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Original Research

Infant and Young Child Feeding Practices and Associated Factors Among HIV Positive Mothers Having Children 0-23 Months Old in Dire Dawa City Health Facility, Eastern Ethiopia 2023

Yosef Assefa[1], Beyene Dereje[3], Yonatan Solomon[2*]

[1]Department of Public Health, College of Medicine and Health Sciences, Dire Dawa University, Dire Dawa, Ethiopia
[2]Department of Nursing, College of Medicine and Health Sciences, Dire Dawa University, Dire Dawa, Ethiopia
[3]Department of Pharmacology, School of Pharmacy, College of Medicine and Health Sciences, Dire Dawa University, Dire Dawa, Ethiopia

Abstract

Background: Infant and young child feeding practices are sets of recommendations for proper feeding of children under the age of two. A limited study is thoroughly evaluated. Infant and small child feeding behaviors of HIV-positive mothers in the research area, which is primarily in Ethiopia. The purpose of this study is to evaluate infant and young child feeding patterns and associated characteristics among HIV-positive women with children aged 0-23 months who are receiving ART/PMTCT services at governmental health institutions in Dire Dawa, Eastern Ethiopia, in 2023.
Method: An institution-based cross-sectional study design was employed from May 01 to May 30, 2023, on 228 participants that were selected using the systematic random sampling technique. Data were cleaned and analyzed using SPSS version 25. Descriptive statistics were calculated for all study variables. Bivariable and multivariable logistic regression analyses were done, and adjusted odds ratios with 95% confidence intervals and $P < 0.05$ were considered statistically significant.
Results: The current study revealed that 58.8%, 21.5%, and 19.7% of mothers practiced exclusive breastfeeding, mixed feeding, and exclusive replacement feeding, respectively. Knowledge on mother-to-child transmission and infant feeding [AOR=7.69, CI: 1.69, 34.89], number of antenatal care visits [AOR=5.37, CI: 1.76, 38.01], WHO clinical stage 3 [AOR=5.56, CI: 1.01, 30.43], and cesarean section delivery [AOR=7.879, CI: 1.83, 33.94] were significantly associated with infant feeding practice.
Conclusion: The present study identified a high number of the HIV-positive mothers who practiced the recommended feeding. Knowledge, ANC, clinical stage, and CS delivery were factors associated with infant feeding practice.

Key words: Infant Feeding Practice, HIV positive mothers, Dire Dawa City, Ethiopia

**Corresponding author: Yonatan Solomon, yonatnsolomon@gmail.com, +251913820259*

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1. Introduction

Infant and young child feeding (IYCF) practices are sets of well-known and common recommendations for appropriate feeding of newborns and children under two years of age. The World Health Organization (WHO) established core and optional indicators to enhance, maintain, and promote IYCF practices, with the three most essential being timely introduction of breastfeeding (TIBF), exclusive breastfeeding (EBF), and timely initiation of supplementary feeding (TICF) [1].

Infant and young child feeding in the context of a human immunodeficiency virus (HIV)-infected mother has significant challenges due to the risk of virus transmission through breastfeeding. It should support the infants to be free from Human Immunodeficiency Virus (HIV) and not harm the health of the mothers. Despite the many success stories in the area of Prevention of Mother-to-Child Transmission (PMTCT), it's unfortunate to state that rates of transmission are still very high in many parts of the world and have generated the total number of new infections in 2020. The majority of cases are being recorded in sub-Saharan Africa (SSA), where the challenges of maintaining breastfeeding are critical in regard to HIV-free survival [2,3].

Based on the recent World Health Organization (WHO) update from 2016, mothers living with Human Immunodeficiency Virus (HIV) should breastfeed for at least 12 months and may continue breastfeeding for up to 24 months or greater if they are receiving Mother-To-Child Transmission (MTCT). In the first six months of age, exclusive replacement feeding should not be utilized unless safe and adequate formula meals are available [4].

In accordance with World Health Organization (WHO) recommendations, Ethiopia's Federal Ministry of Health has adopted and developed an infant and young child feeding practice. According to the national plan, informed choices that meet the circumstances of the mother are encouraged, and the counseling for mothers should be adapted to their particular requirements to balance the risks associated with replacement feeding with the risks of acquiring Human Immunodeficiency Virus (HIV) via breastfeeding [5].

In both developing and developed countries, achieving optimal Infant and Young Child Feeding (IYCF) practices is a huge problem due to the diverse nature of barriers [6]. Each year, about 90% of Human Immunodeficiency Virus (HIV) infections in pediatrics are due to vertical

transmission; 1.5 million infants die if mothers choose not to breastfeed, while roughly 300,000 newborns acquire HIV through breast milk [7].

In 2016, more than half (58%) of children under the age of six months were exclusively breastfed in Ethiopia, while the rate of exclusive breastfeeding decreases with age, from 74% at 0-1 months to 36% at 4-5 months [8]. In addition to the low level of Exclusive Breastfeeding (EBF), inappropriate feeding strategies such as mixed feeding are often used. It is performed at a rate of up to 35.6% among HIV-positive mothers in some Ethiopian regions [9]. Mixed feeding is said to increase risk of infection significantly more than exclusive breastfeeding [19].

Nevertheless, the World Health Organization (WHO) recommends Exclusive Breast Feeding (EBF) by HIV-positive mothers in low- and middle-income countries throughout the postnatal period. Because of the high expense of Exclusive Replacement Feeding (ERF), as well as a lack of clean water and sanitation [10]. Furthermore, Exclusive Breast Feeding (EBF) for up to six months is a more effective strategy for reducing the risk of HIV transmission 3-4-fold compared to mixed feeding [11].

Following the revision of World Health Organization (WHO) Infant and Young Child Feeding (IYCF) recommendations in Ethiopia, there has been little research on Infant and Young Child Feeding (IYCF) status in the HIV context. Even the few studies conducted in the country to assess either breastfeeding or complementary feeding are limited; the study comprehensively assessed infant and young child feeding practices of mothers living with HIV in the study area generally in Ethiopia. This study aims to identify the current status of infant feeding practices and factors associated with the infant feeding practices of HIV-positive mothers attending Antiretroviral Therapy (ART/PMTCT) services in the Dire Dawa City administration.

2. Method and Material

2.1. Study Area and Period

The study was conducted in public health facilities in Dire Dawa City, Eastern Ethiopia, from January 01, 2023, up to June 30, 2023. Dire Dawa is one of the two federal administrative cities in Ethiopia, which is found in the eastern part of the country. Currently the Administration has six hospitals (2 governmental, 3 private, and 1 Ethio-Djibouti hospital), 16 health centers, 34 health posts, 32 private clinics, and about 95 pharmacies and drug shops. It has 9 urban and 38 rural kebeles. There are ten governmental health institutions that offer ART/PMTCT services. In the Dire Dawa city administration there were about 9815 HIV positives, and 440 of them

were pediatric children who were on ART in public hospitals (Unpublished report of the Dire Dawa health bureau, 2016). And 1211 mothers who have children 0-23 months are currently on follow-up [13].

2.2. Study Design

Institution based cross-sectional study design was employed.

2.3. Study Population

The study populations were HIV-positive mothers with children 0-23 years of age who had follow-up in selected health institutions during the study period. HIV-positive mothers having 0–23-month-old children who had follow-up in the ART/PMTCT unit in the selected health facilities were included in the study, while respondents who are mentally or physically disabled mothers, have serious maternal/caregiver illnesses, or come more than once at the time of data collection were excluded.

2.4. Study Variables

2.4.1. Dependent Variable

- Infant and young child feeding practice

2.4.2. Independent Variables

- Socio-demographic and Socio-economic factors (Maternal Age, marital status, maternal & husband occupation, Maternal & husband educational status, monthly income, sex of the child and age of child)
- Maternal knowledge on IYCF
- Maternal related factors (disclosure, maternal employment status)
- Child Health related factors (Infant mouth ulcer, HIV status of the infant and Any disease of the infant)
- Obstetric factors (Place of delivery, Mode of delivery, Parity, ANC follow up, number of antenatal visits, PNC service)
- Health workers related characteristics: Counseling practice

2.5. Operational Definitions

HIV- exposed infant or child: an infant or child born to a mother living with HIV until the infant or child is reliably excluded from being HIV infected [13, 14].

Infant feeding practices: are set of recommendations for appropriate feeding of new- born and children to prevent mother to child transmission of HIV. The responses are categorized as Recommended and Not Recommended [13, 14].

Recommended infant feeding practice: proportion of mothers who practiced either exclusive breast feeding or exclusive replacement feeding to their infants up to six months and started complementary foods at 6 months [6].

Not Recommended infant feeding practice: proportion of mothers who practiced mixed feeding up to six months of age or started complementary food below six months of the infant's age [6].

Exclusive breastfeeding: the infant receives only breast milk without any other liquids or solids, not even water, except for oral rehydration solution or drops or syrups of vitamins, minerals or medicines for the first 6 months [6].

Exclusive replacement feeding: The process of feeding a child who is not receiving breast milk with an infant commercial or home prepared milk, during the first six months until the child is fully fed on family foods or if the infant is less than 6 months up day of the interview. This should be with a suitable breast-milk substitute – commercial formula or home prepared formula with micronutrient supplements [13,14,15].

Mixed breast feeding: Breastfeeding with the addition of fluids, water, solid feeds and non-human milks in the first 6 months of age or if the infant is less than 6 months up to the day of the interview. And started complementary food below or above six months of the infant's age [13,14].

Complementary foods: any solid or semi-solid or soft foods which are given to the child [13,14].

Good knowledge: Respondent who scored greater than or equal to mean [16].

Poor knowledge: Respondent who scored below the mean [16].

2.6. Sample size determination

2.6.1. Sample Size Determination for the First Specific Objective

Sample size was determined by using single population proportion. The prevalence of infant feeding practice taken from study in Wolaita town which was 84% with confidence level of 95% marginal error of 5% and 10% for non-response rate [16].

$$n = \frac{(Z\alpha/2)^2 P (1-P)}{d^2}$$

Where: n = required sample size

Zα/2 = critical value for normal distribution at 95% confidence interval which equals to 1.96.

P = 84% (The prevalence of infant feeding practice taken from study in Wolaita town),

d = an absolute precision (margin of error 5%)

Non-response rate = 10%

$$n = \frac{(1.96)^2\ 0.84(1-0.84)}{(0.05)^2} = 207$$

n = 207 (by adding 10% non-response rate the sample size will be n=228)

The final sample size will be 228.

2.6.2. Sample Size Determination for the Second Specific Objective

Table 1: Sample size determination by factors using Epi-info to determine infant and young child feeding practices among HIV-positive mothers having children 0-23 months old in Dire Dawa city health facilities, Eastern Ethiopia, 2023.

S.N	Variables (factors)	Confidence Level %	Power %	Ratio un-exposed/ Exposed	% of un exposed group	AOR	% of exposed group	Sample Size
1	Information of mother on feeding practice (Adiss Ababa 2019)	95	80	1	56.5	1.77	87.4	78
2	Family support on infant feeding (Adiss Ababa 2019)	95	80	1	31.3	2.05	68.7	64

Based on the above sample size calculation and by comparing the two-sample size, the largest sample size which is calculated by single population proportion. So, 228 will be the final sample size in this study.

2.7. Sampling Technique and Procedure

Currently there are two hospitals and eight health centers are actively providing ART/ PMTCT services in Dire Dawa city administration. First Available flow statics in each facility obtained from each facility to get average monthly facilities visited numbers of mothers with child aged 0- 23 months and average monthly facilities visited numbers served as each facility's population size. Then two hospitals and two health centers will be chosen using simple random sampling (lottery method) out of all the governmental health institutions in Dire Dawa city administration.

Systematic random sampling was used to select study subjects during data collection by dividing the total average monthly facility visit numbers by the total sample size to get the K number, which is 419/228=2. Then every 3rd mother who visited health facilities was selected and interviewed until the estimated sample size was achieved from each facility. The mothers of children between the ages of 0 and 23 months who met the inclusion criteria were chosen by systematic random selection, and they were interviewed at each health facility until the

predicted sample size was reached. Simple random sampling was used to choose the mothers who have more than one kid (Figure 1).

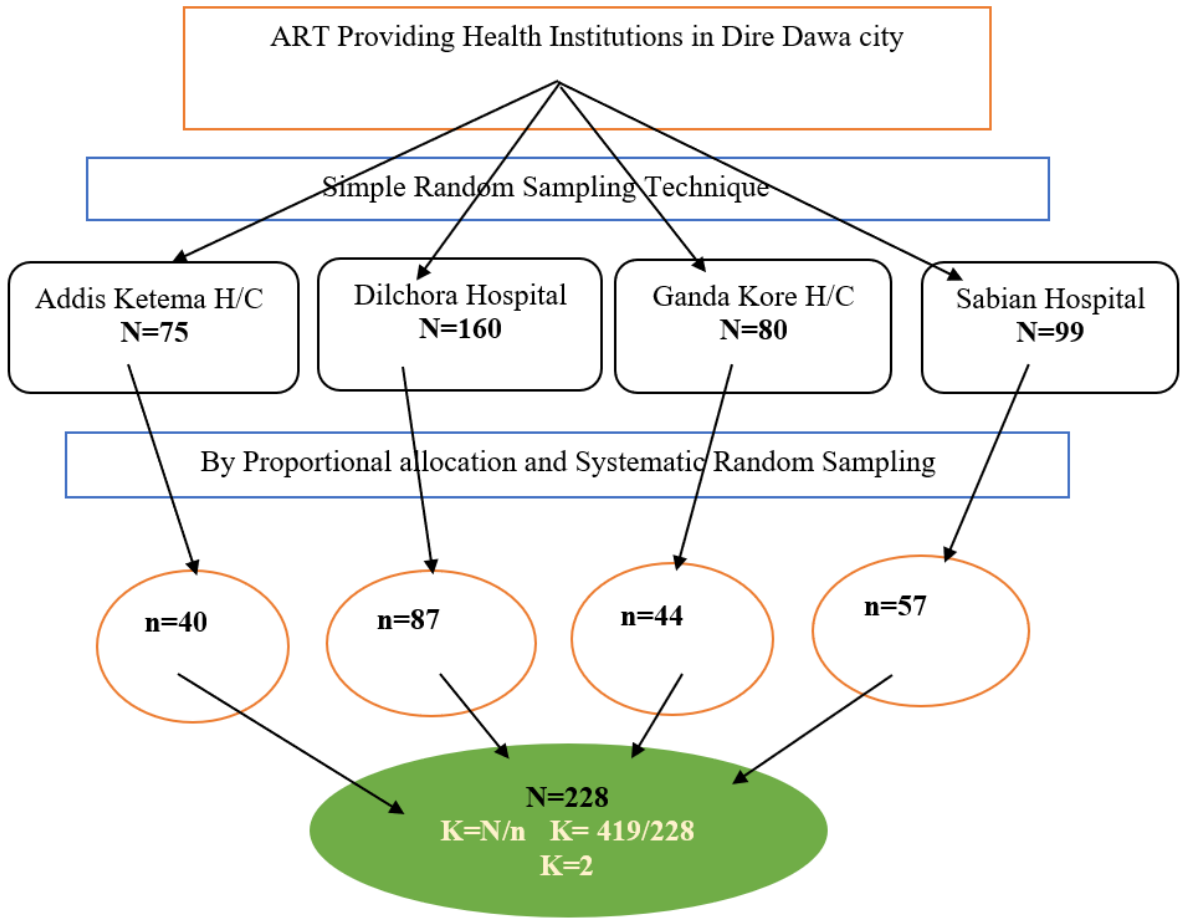

Figure 1: Schematic Presentation of Sampling Procedure for a study on infant feeding practices of HIV positive mothers attending ART/ PMCT services, in governmental institutions of Dire Dawa city administration, 2023.

2.8. Data Collection Tools and Procedures

Data was collected by recruiting HIV-positive mothers who came for their monthly appointment at selected health facilities for ART/PMTCT service follow-up using a structured interviewer-administered questionnaire adopted from different literatures [14,15]. The questionnaire was first prepared in English, then translated into the local language (Amharic, Af Somali, and Afan Oromo), then returned back to English by a language professional to check consistency. Four diploma nurse data collectors and one health officer supervisor were recruited from selected health facilities. Every day after data collection, questionnaires were reviewed and were checked for completeness by the supervisors and principal investigator.

2.9. Data Quality Assurance

A two-day training and orientation were given by the principal investigator for data collectors and supervisors on the objective and significance of the study, how to collect and record the

appropriate information, procedures of data collection techniques, the whole contents of the questionnaire, and keeping confidentiality. A pre-test was done on 5% of the sample size at the Dechatu health center before the actual survey, and important modifications were made on the basis of the findings. During the data collection time, close supervision and monitoring were made every day by the supervisor and principal investigator to ensure the quality of the data. At the end of each data collection day, the principal investigator also checked the completeness of the filled questionnaire and whether the recorded information made sense or not to ensure the quality of the collected data.

2.10. Data Processing and Analysis

The completeness of the questionnaire was checked before data entry, and the data was coded, entered, and stored in the computer using Epi Data version 3.1. Data was cleaned and analyzed by SPSS software version 25. Descriptive statistics were carried out using tables and figures. In order to investigate the association of independent variables with infant feeding practice, both bivariable and multivariable analyses were used. The variables that showed an association with the outcome variable at the bivariate analysis with a p-value <0.25 were entered into the final multivariable logistic regression to control for potential confounders. Model fitness was checked by using Hosmer and Lemeshow goodness of fit, and multicollinearity between dependent and independent variables will be checked to have a lesser variance inflation factor and by using standard error with lower values less than 2 that indicate more precise estimates. Crude and adjusted odds ratios along with 95% confidence intervals were estimated to assess the strength of the association, and a P value <0.05 was considered to declare the statistical significance in the multivariable analysis.

3. Results

3.1. Sociodemographic Characteristics

A total of 228 HIV-positive mothers having infants from three ART service-providing health centers and two hospitals under Dire Dawa were included in the study, making the response rate 100%. The mean ages of mothers and infants were (33±6.46) years and (10.7±5.84) months, respectively. One hundred nineteen (52.2%) of the mothers had a male child, and the majority of the mothers (71.5%) were married. Regarding maternal education, about one-third of the mothers had attended grades 9-12 and above college, and twenty-three (10%) of the respondents were unable to read and write (Table 2).

Table 2: Socio demographic characteristics of HIV positive mothers in 4 health facilities in Dire Dawa city, 2023.

Variable	Category	Frequency	Percent (%)
Age of the mother (n=228)	18-24	16	7.0
	25-29	68	29.8
	30-35	45	19.7
	>35	99	43.4
Age of the child (n=228)	Less than 5	56	24.6
	6 to 11	67	29.4
	12 to 17	66	28.9
	18 to 23	39	17.1
Sex of the child (n=228)	Male	119	52.2
	Female	108	47.4
Marital status (n=228)	Single	5	2.2
	Married	163	71.5
	Divorced	33	14.5
	Widowed	27	11.8
Mother's education (n=228)	Unable to read and write	23	10.1
	Able to read and write	54	23.7
	Grade 9-12	84	36.8
	College and above	67	29.4
Mother's occupation (n=226)	Government employee	66	28.9
	Private employee	61	26.8
	Daily laborer	11	4.8
	House wife	69	30.3
	House servant	6	2.6
	Merchant	15	6.6
Husband's education (n=226)	Unable to read and write	8	3.5
	Able to read and write	52	22.8
	Grade 9-12	91	39.9
	College and above	75	32.9
Husband's occupation (n=226)	Government employee	85	37.3
	Private employee	79	34.6
	Daily laborer	43	18.9
	Merchant	19	7.5
	others**	2	0.9
Monthly income (n=228)	<5000	79	34.6
	5000-10000	133	58.3
	>10000	16	7.0

3.2. Feeding Practice of HIV Positive Mothers

The study revealed that the majority (58.8%) of the mothers experienced exclusive breastfeeding, some practiced mixed feeding (21.5%), and a small proportion (19.7%) had undergone exclusive replacement feeding for their infants. In another expression, a very great number of the HIV-positive mothers experienced recommended feeding (78.5%), and the rest, non-recommended feeding options (21.5%) (Figure 2).

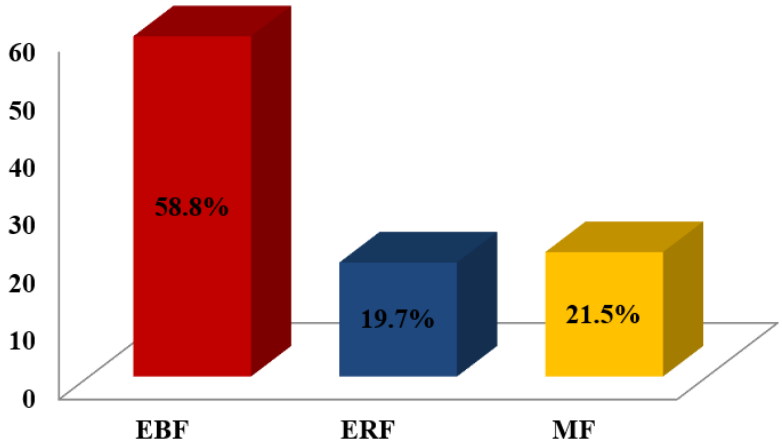

Figure 2: Infant feeding practice of HIV positive mothers attending ART service in governmental health institutions of Dire Dawa City, 2023.

From a total of 228 mothers, 190 (83.3%) had ever breastfed their infant, and 121 (53.1%) of them initiated the first breast milk less than one hour after birth. Fifty-six infants (22.4%) received food/fluid before the first breast milk. While 8 (4%) children received food/drink before the first breast milk. 172 (75.4%) were given foods/fluids other than breast milk until six months of age. The commonly given food for the infants in addition to breast milk was milk powder (28.4%). 25.4% of the respondents gave expressed milk; the majority of the respondents used a bottle, 32 (14.0%), while 25 (11.0%) used a cup.

Among the mothers who practiced ERF 45 (19.7%), most of them, 14 (63.63%), used commercial infant formula, and all of the respondents, 22 (100%), used a cup and spoon to provide these foods. About three-fourths (184, 80.7%) of the mothers introduced solid foods when the child was six months old. However, 61 (26.8%) and 167 (73.2%) initiated it before and after six months, respectively (Table 3).

Table 3: Infant feeding practice of HIV positive mothers attending ART services at 4 health institutions in Dire Dawa city, 2023, (n=228)

Variables	Category	Frequency	Percentage
Ever breast feed (n=228)	Yes	190	83.3
	No	38	16.7
Time of first initiation of breast milk (n=200)	Within first hour	121	53.1
	After first hour	99	43.8
Ever given food other than breast milk before 6 months (n=228)	No	172	75.4
	Yes	56	24.6
What food or fluid (n=177)	Milk powder	66	28.9
	Cow milk	51	22.4
	Porridge	31	13.6
	Adult food	20	8.8
	Yes	58	25.4

Ever given expressed milk(n=228)	No	170	74.6
Utensil used to (n=58)	Bottle	32	14
	Cup	25	11
Feeding practice (n=230)	Safe feeding	179	78.5
	Unsafe feeding	49	21.5
Reason for the feeding option (n=230)	Thinking it is safe for the baby	37	16.2
	Can't afford feeding replacement cost	23	10.1
	Fear of MTCT of HIV	15	6.5
	No counseling was done	18	7.9
	Health professional counseling	59	25.9
	Breast milk insufficient	15	6.6
Practiced replacement feeding (n=230)	Yes	56	24.6
	No	172	75.4
Started complementary feeding (n=230)	Yes	184	80.7
	No	44	19.3
Age complementary feeding started (n=178)	<6 month	61	26.8
	>6 month	167	73.2

Note: HIV – Human Immunodeficiency Syndrome, PMTCT - Prevention of Mother-to-Child Transmission

3.3.Knowledge of Mothers on Recommended Infant Feeding Options and PMTCT

Almost all 138 (60.5%) of the mothers knew that HIV could be transmitted from mother to child, out of which 121 (53.1%), 129 (56.6%), and 118 (51.8%) mothers answered that it could be transmitted during pregnancy, delivery, and breastfeeding, respectively. The majority, 191 (85.8%), of them heard about infant feeding options recommended for HIV-positive mothers, of which 171 (75.0%) heard from health professionals. Most, 183 (80.3%), of the mothers knew the recommended infant feeding practices, and when asked the recommended type of feeding option, 138 (60.5%) mentioned exclusive breastfeeding for the first 6 months (Table 4).

Table 4: Knowledge of HIV positive mothers on recommended infant feeding options and MTCT of HIV who attending ART services at 4 health institutions in Dire Dawa city, 2023.

Variables	Category	Frequency	Percentage
Knowledge on MTCT (n=230)	Yes	138	60.5
	No	90	39.5
When (n=228)	During Pregnancy		
	Yes	121	53.1
	No	107	46.9
	During Delivery		
	Yes	129	56.6
	No	99	43.4
	During Breast feeding		
	Yes	118	51.8
	No	110	48.2

Heard about recommended infant options for HIV positive mothers (n=230)	Yes	191	83.8
	No	37	16.2
Heard from (n=216)	Health professional	171	75
	Other	45	19.7
Knowledge on recommended infant feeding options for HIV positive mothers (n=216)	EBF	138	60.5
	ERF	38	16.7
	MF	49	21.5

Note: HIV – Human Immunodeficiency Syndrome, MTCT - Mother-to-Child Transmission

3.4. Mothers and infant health condition

About 60.9% of mothers had a CD4 count of >500 cells/mm³; more than half of the mothers, 125 (55.7%), were on stage 1 of HIV disease progress; most of them, 160 (70.2%), had not encountered any breast problems; and the majority, 204 (88.7%), answered that they had no long-term illness. Almost all, 165 (72.4%) of the infants, had not encountered any oral ulcer, and 173 (75.9%) mothers knew the HIV status of their child. Only 35 (15.4%) of them were positive. From 230 infants, 51 (22.2%) developed illness, out of which 17 (7.4%) encountered diarrhea (Table 5).

Table 5: Health condition of HIV positive mothers and infants attending ART services at 4 health institutions in Dire Dawa city, 2023.

Variables	Category	Frequency	Percent (%)
Disease progress (n=230)	Stage 1	127	55.7
	Stage 2	69	30.7
	Stage 3	32	14.0
CD4 count(cell/mm³) (n=230)	<200	3	1.3
	200_500	87	37.8
	>500	140	60.9
Ever encountered breast problem (n=228)	Yes	68	29
	No	160	70.2
Type of breast problem (n=68)	Breast engorgement	23	10.1
	Sore nipples	16	7.0
	Cracked nipples	13	5.7
	Burning and tingling	15	6.7
Infant's mouth ulcer (n=228)	Yes	63	27.6
	No	165	72.4
Do you know HIV status of your child (n=228)	Yes	173	75.9
	No	55	24.1
HIV status of your child (n=173)	Negative	139	61.0
	Positive	35	15.4

Note: HIV – Human Immunodeficiency Syndrome

3.5. HIV Disclosure

Most of 134 (58%) the mothers knew their HIV status before this pregnancy. 192(84.2%) of the mothers disclosed their HIV status out of which, majority of mothers, 119(59.0%) disclosed to their husband (Table 6).

Table 7: Disclosure status of HIV positive mothers attending ART services at 4 health institutions in Dire Dawa city, 2023, (n=228).

Variables	Category	Frequency	Percent (%)
The time HIV status is known (n=228)	Before pregnancy	134	58.0
	During this pregnancy	63	27.6
	During delivery	24	10.5
	After delivery	7	3.1
Disclosed your HIV status (n=228)	Yes	192	84.2
	No	36	15.8
For whom your HIV status disclosed	Husband	119	59
	Sister/brother	56	27
	Family	26	12

Note: HIV – Human Immunodeficiency Syndrome

3.6. Obstetric History

Out of 228 mothers, 117 (50.9%) and 74 (32.2%) had 1 and 2 children, respectively. Almost all 228 (99.1%) of them attended ANC follow-up in the last pregnancy, and out of them, 158 (68.7%) mothers had four ANC visits. The majority, 228 (99.1), of the mothers were counseled on infant feeding options. Out of which, 190 (82.6%), 93 (40.4%), 116 (50.4%), and 195 (84.8%) were counseled during ANC, delivery, PNC, and ART visits, respectively. Almost all of the mothers, 222 (97.4%), delivered at the health institutions via spontaneous vaginal delivery 144 (63.1%), and 78.1% of the total respondents attended PNC (Table 7).

Table 7: Obstetric history of HIV positive mothers attending ART services at 4 health institutions in Dire Dawa, 2023, (n=228)

Variable	Category	Frequency	Percent (%)
Number of children m (± SD) (n=228)	1.74±0.94		
Attending ANC (n=228)	Yes	175	76.8
	No	53	23.2
ANC visits m (± SD) (n=228)	4.87±1.857		
Counseled on infant feeding (n=230)	Yes	226	99.1
	No	2	0.9
Place of birth (n=228)	Health institution	222	97.4
	Home	6	2.6
Mode of delivery (n=228)	SVD	144	63.1
	CS	40	17.5
	Instrumental	44	19.3
Attending PNC (n=228)	Yes	178	78.1
	No	50	21.9

Note: ANC – Antenatal Care, PNC – Postnatal Care, SD – Standard Deviation

3.7. Counseling Practice of Health Workers

Almost all 188 (82.5%) of the mothers answered that the health worker explained to them the different feeding options. 207 (90.8%) of mothers answered that the health care providers told them about the advantages of breastfeeding, and 207 (86.1%) stated that they were counseled

on the disadvantages of breastfeeding, while 165 (72.4%) of the mothers were told about the advantages of replacement feeding. Some 125 (54.8%) of them had been told about the advantages and disadvantages of mixed feeding (Table 8).

Table 8: Counseling practice of health workers on infant feeding options among HIV positive mothers attending ART services at 4 health institutions in Dire Dawa city, 2023.

Variables	Category	Frequency	Percentage
Health care provider explains different feeding option (n=228)	Yes	188	82.5
	No	40	17.5
Health care provider discusses about advantage and disadvantage of breast feeding (n=230)	Yes	207	90.8
	No	21	9.2
Health care provider discusses about advantage and disadvantage of replacement feeding (n=230)	Yes	165	72.4
	No	63	27.6
Health care provider discusses about risk of mixed feeding (n=230)	Yes	125	54.8
	No	103	45.2

3.8. Factors affecting infant feeding practice

In the bivariate analysis, maternal education, knowledge of mothers on MTCT and infant feeding, number of ANC visits, those mothers who disclose their HIV status, mothers who get the information about infant feeding, postnatal visits, stage of HIV, place of birth, mode of delivery were found to be significantly associated with infant feeding practice. However, in the multivariable logistic regression, knowledge of mothers on MTCT and infant feeding and those mothers who disclose their HIV status, stage of HIV, and mode of delivery were significantly associated with infant feeding practice. HIV-positive mothers who had knowledge of mothers on MTCT and infant feeding were 7.69 times more likely to practice recommended infant feeding practices as compared to their counterparts (AOR (95% CI): 7.69 (1.69, 34.89)). Those HIV-positive mothers who have greater than 4 ANC follow-ups and those HIV-positive mothers who disclose their status to their husband were 5.37 and 18.59 times more likely to practice recommended infant feeding (AOR (95% CI): 5.37 (0.76, 38.01) and [AOR (95% CI): 18.59 (1.80, 23.52)], respectively.

Those HIV-positive mothers who are at Stage 3 HIV status and who give delivery in CS were 5.55 and 7.88 times more likely to practice recommended infant feeding (AOR (95% CI) 5.55 (1.01, 30.43) and (AOR (95% CI) 7.88 (1.83, 33.94)) compared to those who are at Stage 1 or Stage 2 and who had vaginal delivery, respectively (Table 9).

Table 9: Factors affecting infant feeding practices among HIV positive mothers attending ART service in governmental institutions of Dire Dawa city, 2023.

Variables	Category	Infant feeding practice		COR (95% CI)	AOR (95% CI)
		Recommended	Non-recommended		
Maternal educational status	Unable to read and write	7 (30%)	16 (70%)	1	1
	Able to read/write	20 (37.1%)	34 (62.9%)	2.49 (0.82,7.59)	1.94 (0.53,70.54)
	Grade 9-12	12 (14.3%)	72 (85.7%)	3.35 (1.41,8.02)	1.20 (0.07,20.58)
	College & above	10 (14.9%)	57 (80.1%)	0.95 (0.38,2.36)	0.01 (0.01,0.58)
Knowledge of mothers on MTCT and infant feeding	Good	126 (91.3%)	12 (8.7%)	7.33 (3.55,15.14)	7.69 (1.69,34.89)
	Poor	53 (58.9%)	37 (41.1%)	1	1
No of ANC visit	<4	3 (3.5%)	83 (96.5%)	1	1
	5 to 8	15 (16.7%)	75 (83.3%)	5.53 (1.54,19.87)	5.37 (2.76,38.01)
	>8	31 (59.6%)	21 (40.4%)	40.84 (11.38,46.62)	23.46 (3.95,39.25)
For whom you disclose	Husband	100 (84%)	19 (16%)	1.59 (1.72,3.51)	6.87 (0.89,17.7)
	Sister or brother	43 (81.2%)	13 (23.2%)	0.21 (1.27,1.51)	15.59 (1.23,91.20)
	Parents	25 (96.1%)	1 (3.9%)	1	1
Where did you get the information	Health professional	152 (88.9%)	19 (11.1%)	5.85 (2.73,12.49)	1.75 (0.18,16.92)
	Others	26 (57.8%)	19 (42.2%0	1	1
PNC	Yes	146 (82%)	32 (18%)	2.35 (1.17,4.73)	0.38 (0.01,1.69)
	No	33 (66%)	17 (34%)	1	1
Stage of HIV	Stage 1	28 (22%)	99 (78%)	1	1
	Stage 2	9 (13%)	60 (87%)	0.53 (1.24,1.20)	0.66 (0,14,3.18)
	Stage 3	12 (37%)	20 (62.5%)	2.12 (1.93.4.86)	5.55 (1.01,30.44)
Place of birth	Health Institution	177 (79.7%)	45 (19.8%)	2.12 (1.93.4.86)	0.33 (0.01,15.48)
	Home	2 (33.3%)	4 (66.6%)	1	1
Mode of delivery	SVD	112 (77.8%)	32 (22.2%)	1	1
	CS	38 (95%)	2 (5%)	0.18 (1.04,0.81)	0.34 (1.03,4.09)
	Instrumental	29 (65.9%)	15 (34.1%)	1.81 (1.87,3.78)	7.88 (1.83,33.94)
Counseling by health professional	Yes	24 (12.7%)	164 (87.2%)	1	1
	No	25 (62.5%)	15 (37.5%)	0.08 (0.04,0.09)	0.04(1.08,2.12)

4. Discussion

This study revealed that the prevalence of HIV-positive mothers practicing exclusive breastfeeding (EBF) for the first six months of age was 58.8%, which is higher than the study done in Nigeria (14.8%), South Africa (5%), Addis Ababa, Ethiopia (30.6%), and the Southern Nations, Nationalities, and Peoples' Region (56.3%). It is in line with Cameroon (78%) and Debre Markos (77.3%) [17,18,19,18,3,14]. This may be due to mothers thinking EBF is safe for the baby, and the majority of the respondents were counseled by health professionals. However, it is lower than the study done in Shashemene (96.6%) and Gondar (83.3%). This discrepancy

may be due to mothers expecting that breast milk only is not sufficient for the infant and adding other food [20, 21].

The prevalence of HIV-positive mothers practicing exclusive replacement feeding (ERF) for the first six months was 19.7%, which is higher than that of SNNP region (8.1%), Shashemene (2.7%), Mekelle (3.4%), & Debre Markos (8.5%) [9,20,22,14]. The reason for the difference in this study may be fear of mother-to-child transmission of HIV (87.5%), and the mother was sick. However, the result is lower than the study done in Nigeria (26%), South Africa (38.7%), Kenya (41%), Addis Ababa, Ethiopia (46.8%), and South and North Wollo, Ethiopia (95.1%) [17,18,19,23,24]. This discrepancy may be due to the current cost inflation, which might have been partly responsible for this minimal exclusive breastfeeding practice because they could not afford to buy formula food.

In this study, 21.5% of the respondents practiced mixed feeding. This is lower than the study done in South Africa (30.5%), Kenya (42.2%), and SNNPR (35.6%) [18,25,18]. The reason may be that in this study the majority of the respondents were counseled about different recommended feeding options during ANC, delivery, PNC, and ART follow-up. It was, however, higher than the 4%, 7.8%, 0.7%, and 6.3% reported in Kenya, Addis Ababa, Shashemene, and Mekelle, respectively [19,20,22,23]. The major reasons for this study are the mother's expectation that breast milk is insufficient for the infant and fear of stigma and discrimination. This study also identified that, from those mothers who ever breastfed, 83.3% timely initiated the first breast milk within the first hour of delivery. This finding is better than a previous study done in Addis Ababa (80.4%). This might be due to all the deliveries being in the health institution (97.4%) and more than half of the mothers having normal spontaneous vaginal delivery deliveries (63.1%), so no delay of attachment with their babies might also be the possible explanation [19,26].

In multivariable analysis, mothers' knowledge of the recommended infant feeding options and PMTCT made them 7.7 times more likely to practice recommended feeding options. This is lower than the study done in Shashemene. This discrepancy might be because in this study most of the respondents were illiterate [20]. Those who had more than four regular ANC follow-ups were 5.4 times more likely to follow recommended infant feeding habits than their counterparts. A possible explanation is that ANC tracking can provide much information through direct communication with the healthcare provider. Those who disclosed their HIV status to their husband were 6.8 times more likely to follow the recommended infant feeding

than those who disclosed to their family. A possible reason is that you know your HIV status, treatment plan, and prognosis. Then you will be trusted and well taken care of by the healthcare providers. Mothers who are not counseled on infant feeding options by health professionals were found to be 4% less likely to practice recommended infant feeding as compared to their counterparts.

Finally, WHO clinical stage was also significantly associated with feeding practice. Those mothers who were in WHO clinical stage 3 were 5.5 times more likely to practice appropriate breastfeeding as compared to those who were in WHO clinical stage 1 and above. This may be due to fear of HIV transmission as viral load increases, WHO stage also increases, and then the risk of transmission to the infant also increases.

5. Conclusion

The present study identified a high number of the HIV-positive mothers who practiced the recommended feeding. Knowledge, ANC, clinical stage, and CS delivery were factors associated with infant feeding practice. ART service providers in health institutions in Dire Dawa city would be better off strengthening the work on creating awareness towards safe feeding practices among HIV-positive mothers during antenatal care, ART follow-up, and postnatal care. Health extension workers should encourage HIV-positive mothers to deliver at health institutions to get essential newborn care for their infant. Further research should be conducted by including more study sites to allow a more robust analysis.

Abbreviations

ANC: Antenatal Care, AOR: Adjusted Odd Ration, ART: Anti-Retroviral Treatment, EBF: Exclusive Breastfeeding, HIV: Human immunodeficiency Syndrome, IYCF: Infant and Young Child Feeding, PNC: Postnatal Care, PMTCT - Prevention of Mother-to-Child Transmission, TICF: Timely Initiation of Supplementary Feeding, WHO: World Health Organization.

Authors' Contributions

All authors made substantial contributions from the start of the research idea to proposal development, data collection, analysis and interpretation of data, and preparation of the manuscript. All authors participated in proposal development, data analysis, and preparation of the manuscript for publication. All authors read and approved the final version of the manuscript.

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Ethical Approval

The study was approved by the Institutional Review Board (IRB) of Dire Dawa University. Permission was obtained from the participating health institutions. Participation was voluntary, and all participants provided written informed consent after being informed of the study's purpose, procedures, and their right to withdraw at any time. Confidentiality was maintained, and the study adhered to the ethical principles of the Declaration of Helsinki.

Competing of Interest

The authors declare that they have no competing interests.

Availability of Data and Materials

All the necessary data for this study were included in this manuscript.

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