



**ASRAT WOLDEYES HEALTH SCIENCE CAMPUS SCHOOL OF PUBLIC
HEALTH**

**MAGNITUDE OF FORMULA FEEDING AND ASSOCIATED FACTORS
AMONG MOTHERS WITH INFANTS 0-6 MONTHS OF AGE IN DEBRE
BERHAN CITY, NORTH SHOA, ETHIOPIA, 2023**

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**A RESEARCH SUBMITTED TO THE SCHOOL OF PUBLIC HEALTH,
ASRAT WOLDEYES HEALTH SCIENCE CAMPUS, DEBRE BERHAN
UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF MASTERS OF PUBLIC HEALTH IN NUTRITION.**

JUNLY, 2023

DEBRE BERHAN, ETHIOPIA

**DEBRE BERHAN UNIVERSITY ASRAT WOLDEYES HEALTH SCIENCE
CAMPUS, SCHOOL OF PUBLIC HEALTH, DEPARTMENT OF
NUTRITION**

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SHOA, ETHIOPIA, 2023**

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FULL TITLE OF THE RESEARCH	MAGNITUDE OF FORMULA FEEDING AND ASSOCIATED FACTORS AMONG MOTHERS WITH INFANTS 0-6 MONTHS OF AGE IN DEBRE BERHAN CITY, NORTH SHOA, ETHIOPIA, 2023
STUDY PERIOD	May 10th to May 20th, 2023.
STUDY AREA	DEBRE BERHAN
TOTAL COST OF THE PROJECT	32252ETB

Acknowledgment

I gratefully acknowledge Asrat Woldeyes Health Science Campus, Debre Berehan University School of public health department of nutrition giving me this opportunity to undertake this thesis. I would like to express my heartfelt gratitude to my advisors Dr. Solomon H/meskel (PhD) and Mr. Fitsum Zekariase for their guidance and unreserved support.

Abbreviations/Acronym

AF	Artificial Feeding
AOR	Adjusted odds ratio
ANC	Ante Natal Care
BMS	Breast Milk Substitute
EDHS	Ethiopian Demographic Health Survey
EPI	Expanded Program of Immunization
NGOs	Non-Governmental Organizations
OPD	Out Patient Department
PNC	Post Natal Care
SIDS	Sudden Infant Death Syndrome
SPSS	Statistical Package for Social Science
WHO	World Health Organization

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Abstract

Background; Adequate nutrition during infancy is essential for the normal development and future well-being of the child. Even though breast milk is optimal nutrition for infants during the first six months of life, the duration of breastfeeding has been declining and being replaced by formula feeding, particularly in urban communities of developing countries including Ethiopia.

Objective; to assess the magnitude of formula feeding and associated factors among mothers with infants of 0-6month old in Debre Berhan City, North Shoa, Ethiopia, 2023

Methods; A community based cross-sectional study was conducted among 635 mothers with infants of 0-6month-old from May 10th to May 20th, 2023 in randomly selected kebeles of Debre Berhan city administration, Amhara regional state, Ethiopia. A multistage sampling technique was used to select the study participants. Data were collected by face-to-face interviewer-administered questionnaire and entered using Epi data version 4.6 and exported to SPSS version 24 for analysis. Bivariable and multivariable logistic regression analysis was performed and the strength of association was declared by calculating an adjusted odds ratio at a 95% confidence interval with $P < 0.05$. Variables with a P-value < 0.05 were considered statistically significant.

Result: A total of 635mothers with infants' 0-6-month-old participated in the study with a response rate of (96.7%). The prevalence of formula feeding among the study participants were 39.7% (95% CI: 35.6, 43.65). Initiation of breast feeding after one-hour AOR=2.55 (95% CI: 1.65, 3.95), mothers who didn't know the side effects of formula milk AOR=6.91(95% CI: 4.15, 11.49), attending college and above AOR=7.45(95% CI: 2.39, 2319) and cesarean section delivery AOR=6.07(95% CI: 3.101, 11.88) were predictors of formula feeding.

Conclusion: formula milk feeding among mothers with infants 0-6 months old in Debre Berhan City is high. Maternal educational level, mothers received counselling about breast feeding, initiation of breast feeding after one hour, and delivery by cesarean section were found to influence formula feeding. Creating awareness among mothers about the side effects of formula feeding and promoting initiation of breast feeding within one hour.

Key word: prevalence, formula feeding, Debre Berhan city.

1. Introduction

1.1 Background

Optimal infant and young child feeding practices rank among the most effective interventions to improve child health(1). Adequate nutrition during infancy is essential for the normal growth and development and future wellbeing of the child because breast milk is optimal nutrition for infants during the first six months of life, but the duration of breastfeeding has been declining and being replaced by formula feeding particularly in urban communities of developing countries(2). Breast feeding plays an important role in child survival, nutrition, and physical and mental development, so World Health Organizations (WHO) recommends that infants should be exclusively breast feed during the first half-year of age and then complementary foods with breast milk should be between the ages of 6-23 months(3).

Formula milk is a breast milk substitute formulated industrially following the applicable standards for neonates up to the first half-year of age usually prepared for bottle feeding or cup feeding from powder or liquid(4). Worldwide approximately two out of five mothers fed breast milk substitutes by the time infants were eight weeks old and mostly combined breast milk and breast milk substitutes before their baby reached six months of age(5) . Infant formula milk has many undesired side effects of which can result in adverse outcomes on the maternal milk supply, on the duration and exclusivity of breast feeding, and on the health of newborns leading to bacterial infections such as pneumonia, diarrhea, and certain chronic diseases such as obesity and diabetes(4,6).

Infant formula is manufactured using modified cow's milk or soya and does not contain any of the protective antimicrobial or bioactive substances and continued and aggressive of breast promotion breast-milk substitutes, declining breastfeeding rates and confused the distinction between breast milk and formula, claims that infant formula is safe, easy to use, and nutritionally complete(7).

The higher protein content of artificial baby milk compared to the lower protein content in breast milk is responsible for the increased growth rate and adiposity during the influential period of formula-fed infants which leads to obesity and related problems(8).

1.2 Statement of the problem

Infant formula feeding has become a common practice in developed countries in urban communities in developing countries and, today there is a shift from exclusive breastfeeding practice towards the introduction of bottle feeding. The increasing incidence of bottle feeding in developing countries particularly in Africa reflects the absorption of the Western way of life(9).

Globally, over 68 million infants are not exclusively breast-feed(8). Formula feeding practices have several undesirable health effects. The reasons why mothers fed infant formula were the promotion of breast milk substitutes, personal problems, social and cultural problems against breast feeding, due to work-related load, shortage of time for caring for their infant, and lack of support for breast feeding(10).

Studies from developing countries showed that infants who were artificially fed were six to ten times more likely to die in the first months of life with diarrhea and pneumonia than infants who were fed breast milk, even in situations with adequate hygiene(11). Studies have found that giving formula milk to newborns increases the risk of adverse health outcomes particularly hospitalization by 1.5 times and formula feeding before the first half-year results in an increased rate of antibiotic intake(12,13). Infants who are exposed to formula feeding and stop breast feeding early are at higher risks of illness, obesity and obesity-related problems, allergies and sudden infant death syndrome and impairment in infants' cognitive development. Similarly infants were more likely to be obese at a later age than infants predominantly fed breast milk(14).

Previous studies have shown why mothers/caregivers feeding infant formula are, Lack of education, the mode of delivery was a cesarean section, late initiation of breast feeding after one hour and one day of delivery, birth attended by a traditional birth attendant or friend/relative and positive attitude towards formula feeding were significant determinants of infant formula feeding.

Therefore, providing customized evidence-based support to mothers to decrease personal social and commercial pressures that lead to their decision to feed infant formula is crucial. Therefore, this study may provide information on infant formula feeding practices and associated factors among mothers of infant's aged 6 months in the study area, of Debre Berhan regio-Politian city. As far as the investigator searched, there were limited studies in Ethiopia and no study has been conducted in the study area since the town was a regio-Politian city.

1.3 Significance of the Study

Worldwide, 60% of the 10.9 million infant and young child deaths annually occur due to inappropriate infant feeding practices and infectious disease where two-thirds of these deaths are attributable to suboptimal breastfeeding practices. Even if, infant formula feeding is practiced in Ethiopia like other, the magnitude and factors associated with formula feeding are not well understood. As a result this study provides important base line information on newborn formula feeding practices and associated factors in Debre Berhan regio-Politian city.

It is planned that the study findings will be communicated to the community and may influence them to minimize formula-feeding practice. It may also be used as reference since much has not been done on this topic in our country. The study has also contributed to the body of knowledge on formula feeding and helps base line information for the research.

2. Review of related literatures

2.1 Magnitude of Formula feeding

Worldwide, approximately two out of five infants are not exclusively breast fed for the recommended first half-year of age for multiple reasons(15). A prospective observational study conducted in the United States of America revealed that 31.3% of infants received infant formula feeding in the first six months of life(16). Additional studies conducted in Ireland and Cambodia through cross-sectional surveys showed that 81.8% and 43.1% of infants received formula feeding in the first six months of life respectively(17,18).

A cross-sectional study carried out in Egypt showed that 76.2% of infants were mixed feeding of formula and breast milk(19). Studies conducted in Hawassa to evaluate infant feeding practice the overall prevalence of formula feeding practice among infants age zero up to six month of age was 29.6% and similar study which was carried out in Offa, southern part of Ethiopia showed that 7.8% of infants 0-6 months fed infant formula feeding(20,21)

A community based cross sectional study conducted in Agaro, Jimma zone and Bishoftu , Oromia region among infants aged less than 6 months showed that the proportion of mothers who feed their baby formula-based feeding was 15.1%,47.2% and 65% respectively(22–24). An institutional based cross-sectional study conducted in Dire Dawa revealed that, the prevalence of infant formula feeding among infants age 6 months was 21.4 %(25). Similarly, studies conducted in Mekelle, and Gondar city, Ethiopia indicated that 68.8% and 12.4% of infants were exposed to formula feeding respectively(26,27).

2.2 Associated factors of formula feeding

2.2.1 Socio- demographic related factors

Maternal working conditions had their own effect infant feeding habits. A Study conducted in Cape Coast showed that infants from government employees were more likely to give formula feed compared to mothers who did not have government employees(26). A similar study conducted in Vietnam revealed that using a mixed approach (both breast milk and formula feed), the reasons for formula feeding were that mothers returning to work face the challenges of continued breast feeding led to formula feeding(28).

A study done in Agaro, Oromia regional state, Ethiopia, revealed that the reason why mothers feeding formula milk were, returning to work after maternal leave is one of the reasons reported by them(23). Maternal educational status of being illiterate and being a rural resident, was significantly associated with formula feeding and confirmed by studies conducted in Vietnam, Egypt, Dire Dawa and Jimma in Ethiopia(19,22).

2.2.2 Behavior and Knowledge Related Factors

Studies conducted in Vietnam, India and Egypt have revealed that mothers with the perception of inadequate milk supply are one of the predominant causes of formula feeding supplementation for their infants. A cross-sectional survey conducted in Ireland and Egypt showed that positive maternal attitudes towards infant formula feeding were among the most frequently reported reasons(12,29).

A study conducted in Egypt showed that a significantly higher percentage of formula feeding practice was noticed among infants born to mothers who needed their own body privacy(19). Women who reported during pregnancy that they were more concerned with their pre pregnancy body shape/weight tended to have a shorter exclusive duration than those with less concerns(30).

2.2.3 Obstetrics-related factors

Findings from the United States of America, Egypt, and Dire Dawa in Ethiopia showed that mothers whose delivery mode was by cesarean section were practicing formula feeding in higher percentages than those delivered by spontaneous vaginal delivery(31). Similarly mothers who were delivered at private clinics were provided formula feeding substitutes that were five times more than those delivered in public health institutions(30).

Inadequate counseling services for mothers for the benefit of exclusive breast feeding and side effects of formula feeding by health professionals' leads mothers to use formula feeding. A study conducted in Dire Dawa revealed that lack of counseling service during ANC follow-up strongly influences the initiation of infant formula feeding(25). According to a study conducted in Sorro District, Southern Ethiopia, no antenatal care visits during pregnancy and no postnatal care visits after delivery were significantly associated with non-exclusive breastfeeding(32). A previous study showed that multiparty feeding was also significantly associated with formula feeding practice(11).

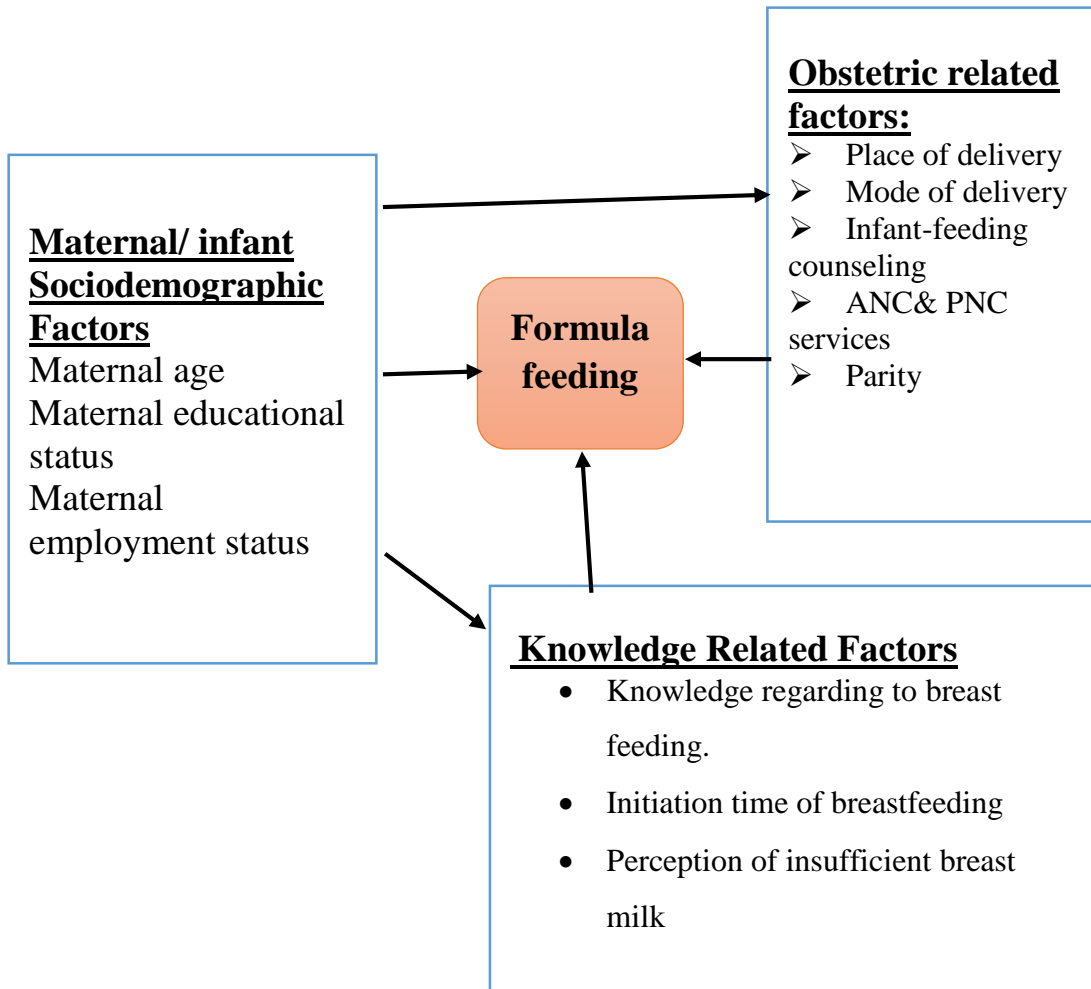


Figure 1 Conceptual framework of infant formula feeding and associated factors at Debre Berehan City adapted from different literatures(2,7,22,31,33–35) .

3. Objectives

3.1 General objective

To assess the magnitude of formula feeding and associated factors among mothers with infants of 0-6month-old in Debre Berhan City, North Shoa, Ethiopia, 2023

3.2 Specific objectives

- To determine the magnitude of formula feeding among mothers with infants of 0-6months of age in Debre Berhan City, North Shoa, Ethiopia, 2023.
- To identify factors associated with formula feeding among mothers with infants of 0-6 months of age in Debre Berhan City, North Shoa, Ethiopia, 2023

4. Methodology

4.1 Study area

The study was conducted at Debre Berehan, North Shoa Zone, which is located in the Amara regional state, in north eastern Ethiopia. Debre Berhan is 130 km from Addis Ababa, and 695 km from the regional city of Bahir Dar. The city has five sub-cities with thirty nine kebeles. According to the 2015 Ethiopian calendar population projection the total number of Debre Berhan city population have 202,226. Among these 106388 were females. The city have two hospitals, eight health center and eighteen health posts.

4.2 Study design and period

A community based cross-sectional study design was conducted from May 10th to May 20th, 2023.

4.3 Source population

All mothers with infants less than 6 months of age living in Debre Berhan City were the source population.

4.4 Study population

All mothers with their infants less than 6 months of age and lived in the randomly selected kebeles of Debre Berhan City.

4.5 Inclusion and exclusion criteria

Inclusion criteria

All mothers with infants less than 6 months of old and lives at randomly selected kebeles

Exclusion criteria

Care givers beside mothers who have a medical reason for the use of infant formula and those who cannot complete the interview because of severe medical /psychiatric problems were excluded in the study.

4.6 Sample Size Determination

➤ Sample size determination by using first objective

The sample size was determined using a single population proportion formula by considering the following assumptions. Proportion of formula feeding study performed at Mettu town (p=28.4%)(2),

$$n = (z\alpha/2)^2 p(1-p)/w^2 \quad n = (1.96)^2 0.284(1-0.284)/ (0.05)^2 = \mathbf{312}$$

n = sample size

w = marginal error (0.05)

z = confidence interval (CI) (95%)

p = proportion of formula feeding (0.284)

$$n = (1.96)^2 0.284(1-0.284)/ (0.05)^2 = \mathbf{312}$$

After adding 5% non-response rate and design effect 2, the total sample size was **656**.

Sample size of the second objective was calculated using Epi Info Stat Calc version 7 with the assumption of 95% of confidence interval and 80% of power by considering exposed to unexposed ratio of 1:1 follows in the table below:

Table 1: Sample size determination based on the second objective on prevalence of formula feeding among 0-6 month infants in Debre Berhan City, 2023.

S. no	Factor	Odds ratio	%in non-exposed	%in exposed	Power	CL	Sample size	Reference
1	Pre-lacteal feeding	7.6	25.6	85.3	80	95	46	(31)
2	Attended by traditional birth attendant	6.89	69.5	7	80	95	294	(21)

Finally, the sample size for the second objective was found to be less than the first objective and the sample size of the first objective, after adding 5% non-response rate the total sample size was 656 infant was taken as final sample size.

4.7 Sampling technique

To select the intended sample size multistage sampling technique was applied. First, three sub-cities out of five sub-cities were selected randomly. Secondly, by using a simple random sampling technique four kebeles were selected from each selected sub-city and the eligible households in each kebele was obtained from health extension workers (EPI registration book). The sample size of each kebele was proportionally allocated. The sampling interval of each kebele was calculated by dividing the number of eligible study participants for allocated sample size of that kebele.

Finally, participants were selected using systematic random sampling technique every 2nd interval for all kebeles by starting selection of the first participant by lottery method from 1 and 2, and subsequent participants were included randomly based on 2nd interval. When the houses is closed at the time of data collection, the houses were coded and go back again to take the information. When it was impossible again; it was replaced by the next eligible house. In houses, when there is more than one household or more than one infant, a single-time balloting method was used to select one household as well as the study participant.

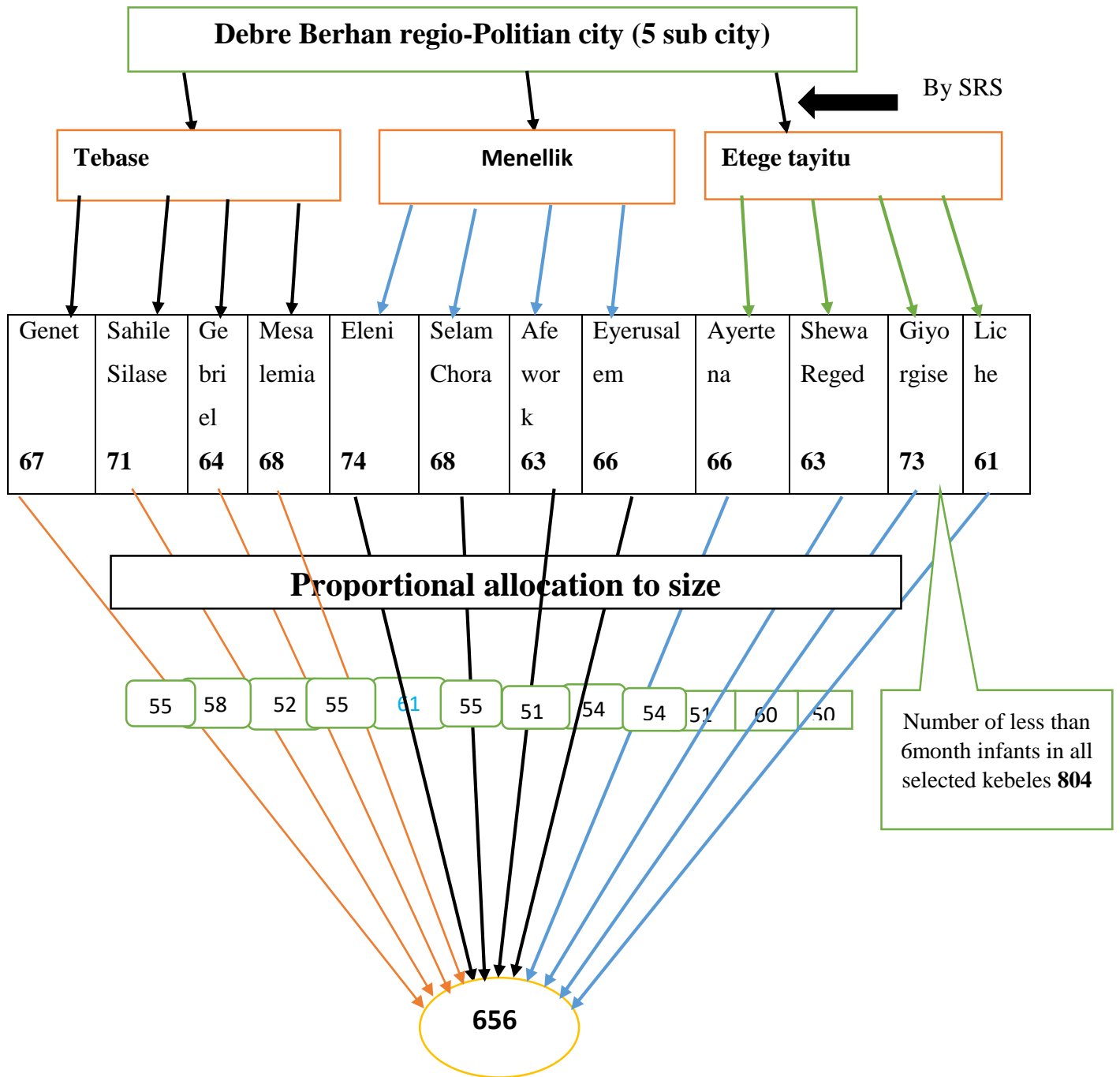


Figure 2 Schematic presentation of sampling procedure in Debre Berhan City, Debre Berhan, 2023.

4.8 Study variables

Dependent variable: Formula feeding (yes/no)

Independent variables;

Sociodemographic Factors; maternal age, maternal educational status, maternal employment status, sex of infant and age of infant.

Obstetric-related factors: Place of delivery, mode of delivery, infant-feeding counseling, ANC follow-up ANC, number of ANC visit, &number of PNC visits, and parity, gravidity, time of initiation of breast feeding, pre-lacteal feeding, counseling on breast feeding

Behavior and Knowledge Related Factors; knowledge regarding breast feeding, attitude towards formula feeding, perception of insufficient breast milk.

4.9 Operational definitions

Formula feeding practice: - Feeding of an infant less than 6 months old with formula food or bottle feeding as a substitute for or supplement to breastfeeding(15).

Breast milk substitutes: - any industrially formulated milk that is prepared for children less than six months up to one year and older(32).

Good knowledge:- When the respondents correctly answer 70% or above for seven questions about breast feeding knowledge(36).

Timely initiation of breast milk: Initiation of breast milk within 1 hour of delivery

Pre-lacteal feeding: Feeding of an infant with any fluid or semisolid food before the mother has begun to breastfeed(36).

4.10 Data collection tool and technique

The data were collected using a structured face-to-face interviewer-administered questionnaire which was adapted after reviewing different literature(22,31,34). The questionnaire consists of socio-demographic, obstetric, and Health care related factors and maternal/caregiver's characteristics. Data were collected by three trained clinical nurses and three trained diploma midwives and supervised by three trained BSc midwives. The data were collected using structured

face-to-face interviewer-administered questionnaires by using systematic random sampling technique after the first participant is selected by lottery method.

4.11 Data Processing and Analysis

After data is collected and checked its completeness, it was entered, categorized and coded using Epi-data version 4.6 and exported to Statistical Package to the Social Science (SPSS) version 25 for further statistical analysis. After categorizing and defining the variables, descriptive analysis was performed for each of the independent variables using frequencies, cross-tabulation and percentages. Bivariate and Multivariable Logistic Regression models were used to identify associated factors. During bivariate analysis p-values of less than 0.2 candidates for multivariable analysis. Finally, variables with a p-value of less than 0.05 during multivariable analysis were considered significantly associated factors. Logistic regression assumption tests were checked. Model fitness was checked by Hosmer and Lemeshow goodness (0.82) and there was no multi collinearity checked by variance inflation factor (VIF).

4.12 Data quality assurance

The items were prepared in English and translated into the local language (Amharic) and then re-translated to English to verify consistency. One day training was provided to data collectors and supervisor on how to collect data. Each day, the collected data were checked for completeness and consistency by the supervisors. The principal investigator closely communicated the performance of the data collectors and supervisors daily. Pretested questionnaire was used for data collection, which was tested in 5% of the sample size in un-selected kebeles of the city. The collected data were reviewed and checked for completeness before entry. Probing of the respondents about the event was carried out to minimize recall bias.

4.13 Ethical consideration

Ethical clearance was obtained from the ethical review board of the Asrat Woldeyes Health Science campus, Debre Berhan University. Additionally, letters of cooperation from the town health office were written to each selected hospital for an effective approach to the data collection process. Verbal consent was obtained from each participant. They were informed of their rights to withdraw from the interview at any time. The information they provide was used only for the study purpose. Data obtained from them were kept confidential using codes instead of personal identifiers.

4.14 Dissemination of the result

The findings of this study will be disseminated to the Debre Berhan University Asrat Woldeyes Health Science Campus and further to the Debre Berhan City Health Department. Finally, the manuscript will be prepared and sent for publication.

5. Result

A total of 635 study participants were included in the study, giving a response rate of 96.7 %. Out of these, 252 (39.7%) of had formula feeding. The mean age of the respondents was 28.8 with SD of ± 4.7 years.

5.1 Socio-demographic characteristics of the respondents

Mothers with children's 0-6 months of age who were participated in this study 635 with a response rate of 96.7%. Five hundred ninety-three (93.4%) of mothers were orthodox religious follower. Based on educational status, three hundred forty-two (53.9%) study participants were attended college and above. Two hundred fourteen (33.7%) study participant mothers were governmental employer. Three hundred forty-four (54.2%) respondents husband attended college and above (**Table 2**).

Table 2 : Socio demographic characteristics of mothers with 0-6 month children in Debre Berhan city North Shewa Zone, Amhara Regional State, Ethiopia, 2023 (n=635).

Variable	Category	Frequency	Percent (%)
Maternal age	15-24	85	13.4
	25-34	434	68.3
	35-45	116	18.3
Maternal occupation	Private worker	136	21.4
	Governmental employer	214	33.7
	Daily laborer	11	1.7
	Merchant	38	6.0
	Farmer	34	5.4
	House wives	202	31.8
Religion	Orthodox	593	93.4
	Protestant	12	1.9
	Muslim	26	4.1
	Other	4	0.6
	Unable to read and write	44	6.9

Educational status	read and write only	20	3.1
	Primary	85	13.4
	Secondary	144	22.7
	College and above	342	53.9
Paternal educational status	Unable to read and write	15	2.4
	only read and write	15	2.4
	Primary	71	11.2
	Secondary	190	29.9
	College and above	344	54.2

5.2 Obstetric and infant-related characteristics

With respect to previous pregnancies, five hundred seventy-eight (91.0%) and 608(81.0%) of study participants had a history of ante natal care follow-up and postnatal care follow-up respectively. Six hundred one (94.6%) of study participants had delivered their infants at governmental health institutions. More than three fourth 500(78.7%) of participants had spontaneous vaginal delivery followed by 114(18.0%) of participants had cesarean section. More than half 385(60.6%) of study participants had started breast feeding within one hour of delivery (Table 3).

Table 3 Obstetric related characteristics of mothers with 0-6 month in Debre Berhan city North Shewa Zone, Amhara Regional State, Ethiopia, 2023 (n=635).

Variable		Frequency	Percent
ANC follow up	Yes	578	91.0
	No	57	9.0
Counselling on breast feeding	Yes	228	35.9
	No	407	64.1
Place of delivery	Public health institutions	601	94.6
	Private health institutions	28	4.4
	Home delivery	6	0.9
Mode of delivery	SVD	500	78.7
	Cesarean section	114	18.0
	Instrumental	21	3.3
PNC	Yes	608	81.7
	No	80	10.8
Infant sex	Male	326	51.3
	Female	309	48.7
Infant age in month	<2month	249	39.2
	2-3 month	137	21.6
	>4month	249	39.2
Initiation of breast milk	With in one hour	385	60.6
	After one hour	250	39.4

5.3 Knowledge Related characteristics of respondents

Maternal knowledge were assessed by asking seven questions about breast feeding, when the respondents correctly answer 70% or above seven considered as good knowledge. Among study participants 44.1% of them were had good knowledge about breast milk feeding.

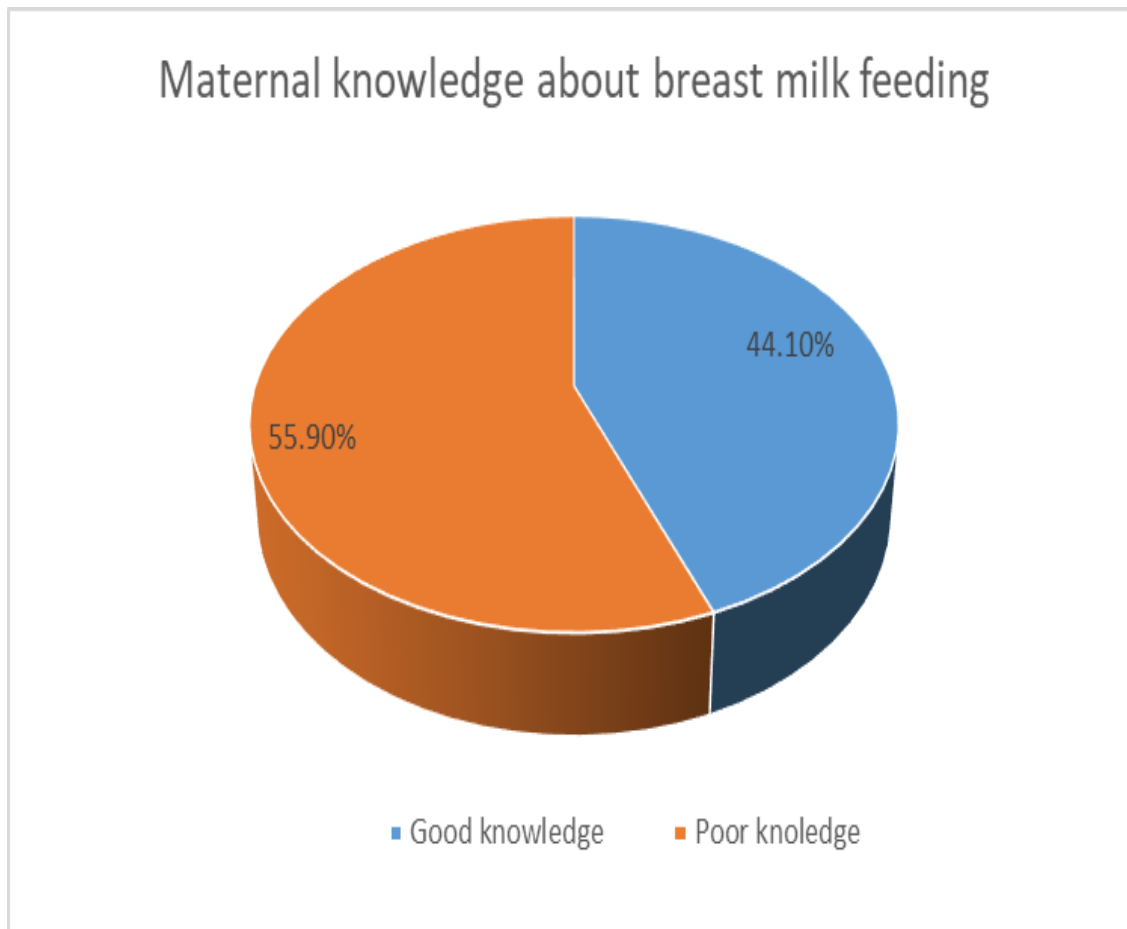


Figure 3: Pie chart shows maternal knowledge on breast feeding in mothers with infants 0-6 months of age at Debre Berhan city, Ethiopia, 2023.

Four hundred fourteen (65.2%) of mothers didn't know the side effects of formula feeding, and also 77.3% mothers had the knowledge breast milk alone is enough for up to six month (Table 4).

Table 4 Maternal Knowledge about formula feeding at Debre Berhan city, North Shewa Zone, Amhara Regional State, Ethiopia, 2023 (n=635).

Variable		Frequency	Percent
feeding breast milk prevents disease	Yes	599	94.3
	No	31	4.9
	I don't know	5	0.8
knowing side effects of formula feeding	Yes	221	34.8
	No	414	65.2
Breast milk alone is enough for up to six month	Yes	491	77.3
	No	144	22.7
Breast feeding delays pregnancy	Yes	322	50.7
	No	153	24.1
	I don't know	160	25.2
Breast feeding increases mother-child relationship	Yes	565	89.0
	No	26	4.1
	I don't know	44	6.9
Breast milk had full food content	yes	586	92.3
	No	16	2.5
	I don't know	33	5.2

5.4 Magnitude of formula feeding

The magnitude of formula feeding among the study participants were 39.7% (95% CI: 35.6, 43.65).

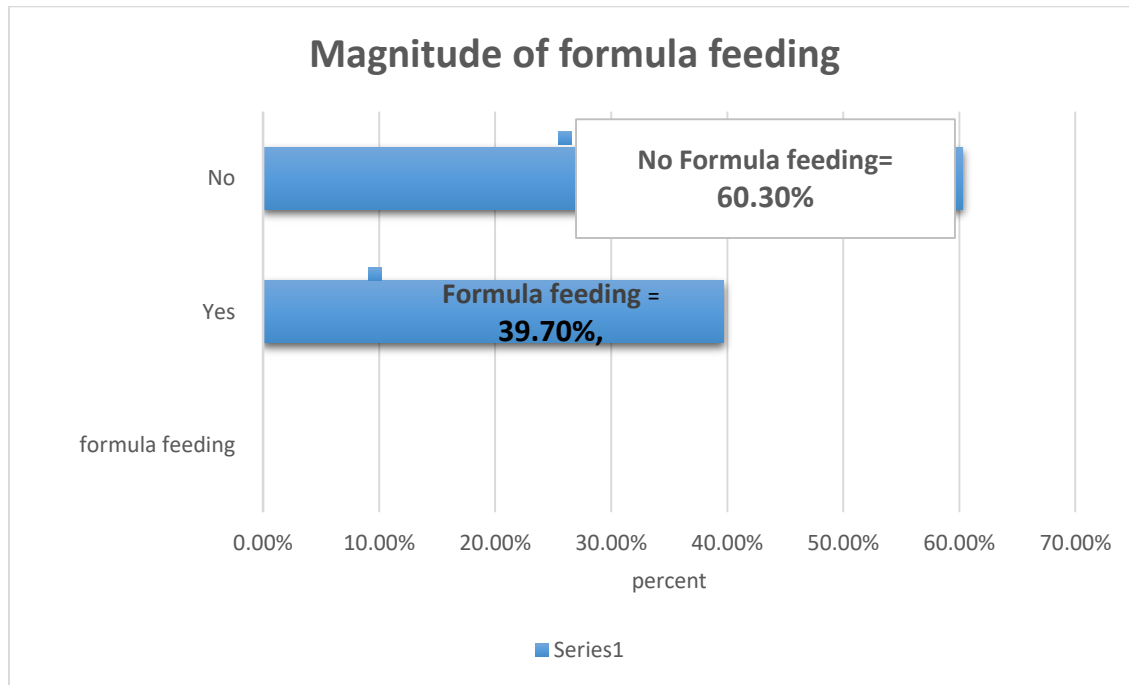


Figure 4: The magnitude of formula feeding among mothers with their infants 0-6 months of age at Debre Berhan city, North Shoa, Ethiopia, 2023.

5.5 Factors Associated with formula feeding

Finally, predictors of formula feeding were identified. There were a total of fourteen variables considered to be investigated for their association with formula feeding. Among them, eight predictor variables were significant during bivariate analysis with a cut point of p-value <0.2 and after adjusting the possible confounders, they were exported to multivariable logistic regression. During multivariable logistic regression analysis five predictor variables were significantly associated with formula feeding (P-value<0.05).

Mothers who initiated breast feeding after one hour were nearly three times more likely to feed formula milk as compared to those who initiated breast feeding within one hour of delivery AOR=2.55 (95% CI: 1.65, 3.95). Feeding formula milk among mothers who didn't know the side effects of formula milk were nearly seven times more likely as compared with those who did have information on its side effect AOR=6.91(95% CI:4.15,11.49).

Mothers who attend college and above were seven times more likely feeding formula milk as compared with mothers with the educational level of unable to read and write AOR=7.45(95% CI:2.39, 23.19). Mothers who had not received counselling services on the importance of breast-feeding during ANC visit were four times more likely as compared with their counter parts AOR=4.42(95% CI: 2.77, 7.07). Mothers who had cesarean section delivery were six times more likely to feed formula milk for their infants as compared with mothers delivered by spontaneous vaginal delivery AOR=6.07(95% CI: 3.101,11.88) (**Table 5**).

Table 5 Factors associated with formula milk feeding among mothers with infants 0-6 months of age who live in Debre Berhan city, North Shewa Zone, Amhara Regional State, Ethiopia, 2023.

Variables	categories	Formula feeding		COR	AOR	AOR P-value
		YES	NO			
Maternal age	15-24	14	71	1	1	1
	25-34	184	250	3.73(2.04, 6.83)	2.03(0.95, 4.33)	0.672
	35-45	54	62	4.42(2.24, 8.71)	3.53(1.46,8.46)	0.663
Maternal employee	Private	57	79	2.08(1.31, 3.31)	1.48(0.77, 2.85)	0.237
	Governmental	125	89	4.05(2.67, 6.14)	1.43(0.77, 2.66)	0.254
	Daily laborer	6	5	3.46(1.01, 11.82)	4.03(0.67, 24.29)	0.128
	Merchant	3	35	0.25(0.07, 0.84)	0.33(0.08,1.30)	0.114
	Farmer	9	25	1.04(0.46, 2.37)	0.32(0.10,1.99)	0.102
	House wife	52	150	1	1	1
Maternal education	Un able to read and write	9	35	1	1	1
	Only read and write	10	10	3.88(1.24,12.18)	1.58(0.29,8.59)	0.592
	Primary	19	66	1.12(0.46,2.73)	1.63(0.48, 5.50)	0.427
	Secondary	34	110	1.20(0.53,2.75)	1.33(0.43,4.13)	0.624
	College and above	180	162	4.32(2.02,9.29)	7.45(2.39,23.19)*	0.001
Counselling on breast feeding	Yes	131	97	1	1	1
	No	121	286	3.19(2.28, 4.47)	4.42(2.77, 7.07)*	0.0001
Mode of delivery	SVD	158	342	1	1	1
	C/S	88	26	7.33(4.55,11.79)	6.07(3.10,11.88)*	0.0001
	Instrumental	6	15	0.87(0.33,2.73)	4.47(0.36,1.65)	0.071
Initiation of BF	Within 1hour	112	273	1	1	1

	After one hour	140	110	3.10(2.22,4.33)	2.55(1.65, 3.95)*	0.0001
PNC follow up	Yes	60	50	2.08(1.37,3.15)	0.56(0.30, 1.04)	0.068
	No	192	333	1	1	1
Knowing the side effects of formula feeding	Yes	43	178	1	1	1
	No	209	205	4.22(2.87, 6.20)	6.91(4.15,11.49)*	0.0001

***Statistically significant (p<0.05), 1 – reference**

6. Discussion

Initiation of breast feeding after one hour AOR=2.55 (95% CI: 1.65, 3.95), mothers who didn't know the side effects of formula milk AOR=6.91(95% CI: 4.15, 11.49), maternal educational college and above level AOR=7.45(95% CI: 2.39, 2319) and cesarean section delivery AOR=6.07(95% CI: 3.101, 11.88) were significantly affect prevalence of formula feeding.

The magnitude of formula feeding among the study participants was 39.7% (95% CI: 35.6, 43.65). This finding was lower than studies done in Jimma City(22) and Addis Ababa(31). The variation could be attributed to differences in the study period, and sample size or it might be related to socio-economic difference in the study population. But the finding was higher than studies conducted in Dire Dawa city administration(25) and Mettu Town, South West Ethiopia(2). The reasons for this difference in the prevalence of formula feeding practice may be due to variations in the study setting, sociocultural characteristics of participants, employment status of participants, and health service utilization

Mothers who were initiate breast feeding after one hour were nearly three times more likely feeding formula milk as compared to those who were initiate breast feeding within one hour of delivery AOR=2.55 (95% CI: 1.65, 3.95). This finding is in agreement with study finding from Addis Ababa(31), Mettu, town, south west Ethiopia(2). The possible justification for this finding is might be due to the fact that mothers who practiced early initiation of breastfeeding may have relatively good knowledge, attitude, and practice towards exclusive breastfeeding and also may have a better understanding about the risk of formula feeding for infants under the age of 6 months.

The odds of feeding formula milk among mothers who didn't know the side effects of formula milk were nearly seven times more likely as compared with those who did have information on its side effect AOR=6.91(95% CI:4.15,11.49). The possible reason for this it might be due to mothers may have a better understanding about the risk of formula feeding for infants under the age of 6 months. Feeding formula milk among mothers who had college and above educational level were seven times more likely feeding formula milk as compared with mothers with educational level of unable to read and write AOR=7.45(95% CI:2.39, 2319). This finding is in line with study conducted in Addis Ababa(31).

The reason was it might be due to when mothers becomes more educated leads in governmental employer, as a result it exposed to lack of adequate time for exclusive breast feeding.

Mothers those who were not got counselling service on the importance of breast feeding during ANC visit were four times more likely as compared with their counter parts AOR=4.42(95% CI: 2.77, 7.07). Mothers whose mode of delivery by cesarean section were six times more likely feeding formula milk for their infants as compared with mothers delivered by spontaneous vaginal delivery AOR=6.07(95% CI: 3.101,11.88). This is in agreement with a similar study conducted in Addis Ababa(31), Dire Dawa(25) and Egypt(19) where cesarean delivery was significantly associated with formula feeding practice. This may be due to post-operative conditions, as mothers with cesarean sections were less likely to have had skin-to-skin contact with their infants and felt fatigued and less relaxed after birth in the delivery room.

7. Strength and limitations

7.2 limitation of the study

- ✓ Recall bias since infant formula feeding was assessed based on self-reporting questions.
- ✓ Barriers for formula feeding could be better assessed if supported by qualitative study.

8. Conclusion

In this study, formula milk feeding among mothers with infants 0-6 months of in Debre Berhan city is higher. The study implied that factors such as: maternal educational level, getting counselling about breast feeding during ANC session, initiation of breast feeding after one hour, and delivery by cesarean section were found to predictors of formula feeding.

9. Recommendation

Based on the result of the study, the following recommendations were made to the following concerned bodies and stake holders to minimize infant formula feeding. Thus, it is recommended that these factors should be worked on for maximizing exclusive breast feeding.

Debre Berhan City Health Department

- Teach mothers about the side effects of formula feeding and the importance of exclusive breast feeding.
- Promoting initiation of breast feeding within one hour.

For health extension worker

- ❖ Continual maternal counselling on the importance of exclusive breast feeding or the side effects of formula feeding.

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Participant Consent form

Hello! My name is I am here on behalf of, Alemtsehay Gashu a student at the Debre Berhan University, Asrat Woldeyes Health Science Campus, and Department of Nutrition. She is conducting research on the partial fulfillment of the requirements for the degree of master’s in Public Health Nutrition on Infant formula feeding practice and associated factors among mothers of infant aged less than 6 months of age in Debre Berhan City, Ethiopia.

I am going to ask you questions related to infant formula feeding practice and associated factors. Your name will not be written in this form and the information you provide is kept confidential and used only for this study. Only the principal investigator and supporter will have this information. If you not want to answer all or some of the questions, you do have the right to do so. However, your willingness to answer all questions is appreciated.

Would you participate in responding to the questions in this questionnaire? -----

Yes ----- No-----

Name and Signature of study participants’ _____ Date _____

Name and signature of data collector _____

Questionnaire designed to assess the prevalence and associated factors of formula feeding practice
In Debre Berehan city, 2023.

Instruction: This questionnaire was designed for face to face interview to collect data from mothers of infants aged 6 months old.

Note: This questionnaire must be filled only by the interviewer once informed consent is obtained from the respondents. Place the answer in blank spaces for open ended questions and circles for multiple choice responses.

Part 1: Socio Demographic

S.no	Questions	Answer	Skip
1	Maternal age	-----years	
2	What is your current marital status?	1.Married 2.Single 3.Divorced 4.Widowed	
3	What is your level of education?	1.Unable to read and write 2. Able to read and write 3. Primary education 4. Secondary education 5. College and above	
4	What is your religion?	1. Orthodox 2. Protestant 3. Muslim 4. Other	
5	What is your resident?	1.Urban 2.Rural	
6	What is your current occupation?	1.Private employee 2.Goverment employee 3.Daily laborer 4.Trader/Private company 5.Farmer 6. Housewife 7. Other	

7	What is your husband's level of education?	1.Unable to read and write 2. Able to read and write 3. Primary education 4. Secondary education 5. College and above	
8	What is your husband's current occupation?	1.Private employee 2.Goverment employee 3.Daily laborer 4.Trader/Private company 5.Farmer 6. Other (Specify)-----	
9	Infants age	-----months	
10	Sex of your current child?	1. Male 2. Female	
11	Birth spacing with the previous child?	-----years	
12	Estimated weight of the child?	1.Low birth weight 2.Normal 3.Big baby	
13	Number of babies delivered in last pregnancy	1.single 2.twins	
Section III. Obstetrics and related health service questions.			
14	How many times of pregnancy did you have?	-----	
15	Did you receive ANC service during your current child pregnancy?	1.Yes 2.No	
16	How many times did you receive ANC during last pregnancy?	1.Once 2 Two times4 3.Threetimes 4.Four times and above	
17	If yes where did you receive ANC service?	1.Gov.t Health Facilities 2.Private Health facilities 3.other-----	

18	Did you receive counseling about breast feeding during your ANC visit?	1.Yes. 2.No	
19	Where did you give birth of this infant?	1.Gov.t Health Facilities 2.Private Health Facilities 3.Home 4..Other,speify-----	
20	What was the mode of your delivery?	1.Normal/vaginal 2.C/S	
21	Did you receive PNC service after delivery?	1.Yes 2.No	
22	How soon after birth did you put your infant for the first time to breast feed?	1.Immediately with in 1hr. of birth 2.After 1 hour 3.After 3 days 4.other-----	
24	If yes, to ever breast fed has your infant fed breast milk currently?	1. Yes 2. NO	
25	Have you fed the first breast milk?	1.Yes 2.No	
26	If you did not feed first milk/ colostrum what was the reason?	1.Infant unable to feed 2.Is not good for infant health 3.It is a tradition/culture 4.If other-----	
27	Have you ever heard/seen any information talking about infant formula?	1.Yes 2.No	
28	If you heard/seen, what kind of information did you received? (Multiple answers are possible)	1.Infant formula is good for infant Growth 2.Infant formula make the infant smart 3.Infant formula is good for infant intelligence	

		4. Infant formula has same nutritional benefits as breast feeding 5. If other-----	
29	If yes from where did you received?	1. From radio/TV 2. From health professionals 3. From supermarket keepers 4. From friends/family 5. Other, specify-----	
30	Have you ever fed infant formula to your current infant?	1. Yes 2. No	
31	What was your reason to start formula milk to your infant?	1. Due to insufficient breast milk 2. Maternal illness 3. Child illness 4. Have no enough time to breast feed 5. Formula milk is good as breast milk 6. Formula milk is better than breast milk 7. Others-----	
32	If Yes for Question no 409, Have you fed infant formula milk currently?	1. Yes 2. No	
33	If your infant fed infant formula, from where you get/buy the infant formula milk?	1. From pharmacy/drug shops 2. From supermarkets 3. From family 4. From health professionals 5. Other, specify. _____	
34	Did your previous infants ever feed an infant formula milk?	1. Yes 2. No	

35	Would you recommend formula feeding to anyone?	1.Yes 2.No	
36	Do you know the side effects of formula feeding to your baby?	1.Yes 2.No	
37	If Yes, what are these side effects that you know?	-----	
38	Do you think short maternity leave leads to formula feeding practice?	1.Yes 2.No	
39	Did your family /friends push you to use infant formula for your infant?	1.Yes 2.No	
Knowledge Questions			
1	1. Is feeding breast milk only adequate to babies in the 1st 6months of life?	1.Yes 2.No 3. I do not know	
2	Does breast milk protective the child from childhood illnesses?	1.Yes 2.No 3. I do not know	
3	Does Feeding only formula or other food to babies is expensive than breast milk?	1.Yes 2.No 3. I do not know	
4	Does Breast milk is nutritious?	1.Yes 2.No 3. I do not know	
5	Does Breast feeding increases bonding between mother and infant?	1.Yes 2.No 3. I do not know	
6	Does breast feeding has contraceptive benefit?	1.Yes 2.No 3. I do not know	

7	Does breast feeding have better advantage than formula feeding?	1. Yes 2. No 3. I do not know	
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የአማርኛ መጠይቅ

ክፍል 1 :- እናቶች እና ህፃናት ማህበራዊ አደናቃ ሁኔታዎች መረጃ

ተ.ቁ	ጥያቄዎች	ምላሾች	ዝላል
1	እዴሜሽ ስንት ነው?	1. _____ ዓመት 2. አላውቀውም	
2	የጋብቻ ሁኔታ?	1. ያገባች 2. ያላገባች 3. የተፋታች 4. የሞተባች	
3	የት/ት ሁኔታ?	1. ማንበብና መፃፍ የማትችል 2. ማንበብና መፃፍ የምትችል 3. የ1ኛ ደረጃ ት/ት የተማረች 4. የ2ኛ ደረጃ ት/ት የተማረች 5. የከፍተኛ ት/ት የተማረች	
4	ሃይማኖት?	1. ኦርቶዶክስ ተዋህዶ 2. ፕሮቴስታንት 3. ሙሊም 4. ሌላ (ጥቀሺ)-----	
5	የመኖሪያ አካባቢ?	1. ከተማ 2. ገጠር	
6	የስራ ሁኔታ?	1. የግል ተቀጣሪ 2. የመንግስት ተቀጣሪ 4. የቀን ሠራተኛ 5. ነጋዴ 6. ገበሬ 7. የቤት እመቤት 8. ሌላ (ጥቀሺ)-----	
7	የባለቤትዎ የትምህርት ደረጃ?	1. ማንበብና መፃፍ የማይችል 2. ማንበብና መፃፍ የሚችል	

		3.የ1ኛ ደረጃ ት/ት የተማረ 4.የ2ኛ ደረጃ ት/ት የተማረ 5.የከፍተኛ ት/ት የተማረ	
8	የባለቤትዎ የስራ ሁኔታ?	1.የግል ተቀጣሪ 2.የመንግስት ተቀጣሪ 3.የቀን ሠራተኛ 4.ነጋዳ 5. ገበሬ 6. ሌላ (ጥቀሽ)-----	
9	የህፃኑ እድሜ ስንት ነው?	-----ወር	
10	የህፃኑ ፆታ?	1.ወንድ 2. ሴት	
11	ባሁኑ ህጻን ና ከዚህ በፊት በተወለደው ህጻን መካከል ያለ የእድሜ ልዩነት	-----አመት	
12	የተወለደው ህፃን ያለው የክብደት ግምት?	1.ዝቅተኛ 2.ተመጣጣኝ 3.ከፍተኛ	
13	በመጨረሻው እርግዝና የተወለደ የልጆች ብዛት?	1.አንድ 2.ሁለት 3.ሌላ ካለ -----	
ክፍል 2. Obstetrics and related health service questions.			
14	ምን ያህል ጊዜ ነፍሰ ጡር ሆነሽ ታውቁዎታለሽ?	-----	
15	በእርግዝናሽ ጊዜ የቅድመ ወሊድ ክትትል በጤና ማዕከል ተከታትላሽ ነበር (በመጨረሻው ልጅ)	1.አዎ 2. የለም	
16	ለስንት ጊዜ ያክል ተከታትላሽ ነበር	1.ለአንድ 2 ለሁለት ጊዜ 3.ለሶስት ጊዜ 4. ለአራት ና በላይ	
17	ቅድመ ወሊድ ክትትል ያረግሽው የት ነው?	1.የመንግስት ጤና ተቋም 2.የግል ጤና ተቋም 3.ሌላ -----	
18	ስለ ጡት ማጥባት ምክር ተሰጥቶሽ ነበር ?	1.አዎ 2.የለም	

19	ልጅዎን የወለዱት የት ነበር ?	1.የመንግስት ጤና ተቋም 2.የግል ጤና ተቋም 3.በቤት ውስጥ 4.ሌላ -----	
20	ልጅዎን የወለዱት በምን መልኩ ነበር?	1.በማህፀን በኩል ያለምንም መሣሪያ 2.በሆዳ በኩል በቀዶ ጥገና 3. በሌላ-----	
21	ለዚህ ህጻን የዱቄት ወተት ሰጠተሽው ታውቂያለሽ?	1.አዎ 2.የለም	
22	ከሰጠሽው ለመስጠት ምክንያትሽ ምን ነበር ?	1. ጡቴ በቂ ልነበረም 2. በእኔ ህመም ምክንያት 3.በህጻኑ ህመም ምክንያት 4.ጡት ለማጥባት በቂ ጊዜ ስለሌለኝ 5.የጡት ወተትን ስለሚተካ 6.የዱቄት ወተት ከጡት የተሻለ ስለሆነ 7.ሌላ ካለ -----	
23	በአሁኑ ሰዓት የዱቄት ወተት እየወሰደ ነው?	1.አዎ 2.የለም	
24	ልጅዎ የዱቄት ወተት የሚመገብ ከሆነ ከየት ነው የምታገኝው/የምትገኘው?	1.ከፋርማሲ 2.ከሱፐር ማርኬት 3.ከቤተሰብ/ዳደሩ 4.ከጤና ባለሙያዎች 5.ሌላ ካለ ይገለጹ.....	
25	ከዚህ በፊት ለተወለደ ልጅ የዱቄት ወተት ሰጥተሽ ነበር ?	1.አዎ 2.የለም	
26	ሰዎች የዱቄት ወተት እንዲጠቀሙ ትመክረያለሽ?	1.አዎ 2.የለም	
27	ስለ ዱቄት ወተት የጎንዮሽ ጉዳት ታውቂያለሽ?	1.አዎ 2.የለም	

28	መልስሽ አዎ ከሆነ ብትጠቅሽልኝ?	-----	
29	ለእናቶች የሚሰጠው የወሊድ ፈቃድ በቂ ነው ብለሽ ታስቢያለሽ?	1.አዎ 2.የለም	
30	ቤተሰቦችሽ የዱቄት ወተት እድትጠቀሚ ይገፋፋሽ ነበር ?	1.አዎ 2.የለም	

እናቶች ስለጡት ማጥባት ያላቸውን ግንዛቤ

1	ለ6 ወር የጡት ወተት ብቻ ማጥባት ለህጻኑ በቂ ነው:	1.አውነት 2.ሀሰት 3.አላውቅም	
2	የጡት ወተት ማጥባት ህጻኑን ከበሽታ ይከላከላል::	1.አውነት 2.ሀሰት 3.አላውቅም	
3	አርቲፊል ወተት መመገብ ከዋጋ አንጻር ውድ ነው::	1.አውነት 2.ሀሰት 3.አላውቅም	
4	ጡት ወተት የተሟላ የምግብ ይዘት አለው::	1.አውነት 2.ሀሰት 3.አላውቅም	
5	የጡት ወተት የእናትና ሌጅ ቅርርብ ይፈጥራል::	1.አውነት 2.ሀሰት 3.አላውቅም	
6	የጡት ማጥባት እርግዝናን ለመከላከል ይረዳል::	1.አውነት 2.ሀሰት 3.አላውቅም	
7	የጡት ወተት ከአርቲፊል ወተት የተሻለ ጥቅም አለው::	1.አውነት 2.ሀሰት 3.አላውቅም	

11. DECLARATION SHEET

I, the undersigned, declare that this is my original work and has never been presented by another person in this or any other University and that all the source materials and references used for this thesis have been duly acknowledged.

Name: Alemtsehay Gashu

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Date of Submission: _____

The proposal has been submitted for examination with my approval as a university advisor.

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Date: _____

Name of advisor: 2. Fitsum Zekariyas

Signature: _____

Date: _____