

The Practice of Breastfeeding and Maternal HIV Status: Trend Analysis in Kenya

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Abstract

Objectives: The main objective of this study is to assess change in practice of breastfeeding among HIV-positive mothers between 2003 and 2008/9.

Methods: The study is based on analysis of the Kenya Demographic and Health Survey (KDHS) data for 2003 and 2008/9. In this study mothers with children age 0-23 months and had been tested for HIV are included from the KDHS data.

Results: The Fisher's exact tests and the logistic regression analysis show that in 2003, there was no association between HIV status and practice of breastfeeding. However, in 2008/9, HIV status of mothers has influenced current breastfeeding status. HIV-positive mothers are less likely to breastfeed their children in 2008/9 than 2003.

Conclusions: Similar results are observed among mothers who may not know their HIV status (but their status are known to this investigation) and among mothers who know their HIV status. The sampled women's breastfeeding practices are not in compliance with WHO's recommendations which promote exclusive breastfeeding among HIV-positive mothers in resource-poor settings.

CHAPTER ONE: INTRODUCTION

1.1 Background Information

The human immunodeficiency virus (HIV) has been a global public health challenge since the first case emerged in the 1970s. Every year, half a million children become infected with HIV and nearly 90% of these children live in Sub-Saharan Africa (1). The major source of child infection is transmission via HIV infected mothers during labor, delivery and/or through breastfeeding. About 10 – 20% of children born to HIV infected mothers contract the virus through breast milk, if breastfeeding continues until two years of age (2). Ceasing breastfeeding can reduce the risk of HIV infection (3). However, in resource constrained settings, ceasing breastfeeding is competing against other causes of infant mortality such as diarrhea and pneumonia (3). Globally, breastfeeding is responsible for approximately 300,000 HIV infections per year while formula feeding with contaminated water is responsible for 1.5 million child deaths per year (3).

In the 1980s, experts realized that breastfeeding could transfer HIV infection from mother to child. Such realization created fear among HIV positive mothers and health care providers. In 2000, the World Health Organization (WHO) recommended alternative feeding options for HIV positive mothers and advised mothers to avoid all breastfeeding unless replacement is not feasible (4). Later, new evidence revealed that exclusive breastfeeding carries a lower risk compared to mixed feeding (5). Exclusive breastfeeding is defined as no other food or drink, not even water, except breast milk for the first 6 months of life, but allows the infant to receive ORS, drops and syrups if

needed (6). Mixed feeding is giving other liquids or solids in addition to breast milk. In 2006, WHO revised the previous guidelines and recommended HIV-positive mothers to exclusively breastfeed for the first 6 months unless replacement feeding is acceptable, feasible, affordable, sustainable and safe (7). At 6 months, to continue breastfeeding with additional complementary food if replacement feeding is not met (7). Where breastfeeding is judged to be the best option, the 2010 WHO revised guidelines recommended HIV infected mothers to exclusively breastfeed for the first 6 months and continue breastfeeding until 12 months of age and wean gradually within 1 month after age one (7).

Kenya, a large country in Eastern Africa, has an estimated prevalence of HIV of 6.3% among adults ages 15 - 49 (8). According to the 2008/9 DHS report, HIV prevalence is nearly two times higher among women age 15-49 than among men age 15-49; 8% versus 4.3% (8). In 2009, an estimate of 22,259 children became infected, making the cumulative number of children infected to be approximately 184,052 (9). In Kenya, mixed breastfeeding is the norm in the first six months of life rather than exclusive breastfeeding. Yet, the exclusive breastfeeding rate improved from 12.7% in 2003 to 31% in 2008/9 (8). The 2010 National AIDS Counsel Report for Kenya stated that scaled up infant feeding counseling at community and health facility levels had contributed to the improvement (9).

1.2 Prior Studies

Several experimental and observational studies explored safety and efficacy of infant feeding alternatives to prevent postnatal HIV transmission via breast milk (3). Evidence has shown that exclusive breastfeeding during the first six months of life is associated with lower rates of HIV transmission than mixed feeding (2, 3). However, few studies have assessed the compliance of HIV infected mothers, in resource-poor settings, with the recommended infant feeding options.

Prior studies illustrated that lack of appropriate knowledge on infant feeding options and fear of breast milk affected the practice of exclusive breastfeeding among HIV positive mothers (10). A longitudinal study by Doherty et al. assessed rates of exclusive breastfeeding and the barriers to exclusive breastfeeding in rural areas of high HIV prevalence, in South Africa (10). The results showed that almost one third of mothers who chose breastfeeding had all the basic conditions appropriate for formula feeding (10). Appropriate conditions for formula feeding were defined as piped water in the house or yard; electricity, gas or paraffin for cooking fuel; disclosure of HIV status by 3 weeks after birth; having someone in the household employed and access to a fridge for storage of prepared formula (10). Two thirds of mothers who chose formula feeding did not have the appropriate conditions for safe formula use; among these mothers, the risk of HIV transmission increased three-fold compared with appropriate formula feeders (adjusted hazard ratio, 3.63; 95% CI, 1.48–8.89) (10). A qualitative study by Koricho examined attitudes of HIV positive mothers and health professionals towards breast milk in Ethiopia (11). The findings demonstrated that infant feeding choices were

confusing and challenging (11). The fear of breast milk as a vehicle of HIV transmission greatly affected mothers' decisions and practices of breastfeeding (11). Some of the health professionals themselves were not convinced to promote breastfeeding as an option for HIV-positive mothers (11).

Maternal factors such as educational status, employment status, and age can influence breastfeeding decisions. Yet in patriarchal societies, such as the Sub-Saharan African, women have little autonomy over their life. In addition to individual motivation of the mother to breastfeed, the larger context of her interaction with partner and extended family influence her practices. In 2006, 234 women who were at least six months postpartum participated in the Morgia et al. study in Kenya (12). The study demonstrated that mothers' decisions to stop or continue breastfeeding were affected by educational level, employment status, reliance on others for income, partner and family support, and local norms about breastfeeding (12).

The community in which the HIV-positive mothers live can also be a determining factor. In most Sub-Saharan countries, mixed feeding is a common infant feeding practice. Thus, promotion of exclusive breastfeeding often goes against traditional practices (13). Additionally, stigma and discrimination are impediments to achieving proven infant feeding recommendations. In 2001-2002, a randomized trial conducted by Shapiro et al. investigated the low adherence to the recommended infant feeding strategies in Botswana (14). Seventy five HIV infected women participated in the Shapiro et al. study (14). The findings showed that exclusive breastfeeding among these women was minimal due to the cultural norm of introducing solid foods at early ages (14). These

mothers preferred mixed feeding rather than formula feeding to avoid disclosure of their HIV status by using formula feeding (14). In Ivory Coast, Traore et al. conducted a qualitative survey which involved 33 HIV-positive women and their male partners to assess decision making processes towards infant feeding options (13). Almost all the males convinced themselves that artificial feedings was the best option for their infants; but for mothers, the image of a 'good mother' and judgments of other people around them influenced their decisions to not breastfeed (13).

Financial constraints to purchase artificial feeding and/or transportation cost to collect free formula compelled some mothers to opt out of the artificial feeding option. In 2005, Chivonivoni et al. conducted a small study with 55 prenatal attendants in one of Zimbabwe's hospitals (15). Nearly half of the mothers did not know the likelihood of HIV transmission through breastfeeding (15). Yet, knowledge of the likelihood of transmission and availability of free formula would not lead mothers to wean their babies for the reason of lack of money to pay for transport to collect free formula (16). The Koricho's Study also found the influence of financial constraints; HIV-positive mothers were worried about the financial cost of cow milk and formula to replace breastfeeding (11).

Prior findings have produced similar results that HIV infected mothers are facing a feeding dilemma whether to breastfeed their children or not. Other than global recommendations, distal and proximate factors are influencing HIV-positive mothers' decisions and actions.

1.3 Study Rationale

In settings where mixed breastfeeding is more predominant than exclusive breastfeeding, studies demonstrate that HIV infected mothers are facing an infant feeding dilemma. In a region where breastfeeding is vital for child survival, researchers have contributed to the understanding of factors influencing the practice of breastfeeding. Some studies applied a qualitative survey approach, mainly in-depth interviews (12, 13, 15). The one-on-one interview design was better suited to delving deep into the issues and challenges. Nevertheless, most of the prior studies are either small-scale studies (12, 13) or based on unrepresentative samples (10, 11, 12, 13, 14). Most studies used data generated from self-reports of non-representative samples. The general HIV positive population was not targeted; informants were identified either through prevention of mother-to-child transmission programs (11, 12, 13) or antenatal/postpartum visits (10, 15). Such designs create selection bias.

Prior studies illustrate that socio-cultural and economic barriers surrounding HIV infected mothers have been influencing the practice of breastfeeding for decades. To my knowledge, studies have not been conducted after the 2006 WHO's recommendations on the practice of breastfeeding among HIV-positive mothers in Sub-Saharan Africa. There is no evidence if the WHO's recommendations have influenced or failed to influence the rate of breastfeeding at a population level. There is a need to demonstrate if the 2006 recommendations, which encourage exclusive breastfeeding, have improved the breastfeeding rate among HIV positive mothers on a national level.

This study will add knowledge to the practice of breastfeeding among HIV infected mothers through analyzing the Kenya 2003 and 2008/9 Demographic Health Survey (KDHS) data. The data will be explored to test if there has been any change in breastfeeding practices among HIV-positive women; additionally, associations between breastfeeding status and maternal factors will be examined.

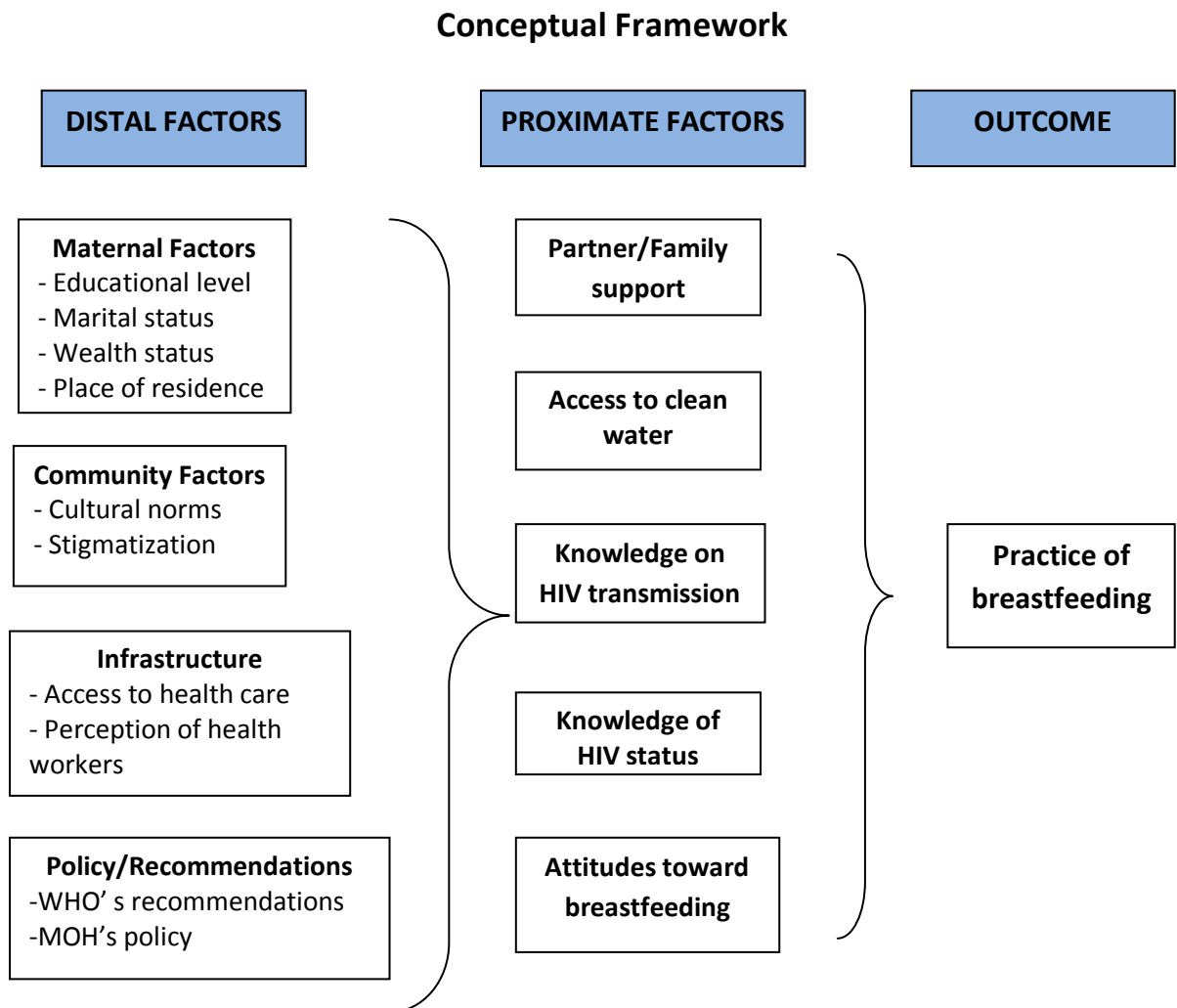
1.4 Research Question and Hypothesis

The research question is: “Has the practice of breastfeeding among HIV-positive mothers changed between 2003 and 2008/9 in Kenya?” This investigation hypothesizes that breastfeeding practices among HIV infected mothers increased in the 2008/9 study period because of increased adoption on WHO guidelines.

1.5 Conceptual Framework

Various factors affect mother’s decisions and practices towards infant feeding. At a higher level, government policies on distribution of free formula and promotion of breastfeeding; provision of health care services such as infant feeding counseling; and provision of infrastructure such as access to clean water influence breastfeeding practices. At the ground level, factors such as cultural norms and stigmatization, partner/family support, maternal education, maternal knowledge about HIV status, maternal attitudes towards breastfeeding, and maternal knowledge on HIV transmission can influence mother’s decisions and practices on infant feeding options.

This study will be guided by a conceptual framework that has a purpose to assess trends in the practice of breastfeeding among HIV infected mothers based on the 2003 and 2008/9 KDHS. Between these two periods, WHO recommended HIV-positive mothers in resource-poor settings to exclusively breastfeed unless replacement is feasible (4, 7). In Kenya, the government promoted exclusive breastfeeding through infant feeding counselors; voluntary counseling and testing expanded; and knowledge on HIV/AIDS related issues improved (8, 9). The diagram below demonstrates variables that can ultimately determine breastfeeding practices among HIV-positive mothers.



CHAPTER TWO: METHODOLOGY

2.1 Design and Sample Size

This study is a secondary data analysis based on the 2003 and 2008/9 KDHSs. In each survey, nearly 10,000 households were sampled from populations residing in households in the country (8, 16). Both the 2003 and 2008/9 Kenya DHS applied a two-stage sampling design. In the first stage, clusters were identified from a national master sample; and in the second stage, households were selected from a list of all households. In each sampled household, eligible women age 15-49 years were interviewed and asked to provide a blood sample for HIV status. With the support of health workers, blood samples were collected during field data collection (8, 16).

The 2003 KDHS interviewed 8,195 women. Of these women, this study included 889 women based on two inclusion and one exclusion criteria. Women with children age 0-23 months and women with known HIV status are included, and pregnant women are excluded from this study. Similarly, the 2008/9 KDHS interviewed 8,444 women; of these, 1043 women were identified based on the above inclusion/exclusion criteria. These women, who voluntarily provided their blood samples, may not know their results. Nevertheless, the anonymous HIV results are provided to researchers; consequently for this investigation the HIV status of the sampled women is known.

2.2 Study Variables

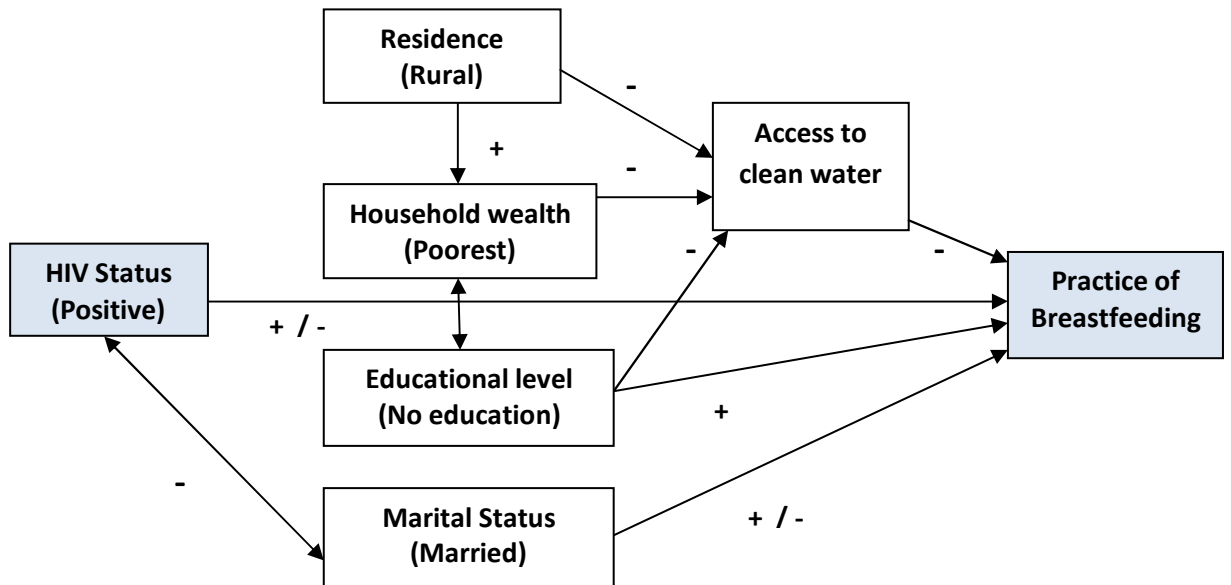
Dependent, independent and intermediate variables are identified to answer the research question.

Dependent Variable: The main outcome of the study is practice of breastfeeding among mothers. Three variables are used to measure practice of breastfeeding: whether or not the mother ever breastfed her child; whether she is currently breastfeeding; and exclusively breastfeeding.

Independent Variable: The key predictor is HIV status of mothers. This variable refers to HIV-positive and HIV-negative mothers.

Intermediate Variables: Place of residence, household wealth, maternal education, maternal marital status, and access to safe water are considered as confounders. Place of residence is dichotomized as rural or urban. Wealth status is measured based on household's ownership of goods, characteristics of dwelling, type of toilet facilities, and source of drinking water. It is a ranked scale of five categories: poorest, poorer, middle, richer and richest. Educational status refers to the highest level of formal education acquired by the women. The variable is grouped into no education, primary school, secondary school and high education. Marital status is a dichotomous variable which refers either to married or not married women. Not married women group includes single, widowed, divorced, and living/not living with someone. Access to safe water refers to two drinking water sources: piped water and/or bottled water. The below diagram is the conceptual model that presents selected variables that will be measured in this study.

Conceptual Model



2.3 Data analysis

Descriptive statistics particularly frequency distributions and cross tabulations are used to describe the study variables. Inferential statistics such as Fisher exact tests, chi-square tests and logistic regression analyses are applied to test associations between key predictors and outcome indicators. A separate analysis is conducted to measure the practice of breastfeeding among women who already know their HIV status.

CHAPTER THREE: RESULTS

3.1 Descriptive Statistics

In this study, 889 mothers from the 2003 KDHS and 1043 mothers from the 2008/9 DHS were selected. Table 1 shows the distribution of sampled women by HIV status, access to safe water, place of residence, wealth status, educational status, marital status and breastfeeding status. In general, the characteristics of the study population have similar distribution in the two study periods. Prevalence of HIV was similar over the years; 8% in both 2003 and 2008/9. Most of the study participants are married rural dwellers who received at least basic formal education. About one quarter of the women have access to safe water. In both 2003 and 2008/9, 94% of the mothers reported ever breastfeeding their child. Most mothers were still breastfeeding; 88% in 2003 and 85% in 2008/9. Exclusive breastfeeding was low in 2003; 9% versus 33%.

Table 1: **Characteristics of the study population**

Variable	2003 (N = 889)		2008/9 (N=1043)	
	n	%	n	%
HIV status				
Positive	69	7.76	88	8.44
Negative	820	92.24	955	91.56
Access to safe water	230	25.87	295	28.28
Place of residence:				
Urban	213	23.96	264	25.31
Rural	676	76.04	779	74.69
Wealth status				
Poorest	216	24.30	281	26.94
Poorer	190	21.37	201	19.27
Middle	171	19.24	153	14.67
Richer	134	15.07	178	17.07
Richest	178	20.02	230	22.05
Marital status:				
Married	663	74.58	807	77.37
Other (divorced, widowed...)	226	25.42	236	22.63
Educational status:				
no education	168	18.90	183	17.55
Primary	525	59.06	596	57.14
Secondary	162	18.22	210	20.13
Higher	34	3.82	54	5.18
Ever breastfed	834	93.81	981	94.06
Currently breastfeeding	783	88.08	890	85.33
Exclusively breastfeeding	31	9.14	134	33.09

Table 2 presents maternal knowledge on mother-to-child HIV transmission (MTCT) and HIV status. Women interviewed in 2008/9 have higher knowledge on MTCT during delivery and breastfeeding. Substantial improvement in voluntary testing is noticed in 2008/9. In 2003, only 14% of the women knew their HIV status; whereas in 2008/9, 79% of the sampled women knew their status.

Table 2: Maternal Knowledge on routes of mother-to-child HIV transmission

Variable	2003 (N=889)			2008/9 (N=1043)	
	n	%		N	%
Know AIDS transmit:					
during pregnancy	580	65.24		522	52.92
during delivery	549	61.75		731	70.09
by breastfeeding	626	70.41		883	84.66
Ever been tested for HIV	144	16.20		853	81.78
Received the test results	128	14.40		823	78.90

Table 3 shows that the practice of breastfeeding was similar among HIV-positive and HIV-negative mothers in 2003. Most of the HIV-positive (96%) and HIV-negative mothers (94%) breastfed their children. Many of them (83% HIV-positive and 89% HIV-negative) were currently breastfeeding their children. Exclusive breastfeeding is very low in both groups. However, there is no statistically significant association between the practice of breastfeeding and HIV status.

Table 3: Maternal HIV status & practice of breastfeeding in 2003

Currently Breastfeeding	HIV-Positive	HIV-Negative	Total
Yes	57 82.61%	726 88.54%	783 88.08%
No	12 17.39%	94 11.46%	106 11.92%
Total	69 100%	889 100%	889 100%
Fisher's exact = 0.173		1-sided Fisher's exact = 0.106	
Ever Breastfed	HIV-Positive	HIV-Negative	Total
Yes	66 95.65%	768 93.66%	834 93.81%
No	3 4.35%	52 6.34%	55 6.19%
Total	69 100%	820 100%	889 100%
Fisher's exact = 0.793		1-sided Fisher's exact = 0.3	
Exclusively Breastfeeding	HIV-Positive	HIV-Negative	Total
Yes	2 6.90%	29 9.35%	31 9.14%
No	27 93.10%	281 90.65%	308 90.86%
Total	29 100%	310 100%	339 100%
Fisher's exact = 1.000		1-sided Fisher's exact = 0.491	

Table 4 presents the practice of breastfeeding and HIV status in 2008/9. Current breastfeeding status shows a different pattern between HIV-positive and HIV-negative mothers. Compared to HIV negative mothers, a lower proportion of HIV-positive mothers were currently breastfeeding their children in 2008/9. Proportions of mothers who ever breastfed and exclusively breastfeeding show similar patterns among HIV-positive and HIV-negative women. In general, the practice of exclusive breastfeeding increased in 2008/9. The Chi-square tests show that there is statistically significant association specifically between current breastfeeding status and HIV status.

Table 4: Maternal HIV status & practice of breastfeeding in 2008/9

Currently Breastfeeding	HIV-Positive	HIV-Negative	Total
Yes	60 68.18%	830 86.91%	890 14.67%
No	28 31.82%	125 13.09%	153 14.67%
Total	100%	100%	100%
Pearson chi2(1) = 22.5801 Pr = 0.000			
Ever Breastfed	HIV-Positive	HIV-Negative	Total
Yes	81 92.05%	908 95.08%	989 94.82%
No	7 7.95%	47 4.92%	54 5.18%
Total	88 100%	955 100%	1,043 100%
Pearson chi2(1) = 1.5099 Pr = 0.219			
Exclusively Breastfeeding	HIV-Positive	HIV-Negative	Total
Yes	11 35.48%	123 32.89%	134 33.09%
No	20 64.52%	251 67.11%	271 66.91%
Total	31 100%	374 100%	405 100%
Pearson chi2(1) = 0.0872 Pr = 0.768			

3.2 Inferential Statistics

A logistic regression model was applied to test the association between the key predictor (HIV status) and the outcome (practice of breastfeeding). Table 5 shows there was no significant association between HIV status and practice of breastfeeding status in 2003.

Table 5: Association between HIV status and practice of breastfeeding in 2003

Variable	Odds Ratio	P-value	95% CI
Currently Breastfeeding			
HIV status	0.62	0.15	0.32 – 1.19
Variable	Odds Ratio	P-value	95% CI
Ever Breastfed			
HIV status	1.49	0.51	0.45 – 4.90
Variable	Odds Ratio	P-value	95% CI
Exclusively Breastfeeding			
HIV status	0.72	0.66	0.16 – 3.17

The Logistic regression model was applied to assess influence of confounders on the association between the key predictor and the outcome. Table 6 presents the association between the two variables after controlling the confounders: maternal education, place of residence, household wealth, marital status and access to safe water. The results show that in 2003, there was no statistically significant association between HIV status and breastfeeding status even after adjusting for confounders.

**Table 6: Association between HIV status and practice of breastfeeding in 2003
(adjusting for confounders)**

Variable	Odds Ratio	P-value	95% CI
Currently Breastfeeding			
HIV status	0.73	0.35	0.37 – 1.43
Educational level	0.59	0.001	0.44 - 0.80
Type of place	0.85	0.59	0.47 – 1.53
Wealth status	0.85	0.13	0.69 - 1.05
Marital status	0.55	0.007	0.36 - 0.85
Access to safe water	1.01	0.970	0.58 - 1.76
Ever Breastfed			
HIV status	1.49	0.519	0.45 – 4.95
Educational level	1.02	0.928	0.66 – 1.58
Type of place	1.51	0.307	0.68 – 3.56
Wealth status	1.22	0.144	0.93 – 1.62
Marital status	0.50	0.018	0.28 – 0.89
Access to safe water	0.70	0.365	0.33 – 1.51
Exclusively Breastfeeding			
HIV status	0.59	0.496	0.13 – 2.72
Educational level	1.02	0.932	0.57 – 1.83
Type of place	0.57	0.309	0.19 – 1.69
Wealth status	1.02	0.936	0.68 – 1.52
Marital status	2.51	0.019	1.16 – 5.40
Access to safe water	1.00	0.96	0.37 – 2.72

Similar analysis was applied to test the association between HIV status and the practice of breastfeeding in 2008/9. Table 7 shows that there is a statistically significant association between HIV status and current breastfeeding status (OR 0.32; 95% CI 0.20 - 0.52 and P= 0.000). HIV-positive mothers are 0.32 times as less likely to breastfeed their

children. Nevertheless, ever breastfeeding and exclusive breastfeeding do not show statistically significant associations with HIV status.

Table 7: Association between HIV status and current breastfeeding status in 2008/9

Variable	Odds Ratio	P-value	95% CI
Currently Breastfeeding			
HIV status	0.32	0.000	0.20 – 0.52

Variable	Odds Ratio	P-value	95% CI
Ever Breastfed			
HIV status	0.60	0.224	0.26 – 1.37

Variable	Odds Ratio	P-value	95% CI
Exclusively Breastfeeding			
HIV status	1.12	0.768	0.52 – 2.42

Table 8 shows the association between HIV and breastfeeding after adjusting for maternal education, type of place, wealth status, marital status and access to safe water. The association between current breastfeeding status and HIV status gets slightly stronger after controlling for the confounders. The association still remains statistically significant (adjusted OR 0.35; 95% CI 0.21 - 0.57 and P= 0.000). However, even after adjusting for confounders, ever breastfeeding and exclusive breastfeeding do not show statistically significant association with HIV status.

**Table 8: Association between HIV status and current breastfeeding status in 2008/9
(adjusting for confounders)**

Variable	Odds Ratio	P-value	95% CI
Currently Breastfeeding			
HIV status	0.35	0.000	0.21- 0.57
Educational level	0.75	0.037	0.58 - 0.98
Type of place	1.57	0.090	0.93 - 2.65
Wealth status	0.95	0.552	0.79 - 1.14
Marital status	0.65	0.033	0.44 - 0.96
Access to safe water	1.12	0.647	0.70 - 1.79
Ever Breastfed			
HIV status	0.62	0.255	0.27 – 1.42
Educational level	0.84	0.413	0.55 – 1.27
Type of place	1.71	0.210	0.74 – 3.98
Wealth status	1.07	0.662	0.80 – 1.43
Marital status	1.07	0.832	0.55 – 2.09
Access to safe water	0.99	0.987	0.27 – 1.42
Exclusively Breastfeeding			
HIV status	1.14	0.744	0.52 – 2.52
Educational level	1.51	0.403	1.07 – 2.12
Type of place	0.73	0.374	0.36 – 1.46
Wealth status	0.91	0.403	0.72 – 1.14
Marital status	0.43	0.002	0.26 – 0.75
Access to safe water	0.55	0.067	0.30 – 1.04

3.3 Practice of Breastfeeding among Mothers Who Know their HIV Status

The practice of breastfeeding was also assessed among mothers who already knew their HIV status. In 2003, 128 mothers and in 2008/9, 823 mother knew their status. Table 9 and table 10 present the association between HIV status and the practice of breastfeeding among mothers who already know their HIV status. Currently

breastfeeding, ever breastfed and exclusively breastfed are used to demonstrate the practice of breastfeeding in 2003 and 2008/9.

In table 9, the Fisher's exact tests show that there was no statistically significant association between practice of breastfeeding and HIV status in 2003. The cross tabulations show a similar pattern between HIV-positive and HIV-negative mothers. Proportions of ever breastfed and currently breastfeeding are high in both groups (HIV-positive and HIV-negative). But, the proportion who are practicing exclusive breastfeeding is very low in both groups.

Table 9: Maternal HIV status & practice of breastfeeding among women who know their HIV status in 2003

Currently Breastfeeding	HIV-Positive	HIV-Negative	Total
Yes	11 91.67%	98 84.48%	109 85.16%
No	1 8.33%	18 15.52%	19 14.84%
Total	12 100%	116 100%	128 100%
Fisher's exact = 1.000 1-sided Fisher's exact = 0.439			
Ever Breastfed	HIV-Positive	HIV-Negative	Total
Yes	12 100%	113 97.4%	125 97.7%
No	0 0%	3 2.6%	3 2.3%
Total	12 100%	116 100%	128 100%
Fisher's exact = 1.000 1-sided Fisher's exact = 0.742			
Exclusively Breastfeeding	HIV-Positive	HIV-Negative	Total
Yes	0 0%	2 3.8%	2 3.5%
No	5 100%	51 96.2%	56 96.5%
Total	5 100%	53 100%	58 100%
Fisher's exact = 1.000 1-sided Fisher's exact = 0.834			

Table 10 presents the practice of breastfeeding among mothers who already knew their HIV status in 2008/9. The Fisher's exact tests show that there is a statistically significant association between HIV status and current breastfeeding status. However, HIV status has no statistically significant association either with mother who ever breastfed or exclusively breastfeeding.

Table 10: Maternal HIV status & practice of breastfeeding among women who know their HIV status in 2008/9

Currently Breastfeeding	HIV-Positive	HIV-Negative	Total
Yes	49 67.12%	646 86.13%	695 84.45%
No	24 32.88%	104 13.87%	128 15.55%
Total	73 100%	750 100%	823 100%
Fisher's exact = 0.000		1-sided Fisher's exact = 0.000	
Ever Breastfed	HIV-Positive	HIV-Negative	Total
Yes	70 95.9%	734 97.9%	804 97.7%
No	3 4.1%	16 2.1%	19 2.3%
Total	73 100%	750 100%	823 100%
Fisher's exact = 0.233		1-sided Fisher's exact = 0.233	
Exclusively Breastfeeding	HIV-Positive	HIV-Negative	Total
Yes	11 40.7%	98 33.22%	109 33.9%
No	16 59.3%	197 66.8%	213 66.1%
Total	27 100%	295 100%	322 100%
Fisher's exact = 0.524		1-sided Fisher's exact = 0.278	

A logistic regression analysis was applied to test the association and strength of association between the practice of breastfeeding and HIV status. In 2003, due to the small size of the sample, mothers' responses show no variation across the board.

However, in 2008/9, a statistically significant association is observed between current breastfeeding status and HIV status. Table 11 presents the significant association before and after adjusting for confounders (maternal education, type of place, wealth status, marital status and access to safe water). The association remains the same after adjusting for confounders. The practice of mothers, who ever breastfed and who are exclusively breastfeeding, does not have an association with their HIV status (results are not shown).

Table 11: Association between HIV status and current breastfeeding status among mothers with Known HIV status in 2008/9

Variable	Odds Ratio	P-value	95% CI
HIV status	0.24	0.000	0.13 – 0.45

Variable	Adjusted Odds Ratio	P-value	95% CI
HIV status	0.24	0.000	0.13 – 0.44

CHAPTER FOUR: DISCUSSION AND CONCLUSION

4.1 Discussion

In 2003, HIV status was not a significant predictor of the practice of breastfeeding among sampled mothers in Kenya. The practice of breastfeeding includes mothers who ever breastfed, are currently breastfeeding and exclusively breastfeeding. The association was tested among mothers who may not know their HIV status (but their status is known to this investigation) and among mothers who know their HIV status. In both cases, the practice of breastfeeding was not associated with maternal HIV status. The study results show similar patterns to the nation's breastfeeding norm; mothers give mixed feeding rather than exclusive breastfeeding irrespective of their HIV status.

Five years later, in 2008/9, the study found that maternal HIV status has become a significant predictor of status of current breastfeeding. Similar results are observed among mothers who may not know their HIV status and among mothers who know their HIV status. In both groups, HIV-positive mothers are less likely to breastfeed their children than HIV-negative mothers. Nevertheless, no statistically significant association is observed between HIV status and ever breastfeeding and exclusively breastfeeding. Practice of breastfeeding among mothers who may not know their HIV status and mothers who know their HIV status is not associated with their HIV status except for current breastfeeding status.

As three quarters of the study population are from rural areas, three quarters do not have access to safe water and nearly half come from poor households, it is unlikely

for replacement feeding to be the better option. In such settings, breastfeeding is judged to be the best option. However, the findings deviate from national and international recommendations. The potential explanations of these findings are discussed in the following paragraphs.

In areas of HIV/AIDS, numerous changes have occurred globally and nationally between 2003 and 2008/9. In 2006, WHO developed the revised infant feeding guidelines which recommended that HIV positive mothers who reside in resource-constrained countries to exclusively breastfeed their children for the first six months unless replacement feeding is acceptable, feasible, affordable, sustainable and safe. Same year (2006), the Kenyan National Guidelines on Nutrition and HIV/AIDS stated actions to support exclusive breastfeeding for the first 6 months of age and continuation of breastfeeding until age one (17).

Voluntary testing and counseling is one of the HIV prevention strategies. In Kenya, the proportion of women who know their HIV status has increased from 13% in 2003, to 57% in 2008/9 (8, 16). A similar trend is observed among the study samples. In 2003, only 14% of the recent mothers knew their HIV status; whereas in 2008/9, 79% knew their HIV status. This huge gap is considered as a potential reason for the association between HIV status and breastfeeding in 2008/9. Since most of the women in 2003 did not know their HIV status, the practice of breastfeeding was not related to HIV status. In 2008/9, most of the mothers knew their HIV status from previous HIV tests. Nevertheless, the practices do not comply with WHO's recommendations and the

Kenyan national guidelines. The 2008/9 findings show that HIV-positive mothers are less likely to breastfeed their children.

Knowledge on mother-to-child transmission via breast milk may raise fear to an extent of avoiding breast milk. In DHS reports, knowledge of women about mother-to-child transmission through breastfeeding has increased from 72% in 2003 to 87% in 2008/9 (8). A similar trend is observed in this study as well; knowledge of women about mother-to-child transmission through breastfeeding has increased from 70% (2003) to 85% (2008/9). Stigma towards people with HIV/AIDS can be another potential determinant of breastfeeding. The DHS reports show that in spite of the 6% improvement, accepting attitudes towards those living with HIV/AIDS is still low (8). Compared to men, women expressed their lower acceptance of individuals with HIV/AIDS (8). Mothers may fear breaking mixed feeding norm due to the association of exclusive breastfeeding with disclosure of their HIV status and exposure to stigma and discrimination.

The National AIDS Control Counsel report for the period 2008-2009, stated that counseling was scaled up at the facility and community levels (9). Nonetheless, the breastfeeding practices raise questions on the quality of infant feeding counseling and attitudes of counselors towards infant feeding choices. As prior studies show that attitudes of counselors have direct influence on mothers' decision making process (11, 18).

4.2 Strengths and Limitations

The study drew its samples from nationally representative probability sample surveys. Unlike prior studies, the strength of the study is that samples are not limited to prevention of mother-to-child transmission or antenatal care attendants. Using a general population may have yielded different results. Another strength of the study is its reproducibility in other nations using similar DHS data. The results can be compared and contrasted with other Sub-Saharan countries.

The major limitation of this study is the small sample size of mothers who know their HIV status. Particularly in 2003, sample size limited this study from applying logistic regression. A similar limitation is faced on the analysis of exclusive breastfeeding due to the small number of women with a child age 0-5 months of age.

Another limitation of the study is that current breastfeeding, one of the key predictors, could result in misclassification. Mothers who are coded as not breastfeeding might have just weaned breast milk.

4.3 Conclusions

A similar pattern is observed among mothers who may not know their HIV status and among mothers who know their HIV status. In both groups, HIV positive mothers do not comply with the current infant feeding recommendations. These women are unlikely to have suitable conditions for replacement feeding mainly due to hygienic requirements to prepare formula feeding and the financial costs associated with regular supplies of alternative feeding. Stigma, discrimination and inadequate counseling are

potential determinants of the practice of breastfeeding among HIV-positive mothers that should be studied in subsequent studies on this topic. Strengthening of community awareness and sensitization on HIV/AIDS and persuasive counseling on adoption of exclusive breastfeeding may improve compliance of HIV-positive mothers to infant feeding recommendations.

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