Colostrum feeding practice and associated factors among mothers attending child immunization clinic at public healthcare facilities in Dire Dawa City, Eastern Ethiopia

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Abstract

Background: Colostrum is yellow to orange colored milk produced during a first few days of lactation and it is rich in nutrients and antibodies that have great role in health of the new born baby. Despite the World Health Organization recommends that every new born baby has to feed breast milk with colostrum within one hour of delivery; poor colostrum feeding practice is still a common problem in Ethiopia.

Objective: Assess the practice of colostrum feeding and related factors among women attending a child immunization clinic in governmental health facilities in Dire Dawa City, Eastern Ethiopia, in 2022.

Method: Institution based cross-sectional study was conducted from February 1–30/2022 in governmental health facilities of Dire Dawa city administrative among 292 mothers with baby less than or equal to 12 months. The data were collected by systematic random sampling technique and analyzed using Statistical Package of Social Sciences 25.0 version. Bivariate and multivariate logistic regression analyses was employed to estimate the crude and adjusted odds ratio with confidence interval of 95% and P value of less than 0.05 considered statistically significant.

Result: 68.8% (95% CI: 63.4-74.3) of the mothers had good colostrum feeding practice. Living in an urban area (AOR=2.52, 95% CI=1.08-5.88), having at least a secondary education (AOR=2.79, 95% CI=1.12-6.98), having visited an antenatal clinic in the past (AOR=3.12, 95% CI=1.12-9.21, receiving counseling on when to start breastfeeding (AOR=2.59, 95% CI=1.02-6.59), receiving colostrum feeding counseling (AOR=2.65, 95% CI=1.12-6.30), having a professional attend the birth (AOR=3.20, 95% CI=1.23-8.31), getting information from a professional (AOR=3.89, 95% CI=1.54-9.82), and having good knowledge of colostrum feeding (AOR=3.53, 95% CI=1.56-7.96) were found to be associated with practice of colostrum feeding.

Conclusion: In the present study, even if more than two-thirds of mothers have good practice of colostrum feeding, still its gap is wide with WHO recommendation on timely initiation of BF, with colostrum of more than 80%. Promoting antenatal care visits and maternal education on breastfeeding is recommended for the increasing colostrum feeding practice of the mothers.

Keywords; Colostrum, Dire Dawa, Milk, Practice

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1. Introduction

Colostrum is the first milk or a viscous, yellow fluid that mammals' mammary glands create in the final stages of pregnancy, right before giving birth, and throughout the early stages of breastfeeding. Although colostrum has less lipids and potassium than regular milk, it is much richer in proteins, carbs, vitamin A, and salt chloride. Because colostrum contains nutrients and antibodies that are essential in the protection of infections and nutritional issues, it is regarded as a baby's first immunization and has a good impact on the prevention of childhood sickness and malnutrition. Additionally, it promotes the first bowel movement, which aids in clearing excess bilirubin, which is produced in huge amounts during birth, and prevents jaundice [1-4].

The World Health Organization (WHO) and United Nations Children's Emergency Fund (UNICEF) advised mothers to exclusively breastfeed their infants for the first six months of their lives. They also advised against using bottles, teats, or pacifiers, and to continue breastfeeding until 24 months or later [3, 5].

Despite the recommendations of the WHO, UNICEF, and Ethiopian Infant and Young Child Feeding (EIYCF) guidelines, many mothers in the country continue to discard colostrum because they view it as heavy, dirty milk, harmful to children's health, lacking in nutrition, or as bad karma for the family and the infant given other pre-lacteal foods other than mother's milk in the first few days after birth [6-10].

Negligent colostrum feeding practices can raise a newborn's risk of infection, stunting, wasting, underweight, and death [11-16]. Therefore, the purpose of this study was to evaluate the colostrum feeding practice (CFP) and its associated factors in the government health facility of Dire Dawa Administrative City (DDAC), Eastern Ethiopia.

2. Methods and materials

2.1. Study area and period

The study was conducted from February 1–30, 2022, in governmental health facilities in Dire Dawa City. Dire Dawa city is located about 515 km from Addis Ababa, the capital city of Ethiopia. The city has ten public health institutions, of which two are hospitals and eight are health centers [17].

2.2. Study design

An institutional-based cross-sectional study design was used.

2.3. Source population and study population

All moms who visited the child immunization clinics at the governmental health facilities in DDAC during the study period served as the study's source population. All moms who attended child immunization clinics in particular governmental health institutions during the study period made up the study population.

2.4. Inclusion and exclusion criteria

All mothers who had baby less than or equal to twelve months and attended child immunization clinic at selected governmental health facilities, of DDAC were included.

2.5. Sample size determination

Based on research done in North West Ethiopia, where the prevalence of colostrum feeding practice was estimated to be 91.2% (38), the sample size was computed using a single population proportion formula while taking the following assumptions into account. Z value at alpha=0.05, or 1.96, is the crucial value for a normal distribution at a 95% confidence level. P = Expected Level of Practice of Colostrum Feeding, d = Margin of Error, 0.05. Therefore,

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

$$= \frac{(1.96)^2 \, (0.912) \, (1-0.912)}{(0.05)^2} = 123$$

By considering 10% non-response rate and design effect 2 = 123 *10/100 = 123+13 = 136*2=272.

2.6. Sampling technique

The study population was chosen using a multi-stage sampling procedure. The administrative city's public health facilities are divided into hospitals and health centers based on the ten public health facilities that DDAC possesses (two hospitals and eight health centers). Then one hospital and three health centers were chosen using a straightforward random sampling procedure. Based on each health facility's quarterly extended program of immunization (EPI) unit flow, the total sample size was proportionally distributed for each of the administrative city's health facilities.

Based on EPI registration books at all chosen health institutions, the average number of mothers who visited an EPI unit quarterly was 1405. In the Dilchora Referral Hospital (DCRH), Genda Kore Health Center (GKHC), Gende Gerada Health Center (GGHC), and Goro Health Center (GHC), respectively, there were 570, 310, 251, and 274 mothers who visited the EPI unit on a quarterly basis.

After proportionate allocation, the overall sample size for DCRH, GKHC, GGHC, and GHC was 119, 64, 52, and 57 mothers, respectively. Each facility's eligible mothers were chosen using a methodical random sampling process. By dividing the number of mothers who visited an EPI unit on a monthly basis by the sample size, the sampling interval or Kth units (1405/292 = 5) was calculated. The first Kth units in each healthcare facility were drawn at random to determine the starting unit
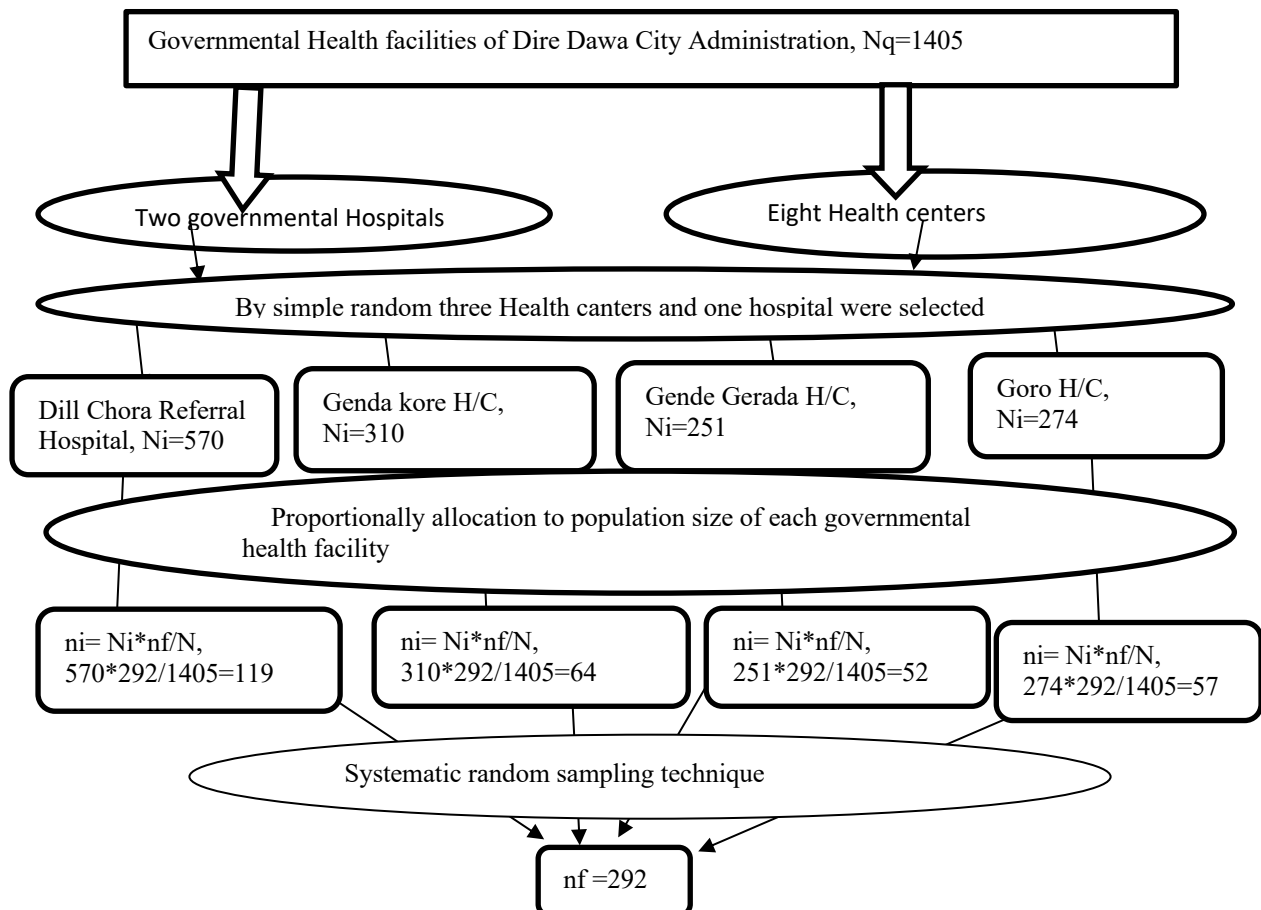

Figure 1: Schematic presentation of sampling procedure

Hint: Nq=Total numbers of mothers who visited EPI unit in selected health facilities of DDAC,

Ni= Total numbers of mothers who visited EPI unit in each governmental health facility at DDAC,

ni =sample size in each facility, **nf**=the total sample size in study site.

Operational definition

Colostrum: is the yellowish breast milk during the three days following delivery [18] .

Practice: The behavior, habit or custom of mothers of infants on CF to their current infants [19].

Good practice: Participant who responds for $\geq 60\%$ of practice related questions[19].

Poor practice: Those participant who answer <60% of practice related questions [19].

Knowledge: In this study, knowledge refers to mothers' understanding of colostrum breast milk and was assessed by mothers' responses to knowledge-related questions[19].

Good knowledge: Those mothers who answer ≥ 60% knowledge related questions[32]..
Poor knowledge: Those mothers who answer < 60% knowledge related questions [19].

2.7. Study variables

Dependent variable: Colostrum feeding practice

Independent factors: Age, place of residence, marital status, religion, level of education, line of work, partner's level of education, and who she was living with are sociodemographic characteristics. Obstetric and reproductive factors: Parity, ANC visits, TIBF, CF, and BF counseling during ANC visits, delivery site, birth attendant, mode of delivery, and BF counseling following delivery. Factors relating to knowledge and practice: the information's source.

2.8. Data collection tool

Data was gathered using a structured interviewer-administered questionnaire that was adjusted to the local context and derived from pertinent literatures. An expert in this language initially developed the questionnaires in English, after which they were translated into Amharic and then back into English to ensure uniformity. The questionnaire asked about socio demographic traits, obstetric and reproductive traits, as well as questions about knowledge and practice. Correct answers received a score of +1, while incorrect ones received a score of –1. Each mother's score was added up and put into categories.

2.9. Data collection method

Data collection involved using a standardized interviewer-administered questionnaire that had been pre-tested. Four BSc midwives, a nurse, and a public health officer collected the data under the direction of a public health officer.

2.10. Data quality control

The instrument was pretested before the actual data collection, and the data were gathered by skilled data collectors. Prior to the actual data collection period, the questionnaire was pre-tested on 5% (15) of the moms who attended the child immunization clinic at Sabian General Hospital but were not included in the study. The investigator gave two days of training to the supervisors and data collectors. Additional adjustments were made based on the findings of the pre-test after the necessary modifications and corrections were made to standardize, ensure, and guarantee its reliability and validity. During data collection, data collectors verified that the data were comprehensive, and supervisors examined the data on a daily basis to ensure it was.

2.11.   Data processing and analysis

The data were entered into Epi data 4.2, edited and cleaned for inconsistencies, missing values and outliers, then exported to SPSS version 25.0 for analysis. During analysis all explanatory variables which have significant association in bivariate analysis with P value

<0.20 was entered into a multivariate logistic regression model to get adjusted odds ratio (AOR) and those variables with 95% of confidence intervals (CI) and a P value of < 0.05 was considered as statistically significance with CFP. Multi collinearity test was done using variance inflation factor and no collinearity exists between the independent variables. The model goodness of the test was checked by Hosmer- Lem show goodness of the fit and the p-value of the model fitness of the test was 0.780. Frequency tables, and descriptive summaries were used to describe the study variables.

3. Results

3.1.Socio demographic characteristics of child immunization clinic attendees

A total of 292 mothers participated in the study with a response rate of 100%. The mean age of the child immunization clinic attended mothers was 24.72 years with (±SD=4.55) ranging from 15-40 years. Of these, 134 (45.9%) of them found in the age group of 20-25 years. Majority of the mothers (80.5%) lived in urban and 278 (95.2%) of them were married. Of the child immunization clinic attendees 151 (51.7%) of them were Muslim religion followers. From the total child immunization attended mothers115 (39.4%) of them had primary educational level and 165 (56.5%) of them were house wife. Regarding to their partner educational level 87 (31.3%) of them had secondary educational level.

3.2.Reproductive and obstetric characteristics of the child immunization clinic attendees

In this study, 218 (74.7%) of the mothers were multigravida and 238 (81.5%) of them had history of ANC visit in their most recent pregnancy. Among mothers who had history of ANC visit, 195 (81.9%) of them were counselled on timely initiation of breast feeding (TIBF) during your ANC visits. One hundred seventy-six (73.9%) of them were counselled on CF and 189 (79.4%) counselled on exclusive breast feeding (EBF) for the first six months after delivery during their ANC visit. From the total child immunization clinic attended mothers 248 (84.9%) of them gave child birth at health institution and 253 (86.6%) of the birth were attended by health professional. Two hundred thirty-two (79.5%) of the mothers were counselled about BF immediately after delivery and 255 (87.3%) of them were gave child birth vaginally.

3.3.Knowledge of the study participants on colostrum feeding

According to the above predetermined criteria, from total study participants 187 (64.0%) mothers had good knowledge about CF., and most of the mothers obtaining their information on colostrum from health professional (n=149, 51.1%).

3.4. Practice of study participants towards colostrum feeding

In our study, 259 (88.7%) of the mothers gave colostrum to their baby within three days after birth, while 33 (11.3%) did not provide colostrum and it may cause abdominal discomfort and diarrhea for the baby 13 (39.4%) was their mean reason not feeding colostrum. Of the participants 43 (14.7%) them were gave PLF to their baby and majority of them 24 (55.8%) gave infant formula milk. Two hundred ten (71.9%) of the mothers were put the baby to the breast immediately within an hour and 203 (69.5%) of them were start colostrum with breast milk feeding within an hour, while 287 (98.3) of the mothers were continued to give colostrum with breast milk within the first three days of delivery. Overall, in our study, according to the predetermined criteria, 201 (68.8%) mothers had good practice of CF.

Table1: Colostrum feeding practice of the mothers who attended child immunization clinic in governmental health facilities of Dire Dawa administrative city, Eastern Ethiopia, 2022, (n=292).

Variable		No. (%)
Did you feed colostrum to the baby after birth	Yes	259 (88.7)
	No	33 (11.3)
If no, reason for not feeding colostrum (n=	Causes abdominal discomfort	10 (30.3)
	Maternal illness	5 (15.2)
	Not clean	8 (24.2)
	My breast has no breast milk	6 (18.2)
	Baby unable to suck	4 (12.1)
PLF	Yes	43(14.7)
	No	249 (85.3)
Reason for PLF (n=43)	Cultural practice	17 (39.5)
	Not having enough milk	14 (32.6)
	Breast pain	7 (16.3)
	I was sick	5 (11.6)
Types of PLF (n=43)	Infant formula milk	16 (37.2)
	Cow's milk	11 (25.6)
	Plain water	7 (16.3)
	Sugar solution	5 (11.6)
	Honey	4 (9.3)
How long after delivery did you put the b **to the breast**	Immediately within an hour	210 (71.9)
	After an hour	82 (28.1)
The time mothers started BF with colostr	Within an hour	203 (69.5)
	Within 6 hours after delivery	48 (16.4)
	Within 24 hours after delivery	12 (4.1)
	After discard some of colostrum milk	19 (6.5)
	After white milk appeared	10 (3.4)
Did you gave the baby breast milk within first three day after delivery	Yes	287 (98.3)
	No	5 (1.7)
Practice of CF	Good practice	201 (68.8)
	Poor practice	91 (31.2)

PLF* pre lacteal feeding, CF*colostrum feeding

3.5. Factors associated with colostrum feeding practice

In bivariate analysis variables which have significant association with a P value of <0.20 were age, residency, educational level of the mothers, parity, history of ANC visit, counselling on; TIBF, CF and EBF as well as place of deliver, giving child birth with the assistant of health care provider, counselling on BF after delivery, source of information and good knowledge of CF. In a multivariate logistic regression analysis; Living in an urban area (AOR=2.52, 95% CI=1.08-5.88), having at least a secondary education (AOR=2.79, 95% CI=1.12-6.98), having visited an antenatal clinic in the past [AOR=3.12, 95% CI=1.12-9.21), receiving counseling on when to start breastfeeding (AOR=2.59, 95% CI=1.02-6.59), receiving colostrum feeding counseling (AOR=2.65, 95% CI=1.12-6.30), having a professional attend the birth (AOR=3.20, 95% CI=1.23-8.31), getting information from a professional (AOR=3.89, 95% CI=1.54-9.82), and having good knowledge of colostrum feeding (AOR=3.53, 95% CI=1.56-7.96) were found to be associated with practice of colostrum feeding .

Table 2: Logistic regression analysis for colostrum feeding practice among mothers who attended child immunization clinic in governmental health facilities of Dire Dawa administrative city, Eastern Ethiopia, 2022, (n=292).

Variable	Practice of CF		COR (95%-CI)	AOR (95%-CI)	P- value
	Good	Poor			
Age, y					
15-19	10	9	1	1	
20-25	95	39	2.19 (0.83-5.81)	1.77 (0.46-6.79)	0.403
26-30	73	33	1.99 (0.74-5.36)	2.87 (0.73-11.26)	0.131
>=31	23	10	2.07 (0.64.6.65)	2.11 (0.43-10.41)	0.357
Residency					
Rural	25	32	1	1	
Urban	176	59	3.82 (2.09-6.96)	2.52 (1.08-5.88)	0.033*
Educational level					
No-formal education	21	26	1	1	
Primary education Secondary and above	79	36	2.72 (1.35-5.46)	2.36 (0.93-6.01)	0.072
	101	29	4.31 (2.12-8.75)	2.79 (1.12-6.98)	0.028*
Parity					
Primipara/1	48	36	1	1	
Multipara/>=2	153	55	2.09 (1.23-3.55)	1.30 (0.60-2.79)	0.506
History of ANC visits					
No	12	42	1	1	
Yes	189	49	13.50 (6.61-27.58)	3.21 (1.12-9.21)	0.030*
Counselled on TIBF					
No	38	60	1	1	
Yes	163	31	8.30 4.75-14.52)	2.59 (1.02-6.59)	0.046*
Counselled on CF					
No	52	64	1	1	
Yes	149	27	6.79 (3.92-11.77)	2.65 (1.12-6.30)	0.027*
Counselled on EBF					
No	49	53	1	1	
Yes	152	38	4.33 (2.55-7.33)	0.56 (0.21-1.50)	0.252
Place of delivery					
Home	22	22	1	1	
Health institution	179	69	2.59 (1.35-4.98)	0.68 (0.05-9.23)	0.772
Birth attendant					
TBA/family					
Health professional	19	20	1	1	

	182	71	2.70 (1.36-5.35)	3.20 (1.23-8.31)	0.017*
Counselled on BF after delivery					
No	29	31	1	1	
Yes	172	60	3.06 (1.71-5.50)	1.85 (0.59-5.76)	0.290
Source of information					
Family/friends	34	38	1	1	
Mass media	43	24	2.01 (1.01-3.96)	2.47 (0.99-6.15)	0.052
Health professional	124	29	4.78 (2.58-8.83)	3.89 (1.54-9.82)	0.004*
Knowledge on CF					
Poor	49	56	1	1	
Good	152	35	4.96 (2.92-8.44)	3.53 (1.56-7.96)	0.002*

*Indicates that (Significant at a P-value of <0.05)
TIBF*timely initiation of breast feeding, TBA*traditional birth attendant*breast feeding.

4. Discussion

This study shows that, 68.8% with (95% CI: 63.4-74.3) of mothers had good practice of CF. This finding was in line with the studies conducted in Bangladesh, Afambo District, Afar (65.1%), and Harar Town Governmental Hospital (70.0%) (63%) [20-22]. The practice of CF was lower than a studies conducted in different countries: teaching hospital in Nepal (80%), Kamrup, India (79.0%), and Bangladesh (75.92%) [23-25]. The practice of CF was higher than the studies conducted in Utarkhand, India (8.0%), South Sudan (61.2%), and Egypt (41.4%) (68) [26-28]. The difference may attribute to the studies setting and the difference in cultural practice of the study population.

The report from this study concluded that socio-demographic characteristics, obstetric and reproductive, and knowledge level of mothers on colostrum were significantly associated with good practice of CF. Living in urban were increased the odds of having good Practice of CF 2.52 times. This finding was supported by studies done in Amibara district & Teaching Hospital in Nepal [23, 29].

Mothers who had secondary and above educational level were 2.79 times more likely had good practice of CF. This finding was supported by study done in Amibara district [29].

Having history of ANC visit in their most recent pregnancy was increased the odds of having a good practice of CF 3.21 times. There was a supporting report: based on a systemic review and meta-analysis in Ethiopia, mothers having ANC visits were 72.6% less likely to discord colostrum than mothers who did not have ANC visits during pregnancy. This shows that ANC visits helps mothers to increase the awareness of the mothers on CF. This might be having ANC visits could offer a good educational channel regarding neonatal feeding and the importance of colostrum to the neonate with health professionals [30].

Mothers who are counselled on TIBF were 2.59 times more likely had good practice of CF. This finding was supported by study done in Wolaita Sodo city, Ambo, Gozamen district and Kombolcha

[31-34]. This shows that lack of counseling on the importance of TIBF with colostrum make the mothers to initiate BF later, they would have more time for infant feeding malpractices like colostrum avoidance.

Giving child birth with the assistant of health professional were increased the odds of having good practice of CF. This finding was supported by studies done in rural pastoralist communities of Afar, Motta town and Wolaita Sodo city [31, 35, 36]. The possible explanation for this might be due to that giving child birth at health institution with assistant of health professional could increase the chance of getting counselling on early initiation of BF with colostrum than those who gave child birth at home with the assistant of TBA or family.

The study participants who got information about CF from health professionals were nearly four times more likely had good practice of CF. In this study more than half (51.1%) of the mothers received information on CF from health professionals and this shows that the information on colostrum obtained from health professional is more accurate and the mothers have good level of information on CF than those who obtained the information from other sources. This is supported by a study conducted in Aksum town [37].

Mothers who were knowledgeable with CF were more likely to have experience with CF. An investigation carried out in Selected Woreda of South Nation Nationality of People Regional State of Ethiopia corroborated this conclusion [38]. These supporting evidences revealed that improving the mother's knowledge on colostrum increase the likelihood of having good practice of CF.

Limitation of the Study

There could be recall bias regarding the time of initiating breast feeding.

5. Conclusion

In our study, women with infants younger than 12 months have low CFP. Residency, educational level, prior ANC visits, counseling on CF and TIBF during ANC visits, childbirth with a medical professional present, receiving information about colostrum from a medical professional, and having a thorough understanding of CF were important predictors of CFP. Even though more than two thirds of moms practice CF well, there is still a significant difference between this and the WHO recommendation for timely BF initiation with colostrum levels of more than 80%.

6. Recommendations

This study suggests that the subjects in this study should practice better colostrum feeding. We would want to suggest that the Federal Ministry of Health amend the EDHS to add indicators for colostrum feeding. In addition, training and retraining health professionals to promote and counsel mothers on importance of colostrum feeding is recommended to increase practice of colostrum

feeding. Maternal health booklets that highlight the importance of colostrum feeding should be designed and distributed by Dire Dawa city administration health office. The community should be informed and educated about the value of colostrum breast milk and the encouragement of ANC visits and institutional deliveries by health care experts. Since improved maternal education has been demonstrated to be positively connected with favorable outcomes for children, education officials should work to increase women's education

Abbreviations and acronyms

ANC: Ante Natal Care; AOR: Adjusted Odd Ratio; BF: Breast Feeding; CFP: Colostrum Feeding Practice; CF: Colostrum Feeding; CI: Confidence Interval; DDCA: Dire Dawa Administrative city; DCRH: Dilchora Referral Hospital; EBF: Exclusive breast feeding; EDHS: Ethiopian Demographic Health Survey; EIYCF: Ethiopian Infant and Young Child Feeding; EPI: Expanded Program of Immunization; PLF: Pre-Lacteal Feeding; PNC: Post-Natal Care; TBA: Traditional Birth Attendant; TIBF: Timely Initiation of Breast Feeding; UNICEF: United Nation Children's Emergency Fund; WHO: World Health Organization.

Ethical Consideration

Ethical clearance was obtained from the Institutional Review Board of Bahir Dar University. Each mother received a detailed explanation of the study's objectives as well as her right to join or decline. For study participants who were older than or equal to 18 years old, written consent was acquired; for those who were younger than 18, written consent was obtained from parents or guardians. Every respondent affirmed that the information would not negatively affect any area of their lives.

Availability of data

The manuscript contains all relevant data that are linked to the topic. On reasonable request, the corresponding author will provide the data set that supports this article's conclusion.

Conflict of interests

The authors declare that they have no conflict of interest.

Authors contributions

All authors contributed to the idea and design, the collection of data, the analysis and interpretation of data, the writing of the article, the review of the draft manuscript for originality, and the revision. The final draft of the work has been read and approved by all authors for publication. The work will be fully answerable to all writers, who concur.

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