



## Research article

# Non-exclusive breast feeding and its factors in the first 6-month life of infants among mother-infant pairs of 6–12 months in Debre Tabor town, Northwest Ethiopia, 2019: community-based cross-sectional study



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## ABSTRACT

**Background:** Non-exclusive breastfeeding is becoming a major cause of infant and child morbidity and mortality in developing countries including Ethiopia.

**Objective:** To assess the prevalence of non-exclusive breastfeeding and its factors in the first 6 months life of infants among mother-infant pairs of 6–12 months in Debre Tabor Town, Northwest Ethiopia, 2019.

**Methods:** A Community based cross-sectional study was conducted among 860 mother-infant pairs of 6–12 months in Debre Tabor Town, from March 1–30/2019. To select study participants cluster sampling technique was employed. Data were entered into EPI info version 7.2.0.1 and exported to SPSS window version 20 for analysis. Binary and multivariable logistic regression was used to see the association between dependent and independent variables. The odds' ratio with a 95% confidence interval was computed.

**Results:** The prevalence of non-exclusive breastfeeding of mothers to their infants within the first 6 months was found to be 39.8% (95% CI: 36.6–43.0). Mothers whose husbands had no formal education [(Adjusted odds ratio AOR = 6.60 [95%CI: 4.14, 10.41]), primary education (AOR = 4.30 [95% CI: 2.62, 7.20]), Mothers governmental employed (AOR = 8.20 [95% CI: 5.191, 12.940]), daily laborer (AOR = 1.70 [95% CI: 1.01, 2.90]), merchant mothers (AOR = 0.44 [95% CI: 0.35, 0.90]), and Mothers who had no post-natal care follow up for current baby in health service (AOR = 2.40 [95% CI: 1.56, 3.76]) were significantly associated with outcome.

**Conclusion:** and Recommendations: High proportion of mothers practiced Early Initiation of Complementary feeding within the first 6 months. Husbands had no formal education, primary education maternal governmental employed, daily laborer, merchant, and mothers who had no post-natal follow up where were found to be a predictors variable. Hence,; it is better to increase annual leave for delivered mothers, improve awareness of husbands towards benefits of introducing complementary feeding timely, and advise mothers to improve post-natal period follow up.

## 1. Introduction

Non-exclusive breastfeeding (NEBF) is defined as the provision of food or fluids in addition to breast milk other than drugs, vitamins, and minerals to infants before the age of six months [1, 2]. NEBF is becoming a major cause of infant and childhood morbidity and mortality in developing countries. It is believed to be responsible for 10% of the disease burden, and 1.4 million child deaths [3]. In addition, in developing countries early and abrupt cessation of BF followed by an

introduction of dirty and unsound artificial feeding of infants is a common practice that makes children more vulnerable to infection with different pathogens [4, 5].

Worldwide, only 35% of infants on proper exclusively breast feeding during the first four months of life. In most of mother specially in developing countries, Complementary Feeding (CF) usually too early or too late, which leads to nutritionally inadequate and unsafe [2, 6].

In Ethiopia, high numbers of mothers are practicing NEBF. It was 42% national as it was reported in 2016 Ethiopian Demographic and

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Health Survey (EDHS) [7], And ranged from 13%-60% in individual studies [2, 3, 8, 9, 10, 11].

Infants who had not been fed exclusively face future health challenges. These problems cause a decrease in the full absorption of nutrients from breast milk; predispose them to diarrhea, and acute respiratory infections. This further contributes to weight loss; malnutrition; poor academic performance; decreased productivity; impaired cognitive, and social development [3, 12, 13]. But, the above problems are preventable if promote benefits and burden of EBF, EI CF to the community, and also is implemented properly [11].

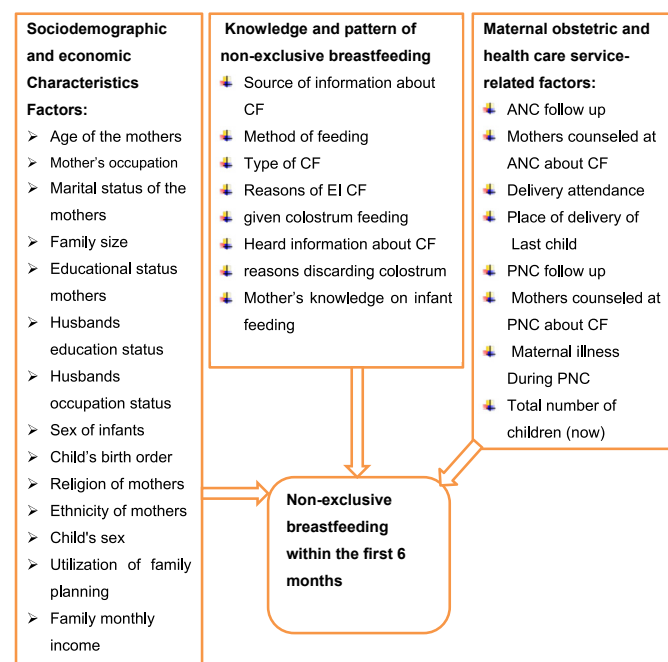
To avert the problem infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development, and health as a global public health recommendation [14]. In addition,; the global nutrition target is to increase the rate of EBF in the first six months up to at least 50% by 2025. The purpose of this policy brief is to increase attention, investment, and action for a set of cost-effective interventions and policies that can help member states and their partners in improving EBF rates among infants less than six months [6].

To strengthen the effort in reducing child mortality, the Ethiopian Ministry of Health had targeted an increased proportion of exclusively breastfed infants under age 6 months 52–72% by 2019/2020 as one strategy to improve child health [15]. To achieve such a plan data related to NEBF and factors associated is necessary. However, limited studies have been conducted at the community level regarding the prevalence and associated factors of NEBF in Ethiopia; particularly in the study area. Therefore, this study has assessed the prevalence of NEBF and its factors in the first 6-months life of infants in Debre Tabor town, Northwest Ethiopia (See Figure 1: Conceptual framework).

## 2. Methods

### 2.1. Study area and period

This study was conducted in Debre Tabor town. This is located at a distance of 666 km from the capital city of Addis Ababa in the North direction of Ethiopia. Based on the information from Debre Tabor town administrative bureau, the town has 6 urban kebeles and with an



**Figure 1.** Conceptual framework of non-exclusive breastfeeding and its factors in the first 6-month life of infants among mother-infant pairs of 6–12 months in Debre Tabor town, Northwest, Ethiopia, 2019.

estimated total population of 84,382 with 36,285 households. Of the 19,898 in reproductive age (15–49) group. There are 11,429 under-five children in the town. Among them, infants aged less than 12 months are 2,628 and 2,068 are aged from 6 to 12 months. Debre Tabor town has one General hospital, three health centers, and six private clinics and has two health extension workers in each health center (kebele) [16]. The study was conducted from March 1<sup>st</sup>-30<sup>th</sup>, 2019.

### 2.2. Study design and participants characteristics

A Community-based cross-sectional quantitative study was conducted. All mother-child pairs from 6-12 months in Debre Tabor town considered as a source population and the study population was selected/sampled/mother-child pairs from 6-12 months in Debre Tabor town who fulfill the inclusion criteria. All biological mother-child pairs aged 6–12 months in Debre Tabor town were included. However, mothers who were mentally/severely ill (not able to give breast milk due to mastectomy, unable to respond, could not talk or hear due to disability), and HIV-positive mothers who choose to replacement feed were excluded from the study.

### 2.3. Operational definition

**Non-exclusive breastfeeding** is giving infants other foods or fluids in addition to the breast milk other than drugs, vitamins, and minerals to infants before the age of six months [1, 2, 17].

**Good knowledge on infant feeding before 6 months:** Four knowledge questions were asked, and those having scored  $\geq$  mean (2.51) by categorizing the mothers as having Good knowledge, and

**Poor knowledge on infant feeding before 6 months:** Four knowledge questions were asked, and those having scored less than the mean (2.51) were classified as having poor knowledge [3, 17].

**Early initiation of breastfeeding:** is infants breastfed within one hour of birth [14].

### 2.4. Sample size determination and sampling procedure

The sample size is determined using a single population proportion formula using the proportion of NEBF 47.5% in a study conducted in Gondar town [2] with 95% confidence interval and precision level of 5%.

$$ni = \frac{(Z\alpha/2)^2 p (1 - P)}{d^2} = \frac{(1.96)^2 * 0.475(1 - 0.475)}{0.05^2} = 384$$

Where **n** = Sample size needed

**z** = Standard normal variable at 95% confidence level (1.96)

**p** = the prevalence of NEBF in Gondar town (0.475)

**d** = Margin of error (0.05)

**Z  $\alpha/2$**  = Value of the standard normal distribution corresponding to a significant level of alpha ( $\alpha$ ) 0.05 which is 1.96.

**DE** = Design Effect = 2 (due to cluster sampling technique was used)

Adding 10% nonresponse rates the final sample size for objective one was 844. But, 2 Kebeles were included in all samples taken, so the total sample size became 860. After calculating the sample for different factors the larger sample size for the study was 860 (See Table 1: for the second objective identify three predictors).

Cluster sampling was used to take the appropriate sample. Then two clusters were selected randomly by lottery method (See Figure 2: Schematic presentation of the sampling procedure).

### 2.5. Variables of the study

#### 2.5.1. Dependent variable

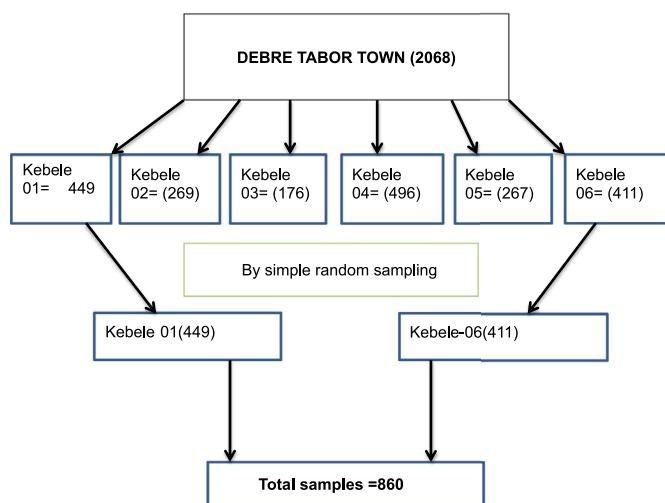
Non-exclusive breastfeeding within the first 6 months.

**Table 1.** For the second objective identify three predictors, for non-exclusive breastfeeding in Debre Tabor Town, North West Ethiopia, 2019.

Associated factors	Assumption	Final Sample size with 10% NR and Design Effect = 2	Reference
Mother's occupation	<ul style="list-style-type: none"> <li>• CI = 95%,AOR = 2.55,power = 80%</li> <li>• non-exposed group = 42.7%,</li> <li>• exposed group = 60.8%</li> <li>• Ratio1:1, 10% NR</li> </ul>	366	[2]
ANC follow up	<ul style="list-style-type: none"> <li>&gt; CI = 95%,AOR = 2.60,Power = 80%</li> <li>&gt; non-exposed group = 67.6%,</li> <li>&gt; exposed group = 36.5%,</li> <li>&gt; Ratio1:1, 10% NR</li> </ul>	492	[10]
Time of initiation of BF	<ul style="list-style-type: none"> <li>❖ CI = 95%,AOR = 2.11,Power = 80%</li> <li>❖ Non-exposed-group = 60.5%,</li> <li>❖ Exposed-group = 37.5%,</li> <li>❖ Ratio1:1 10% NR</li> </ul>	642	[10]

AOR: - adjusted odds' ratio; CI: - confidence interval, NR:-Non-Response rate.

After calculating the sample for different factors I found that the sample sizes for the first objective were 860 [with 10% NR and multiplying by 2 design effect] which was greater than that of the 2<sup>nd</sup> objective; therefore the larger the sample size was considered for the study.



**Figure 2.** Schematic presentation of the sampling procedure for non-exclusive breastfeeding in the first 6-month life of infants among mother-infant pairs of 6–12 months in Debre Tabor town, Northwest, Ethiopia, 2019.

**2.5.2. Independent variables**

**2.5.2.1. Sociodemographic and economic characteristics.** Age of the mothers, sex of infants, age of infants, ethnicity of the mothers, sex of the infant's, family size, utilization of family planning, marital status of the mothers, religion of mothers, number of under-five children, husbands occupation, educational status mothers, mother's occupation, husbands education status, family monthly income.

**2.5.2.2. Maternal obstetric and health care service related.** ANC follow up, mothers counseled at ANC, delivery attendance, place of delivery of last-child, PNC follow up, mothers counseled at PNC, maternal illness during the postpartum period, the total number of children (now).

**2.5.2.3. Knowledge and pattern of non-exclusive breastfeeding.** Knowledge of CF time, source of information, heard information, method of feeding, type of CF, reasons of EI CF, know colostrum feeding, given colostrum, reasons discarding colostrum, EBF prevent disease, time of initiation of BF, given mashed/fluid, time to offer the child additional diet besides breast milk, and mother's knowledge on infant feeding.

**2.6. Data collection tools and techniques**

**2.6.1. Data collection tools**

Data was collected using a pretested and structured interviewer-administered questionnaire, which was adapted from WHO and

published articles with some modifications to the local context [1, 2, 3, 6, 10, 14, 18]. The questionnaire was prepared in the English version and translated to the local language (Amharic which was used to collect the data). The questionnaire had thirty-seven questions and three parts: sociodemographic and economic characteristic's assessment status, maternal obstetric and health care service related assessment, and knowledge and pattern of non-exclusive breastfeeding before 6 months factors.

**2.6.2. Data collection techniques**

A total of four B.Sc. nurses as data collector and two B.Sc. nurses as a supervisor (who had an experience of data collection) were selected. After briefly presenting the study purpose and getting oral consent from each mother with an eligible infant, data collectors interviewed participants.

**2.6.3. Data quality control**

The quality of the data was assured by pretesting the questionnaire on 5% of the sample (43 mothers with an eligible infant) in woreda town prior to the start of the actual study to test the fitness of the questionnaire for the study settings. Training about the data collection tool as well as data collection procedures (ways of approaching the eligible mothers and how to obtain permission for an interview) was given to data collectors and supervisors for a total of two days prior to the data collection process.

The objectives of the study were clearly explained to the data collectors as well as supervisors. The respondents were given a brief orientation before they are interviewed and supervision was done at the spot by the supervisors. Throughout the course of the data collection, interviewers were supervised at each site, regular meetings were held between the data collectors, supervisor, and the principal investigator to discuss the problem arising in each interview, and detailed feedback was provided to the data collectors.

In addition, the collected data were checked daily for its completeness, accuracy, and clarity by supervisors. The principal investigator checked every questionnaire before data entry. Data was kept in the form of a file in a private secured place.

**2.7. Data processing and analysis**

After checking the completeness of the data, it was entered into EPI info version 7.2.0.1, and then; it was exported to SPSS version 20 for analysis. Descriptive analysis was done by computing proportions and summary statistics. The association between each independent variable and the outcome variable was assessed by using binary logistic regression. All variables with  $P \leq 0.2$  in the bivariate analysis were included in the final model of multivariable analysis in order to control all possible confounders.

Adjusted odds ratio (AOR) along with 95% CI were computed and variable having a P-value < 0.05 was considered to declare factors that have a statistically significant association with NEBF by using multivariable analysis. The goodness of fit was tested by the Hosmer-Lemeshow statistic test. Finally, the result is presented in the form of texts, tables, and graphs.

### 2.8. Ethical consideration

Ethical clearance was obtained from the ethical review committee of the school of Nursing, University of Gondar, College of Medicine and Health Sciences. Then, the participants of the study were informed about the purpose of the study, the importance of their participation, and their right to withdraw at any time. Verbal informed consent was obtained prior to data collection, and then from volunteer mothers collects the data. Mothers who practice NEBF during the data collection period were advised regarding infant feeding.

## 3. Results

### 3.1. Sociodemographic and economic characteristics of the study population

A total of 860 mothers of children age between 6-12 months old were included in the study and interviewed which gave the response rate of the study 100%. The mean ages of the mothers were 31.1 years (S.D ± 5.4). Regarding their child, 527 (61.3%) were 6–9 years, and 485 (56.4%) were female. The majority of the respondents were from Amhara 843 (98.0%) in ethnicity, and 806 (93.7%) were orthodox Christian. Eight hundred fourteen (94.7%) were married. Around 551 (64.1%) of mothers had an educational level of secondary and above, while 544 (63.2%) of husbands had an educational level of secondary and above. Regarding the mother's occupational status, 264 (30.7%) were housewives, and 418 (48.6%) of their husbands were governmental employees (See Table 2).

### 3.2. Obstetric and healthcare-related factors of the participants

Of all study participants, mothers were 542 (63.0%) had 1-2 number of children (now). Six hundred ten (70.9%) had ANC follow-up, and nearly half of mothers 409 (67.0%) were informed about CF during their ANC. Five hundred twenty three (60.8%) delivered their last child at the governmental hospital, and 519 (60.3%) were delivered by nurses/midwifery. Six hundred forty-five (75.0%) of the mothers were attended PNC, and 408 (63.3%) mothers counseled about CF during their PNC visit. Six hundred fifteen (71.5%) mothers following the last delivery don't have illness during the postpartum period (See Table 3).

### 3.3. Knowledge and pattern of non-exclusive breastfeeding

Among study participants, 628 (73%) knew colostrum feeding, 531 (84.6%) mothers gave colostrum feeding to their recent child. Among mothers who discarded colostrum, 59 (60.8%) of them responded that it was not good to feed their infants.

Four hundred thirty five (50.6%) mothers responded as they initiated BF after one hour, and 533 (62%) of mothers responded that EBF can prevent disease.

Six hundred forty two (74.7%) of participants heard information regarding CF, and the sources of information about CF, 316 (49.2%) of mothers were from health professionals.

In the appropriate time to introduce complementary food for the child, 350 (40.7%) mothers respond at 6 months, and 123 (36%) mothers offer the child an additional diet besides breast milk at 4–6 months.

The data revealed that mothers' reasons practiced NEBF, as they considered 166 (48.5%) breast milk is not enough for the baby (See Figure 3). Among the study participants, 154 (45.0%) mothers provided

**Table 2.** Sociodemographic and economic characteristics of study participants in Debre Tabor town, North West, Ethiopia, 2019 (N = 860).

Variable	category	Frequency	Percent (%)
Maternal age	15–19	15	1.7
	20–24	104	12.1
	25–29	202	23.5
	30–34	299	34.8
	35–39	193	22.4
	40–44	47	5.5
	≥45	0	0
Child age	6–9	527	61.3
	10–12	333	38.7
Child sex	male	375	43.6
	female	485	56.4
Child's birth order	first	241	28.0
	second	329	38.3
	Third and above	290	33.7
Mother's religion	Orthodox	806	93.7
	Muslim	48	5.6
	Protestant	6	0.7
Mother's ethnicity	Amhara	843	98.0
	Oromo	11	1.3
	Tigray	6	0.7
Marital status	Single	13	1.5
	Married	814	94.7
	Divorced	27	3.1
	Widowed	6	0.7
Maternal education	No Formal education	125	14.5
	Primary education	184	21.4
	Secondary education and above	551	64.1
Family size	<4	546	63.5
	≥4	314	36.5
FP utilization	Yes	487	56.6
	no	373	43.4
Number of under-five children	1	710	82.6
	≥2	150	17.4
Husband's education	No-formal education	169	19.7
	Primary education	147	17.1
	Secondary education and above	544	63.2
Mother's occupation	Governmental employee	241	28.0
	Farmer	0	0
	Merchant	233	27.1
	Daily laborer	122	14.2
	Housewife	264	30.7
Husband's occupation	Government employee	418	48.6
	Farmer	0	0
	merchant	324	37.7
	Daily laborer	118	13.7
Family income of family	<500 ETB	0	0
	500-1000 ETB	7	0.8
	1000-1500 ETB	22	2.6
	≥1500 ETB	831	96.6

powder milk (See Figure 4), and in feeding utensils of mothers who practiced NEBF, 204 (59.6%) used cups and spoons.

The overall knowledge of mothers on infant feeding before 6 months (knowledge questions which were known colostrum feeding, time to initiation of BF, to prevent disease, and appropriate time to introduce CF for the child) were calculated based on mean value by giving 0 for non-correct answers and 1 for correct answers of for all the four knowledge questions. The mean value was 2.51 by categorizing the mothers as having poor knowledge those who score less than 2.51, and good

**Table 3.** Obstetric and healthcare-related factors of participants in Debre Tabor Town, Northwest, Ethiopia, 2019.

Variable	category	Frequency	Percent (%)
Number of Children	1–2	542	63.0%
	3–4	263	30.6
	≥5	55	6.4
Antenatal care	yes	610	70.9
	no	250	29.1
Informed CF at ANC Visit	yes	409	67.0
	No	201	33.0
	Home	0	0
Place of birth For last child	Gov't Hosp.	523	60.8
	Gov't HC	327	38.0
	Gov't HP	0	0
	Private clinic	10	1.2
	Doctor	341	39.7
Delivery attendance For last-child	Nurse/midwife	519	60.3
	HEW	0	0
	TBA	0	0
	Relative/friend	0	0
Attended PNC	yes	645	75.0
	no	215	25.0
Counseled about CF at PNC Visit	yes	408	63.3
	no	237	36.7
Mothers had illness during postpartum period	no	615	71.5
	yes	245	28.5

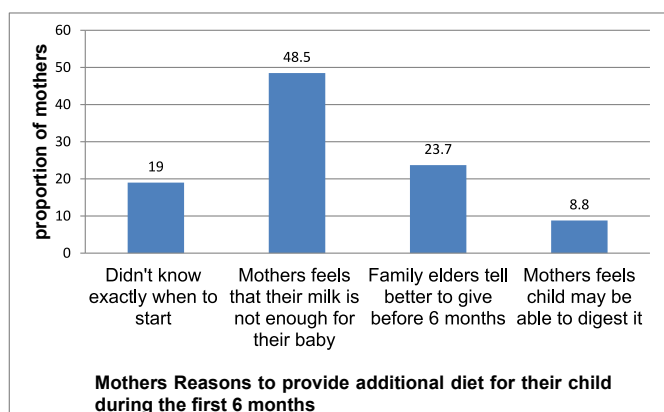
knowledge those who score of mean  $\geq 2.51$ . Based on this 55.3% of mothers had good knowledge and the rest had poor knowledge on infant feeding before 6 months (See Table 4).

### 3.4. Prevalence of non-exclusive breastfeeding

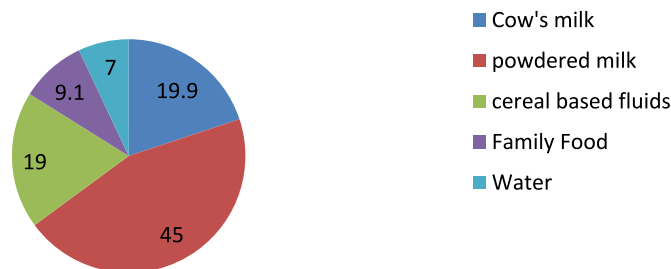
The results of the study revealed that about 342 (39.8%) (95% CI: 36.6–43.0) of Debre Tabor town mothers practiced NEBF to their infants during the first 6 months of age.

### 3.5. Factors associated with non-exclusive breastfeeding

In order to determine factors associated with NEBF logistic regression analysis was used. On Bivariate analysis, variables having a statistically significant association between NEBF, and p-value ( $P \leq 0.2$ ) where mother's occupational status, ANC follows up, PNC follows up, husband's educational status, husband's occupational status, mother's age, and mothers knowledge on infant feeding. However, in multivariable analysis



**Figure 3.** Mother's reasons to provide an additional diet for their child during the first 6 months in Debre Tabor town, Northwest, Ethiopia, 2019.



**Figure 4.** Type of additional food mothers provides their child during the first 6 months in Debre Tabor town, Northwest, Ethiopia, 2019.

mothers whose husbands, who had no formal education [AOR (95 % CI) = 6.60 (4.14, 10.410)], and primary education [AOR (95 % CI) = 4.30 (2.62, 7.20)], maternal occupation, governmental employed (AOR = 8.20 [95% CI: 5.191, 12.940]), and daily laborer (AOR = 1.70 [95% CI: 1.01, 2.90]), merchant (AOR = 0.44 [95% CI: 0.35, 0.90]) and mothers who had no PNC follow up for their current child in health service (AOR = 2.40 [95% CI: 1.56, 3.76]) were remained significantly associated with the outcome variable with at 95% CI and P-value of  $< 0.05$  (See Table 5).

## 4. Discussion

This study showed that 39.8% (95% CI: 36.6–43.0) of mothers in Debre Tabor town practiced NEBF for their infants within the first six months of age. This finding was in line with A study conducted in Jimma Arjo (42.9%) [8], Research conducted in Maharashtra, India (42.7%) [19], And A study in Pokhara, Nepal (40.3%) [20].

However, the result of this study was much lower than the study done in Gondar town, Northwest, Ethiopia (47.5%) [2]. The possible explanation for the difference could be the study setting done in Gondar was both urban and rural areas. A study report in Sorro District, Southern Ethiopia (49.4%) [10]. A study conducted at Kamba Woreda, South West Ethiopia (59.6%) [11]. Another study was done in Jimma Arjo Woreda, Southwest Ethiopia (52.1%) [21]. All the above studies the possible justification for the difference could be studies setting which was done only in rural areas.

Also, this study was much lower than the study done in Saudi Arabia (62.5%) [22]. The study conducted in machakos district, Kenya (52%) [12]. A study at Iranshahr, Iran (76.9%) [4]. The result from a study of Peninsular, Malaysia (45.8%) [23].

The possible explanation for the highest prevalence in (Saudi Arabia, Kenya, Iran, Malaysia) could be the study design used, which were institutional-based cross-sectional, among mothers who were admitted for mildly wasted infants which may increase the use of additional diet; and the majority of respondents believed that an appropriate time for introducing complementary foods was between four and six months.

This result was higher than compared with other similar studies such as on research done at kersa woreda, east Ethiopia (28.3%) [3]. The possible justification for the difference could be in kersa woreda study population selected from 6-23 months which were recall bias affect under/over the result. A study conducted in Bishoftu town, Oromia, Ethiopia (32.9%) [9]. The possible explanation for the difference might be in Bishoftu study population of selected mothers with infants aged less than six months who were attending public health facilities for pentavalent three immunizations. Might be decreased the prevalence because study subjects selected at 14 weeks. And higher than research done in Hula district, Southern Ethiopia (13.4%) [18]. The possible justification for the difference might be due to mothers had higher knowledge of exclusive breastfeeding practice (96.2%) in the Hula district and there was an NGO that was working on a program called 'alive and thrives' and highly promoting the optimal breastfeeding practice.

This study also much higher than a study done in Darjeeling, West Bengal (India) (30.3%) [24]. The possible explanation for the difference

**Table 4.** Knowledge and Pattern of non-exclusive breastfeeding-related factors of participants in Debre Tabor town, Northwest, Ethiopia, 2019.

Variable	Category	Frequency	Percent (%)
know colostrum feeding	no	232	27.0
	yes	628	73.0
Given colostrum feeding	no	97	15.4
	Yes	531	84.6
Reason discarding colostrum	Not good for infant	59	60.8
	Due to illness	38	39.2
Time to initiation of BF	After one hour	435	50.6
	Within one hour	425	49.4
EBF prevent disease	no	327	38.0
	Yes	533	62.0
Heard information to CF	no	218	25.3
	Yes	642	74.7
Source of information to CF	Radio	75	11.7
	Television	133	20.7
	CHW	118	18.4
	HP	316	49.2
The appropriate time to introduce CF for the child	Before 6 months	290	33.7
	At 6 months	350	40.7
	After 6 months	220	25.6
Give mashed or fluid to child During the first 6 months	no	518	60.2
	yes	342	39.8
Offer the child an additional diet besides breast milk	Before 4 months	66	19.3
	At 4–6 months	123	36.0
	At 6 months	11	3.2
	Late after 6 months	32	9.4
	months I don't know	110	32.1
Reasons to provide additional diet	Didn't know exactly when to start	65	19.0
	Mothers feel that their milk is not enough for their baby	166	48.5
	Family elders tell better to give before 6 months	81	23.7
	Mothers feel a child maybe able to digest it	30	8.8
Additional food mothers provide	Cow's milk	68	19.9
	Powdered milk	154	45.0
	Cereal based fluids	65	19.0
	Family food	31	9.1
	Water	24	7.0
used to give the fluids with (utensils)	Bottle nipple	56	16.4
	Cup and spoon	204	59.6
	Both bottle and Cup and spoon	82	24.0
Mothers knowledge on infant feeding	Poor	384	44.7
	Good	476	55.3

could be in the India study population selected from 6-24 months which were recall bias affect under/over the result. A study conducted in Thailand (26.4%) [25]. A study was done in Australia (27%) [26]. The possible justification for the difference could be in Thailand study population selected at 12 weeks of postpartum women who attended the clinic and in Australia reported by age of 4 months.

This study showed that the husband's educational status had a significant role on NEBF within the first 6 months. Those mothers whose husbands had no formal education [AOR (95 % CI) = 6.6 0 (4.14, 10.410)], and primary education [AOR (95 % CI) = 4.30 (2.62, 7.20)] were significantly associated factors for NEBF. This finding was supported by the study done in Northwest Ethiopia which revealed that the husband's educational level of no formal education was 1.15 times, and primary education 3.26 times more likely to practice pre-lacteal feeding than those who had secondary education and above [27]. A study done at Arba Minch Zuria's husband educational level which were no education (AOR = 2.92) and able to reading and writing (AOR = 3.08) were significant association with mothers' had no knowledge of optimal BF [28]. The possible Explanation that husbands who had secondary and above

educational level might have a better understanding of the benefits of introducing CF timely, identification of the effects of NEBF before 6 months, and empowers them to defend against external interferences and pressures from traditional belief and misconception.

The maternal occupation was found to be one of those significantly associated factors of NEBF for infants during the first 6 months of age. In this study, maternal occupation, the odds of NEBF were 8.2 times higher in governmental employed (AOR = 8.20 [95% CI: 5.191, 12.940]), and 1.7 times higher in daily laborer (AOR = 1.70 [95% CI: 1.01, 2.90]) than housewife mothers. The odds of NEBF were 56% lower than in merchant mothers compared to mothers with housewives (AOR = 0.44 [95% CI: 0.35, 0.90]).

This finding was consistent with the studies done in Gondar town, being governmental employed (AOR = 2.55), and Kamba woreda, South West Ethiopia, daily laborer (AOR = 3.06) were more likely to practice NEBF compared to housewife. And maternal occupation which was a merchant (AOR = 0.84) consistent with the studies done in Gondar town less likely to practice NEBF to their infants before 6 months. However, a study was done in Kamba woreda, South West, Ethiopia being

**Table 5.** Factors associated with non-exclusive breastfeeding before 6 months, in Debre Tabor town, Northwest Ethiopia, 2019.

Variable	category	NEBF within 6 months		COR (95% CI)	AOR (95% CI)	p-v
		Yes n (%)	No n (%)			
Husband's education	No-formal education	98(58.0)	71(42.0)	3.12(2.18,4.45)	6.6(4.14, 10.41)	.000
	Primary education	77(52.4)	70(47.6)	2.48(1.71,3.60)	4.3(2.62, 7.20)	.000
	Secondary education and above	167(30.7)	377(69.3)	1	1	
Mother's occupation	Gov'tal employee	150(62.2)	91(37.8)	4.15(2.90,6.03)	8.20(5.19,12.94)	.000
	Merchant	61(26.2)	172(73.8)	0.89(0.60,1.33)	0.44(.35, .90)	.017
	Daily laborer	56(46.0)	66(54.0)	2.14(1.37,3.34)	1.70(1.01,2.90)	.045
	Housewife	75(28.4)	189(71.6)	1	1	
Husband's occupation	Gov'tal employee	151 (36.1)	267 (63.9)	0.743 (0.49,1.13)		
	Merchant	140 (43.2)	184 (56.8)	1,000 (.65,1.53)		
	Daily laborer	51 (43.2)	67 (56.8)	1		
ANC Follow up	no	134 (53.6)	116 (46.4)	2.23 (1.65, 3.01)		
	yes	208 (34.1)	402 (65.9)	1		
PNC Follow up	no	132(61.4)	83(38.6)	3.29(2.39,4.54)	2.4(1.56, 3.76)	.000
	Yes	210(32.6)	435(67.4)	1	1	
Mother's age	15–19	5 (33.3)	10 (66.7)	0.88 (0.26,3.01)		
	20–24	38 (36.5)	66 (63.5)	1.0 (0.50,2.08)		
	25–29	70 (34.7)	132 (65.3)	0.94 (0.48,1.81)		
	30–34	119 (39.8)	180 (60.2)	1.17 (0.62,2.20)		
	35–39	93 (48.2)	100 (51.8)	1.64 (0.85,3.20)		
	40–44	17 (36.2)	30 (63.8)	1		
Mother knowledge on infant feeding	Poor	163 (42.4)	221 (57.6)	1.2 (0.93,1.61)		
	good	179 (37.6)	297 (62.4)	1		

Reference = 1.00, COR = Crude Odds Ratio, AOR = Adjusted Odds Ratio, PV = P-Value.

governmental employed (AOR = 0.44) were less likely to practice NEBF which was inconsistent with this study [2, 11]. In Bishoftu town, Oromia, Ethiopia, the odds of housewife mothers had 64% lower risk to EI CF than employed mothers with [AOR 0.34 (95% CI; 0.21, 0.55)] [9].

The study was done in Saudi Arabia consistent with this study, employed (AOR = 6.39) more likely to practice EI CF before 6 months compared to not employed [22]. And a study done in Indonesia working mothers (AOR = 1.45) was a significant association with NEBF compared to non-working mothers [29]. In a study done in Peninsular Malaysia, mothers who have a job were 3.5 times more likely not to exclusively breastfeed compared to non-working mothers [23]. The possible explanation for this association government employed and daily laborer mothers believe the child is exposed to hunger and water thrust due to lack of time to breastfeed frequently. So, that they start to initiate early feeding of their child solid and semi-solid food; but this might be due to the fact that housewife mothers get to stay longer with their newborn and would not be obliged like mothers who are working to wean early to go to work, so, they may also breastfeed their newborn.

Mothers who had no PNC follow-up for their current child in health service (AOR = 2.40 [95% CI: 1.56, 3.76]) were significantly associated factors for NEBF. This finding was in agreement with a study done by Sorro district, Southern Ethiopia, no PNC visit after delivery (AOR = 1.90) was significantly associated with NEBF [10]. In a study conducted in Kamba woreda, South West Ethiopia, mothers who have no PNC follow up for their child in health service (AOR = 1.64) were significantly associated factors for EI CF [11]. The possible explanation could be mothers who get advice to improve post-natal period visit has a favorable impact on the promotion of timely initiation of CF.

## 5. Strengths and limitations

### 5.1. Strengths

- ❖ The study has used a relatively larger sample size.

### 5.2. Limitations

- ❖ NEBF practice of mother may under/over report because mothers may not surely remember foods that child took due to recall bias.

## 6. Conclusion and recommendations

High proportion of mothers practiced early initiation of complementary feeding within the first 6 months. Husbands had no formal education, primary education maternal governmental employed, daily laborer, merchant, and mothers who had no post-natal follow up were found to be a predictors variable. Hence; it is better to increase annual leave for delivered mothers, improve awareness of husbands towards benefits of introducing complementary feeding timely, and advise mothers to improve post-natal period follow up.

### Declarations

#### Author contribution statement

Dejen Getanh Feleke and Ermias Sisay Chanie: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

Chanyalew Worku Kassahun, Tesfamichael G/Mariam W/mariam and Sheganew Fetene Tassaw: Contributed reagents, materials, analysis tools or data; Wrote the paper.

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#### Data availability statement

Data will be made available on request.

### Declaration of interests statement

The authors declare no conflict of interest.

### Additional information

No additional information is available for this paper.

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### References

- [1] Nutrition Section Program, United Nations International, Children's Fund (UNICEF) New York. Infant and Young Child Feeding Program Guideline, May 2011.
- [2] M. Birhanu, et al., Prevalence and associated factors of nonexclusive breastfeeding to infants within the first 6 Months in gondar town, northwest Ethiopia, 2014, Hindawi Publish. Corp. Adv. Nurs. 2015 (2014).
- [3] Egata, et al., Predictors of non-exclusive breastfeeding at 6 months among rural mothers in east Ethiopia: a community-based analytical cross-sectional study, Int. Breastfeed. J. 8 (8) (2013).
- [4] Kordsalarzeh, et al., Qualitative study of factors affecting non-exclusive breastfeeding in the first 6-month life of infants and discontinuation of breastfeeding in women admitted to Iranshahr health centers 2018, Prensa Med. Argent. 104 (6) (2018).
- [5] Ogbo, et al., Population attributable risk of key modifiable risk factors associated with nonexclusive breastfeeding in Nigeria Ogbo et al, BMC Publ. Health 18 (2018) 247.
- [6] World Health Organization (WHO). Global Nutrition Targets 2025: Breastfeeding Policy Brief.
- [7] Ethiopia Federal, Ethiopia Demographic and Health Survey 2016 Central Statistical Agency Addis Ababa, Ethiopia, 2016.
- [8] D. Tamiru, et al., Survey on the introduction of complementary foods to infants within the first six months and associated factors in rural communities of Jimma Arjo, Int. J. Nutr. Food Sci. (2) (2013) 77–84.
- [9] G. Deme, et al., Factors associated with early initiation of complementary feeding in Bishoftu town, Oromia, Ethiopia open access, Libr. J. 2 (2015).
- [10] Tadesse, et al., Prevalence and associated factors of nonexclusive breastfeeding of infants during the first six months in a rural area of Sorro District, Southern Ethiopia: a cross-sectional study, Int. Breastfeed. J. (2016).
- [11] Agedew, et al., Early initiation of complementary feeding and associated factors among 6 Months to 2 Years young children, in Kamba woreda, South west Ethiopia: a community –based cross-sectional study, J. Nutr. Food Sci. 4 (6) (2014).
- [12] L. Ndolo, Factors Associated with the introduction of complementary feeding of infants below six months, in: Machakos District, Kenya, Nairobi University cabete LIBRARY, 2008.
- [13] R. Haider, et al., Early complementary feeding is associated with low nutritional status of young infants recovering from diarrhea, J. Trop. Pediatr. 42 (1996).
- [14] World Health Organization (WHO), Planning Guide for National Implementation of the Global Strategy for Infant and Young Child Feeding, 2007.
- [15] Federal Ministry of Health, Health Sector Transformation Plan (HSTP), October 2015.
- [16] A. Fentahun, South Gondar Zone Health Department Report, 2019 unpublished. 2019.
- [17] United States Agency for International Development (USAID), Maternal and Child Health Survival Program (MCSP) Nutrition Brief Addressing Barriers to Exclusive Breastfeeding: Evidence and Program Considerations for Low- and Middle-Income Countries, Maternal and child health program, 2017.
- [18] Shibri, et al., Sub-optimal breastfeeding and its associated factors in rural communities of Hula district, southern Ethiopia: a cross-sectional study, Ethiop. J. Health Sci. 28 (1) (2018).
- [19] Dawal, et al., Study of pre-lactal feeding practices and its determinants in a rural area of Maharashtra scholars, J. Appl. Med. Sci. 2 (4) (2014) 1422–1427.
- [20] S. Basnet, et al., Reasons for early or late initiation of complementary feeding: a study in Pokhara, Art. Am. J. Publ. Health 3 (4) (2015) 69–75.
- [21] Tamiru, et al., Sub-optimal breastfeeding of infants during the first six months and associated factors in rural communities of Jimma Arjo Woreda, Southwest Ethiopia, BMC Publ. Health (2012).
- [22] R.A. Alzaheb, et al., Factors Associated with the Early Introduction of Complementary Feeding in Saudi Arabia International Journal of Environmental Research and Public Health, 2016.
- [23] K.L. Tan, Non-exclusive breastfeeding among 4-week postpartum mothers 11 factors associated with non-exclusive breastfeeding among 4-week postpartum mothers in Klang district, peninsular Malaysia, Malar. J. NF15 (1) (2009) 11–18.
- [24] H. Sarkar, et al., Factors influencing mothers to initiate early complementary feeding in darjeeling, West Bengal, J. Clin. Diagn. Res. –11 (10) (2013).
- [25] B. Sucharat, et al., Rate and factors affecting non-exclusive breastfeeding among Thai women under the breastfeeding promotion program, Int. J. Wom. Health (2017).
- [26] L. Tang, et al., Predictors of early introduction of complementary feeding: longitudinal study, Pediatr. Int. (2015) 126–130.
- [27] Tariku, et al., Factors associated with pre-lactal feeding in the rural population of northwest Ethiopia: a community cross-sectional study, Int. Breastfeed. J. 11 (2016) 14.
- [28] Tamiru, et al., Maternal knowledge of optimal breastfeeding practices and associated factors in rural communities of Arba Minch Zuria, Int. J. Nutr. Food Sci. 2 (3) (2013) 122–129.
- [29] M. Upul Senarath, et al., Factors Associated with Nonexclusive Breastfeeding in 5 East and Southeast Asian Countries: A Multilevel Analysis, 2013.