% were single parents.

Mothers with below secondary level of education were 54.5% while those with above secondary level of education were 45.5%. Low educational level was a significant risk factor to mixed feeding (AOR=3.118, 95% CI 1.307–7.439, p=0.010) (Table 2).

Table 2. Multivariate logistic regression analysis with compliance to infant formula feeding as the dependent variable

Variable	*p*–value	Adjusted Odds ratio	95% CI for Odds ratio	
			Lower	Upper
Age	0.697	1.020	0.923	1.127
Marital status	0.204	0.087	0.002	3.772
Educational level	0.010	3.118	1.307	7.439
Household income	0.169	1.824	0.774	4.295
Lack of food	0.396	1.455	0.612	3.458
Suffer stigma	0.165	2.461	0.689	8.783
Infant formula feeding exposes one's HIV status	0.980	1.012	0.401	2.556
Visit by mother in–law, friends or relatives	0.000	7.895	3.103	20.089
Disclosure of one's HIV status to spouse	0.951	0.968	0.343	2.729
Disclosure of one's HIV status to friends and relatives	0.926	1.048	0.39	2.816
Running out of formula supplies	0.981	1.011	0.418	2.445
Lack of transport	0.007	3.410	1.409	8.253
Travelling after delivery	0.000	13.577	4.141	44.519
Running out of fuel	0.008	3.337	1.379	8.079

Further, being visited by relatives after delivery was another significant risk factor to mixed feeding (AOR=7.895, 95% CI 3.103–20.089, p=0.0001) (Table 2). During the focus group discussions, majority of the mothers cited pressure and harassment especially from relatives to breastfeed their babies. This observation was evidenced from a 29 year old mother; "*One day my brother in–law paid us a visit and spent that night at our place. He noted that I was not breastfeeding my child and yet she was just three weeks old. When he went back, he told my mother–in–law that I was not breastfeeding my baby. My mother–in–law hurriedly came the following day to know why I was not breastfeeding. When she came, I told her that my breasts were sick, but she insisted to accompany me to the clinic to know why. When we arrived at the clinic she*

wanted an explanation as to why I wasn't breastfeeding. Since she was illiterate, I told the sister (nurse) that I was not ready to disclose my status and they were able to tell my mother in-law that I was still under medication. That was not enough and she took me to another hospital. I told the doctor about my status in English telling him that I was not ready to disclose my status. The doctor then prescribed me some multivitamin tablets telling my mother-in-law that my breasts were still sick. After that incident, she accepted that indeed my breasts were sick."

Findings also showed that 47.1% of the mothers had ran out of cooking fuel e.g. kerosene more than a day. Running out of fuel was a significant risk factor to mixed feeding (AOR=3.337, 95% CI 1.379-8.079, *p*=0.008) (Table 2). Further, 59.8% of the mothers ran out of supply to the free infant formula at least once. This was evident from a key informant, a nutritional counsellor; "*One of the major problems we are facing was that the free-infant formula supply was not consistent and therefore in such a situation mothers lacked something to give their babies. There were so many mothers in this programme such that the quantities of formula received were not enough."* Among the mothers who ran out of supplies, 3.1% of them over-diluted the infant formula feed, 4.1% breastfed the baby, 71.0% used alternative food types while 21.8% bought the infant formula.

This observation was supported by evidence from a key informant who had this to say, *"Most of these mothers could not afford to purchase the formula because they were poor. Sometimes when these mothers come for the formula and it happens to be out of stock, sometimes I don't know what to tell them. Some will even cry because they have nothing to give their babies. Some mothers will even go ahead to feed their babies with packet milk, cow milk or even porridge and this is not acceptable."*

The study also showed that 42.1% of the mothers lacked money for transport to collect the infant formula. Among the mothers who had transport problems, 27.4% of them failed to access the infant formula, 45.9% borrowed money for transport, while 26.7% walked to the hospital. Among the mothers who failed to access the formula due to transport difficulties, four of them breastfed, six used alternative food types, four bought the infant formula while twenty three had sent somebody to collect the formula on their behalf. Lack of transport to collect the free formula milk was a significant risk factor to mixed feeding (AOR=3.410, 95% CI 1.409-8.253, *p*=0.007) (Table 2). Most of the mothers in the focus group discussions complained that they had been making very many visits to check for the formula and this was expensive to them in terms of transport costs. A 34 year old mother had this to say, "*We have been coming to collect the formula once a week and sometimes three times when the milk is out of stock. Sometimes when I fail to get transport, I fail to come or send somebody to collect the formula on my behalf."*

Finally, travelling after delivery with a baby was another significant risk factor to mixed feeding (AOR=13.577, 95% CI 4.141-44.519, *p*=0.0001) (Table 2).

Mothers who had travelled with a baby after delivery, but could not resist the pressure to breastfeed were at risk of mixed feeding. Therefore, as a coping mechanism to resist breastfeeding, majority of the mothers opted not to travel with the baby. This experience was captured in the focus group discussion where a 26 year old mother had this to say; "*I really avoid travelling with my baby because when I don't breastfeed it's like advertising*

myself that am positive. Therefore when I travel, I usually leave my baby behind with somebody."

Discussion

Practicing replacement feeding in resource poor settings is challenging because of the health, economical, logistical and the social disadvantage of employing this mode in these areas (WHO, 2001). Among the 323 mothers who had been enrolled into the exclusive infant formula feeding programme, 67(20.7%) of them had practiced mixed feeding thereby suggesting the difficulty of implementing this type of intervention. However, the findings showed a remarkable decline compared to a previous study conducted in four Nairobi City Council antenatal clinics in Nairobi where 30% of the mothers enrolled into infant formula feeding program had practiced mixed feeding (Nduati *et al.,* 2000).

In another study in Abidjan, Cote d'Ivoire a non-compliance rate of 15.6% was reported (Leroy *et al.*, 2007), indicating that these rates vary in different contexts. The findings of the present study show that several risk factors were associated with non-compliance to exclusive infant formula feeding among HIV-positive mothers.

Mothers with a low educational background were likely to practice mixed feeding. The mother's educational level plays a vital role regarding infant feeding and care. Good health and nutrition are not only essential inputs but important outcomes of basic education of good quality. Good health and good education are not only ends in themselves, but also a means which provide individuals with the chance to lead productive and satisfying life. Health knowledge and health literacy affect adoption of healthy behaviour, right perception of risks, and perceived benefits. These findings are consistent with those of a study in Abidjan, Cote d'Ivoire where educational level was a determinant in adopting and adhering to replacement feeding (Leroy *et al.*, 2007).

Mothers who lacked money for transport to collect the free formula milk were likely to practice mixed feeding. Although some mothers opted to walk to hospital or borrow money for transport, others failed to collect the formula. This observation showed that most of these mothers had economic challenges. Financial constraints has been reported as a barrier to exclusive infant formula feeding by several studies (MacCarthy *et al.*, 2013; Maman *et al.*, 2012; Chisenga *et al.*, 2011)

The findings of this study also showed that mothers who ran out of fuel more than a day were likely to practice mixed feeding. Since majority of the mothers relied on kerosene as their fuel, the high cost associated with this commodity was prohibitive. Hence when the mothers failed to get an alternative source of fuel for boiling the water used to prepare the formula, they were likely to breastfeed instead using unsafe drinking water that could expose their infants to the dangers of using untreated water.

Although the mothers had the option of acquiring free chlorine solution from the health facility, majority preferred to boil the water citing chlorine as having dangerous chemicals for the baby.

Mothers visited by relatives were apparently more likely to practice mixed feeding. In countries where breastfeeding is the norm, formula feeding has been noted to alert a woman's family or community that she is HIV-positive, and may result in stigma or other negative repercussions (MacCarthy *et al.*, 2013; de Paoli *et al.*, 2002; Nduati *et al.*, 2000). Kuhn *et al.*, (2004) and De

Kock *et al.*, (2000) also indicated that stigma of HIV in developing countries continues to be so heavy that many women fail to formula feed because doing so will be equivalent to disclosing their HIV status. This follows traditional recommendations and routines where a mother is expected to breastfeed as well as giving the baby other forms of replacement feed. It's therefore difficult for a mother to offer either exclusive breastfeeding or formula feeding to her baby since they do not meet the traditional expectations of friends and relatives. Hence a mother is likely to breastfeed under the pressure influence of her relatives because any resistance would raise suspicion about her HIV status (Chisenga *et al.*, 2011). It is necessary to address how best HIV-positive mothers could handle or overcome critisms and stigmatisation by others (Oladokun *et al.*, 2010).

It was also observed that mothers who had travelled with a baby after delivery were more likely to practice mixed feeding. This could have been due to the fact that most of these mothers had not yet disclosed their HIV status to friends and relatives for the fear of stigmatization and rejection. Hence in order to maintain their status a secret, majority of the mothers opted never to travel after delivery until the baby was ready for weaning. Hence to cope with the pressure to breastfeed, the mothers were forced to leave their babies behind with a care taker. This observation showed that the stigma associated with HIV/AIDS and low disclosure rates of one's status to the in-laws is still a major hindrance to exclusive infant formula feeding. Therefore, there is a need to integrate stigma-reduction components into PMTCT (Turan and Nyblade, 2013).

Study implications

These findings have two major implications. Firstly, significant family members may play a decisive role towards influencing compliance to exclusive infant formula feeding. Secondly, economic capability to sustain un-interrupted supply of infant formula including other associated necessities like fuel is critical towards enhancing compliance to exclusive infant formula feeding. Hence for optimal success of free formula feeding programs, such factors need to be assessed before recruitment of HIV-positive mothers especially in resource constrained settings.

Conclusion

This study has found that stigmatization, low disclosure of ones HIV status to relatives, challenges of affordability and availability of free infant formula are a hindrance to compliance to exclusive infant formula feeding and HIV-free survival for HIV-positive mothers from resource poor settings.

Limitations of the study

The study focused on HIV-infected mothers from a resource poor urban setting and therefore the findings could not be generalized to the entire population. Failure to translate the research instruments prior to the study may have compromised the translation validity of the study.

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