

Formula Feeding Practice and Associated Factors Among Mothers Who Visited Health Facilities for Their Infants Aged Below 6 Months in Bahir Dar City, Northwest Ethiopia, 2020

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Background: Even though breastfeeding for infants and young children provides the ideal food for healthy growth and development, nowadays the use of infant formula feeding has increased worldwide. In developing countries, 1.3 million to 1.45 million childhood deaths are attributed to suboptimal breastfeeding practices.

Objective: This study aimed to assess infant formula feeding practice and associated factors among mothers who visited health facilities for their infants aged less than 6 months in Bahir Dar city in 2020.

Methods: An institution-based cross-sectional study was conducted in March–May 2020. Data were collected from 593 randomly selected mothers with infants less than 6 months of age. A multivariable logistic regression analysis was performed to identify associated factors of formula feeding practice with a p-value of less than 0.05 and an adjusted odds ratio of 95% confidence interval.

Results: The prevalence of infant formula feeding practices was 25%. Maternal age group of 25–34 years [AOR = 2.388; 95% CI: 1.295, 4.406], mother's occupation of private employee [AOR = 6.726; 95% CI: 2.756, 16.413], government employee [AOR = 4.726; 95% CI: 1.895, 8.700] and merchant [AOR = 2.798; 95% CI: 1.066, 7.345], positive attitude to infant formula [AOR = 2.10; CI: 1.09, 4.06], delayed breast milk initiation after delivery [AOR = 3.73; 95% CI: 1.504, 9.252], mothers who had 3 antenatal care [AOR = 2.294; 95% CI: 1.317, 3.997] and source of formula milk information from supermarket/pharmacy [AOR = 6.57; 95% CI: 1.48, 29.16] and from families/friends [AOR = 2.24; 95% CI: 1.24, 4.03] were independent predictors of infant formula feeding practice.

Conclusion: This study's findings revealed that one-fourth of mothers fed infant formula before the age of 6 months. Therefore, we recommended promoting behavior change communication, focusing on attitude change in formula feeding practice and its health consequences, promoting exclusive breastfeeding practice, and strengthening ANC service provision.

Keywords: formula feeding practice, infants less than 6 months of age, Ethiopia

Introduction

Infant formula is a breast milk substitute formulated industrially following the applicable standards for infants up to six months of age, usually prepared for bottle-feeding or cup-feeding from powder or liquid.¹ Infant formula is manufactured using modified cow's milk or soy and does not contain any of the protective antimicrobial or bioactive substances.²

The World Health Organization recommends that babies be exclusively breastfed for their first 6 months of life and then introduced to complementary foods with breast milk between the ages of 6 and 23 months.³ Exclusive breastfeeding is basic for child survival and health because it provides essential, complete, and irreplaceable nutrition for a child's

growth and development.⁴ Furthermore, breastfeeding protects mothers against certain types of health problems, like bleeding after delivery and ovarian and breast cancer, and it delays the return of pregnancy.⁵

Despite all the benefits of exclusive breastfeeding, studies indicate that the prevalence and duration of breastfeeding are declining and being replaced by formula feeding, including plain water, butter, fruit juice, and other local foods. At the same time, colostrum is discarded as unclean.^{6,7}

Globally, around two out of five mothers introduced breast milk substitutes (BMS) by the time their baby was 8 weeks old, and most were combining breast milk and BMS before their baby reached 6 months of age.³

In many developing countries like Ethiopia, women discard colostrum based on traditional or cultural beliefs, perceiving it as sour, difficult to digest, and harmful to the infant's health. Thus, they replace it with pre-lacteal feedings such as plain water, honey, formula, or animal milk.^{8–10}

Formula supplementation has many undesired side effects that can result in adverse outcomes on the maternal milk supply, on the duration and exclusivity of breastfeeding, and on the infant's health, which leads to pneumonia, diarrhea, and certain chronic diseases like obesity and diabetes.¹¹ 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 the infancy of formula-fed infants, which leads to obesity and related problems.¹²

Babies who are exposed to formula and stop breastfeeding early have higher risks of illness, obesity, allergies, and sudden infant death syndrome (SIDS) and impairment of the child's cognitive development.^{13,14} increased risk of long-term diseases with an immunological basis, including asthma and other atopic conditions: type 1 diabetes, celiac disease, ulcerative colitis, and Crohn's disease. Formula feeding is also associated with a greater risk of childhood leukemia.⁴

According to a 2017 WHO report, globally, only 40% of mothers exclusively breastfed their infants for 6 months.¹⁵ According to the 2019 Ethiopia Mini Demographic and Health Survey (EMDHS), only 59% of Ethiopian infants under 6 months of age were exclusively breastfed.¹⁶

Continued and aggressive marketing of breast-milk substitutes, with the promotion of feeding bottles and teats, is declining breastfeeding rates and confusing the distinction between breast milk and formula, with claims that infant formula is safe, easy to use, and nutritionally complete.^{17,18} In 2012, the World Health Assembly endorsed a comprehensive implementation plan on maternal, infant, and young child nutrition, specifying six global nutrition targets for 2025, one of which is to increase the rate of exclusive breastfeeding in the first 6 months up to at least 50%.¹⁹

In a country like Ethiopia, where child morbidity and mortality due to diarrhea and other gastrointestinal and respiratory infections are very high, exclusive breastfeeding is the best child-feeding option compared to formula or other feeding practices.²¹

In Ethiopia, the Ministry of Health (MoH) established the National Nutrition Programme II (NNPII) and the National Guideline on Infant and Young Child Nutrition to promote optimal feeding and care practices that follow international recommendations.^{22,23} Despite this, formula feeding is practiced significantly. This study provides comprehensive evidence for policymakers and decision-makers to develop holistic strategies to tackle these public health problems and to provide customized evidence-based support to mothers to decrease personal, social, and commercial pressures that lead to their decision to feed infants. Therefore, this study aimed to assess infant formula feeding practices and associated factors among mothers of infants less than 6 months of age in the study area, Bahir Dar City, Ethiopia.

Methods and Materials

Study Setting

The study was conducted in selected Bahir Dar city health facilities. Bahir Dar is the capital city of Amhara National Regional State. The city is located on the southern shore of Lake Tana. It is located approximately 578 km northwest of Addis Ababa, the capital city of Ethiopia. Based on the Central Statistics Agency (CSA), the city has more than 314,000 inhabitants; of these, 158,570 are females, 47,100 are under-five children, and 75,360 are mothers in the reproductive age group.²⁴ In the city, there are three public hospitals (two referral hospitals and one primary hospital), four private hospitals, 52 private clinics, and six public health centers.

Study Design and Period

An institution-based cross-sectional study was conducted from March to May 2020.

Study Population

All mothers having infants less than 6 months of age coming for immunization and under five OPD services in Bahir Dar city health facilities were the source population, while mothers having infants less than 6 months of age coming for immunization and under five OPD services during the study period in selected Bahir Dar city health facilities were the study population.

Inclusion Criteria and Exclusion Criteria

All mothers with infants younger than 6 months came for immunization and under five outpatient department services during the study period, while caretakers beside mothers who brought infants to facilities were excluded from the sample.

Sample Size Determination

The sample size was determined using a single population proportion formula by considering the following: $n = \frac{Z^2 p(1-p)}{w^2}$; where: Z = standard normal distribution value at 95% CI, which is 1.96; P = prevalence of formula feeding practice from a study done in Jimma, which was 47.2% ($P = 0.472$); W = the margin of error, taken as 5%. Accordingly, by considering a 10% non-response rate and 1.5 design effects, the sample size was 630.

Sampling Technique and Sampling Procedure

Health facilities with high client flow for immunization and under five OPD services, which were three hospitals and six health centers from public institutions, four hospitals, and three specialty clinics from private health facilities, were selected. Of these health facilities, four of them (one from each) were selected by the lottery method to ensure representativeness. The calculated sample size was proportionally allocated for each health facility according to the pre-determined monthly client flow from the previous year from the service log book of each department. The sampling interval (K^{th} value) was calculated by dividing the total number of units in the population by the desired sample size, and the k value was found to be 3. Then, a number between one and the K value was taken as the random starting point. When mothers with infants aged less than 6 months who fulfilled the inclusion criteria came to immunization and under-5 OPD services, they were selected by using systematic random sampling and interviewed until an estimated sample size was achieved from each health facility.

Data Collection Procedure

A face-to-face interview was conducted among selected mothers with infants less than 6 months of age using a structured interviewer-administered questionnaire adapted from EDHS and different literature.^{21,26,27} The questionnaire was primarily prepared in English and then translated into the local language, Amharic, and then back to English to check for consistency. Eight female diploma nurse data collectors and two BSc nurse supervisors were recruited from selected health facilities. Two days of training were given to the data collectors by the primary investigator. The collected data contains variables related to socio-demographic characteristics, socio-economic and housing conditions (wealth index), obstetric-related characteristics, infant feeding practice, source infant formula information, mother's behavior, and knowledge-related factors. Data on formula feeding practice was collected using the "recall since birth" method.

Operational Definition

Wealth index: was determined using the principal component analysis (PCA) with SPSS by considering household assets, latrine, water source, livestock, and agricultural land ownership adopted from EDHS 2016.²⁸ quintiles of the wealth score were created, and respondents who were in the third quintile were rich (wealthy), in the second quintile were medium, and in the first quintile were poor in their economic status.

Data Quality Assurance

Data quality was assured through the careful design of a structured, pre-tested questionnaire and data collection procedure. Before data collection, training was given to data collectors on techniques of interviewing and recording. The questionnaire was pretested to ensure its understandability by taking 5% (n = 32) of sample volunteer mothers in Addisalem Primary Hospital. During data collection, all the collected data were reviewed by the supervisors and principal investigator for completeness and consistency. After collection, the data were cleaned and coded to minimize errors before analysis.

Data Processing and Analysis

Data were coded and entered into Epi Data version 3.1 software and exported to Statistical Package for the Social Sciences (SPSS) version 23 for data analysis. Descriptive statistics like frequency distribution, percentage, mean, and standard deviation were calculated. Associations between categorical variables were calculated using cross-tabulations and the a chi-squared statistical test. Socioeconomic status (wealth index) was assessed by constructing an index through the use of principal component analysis (PCA) of household assets. Principal component analysis (PCA) was used to determine the wealth status of respondents. The responses to all variables were classified into two scores. The highest score was coded as 1, and the lower score was given code 0. Assumptions of PCA were checked to carry out the wealth index score. In PCA, to determine the number of components that would be retained, the eigenvalue-one criterion was used, and those variables having a commonality value greater than 0.5 were used to produce factor scores. Lastly, the score for each household on the first principal component was retained to create the wealth score. Cut-off points were given for three equal groups of quintiles representing the poor and the rich (wealthy). Finally, portions of the wealth score were created to categorize households as poor, medium, and rich. Multicollinearity was checked using variance, inflation factors, and tolerance tests.

Bi-variable and multivariable logistic regression analyses were used to investigate the independent predictors of formula feeding practice. Independent variables with a P-value 0.25 during bi-variable analysis were entered into the multivariable analysis model. A crude and adjusted odds ratios and a 95% confidence interval were computed to assess the presence and degree of association between dependent and independent variables. A P-value of 0.05 in multivariable logistic regression was considered statistically significant for formula feeding practice. Model fitness was checked using Hosmer Lemeshow ($P = 0.87$).

Results

From the total of 630 calculated sample sizes, 593 mothers participated, giving a response rate of 94.12%.

Socio-Demographic Characteristics

More than half of the study participants, 335 (56.5%), were in the age group of 25–34 years. Three-fourths of the study participants, 450 (75.9%), reported that they belonged to the Orthodox religion, and most of them, 555 (93.6%), were married. Three-fourths of the participants were educated and attended primarily college and above. More than two-thirds (405, or 68.3%) of the participants believed that short maternity leave led mothers to start formula feeding practices (Table 1).

Obstetrics-Related Factors

About 294 (49.6%) of the mothers had 2–4 children. For almost all mothers, 590 (99.5%) received ANC service at least once, and 351 (59.5%) attended ANC visits four times or more. About 493 (83.6%) of the respondents received ANC services from governmental health facilities. Three-fourths of the mothers had received breastfeeding counseling during the ANC service. Five hundred eleven (86.0%) and 482 (81.3%) mothers were delivered by normal or vaginal delivery and attended PNC service after delivery, respectively (Table 2).

Breastfeeding Practice

All mothers had ever practiced breastfeeding for their infants younger than 6 months of age. In contrast, those mothers who put their infants at the breast immediately within the first hour of delivery were 527 (88.9%). About 567 (95.6%) of them had fed the first milk or colostrum to their infants. Five hundred forty-two (91.4%) mothers reported that they were practicing breastfeeding their infants during the study period (Table 3).

Table 1 Socio-Demographic Characteristics of Mothers and Infants Less Than 6 Months of Age (n = 593) in Bahir Dar City Health Facilities in Amhara Regional State, Northwest Ethiopia, from March to May 2020

Variables	Category	Frequency	Percent (%)
Age	15–24	163	27.5
	25–34	335	56.5
	35–49	95	16.0
Religion	Orthodox	450	75.9
	Muslim	112	18.96
	Protestant	31	5.2
Residence	Urban	526	88.7
	Rural	67	11.3
Education	Unable to read and write	48	8.1
	Able to read and write	102	17.2
	Primary education	110	18.5
	Secondary education	210	35.4
Marital status	College and above	123	20.7
	Married	555	93.6
	Single	30	5.1
	Divorced	6	1.0
Occupation	Widowed	2	0.3
	Housewife	250	42.2
	Government employer	145	24.5
	Merchant	76	12.8
	Private employer	71	12.0
Wealth index	Farmer	38	6.4
	Daily labourer	9	1.5
	Poor	196	33.1
	Medium	197	33.2
Do you think a short maternity leave leads to formula feeding?	High	200	33.7
	Yes	405	68.3
	No	188	31.7

Exposure to Infant Formula Information

Four hundred ten (69.6%) mothers were exposed to infant formula information once in their lifetime. Two hundred thirty-two mothers (56.5%) reported that they had been informed that infant formula is good for infant growth.

A bit more than half of the study participants, 211 (51.5%), reported that they obtained information from TV or radio, followed by their families or friends, 134 (22.5%) (Table 4).

Behavior and Knowledge-Related Factors

Mothers were asked favorable questions about their knowledge of breastfeeding and attitude towards infant formula feeding. In general, among respondents, 473 (79.7%) had good knowledge about breastfeeding, and the majority of mothers (511 (86.2%) had a negative attitude regarding infant formula feeding practice. Most of the respondents, 370 (90.3%), did not believe that infant formula protects the maternal body.

Table 2 Obstetrics-Related Factors of Mothers Who Had Infants Less Than 6 Months (n = 593; Otherwise, It is Mentioned) in Bahir Dar City, Amhara Regional State, Northwest Ethiopia, March to May 2020

Variables	Category	Frequency	Percent (%)
Number of children	1	280	47.2
	2–4	294	49.6
	≥5	19	3.2
ANC	Yes	590	99.5
	No	3	0.5
Health facility ANC received (n = 590)	Government	493	83.6
	Private	97	16.4
Number of ANC (n = 590)	Once	36	6.1
	Two times	74	12.5
	Three times	129	21.9
	Four times and above	351	59.5
Breastfeeding counseling (n = 590)	Yes	447	75.8
	No	143	24.2
Place of delivery	Gov't health facility	493	83.1
	Private health facility	96	16.2
	Home	4	0.7
Mode of delivery	Normal/vaginal	511	86.0
	C/S delivery	82	14.0
Postnatal care service	Yes	482	81.3
	No	111	18.7

Table 3 Breastfeeding Practice Among Mothers (n = 593) Who Visited Health Facilities for Immunization and <5 OPD Services for Their Infants Less Than 6 Months of Age in Bahir Dar City, Northwest Ethiopia, from March to May 2020

Variables	Category	Frequency	Percent (%)
Ever breastfeeding	Yes	593	100
Time of the initiation of breastfeeding	Within the first hour	527	59.6
	After 1 hour	40	4.5
	After 3 days	26	2.9
Colostrum feeding	Yes	567	95.6
	No	26	4.4
Reason for not feeding colostrum (n = 26)	Maternal illness	16	61.5
	Infant unable to feed	10	38.4
Current breastfeeding status of an infant	Yes	542	91.4
	No	51	9.6

Infant Formula Feeding Practice

Out of the respondents, 148 (25%) mothers initiated formula milk once in their lifetime for their index infants. From these, about 88 (59.7%) mothers started infant formula feeding within one month after delivery.

Factors Associated with Infant Formula Feeding Practice

Based on the bi-variable analysis, the age of the mothers, educational status of the mother, occupation of the mother, wealth index of the household, number of ANC, mode of delivery, time of initiation of breastfeeding, age of the infant, source of information about infant formula, and mothers' attitude towards formula feeding were associated with formula feeding practices ($P < 0.25$). Adjusting for potential confounders in the multivariable analysis, maternal age, occupation,

Table 4 Exposure to the Infant Formula Information of Mothers (n = 593) Who Visited Health Facilities for Their Infants Less Than 6 Months of Age in Bahir Dar, Northwest Ethiopia, from March to May 2020

Variables	Category	Frequency	Percent
Exposed to infant formula information	Yes	414	69.82
	No	179	30.18
Information received from advertisement (n = 410)	Good for infant growth	232	56.5
	Similar to breastfeeding	118	28.7
	For infant intelligence	49	11.9
	Make an infant beautiful.	11	2.7
Source of infant formula information (n = 410)	TV/Radio	211	51.5
	Family/friends	134	32.7
	Health professionals	50	12.2
	Supermarket/Pharmacy	15	3.6

number of ANC visits, initiation of BF, and source of information about infant formula were significantly associated with formula feeding practices at a p-value of 0.05 with a 95% CI.

Mothers whose ages were between 25 and 34 years were 2.3 times more likely to feed infant formula compared to mothers in the age category of 15–24 years (AOR = 2.39; 95% CI = 1.295, 4.406).

Regarding the occupation of mothers, those who were private employees [AOR = 6.73 (95% CI = 2.756, 16.413)], government employees (AOR = 4.06; 95% CI = 1.895, 8.700), and merchants (AOR = 2.78; 95% CI = 1.066, 7.345) were 6.7, 4.1, and 2.8 times more likely to practice infant formula feeding compared to those mothers who were housewives.

The number of ANC visits was also associated with infant formula feeding practice, and mothers who had ANC visits less than four times were 2.3 times more likely to feed infant formula to their infants less than 6 months of age compared to mothers who had 4 and above ANC visits (AOR = 2.29; 95% CI = 1.317, 3.997).

Mothers who initiated breast milk after one hour of delivery were 3.73 times more likely to practice infant formula feeding compared to those mothers who initiated breast milk within one hour of delivery (AOR = 3.73; 95% CI = 1.504, 9.252).

Mothers who reported a positive attitude towards infant formula were 2.1 times more likely to practice infant formula feeding compared to their counterparts (AOR = 2.10; 95% CI = 1.090, 4.062).

Mothers who received information about infant formula feeding from a supermarket or pharmacy (AOR = 6.57; 95% CI = 1.481, 29.155) and their families or friends (AOR = 2.24; 95% CI = 1.242, 4.034) were 6.57 times and 2.24 times, respectively, more likely to practice infant formula feeding compared to those mothers who received information from TV or radio (Table 5).

Table 5 Factors Associated with Infant Formula Feeding Practice Among Mothers (n = 593) Who Visited Health Facilities for Immunization of Their Infants Less Than 6 Months of Age in Bahir Dar City, Northwest Ethiopia, from March to May 2020

Factors	Category	Formula Feeding		COR (95% CI)	AOR (95% CI)
		Yes (%)	No (%)		
Age (in years)	15–24	33(22.3%)	130(29.2%)	1	1
	25–34	109(73.6%)	226(50.8%)	1.900(1.22, 2.10)	2.388(1.295, 4.406)*
	35–49	6(4.1%)	89(20.0%)	0.266(0.107,0.660)	0.134(0.026, 1.513)
Education	Unable to R & W	9(6.1)	39(8.8)	1	1
	Able to R & W	9(6.1)	93(20.9)	0.419(0.155,1.136)	0.395(0.078,2.014)
	Prim. Education	31(20.9)	79(17.7)	1.700(0.737,3.921)	1.728(0.450,6.630)
	Secondary Education	64(43.2)	146(32.8)	1.900(0.869,4.152)	0.741(0.222,2.472)
	College+	35(23.4)	88(19.7)	1.723(0.756,3.928)	0.554(0.157,1.961)

(Continued)

Table 5 (Continued).

Factors	Category	Formula Feeding		COR (95% CI)	AOR (95% CI)
		Yes (%)	No (%)		
Occupation	Housewife	50(33.8)%	200(45.4%)	1	1
	Government	49(31.1%)	96(21.8%)	2.042(1.29, 3.24)	4.060(1.895,8.700)*
	Merchant	17(11.5%)	59(13.4%)	1.153(0.619, 2.15)	2.798(1.066,7.345)*
	Private	25(16.9%)	46(10.4%)	2.174(1.22, 3.87)	6.726(2.756,16.413)*
	Farmer	7(4.7%)	31(7.0%)	0.903(0.376,2.171)	1.718(0.492,2.026)
	Daily labourer	0(0.0)	9(2.0%)	–	–
Wealth index	Poor	58(35.3%)	139(32.4%)	1	1
	Medium	40(20.3%)	160(37.5%)	0.599(0.377,0.951)	0.692(0.355,1.349)
	High	50(44.6%)	146(30.1%)	0.821(0.527,1.279)	1.806(0.824,3.960)
Age of the infant	1–3 months	69(46.6%)	291(65.4%)	0.462(0.317,0.674)	0.703(0.395,1.254)
	4–6 months	79(53.4%)	154(34.6%)	1	1
Number of ANC visits	1–3 times	85(57.4%)	154(34.6%)	2.549(1.744,3.728)	2.294(1.317,3.997)*
	4 times and above	63(42.6%)	291(65.4%)	1	1
Mode of delivery	Normal/vaginal	116(69.6%)	395(91.5%)	1	1
	C/S delivery	32(30.4%)	50(8.5%)	2.179(1.336,0.556)	2.259(0.977,5.222)
Initiation of BF	Within the first hour	119(73.6%)	408(93.9%)	1	1
	After an hour	29(26.4%)	37(6.1%)	2.687(1.586,4.553)	3.73(1.504,9.252)*
Attitude towards IF	Positive	39(26.4%)	43(9.7%)	3.345(2.065,5.418)	2.10(1.090,4.062)*
	Negative	109(73.6%)	402(90.3%)	1	1
Source of information about IF	TV/Radio	66(45.2%)	146(55.1%)	1	1
	Health professional	15(10.3%)	35(13.2%)	0.948(0.485,1.855)	1.67(0.676,4.135)
	Supermarket/Pharmacy	9(6.2%)	6(2.3%)	3.318(1.135,9.704)	6.57(1.481,29.155)*
	Family/friends	56(38.4%)	78(29.4%)	1.588(1.013,2.490)	2.24(1.242,4.034)*

Note: *Significant at p-value of ≤0.05.

Abbreviations: IF, infant formula; COR, crude odds ratio; AOR, adjusted odds ratio.

Discussion

This study was intended to assess the prevalence and factors associated with formula feeding practices among mothers who visited health facilities for immunization and five OPD services for their infants aged below 6 months in Bahir Dar city.

Formula feeding is becoming a common practice in various parts of Ethiopia due to various socio-cultural reasons. Different works of the literature showed that babies who are exposed to formula and stop breastfeeding early have higher risks of acute illnesses like pneumonia, diarrhea, allergies, sudden infant death syndrome (SIDS), and chronic health problems like obesity, diabetes, and impairment of their cognitive development in later life.^{14,29}

The result of this study revealed that the prevalence of infant formula feeding practices was 25%. This finding is comparable with studies done in Dire Dawa (21.4%) and Nigeria (28%).^{27,30}

The finding in this study was higher than studies done in Offa district, southern Ethiopia (7.8%), and Gondar town, northwest Ethiopia (12.4%), but lower as compared to studies in the USA (31.3%), Ireland (81.8%), Cambodia (43.1%), and Egypt (76.2%).^{33–36} The finding was also lower than studies done in different parts of Ethiopia: Hawassa (29.6%), Jimma Zone (47.2%), Bishoftu (65%), and Mekele (68.8%).^{37–40} These differences might be because the study design of the previous studies was community-based, which might have a better response rate as compared to the facility-based study design, which is the current study design. It might also be the impact of COVID-19 that affects the health service utilization of mothers, including immunization services.

Furthermore, infant-related factors like the age of the infant, which in some of the studies includes infants up to 24 months, utilization of health services like ANC and PNC, accessibility and availability of infant formula, and the differences in socio-economic conditions of study participants may also contribute to the differences in reported prevalence among studies.

This study revealed that the occupation of the mother, number of ANC visits, breast-feeding initiation time, attitude of the mother towards formula feeding, source of infant formula information, and age of mothers were significant factors associated with formula feeding practice among mothers who visited health facilities for infants less than 6 months of age.

The occupation of mothers was a significant factor associated with infant formula feeding practices. Mothers who were privately employed, the government employed, and merchants had 6.7 times, 4 times, and 2.28 times higher chances of practicing formula feeding than housewives. This is consistent with other study findings from the Cape Coast and Vietnam (41-42) and a study done in Agaro, Ethiopia.³⁸ The possible reason might be that mothers who work outside their home lack the time to breastfeed their children. This was due to employed mothers going back to work after completing their 4 months of maternity leave, while others were ready for work, which led them to feed formula to their infants. The other possible explanation could be that mothers working outside might have more income to buy infant formula than those who were housewives, who might be dependent on their spouses.

A significant association was observed between the number of ANC visits and formula feeding practices; mothers who had fewer than 3 ANC visits were 2.29 times more likely to practice formula feeding as compared to those mothers who had ANC visits of 4 or more. This is in line with other study findings from Egypt and Jigjiga town.^{36,43} The possible reason might be that mothers who visited health facilities frequently were more counseled about the advantages of breastfeeding, which in turn led mothers to breastfeed their infants exclusively rather than use infant formula.

Breastfeeding initiation time had a significant association with formula feeding practice. Those mothers who initiated breastfeeding for their child after one hour of delivery were 3.7 times more likely to practice infant formula feeding than those who initiated breastfeeding within one hour after delivery. This is comparable with studies done in Nigeria and Ethiopia.^{30,39} This is because, in contrast to other feeding options like cow's milk and homemade feeding options, formula milk is readily available in pharmacies and supermarkets and is ready to use for mothers who have delayed starting breastfeeding for various reasons.

This study revealed that the attitude of mothers towards infant formula had a significant association with infant formula feeding practice. Those mothers who had a positive attitude towards infant formula were two times more likely to give formula milk to their infant than those who had a negative attitude. This finding is similar to study findings from Ireland and the Jimma Zone.^{20,34}

The possible explanation could be that those mothers who think that formula feeding is better or that formula has a similar quality to breast milk and those who have less awareness about the possible risks of infant formula could have more formula feeding practices. This is evidenced by the fact that 81.1% of study participants who practiced infant formula feeding did not know about the risks of infant formula feeding.

A significant association was observed between the source of infant formula information and infant formula feeding practice. Those mothers who got information from supermarkets, pharmacies, and their family or friends were 6.5 and 2.2 times more likely to practice infant formula feeding, respectively. This study is consistent with the studies done in Dire Dawa and Hong Kong.^{27,44} A study in Hong Kong found women to be more likely to initiate discussions about infant feeding with family and friends because healthcare providers perceived them as not being supportive of formula feeding. Advice from friends, neighbors, and family heavily influenced the initiation of infant formula feeding. This could be due to the fact that most mothers were practicing what their friends and families were doing and were influenced by informal advice. Another reason could be information from health professionals, including both the risks of infant formula milk and the importance of exclusive breastfeeding. However, information from peers' families and sellers mainly did not focus on the risks of infant formula milk, which facilitates the initiation of infant formula feeding.

In this study, the age of mothers was one of the predictors of infant formula feeding practice. The odds of ever practicing formula feeding among mothers aged 25–34 were 2.39 times higher as compared to mothers in the age group between 18 and 24 years. This study was comparable to the study done by Debre Birhan.⁴⁵

This might be due to the fact that young mothers had less experience sharing other feeding options other than breastfeeding, and those mothers who did not have the experience of formula feeding for their previous child could want to try the benefits of formula milk for their next infant. Evidenced by the fact that 77% of mothers who did not have formula feeding experience for their previous child had infant formula feeding practice for the index infant.

The use of pre-tested and standard questionnaires from EDHS and different literature to assure the quality of data was the strength of this study, while recall bias, response bias, and the impact of COVID-19 on food insecurity and health service utilization were the limitations of this study.

This study finding implies that health care professionals should upgrade and strengthen ANC service provision to mothers with strong breast-feeding counseling to tackle inappropriate formula feeding practices and their health consequences. It is also recommended to do further research to determine the exact level of formula feeding practice.

Public Health Significance

Exclusive breastfeeding is an effective intervention for improving child nutrition and reducing child mortality in developing countries. In this study, the findings show that there are significant numbers of infants exposed to infant formula feeding. These findings have implications for policies addressing problems related to breastfeeding practices in developing countries like Ethiopia. Additionally, these findings influence our understanding of exclusive breastfeeding practice interventions.

Conclusion

While WHO recommends exclusive breastfeeding for infants aged less than 6 months, the result of this study revealed that one out of four mothers (25%) practiced infant formula feeding for their infants less than 6 months of age. Evident factors that predict infant formula feeding practice include: mothers whose age group is 25–34 years old; the occupation of employed and merchant mothers; mothers having 3 ANC visits; delay in breastfeeding initiation after birth; those whose source of information about infant formula was from a supermarket or pharmacy and their family or friends; and having a positive attitude towards infant formula. Therefore, we recommended promoting behavior change communication, focusing on attitude change in formula feeding practice and its health consequences, promoting exclusive breastfeeding practice, and strengthening ANC service provision.

Data Sharing Statement

All necessary data are available with the corresponding author and will be given upon reasonable request.

Ethics Approval and Consent to Participate

Ethical clearance was obtained from the institutional review board of Bahir Dar University, College of Medicine and Health Sciences, with the ethical review board (IRB). Written informed consent was obtained from all study participants, and verbal assent for mothers aged less than 18 from guardians was obtained. The verbal assent process was acceptable and approved by the ethics committee. Study participants have been informed of their right to withdraw at any point in data collection, and data are confidentially secured. All methods were carried out in accordance with relevant guidelines and regulations that complied with the Helsinki Declaration.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis, and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors declare that they have no competing interests.

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