



Factors Associated with Compliance with World Health Organization-Recommended Infant-Feeding Practices by Mothers with HIV Infection in Northwest Ethiopia

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ABSTRACT

Background: The World Health Organization has recommended either exclusive replacement feeding or exclusive breastfeeding options for HIV-exposed infants for the first 6 months of life.

Objective: The purpose of this study was to assess the factors associated with noncompliance with these recommendations among a population of HIV-infected mothers of young infants in Bahir Dar City, Amhara Regional State, Ethiopia.

Methods: An institutional based cross-sectional study was conducted from March 1 to May 15, 2018. A structured interview was conducted with 213 HIV-positive mothers. Descriptive statistics were used to show the frequency distributions of factors associated with noncompliance with World Health Organization-recommended infant-feeding practices. Both bivariate and multivariate logistic regression analyses were performed to identify the variables predictive of infant-feeding practices.

Results: All mothers were undergoing antiretroviral therapy. Only 83.5% claimed to be following World Health Organization-recommended infant-feeding practices. Bivariate analysis showed that high school or greater educational status [Adjusted odds ratio (AOR) = 3.6 (95% CI = 4.2, 9.5)], having attended antenatal visits [AOR = 6.7 (95% CI = 5.6, 10.9)] and postnatal follow-up visits [AOR = 6.9 (95% CI = 4.2, 9.3)], and disclosure of HIV status to their spouse [AOR = 8.2 (95% CI = 6.2, 10.7)] were associated with adherence to recommended infant-feeding practices.

Conclusions: The prevalence of recommended infant feeding practices among HIV-exposed infants in the study area was suboptimal compared with the $\geq 90\%$ recommended by the World Health Organization. Higher educational status of the mother, antenatal and postnatal follow-ups, and disclosure of HIV status to spouses were predictors of adherence to the recommended infant-feeding practices. Although not yet proven in a prospective clinical trial, providing more education for women, improving attendance at antenatal and postnatal follow-up visits, encouraging the disclosure of HIV status to spouses, and educating mothers about proper infant-feeding options during follow-up visits may all be useful to increase compliance.

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Introduction

Globally, 36.9 million people are living with HIV and 25.7 million of them live in Africa; only 21.7 million people of whom have access to antiretroviral therapies (ART) that help to decrease HIV-related deaths by 38%.¹

Globally, approximately 70% of all new HIV infections in children occur in Sub-Saharan Africa countries; most of which are caused by vertical transmissions of the HIV virus during pregnancy, delivery, or breastfeeding.² Prevention of mother to child transmission (PMTCT) provide ART to HIV-positive pregnant women to decrease the risk of their infants becoming infected with HIV. Without treatment, the likelihood of HIV passing from mother to child is 15% to 45%. However, ART and other effective PMTCT interventions can reduce the risk of HIV transmission to below 5%.³

In addition to providing ART, other strategies are also proposed to minimize the vertical transmission. One recommendation

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involves infant-feeding practices. HIV-infected mothers are advised to avoid breastfeeding their infants. However, in areas where breast-milk substitutes are not readily available or affordable, exclusive breastfeeding until age 6 months and then shifting to exclusive feeding of other foods is recommended by the World Health Organization (WHO). Exclusive breastfeeding can prevent 8% of child deaths.⁴

The Federal HIV/AIDS Prevention and Control Office has estimated that in Ethiopia there are 433,763 women and 65,088 children aged 0 to 14 years who have HIV virus in their blood.⁴ A systematic review of studies found that about 5.7% of pregnant mothers in Ethiopia had HIV in their blood and only 69% of these HIV-positive pregnant mothers were receiving ART drugs.⁵

There is clinical debate about the relative benefits of exclusive breastfeeding versus total replacement feeding practices. Studies suggest that optimal breastfeeding can decrease infant morbidity and mortality in the general population. Breastfeeding by HIV-positive mothers can result in 15% to 20% postnatal HIV transmission rates; however, exclusive breastfeeding with timely prophylaxis and providing ART for pregnant mothers can decrease vertical transmission of HIV infections to <5%.^{1,4} Total replacement feeding can essentially prevent postnatal transmission.

The practice of mixing breastfeeding with formula feeding increases the rate of vertical HIV infection compared with exclusive breastfeeding,⁴ probably as a result of microtrauma and inflammation in the still-developing infant gastrointestinal tract. Diarrhea, which is common worldwide, accounts for 8% of total deaths of children younger than age 5 years and is especially common in HIV-infected children. Thus, practicing either exclusive breastfeeding or exclusive replacement feeding are both better options than mixed feeding to decrease the risk of occurrence of gastrointestinal inflammation, diarrhea, and HIV infections.⁶

Although Ethiopian authorities accept the WHO infant-feeding recommendations for infants of HIV positive mothers, the level of practice is still below the WHO recommended rate (ie, above 90%).⁴ The purpose of this study was to assess infant-feeding practices of HIV-positive mothers attending ART clinics in Bahir Dar City in the northwest part of Ethiopia and to examine the factors associated with compliance with these WHO recommendations.

Methods

Ethical approval and consent to participate

Ethical approval to conduct the study was obtained from the ethical review committee at Bahir Dar University. Permission was also obtained from Bahir Dar Health Bureau. The purpose of the study, procedures, advantages, and disadvantages were explained and verbal consent was obtained from all individual participants. Approval was obtained from the ethical review committee to obtain verbal consent from parents and was waived in the case of mothers younger than age 16 years. To ensure confidentiality, no patient identifying information was collected. All other data were kept securely locked with access only to the study team and were not exposed to any third party. Confidentiality was maintained throughout the data collection, entry, analysis, and reporting process.

Operational definition

Using recommended infant feeding practices was defined as an HIV-positive mother who reported practicing either exclusive breastfeeding or exclusive replacement feeding for her HIV-exposed infant during the first 6 months of life.⁷ Exclusive breastfeeding was defined as a mother reporting to have given her infant only breastmilk; no other food or drink, not even water,

except drops or syrups containing vitamins, mineral supplements, or prescribed medicines for at least the first 6 months.⁷ Exclusive replacement feeding was defined as a mother reporting to have given her infant only nutritionally adequate breastmilk substitute feedings; no breastfeeding. Mixed breastfeeding was defined as a mother reporting to have breastfed her infant as well as additional fluids, solid foods, and/or nonhuman milk during the first 6 months of life.

Study setting and design

The study was conducted from March 1 to May 15, 2018, in the city of Bahir Dar City, Ethiopia. This city is 565 km from Addis Ababa, the capital city. The city's estimated population is 311,724. There are 2 government hospitals, 2 private hospitals, and 5 health centers actively providing PMTCT and ART services in Bahir Dar. HIV-positive mothers of infants attending either of the 2 government hospitals or any of the 5 health centers actively providing PMTCT and ART services in Bahir Dar City were recruited for this study.

Sample size and sampling techniques

The sample size was determined using the single population proportion formula. Assumptions used in the formula were made from finding in other studies: prevalence = 83.3% (proportion of exclusive breastfeeding practice among HIV-positive women in Gondar, Ethiopia),⁶ 95% CI, margin of error = 5%, and the final calculated sample size was 213. A complete list of potentially eligible HIV positive mothers with infants who attended the PMTCT clinics in the selected health facilities during the study period was obtained from coordinators at each of the hospitals and health centers. A systematic sampling method was used to select potential study participants based on the number of eligible subjects (see the [Figure 1](#)). Women who consented and fulfilled the inclusion criteria were interviewed during their visit to the PMTCT clinic until the predetermined sample size had been reached.

Inclusion and exclusion criteria

Inclusion criteria included HIV-positive mothers with a child up to age 1 year. Exclusion criteria included HIV-positive mothers without a child in that age group.

Measurements

An interviewer-administered questionnaire was used to collect the data. The questionnaire was adapted and modified from research done on similar topics.^{7–10} The questionnaire contained questions on sociodemographic characteristics, factors that can be barriers to infant-feeding practices, information on antenatal and postnatal follow-up, and infant-feeding practices. The questionnaire was first prepared in English then translated into Amharic for data collection. To check whether the translation was consistent with the English version, the questionnaire was back-translated into English by experts in both languages and its consistency was validated.

Statistical analysis

Data were entered into EPI Info version 7 (Centers for Disease Control and Prevention, Atlanta, Georgia) and exported to SPSS version 23 (IBM-SPSS Inc, Armonk, New York) for analysis. Frequency distribution tables were made showing the study population sociodemographic characteristics and infant-feeding practices. Binary and multivariate logistic regression analyses

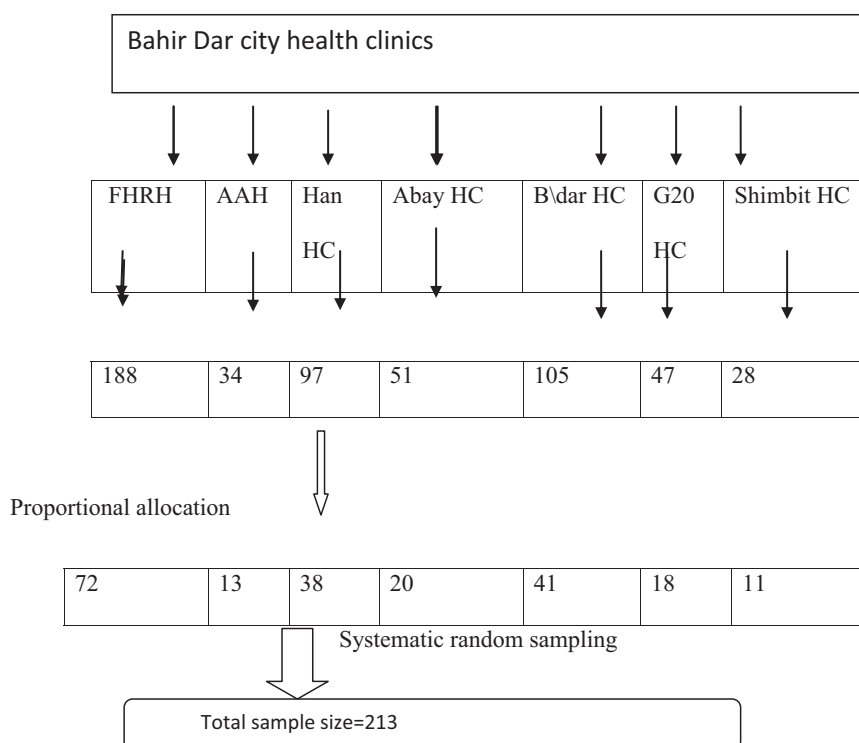


Fig. 1. Potential study participants based on the number of eligible patients in Bahir Dar City, Amhara Regional State, Ethiopia. AAH = xxxx; Abay HC = xxx; B'dar HC = xxxx; FHRH = xxxx; G20 HC = xxx; Han = xxx; Shimbit HC = xxxx.

were used to identify independent factors that might influence recommended infant-feeding practices. Variables with $P < 0.05$ in the bivariate analysis were considered for multivariate analysis. In multivariate logistic regressions, statistical significance was considered as $P < 0.05$. Odds ratios (ORs) with 95% CI were used to measure the strength of associations.

Results

Sociodemographic characteristics

The mean age with standard deviation of mothers and infants were 30.5 (2.2) years and 7.7 (3.2) months, respectively. One hundred thirty-two (62%) mothers had a male child and the majority of the mothers 182 were married (85.4%). One-third of the mothers (33.3%) had attended grades 1 through 8, 73.7% were Orthodox Christian by religion, 96.7% were Amhara by ethnicity, and 45% were housewives (Table 1).

Obstetrics history

Of the 213 mothers, 86 (40.4%), 102 (47.9%), and 25 (11.7%) had 1, 2, and 3 children, respectively. The number of mothers who had antenatal visits during their last pregnancy was 201 (94.4%); of these, 148 (69.4%) attended 5 antenatal visits.

A majority of mothers (204 [96%]) had been counseled about recommended infant-feeding options. Of these women, 163 (80%), 38 (18.6%), and 3 (1.4%) were counseled during their antenatal visits, delivery, and postnatal care visits, respectively. A total of 194 mothers (91%) delivered at health institutions; 67.6% had a spontaneous vaginal delivery (Table 2).

Infant-feeding practices

Of all participants, 101 (47.4%) reported practicing exclusive replacement feeding, 77 (36.2%) reported exclusive breastfeeding,

Table 1

Sociodemographic characteristics of HIV-positive mothers in Bahir Dar City, Amhara Regional State, Ethiopia, in 2018 (N = 213).

Variable	n	%
Age of mother (y)		
15–24	48	22.5
25–34	129	60.5
≥35	36	17
Age of child (d)		
0–180	88	41.3
181–365	125	58.7
Sex of child		
Male	132	62
Female	81	38
Marital status		
Married	182	85.4
Single	13	6.1
Divorced	18	8.5
Mother's educational status		
Unable to read and write	61	28.6
Grade 1–8	71	33.3
Grade 9–10	32	15.1
Grade 11–12	37	17.4
College and beyond	12	5.6
Religion		
Orthodox	157	73.7
Muslim	50	23.5
Protestant	5	2.4
Catholic	1	0.4
Ethnic group		
Amhara	206	96.7
Agew	5	2.4
Other	2	0.9
Mother's occupation		
Merchant	28	13.2
Government employed	46	21.6
Housewife	96	45
Daily labor	32	15
Other	11	5.2

Table 2
Obstetric history and disclosure status of HIV-positive mothers attending antiretroviral therapy services in Bahir Dar City, Amhara Regional State, Ethiopia, in 2018 (n = 213).

Variable	n	%
No. of children		
1	86	40.4
2	102	47.9
3	25	11.7
Attending ANC		
Yes	201	94.4
No	12	5.6
Postnatal follow-up		
Yes	138	64.8
No	75	35.2
Counseling on infant feeding options		
Yes	204	95.8
No	9	4.2
Counseling on MTCT		
Yes	184	86.4
No	29	13.6
Place of delivery		
Health institution	194	91
Home	19	9
Mode of delivery		
Spontaneous	144	67.6
Instrumental	65	30.5
Caesarean section	4	1.9
Time of HIV status disclosure to their spouses		
During ANC	105	49.3
During delivery	31	14.6
During antiretroviral therapy follow-up	32	15.1
No	45	21
Disclosed your HIV status to her spouse		
Yes	168	79
No	45	21

ANC = antenatal care; MTCT = mother to child transmission.

and 35 (16.4%) reported mixed feeding. A total of 147 (69%) initiated breastfeeding within the first hour after birth. More than half of mothers (61 [60.4%]) who practiced replacement feeding reported that they prepared feedings more than 8 times per day (Table 3).

Table 4
Factors association for recommended infant-feeding practices among HIV-positive mothers attending antiretroviral therapy services in Bahir Dar City, Amhara Regional State, Ethiopia, in 2018.

Variable	Recommended infant-feeding practices		Corrected odds ratio 95% CI	Adjusted odds ratio
	Safe (n = 178) n (%)	Unsafe (n = 35)		
Maternal education status				
Secondary and above	76 (93.8)	5 (6.2)	5.4 (1.3–10.3)	3.6 (4.2–9.5)
Grade 1–8	57 (80.3)	14 (19.7)	1.5 (0.4–5.8)	
Unable to read and write	45 (73.8)	16 (26.2)	1	
Place of delivery				
Health institutions	112 (57.7)	82 (42.7)	1.2 (1.0–2.6)	
Home	10 (52.6)	9 (47.4)	1	
ANC follow-up				
Yes	174 (86.6)	27 (13.4)	12.8 (9.3–21.4)	6.7 (5.6–10.9)*
No	4 (33.3)	8 (66.7)	1	
Postnatal follow-up				
Yes	115 (83.3)	23 (16.7)	2.1 (1.5–8.3)	6.9 (4.2–9.3)*
No	53 (70.7)	22 (29.3)	1	
Counseling on MTCT				
Yes	120 (65.2)	64 (34.8)	1.3 (1.1–2.1)	
No	17 (58.6)	12 (41.4)	1	
HIV status disclosure to their spouse				
Disclosed	155 (92.3)	13 (7.7)	11.4 (4.1–14)	8.2 (6.2–10.7)*
Not disclosed	23 (51)	22 (49)	1	

ANC = antenatal care visit; MTCT = mother to child transmission.

* Significant at $P < 0.05$.

Table 3
Infant-feeding practice of HIV-positive mothers attending antiretroviral therapy services in Bahir Dar City, Amhara Regional State, Ethiopia, in 2018 (N = 213).

Variable	n	%
Type of feeding		
EBF	77	36.2
ERF	101	47.4
Mixed feeding	35	16.4
Time of first initiation of breastfeeding		
<1 h after delivery	147	69
>1 h after delivery	66	31
Infant feeding practices		
Recommended	178	83.6
Not recommended	35	16.4
Frequency of formula feeding*		
<8 times/d	40	39.6
>8 times/d	61	60.4

EBF = exclusive breastfeeding; ERF = exclusive replacement feeding.

* n = 101.

Factors affecting infant-feeding practices

Factors found in the bivariate analysis to be significantly associated with following recommended infant-feeding practices were maternal educational status, place of delivery, attendance at antenatal and postnatal follow-up visits, having received counseling on MTCT, and the mother having disclosed her HIV status to her spouse.

In the multivariate analysis, mother's educational status, attendance at antenatal and postnatal follow-up visits, and having disclosed HIV status to her spouse were found to be independently associated with following recommended infant-feeding practices.

Mothers who had a high school or higher educational level were 3.6 times more likely to report following recommended infant-feeding practices than those who had finished only grade 1 through 8 or who were not able to read and write (adjusted OR [aOR] = 3.6; 95% CI, 4.2–9.5).

Mothers who attended antenatal visits were 6.7 times more likely to report following recommended infant-feeding practices than those who did not attend antenatal visits (aOR = 6.7; 95% CI, 5.6–10.9).

Mothers who received postpartum care were 6.9 times more likely to report following recommended infant-feeding practices than those who did not attend follow-up postnatal care visits (aOR = 6.9; 95% CI, 4.2–9.3).

Mothers who reported disclosing their HIV status to their spouse were 8.2 times more likely to report following recommended infant-feeding practices than in those who did not (aOR = 8.2; 95% CI, 6.2–10.7 (Table 4).

Discussion

Although the WHO recommends exclusive breastfeeding or exclusive replacement-feeding practices for HIV-exposed infants, 16.5% of mothers in Ethiopia are practicing less safe, mixed-feeding practices. All mothers in this study were receiving ART. A majority of mothers (83.5%) claimed to be following recommended infant-feeding practices. This is similar to rates reported in South Africa (84%),⁸ Nigeria (86%),⁹ and Debre Markose, Ethiopia (85.8%).¹⁰ This rate is slightly lower than reported in studies done in cities in Ethiopia such as Gonder (89.5%),⁷ Shashemene (96.6%),¹¹ and Mekelle (93.4%),¹² but it is higher than reported in Addis Ababa, Ethiopia (77.4%)¹³; Adama, Ethiopia (77.4%)¹⁴; Uganda (77%)¹⁵; and Tanzania (73.8%)¹⁶ Differences may be related to study methods used; social, economic, and demographic characteristics of respondents; culturally difference in accepting HIV/AIDS; fear of stigma; discrimination and availability; quality or time spent with mothers; and provider training or interest in providing infant-feeding option counseling services.

Mother's educational status was significantly associated with following recommended infant-feeding practices. Mothers with a secondary education or more were 3.6 times more likely to report following recommended infant-feeding practices than those who had completed grades 1 through 8 or who were not educated. These findings are consistent with studies done in Debre Markos, Ethiopia,¹⁰ and South Africa.⁸ Education may increase decision-making skills or build the confidence needed to help mothers resist peer pressure and follow recommended infant-feeding options. It is also possible that more educated mothers are more likely than uneducated ones to understand the reasons for avoiding mixed-feeding options, were more motivated to follow health care provider advice, or were even more likely to answer questions in a way that suggests they were more compliant with recommendations. Unfortunately, the study did not provide any data on the reliability of the mothers' responses to questions.

HIV-positive mothers who attended antenatal visits were 6.7 times more likely to report following recommended infant-feeding practices than those who did not attend antenatal visits. The finding is similar to what was reported in studies done in Debre Markos, Ethiopia¹⁰; Nigeria⁹; Mekelle, Ethiopia¹²; and Uganda.¹³ Similarly, mothers who had postnatal follow-up were 6.9 times more likely to report following recommended infant-feeding practices than those who did not. These may be because antenatal and postnatal visits provide an opportunity for repeated counseling and increased knowledge of infant-feeding practices.

Mothers who reported disclosing their HIV status to their spouse were 8.2 times more likely to report following recommended infant-feeding practices than those who did not. This finding is consistent with studies done in Debre Markos, Ethiopia¹⁰; Uganda¹⁵; and Nigeria.¹⁷ Disclosure of HIV status increases the opportunity for free discussions about infant-feeding options and provides psychological comfort, which allows them to more often follow infant-feeding options than women who do not disclose their HIV status to their spouse. Additionally, disclosure may strengthen family relationships and bring family members closer. Disclosure provides family members with the opportunity to offer support to the PLWHA staff to provide medical care or counsel-

ing. Assuming these responses were truthful, it is also possible that women who disclose their status are more likely to follow medical advice.

Conclusions

The prevalence of reporting related to following WHO recommended feeding practices for HIV-exposed infant in this Ethiopian population was suboptimal. Maternal educational status, antenatal visits, postnatal follow-up, and disclosure of the mother's HIV status to their spouses were all significantly associated with claiming to follow WHO-recommended infant-feeding practices.

Although not yet proven in prospective controlled trials, increasing women's access to education, improving attendance at prenatal and antenatal care visits, and encouraging HIV-positive women to reveal their status to spouses are likely to improve compliance and thereby decrease MTCT of HIV. Furthermore, research is needed to establish the reliability of questionnaire-generated compliance data and understand how to increase attendance at prenatal and antenatal care visits, disclosure of HIV status to spouses, and increase compliance with WHO recommended feeding practices.

Conflicts of Interest

The authors have indicated that they have no conflicts of interest regarding the content of this article.

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