Research Article

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Effects of Bottle-Feeding Practice on Undernutrition Among Children 6 to 23 Months Old in Bole Sub-City Health Centers, Addis Abeba, Ethiopia: Unmatched Case-Control Study

Kedir Negesso Tukeni[1*], Kelil Hussein Jibicho[2] and Kedir Teji Roba[3]

[1]*Department of Internal Medicine, Jimma University, Ethiopia*

[2]*Department of Gynecology and Obstetrics, Jimma University, Ethiopia*

[3]*School of Public Health, College of Health and Medical Sciences, Haramaya University, Ethiopia*

[*]Corresponding Author
Kedir Negesso Tukeni, Department of Internal Medicine, Jimma University, Ethiopia.

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Abstract

Background: *Nowadays, both metropolitan areas of underdeveloped countries and the industrialized world use bottles to feed babies. Particularly in developing nations like sub-Saharan Africa, this practice is linked to an increased risk of diarrheal illnesses. In Bole Sub-City Health Centers in Addis Ababa, Ethiopia, this study was carried out to assess the impact of bottle-feeding practice on undernutrition in children aged 6-23 months.*

Objective: *Therefore, the goal of this study was to determine the prevalence of bottle feeding and its effects on undernutrition and the risk of developing diarrheal infections in children aged 6 to 23 months in Bole, Addis Abeba, Ethiopia.*

Methods: *A facility-based unmatched case-control study was carried out in Bole, Addis Abeba, Ethiopia, from November 1 to October 30, 2020. 162 mothers who had children between the ages of 6 and 23 months were used to recruit a total of 52 cases and 103 controls (1:2 ratios). With the aid of a multivariable binary logistic regression model, bottle-feeding effects were discovered. Bottle feeding was determined to be significantly linked with variables.*

Results: *53.8% of the total 52 cases were wasted, compared to 29.1% of the controls, demonstrating a strong correlation between wasting and bottle feeding (AOR= 3.38, 95% C.I.: ((1.33,8.61)). Compared to the control group, the bottle-feeding group experienced more diarrhea (AOR = 3.47, 95% C.I.: 1.07, 11.16). Factors related to bottle feeding were having a cesarean section (AOR= 4.09, 95% C.I.: 1.59, 10.52), and working for the government (AOR= 5.03, 95% C.I.: 1.87, 13.57).*

Conclusion: *Children who were being bottle-fed had higher rates of wasting and diarrhea. Bottle feeding was substantially correlated with the delivery method and the husband's employment. During ANC follow-up, mothers may receive counseling regarding the hazards of bottle feeding, which could enhance optimal feeding techniques after 6 months.*

Keywords: Bottle Feeding, Formula Feeding, Diarrheal Diseases, Malnutrition, Underweight, Ethiopia

Abbreviations

ANC: Ante Natal Care,
AOR: Adjusted Odds Ratio,
BTF: Bottle Feeding Practice,
COR: Crudes Odds Ratio,
EBF: Exclusive Breast Feeding,
EDHS: Ethiopian Demographic and Health survey,
SRS: Simple Random Sampling,
IYCF: Infant and young child feeding,
LAZ: Length for Age Z-score,
WAZ: Weight-For-Age Z-score,
WHO: World Health Organization,
WLZ: Weight for Length Z-score

1. Introduction

Newborn infant feeding practices have significant effects on both the child's current and future health. Infectious infections and inadequate newborn feeding account for 60% of all child deaths globally; in the poor world, where inadequate breastfeeding is the norm for around two-thirds of the population, this percentage is significantly higher. This inadequate breastfeeding accounts for 40% of infant fatalities from infections, 30% of infant deaths from diarrhea, and 18% of infant deaths from acute respiratory problems [1, 2].

The first 1000 days of a child's life are crucial because good nutrition during this time reduces chronic illness risk, lowers morbidity and mortality, and promotes overall better development [3]. The widespread use of breast milk replacements with bottle feeding, which has an adverse effect on effective breastfeeding and suitable supplemental feeding, should be avoided. The World Health Organization (WHO) advises against bottle-feeding for infants and young children because it interferes with supplemental feeding that is appropriate and optimal for breastfeeding and because bottles with a nipple are more likely to be contaminated [4].

Bottle feeding is the act of giving an infant any type of food or drink, including breast milk, infant formula, semisolid cereals, tea, juice, etc., from a bottle with a nipple/teat [5]. The rate of bottle-feeding differs by country, ranging from 15% in Nigeria to 64% in Iraq [6, 7]. Furthermore, a higher prevalence of bottle-feeding was reported in various studies, for example in Yemen, it is about 55% [8]. The prevalence of BTLF for West Africa, East Africa, Central Africa, and Southern Africa was 8.17%, 14.32%, 17.01%, and 30.05% respectively [9]. In Ethiopia, bottle feeding prevalence and rates vary by sociodemographic factors. This practice is predominantly associated with Socio-demographic characteristics like age, level of maternal education, maternal economic and employment status, marital status, the residence of the mothers, and obstetric and health facility-related factors [4, 10-17]. Additionally, many studies also addressed the reasons for practicing bottle-feeding like easiness for feeding the child, assumption of insufficient breast milk, breast or nipple condition and the child did not cry when they gave bottle, are among others [10, 18, 19]. Other studies indicated that mother's illness, breast-related health issues as well as perceived issues (i.e. perception of insufficiency of mother's milk) are also the reasons to provide bottle-feeding [20, 21]. According to the World Health Organization, the best practices for feeding infants and young children include starting breastfeeding as soon as possible after birth, continuing breastfeeding for at least 6 months while introducing complementary feeding, and continuing breastfeeding for up to 2 years or longer. Even beyond six months, it is advised to feed the infant all liquids from a cup rather than a bottle.

The EDHS 2011 states that one child of every ten uses a bottle with a nipple [22]. Furthermore, other studies done in different parts of Ethiopia showed that the prevalence of bottle feeding in towns like Holeta, Shashemene, and Agaro town of Jimma Zone is 20.9%, 19.6%, and 93.2% respectively [3, 4, 10]. According to the 2011 Ethiopian Demographic and Health Survey, 13% of 0–23 months old infants and young children and 16% of infants under 6 months were fed using a bottle with a nipple [23, 24].

Despite what would appear to be relatively low rates of bottle feeding, which may not accurately reflect the country as a whole, the manner it is done makes bottle feeding more difficult. Furthermore, this practice is especially prevalent in developing nations due to low levels of education among women, limited financial resources, a lack of clean water, unclean environments, and other factors. Inadequate and/or inferior bottles and teats are widely available, which exacerbates the situation in developing countries. One of the dangers of bottle-feeding breast milk to infants is overdilution of the milk, which results in malnutrition. Additionally, bottle-feeding increases the risk of gastrointestinal tract (GIT) disorders such dental caries, ear infections, and others. [6, 7, 25-27].

In general, there is a large shift from breastfeeding to bottle feeding in the urban areas of developing countries and in Ethiopia, the problem of malnutrition, infectious diseases, and mortality among children under the age of 5 years are substantially high [21, 22, 28-30]. Additionally, bottle feeding is more common in Ethiopia, with rates as high as 38% in some regions like Oromia. According to data from two successive demographic and health surveys, there is also a trend toward more people in the country using bottles to feed their babies (11 to 13%). Even though bottle-feeding is a prevalent practice in Ethiopia, issues relating to it are rare, especially in Addis Abeba's municipal administration. In order to determine the impact of bottle feeding on undernutrition in children aged 6 to 23 months in Bole Sub-City Health Centers of Addis Ababa City Administration of Ethiopia, this study's objective is to evaluate this effect.

2. Methods

2.1. Study Setting, Design and Period

According to the 2007 census, which was carried out by the Central Statistics Agency (CSA) of the nation, Addis Ababa has a population of 2,739,551 (1,305,387 men and 1,434,164 women), making it the most densely populated city in Ethiopia. One of the Ethiopian municipal government of Addis Ababa's sub cities is Bole. In the suburb, eight private clinics and nine government health facilities offer medical care to the local population. This study was conducted in the four randomly chosen public facilities in the sub-city from November 1 through 30, 2020.

2.2. Study Population and Participant Selection

By questioning the mothers/caregivers at the time of the visit, all children aged 6 to 23 months who attended the chosen public health facilities in the Bole sub-city were enrolled. Following that, the research populations were divided into cases and controls according to the feeding habits of the children. In this study, the Cases were 6- to 23-month-old children whose mothers bottle-fed them, while the Controls were similarly aged 6- to 23-month-old children whose
mothers did not bottle-feed them.

2.3. Eligibility Criteria and Sampling Procedures

All children between the ages of 6 and 23 months who went to

specific public health facilities in the Bole sub-city throughout the study period were eligible, and as a result, they were all recruited in the study. Children in critical condition and those with chronic illnesses other than diarrhea were not included in the study. The sample size was chosen by taking into account the relationship between bottle feeding and stunting that was discovered in a study done elsewhere in Ethiopia [31]. In order to obtain the largest possible sample size, the following presumptions were made: Level of significance=5% (= 0.05), test power (1-) = 80%, case to control ratio (r) = 1:2, odds ratio (OR) = 3.83, and 10% non-response rate contingency were all taken into account. Finally, a total sample size of 162 was determined, which was then proportionally distributed across the chosen medical facilities. Then, 52 cases (mothers who were using the bottle to feed their children) and 103 controls (mothers who were not using the bottle to feed their children) were chosen, as 7 of the children (4 from case and 3 from control) were excluded as they were having critical illnesses.

2.4. Data Collection Tools and Procedures

Pre-tested, structured interviewer-administered questions were used to gather the data. The questionnaires were initially written in English and then translated into the local tongue, Amharic, by bilingual specialists. To ensure uniformity, they were afterwards translated back into English. Four female healthcare professionals with bachelor's degrees in nursing who had prior experience with data collecting collected the information. To oversee the data collectors and data gathering procedures, two supervisors who were Master of public health specialists were hired. After the participants made a firm decision to participate in the study, the data collectors conducted interviews with them. To ensure privacy, the interview was done in a separate space throughout the waiting and leave times. During the interview, confidentiality was ensured.

2.5. Study Variables and Measurements

Bottle-feeding practice, which is defined as the act of giving a newborn any food or drink, including breast milk, from a bottle with a nipple or teat, regardless of whether they are breastfed or not, was a dependent variable in this study [5]. As a result, we classified a situation as a "case" if the mother fed her child using a bottle, and a "control" situation if she did not. Pre-lacteal feeding status, infant health status, maternal age, marital status, monthly income, maternal education level, maternal occupation, exclusive breastfeeding knowledge, prior exposure to information about bottle-feeding, obstetric history including place and mode of delivery, antenatal care follow-up, and postnatal care follow-up are also taken into consideration as independent variables in this study.

2.6. Measurements

2.6.1. Anthropometric Measurements, Dietary Diversity

The questionnaire was extracted and adopted from different literature [9, 10, 12, 13]. Dietary data questionnaires were adapted from Food and Nutrition Technical Assistance (FANTA), Food and Agriculture Organization (FAO), and World Food Program (WFP) [32, 33]. In each age group, the relationship between length-for-age Z-scores (LAZ) and weight-for-length Z-scores (WLZ) was studied independently. Anthropometric measurements were used for physical measurement. Accordingly, the baby's length (to the nearest 0.1 cm) was measured without shoes using the Pediatric Length Board, and its weight (to the nearest 0.1 kg) was measured similarly. Additionally, to increase the reliability of the measurements, both length and weight were measured at seven target points twice. Weight-for-length (WLZ), length-for-age (LAZ), and weight-for-age (WAZ) indices of nutritional status were compared to reference data from World Health Organization standards. Children were categorized as wasted, stunted, or underweight depending on whether they were below two standard deviations (2SD) of the WHO median for WLZ, LAZ, and WAZ.

The definitions utilized for the indicators of malnutrition were as follows: Underweight is defined as having a weight-for-age below two standard deviations (SDs) of the median in the WHO 2006 standard curve, stunting in children under five years is defined as height-for-age, wasting is defined as weight-for-height, and low birth weight is defined as having a weight-for-age below 2500g. The United Nations Children's Fund (UNICEF) standard Mid Upper Arm Circumference (MUAC) tape was used. To the nearest hundredth of a centimeter, all MUAC measures were recorded. A MUAC reading of less than 11 cm was regarded as malnutrition, whereas a measurement of more than 11 cm was regarded as normal. Based on the total number of distinct food groups consumed over the course of a 24-hour period, dietary variety was qualitatively evaluated. Nine food groups were used to score the diversity of children's diets. Accordingly, food categories of 3 were deemed to have low dietary diversity, 4 and 5 had medium dietary diversity, and >6 had great dietary diversity (FAO, 2011). The frequency of consumption of various food groups by a family over the course of the seven days before to the survey was used to construct the food consumption score (FCS). Anything above 35 is regarded as normal.

2.7. Data Quality Control

The supervisors and data collectors received a day of instruction on fundamental data gathering techniques. 5% of the study population, who shared many traits with the study participants but did not take part in the study, were used to evaluate the Amharic version of the questionnaire. The pre-testing and standardization of the questionnaires involved participation from all data collectors and supervisors. Prior to beginning the actual data collection, issues identified during the pilot research were fixed. The investigator and supervisors undertook constant monitoring during the pre-test and data collection period, ensuring that each item was correctly coded. At the end of each working day, supervisors assessed the consistency and completeness of the documentation on the questionnaire sheets in order to take corrective action if necessary.

2.8. Data Processing and Analysis

The obtained data was reviewed, cleaned, and imported into SPSS version 20 for analysis after the survey's accuracy had been confirmed. The data were presented and described using descriptive and summary statistics. To examine connections between the bottle-feeding practice and independent variables, binary logistic regression was performed. Bivariate analysis was used to determine the odds ratio at a 95% confidence level and

analyze the relationship between a single explanatory variable and the dependent variable. All bivariate analyses with a p-value of less than 0.25 were kept for multivariate analysis, and factors with a p-value of less than 0.05 were shown to be statistically related to the practice of bottle feeding. The strength of the connections was assessed using the odds ratio with 95% CI.

3. Results

3.1. Socio-Demographic Characteristics of the Study Participants

A total of 155 mothers with children aged 6 to 23 months were included in the study, yielding a response rate of 95.6%, after a systematic sampling technique was used to select 52 cases (mothers who were using the bottle to feed their children) and 103 controls (mothers who did not use the bottle to feed their children). There were 28 female children overall in the study group (53.8%), compared to 56 (54.4%) in the control group. 42 (80.8%) of the mothers in the study group and 97 (94.2%) of the mothers in the control group were married and residing with their husbands. The research group's mother educational level is lower than the control groups, at 22 (42.3%) as opposed to 41 (39.8%). However, compared to the research group's 17 (32.6%) mothers, the majority of women in the control group—45, or 43.7%—were stay-at-home moms. At 9 months and 12 months of age, the index child's sex proportion was larger in both groups (Table 1).

Socio-demographic factor		Case	Control	X^2
		Number (n=52 (100%)	Number (n=103) (100%)	
Age of mother	15-24 25-34 >=35	7(13.5%) 31(59.6%) 14(26.9%)	12(11.7%) 75(72.8%) 16(15.5%)	3.28
Age of father	15-24 25-34 >=35	- 21(50%) 21(50%)	- 41(42.3%) 56(57.7%)	0.71
Marital status	Married divorced single widow	42(80.8%) 5(9.6%) 2(3.8%) 3(5.8%)	97(94.2%) 1(1%) 3(2.9%) 2(1.94%)	9.02
Maternal Education	Unable to read and write Read and write only Primary education Secondary education College diploma and above	12(23.1%) 5(9.6%) 0(0.00%) 13(25%) 22(42.3%)	0(0.00%) 10(9.7%) 31(30.1%) 20(19.4%) 42(40.8%)	39.94
Husband Education	Unable to read and write Read and write only Primary education Secondary education College diploma and above	8(19%) 1(2.4%) 0(0.00%) 11(26.2%) 22(52.4%)	0(0.00%) 5(5.2%) 24(24.7%) 27(27.8%) 41(42.3%)	30.08
Maternal Occupation	Governmental House wives Own business Private employed	24(46.2%) 17(32.6%) 6(33.3%) 5(25%)	31(30.1%) 45(43.7%) 12(11.7%) 15(14.5%)	4.21
Husband Occupation	Governmental Own business Private employed	22(52.4%) 9(21.4%) 11(26.2%)	19(19.6%) 33(34%) 45(46.4%)	15.91
Number of children	One Two Three Four and above	27(51.9%) 11(21.2%) 10(19.2%) 4(7.7%)	48(46.6%) 36(34.9%) 17(16.5%) 2(1.9%)	5.47
Sex of the child	Male Female	24(46.2%) 28(53.8%)	47(45.6%) 56(54.4%)	0.004

Age of the child	8 months 9 months 12 months 13 months 14 months 15 months 16 months	2(3.8%) 24(46.1%) 1(1.9%) 19(36.5%) 2(3.8%) 3(5.8%) 1(1.9%)	1(1%) 57(55.3%) 0(0.00%) 41(39.8%) 0(0.00%) 2(1.9%) 2(1.9%)	9.64

Table 1: Socio-Demographic Characteristics of Mothers and Children Aged 6-23 Months, Bole Sub-City, Addis Ababa Ethiopia 2020

3.2. Obstetric and Health Facility Related Factors

Within an hour of birth, 45 (86.5%) of the study group's infants were breastfed, compared to 80 (77.7%) of the control group's infants. Pre-lacteal nutrition, which in most cases consisted of bovine milk and water, was delivered to the study group at a higher rate—52 (100%) compared to 51 (49.5%) in the control group. About a third of the moms in the study group clean the bottle by boiling water, while the majority of them rinse it with soap and water. Eight of the research moms fed their children with bottles four times a day, and 11 of the mothers in the study group always cleaned the bottle after each feeding. In general, control groups were more likely than study participants to be exposed to information about bottle-feeding, at 79 (76.7%) versus 48 (92.3%). In the experimental group, 3 loose stools per day were experienced by 38 people (73.1%), compared to only 47 people (45.6%) in the control group. Additionally, a sizable percentage of mothers in the study group, 28 (53.9 percent of those who bottled-fed their kid), planned to continue bottle-feeding their child until the baby stopped, while the remaining moms planned to stop bottle-feeding after their child became one year old (Table 2).

Obstetric and health facility-related factors		**Case**	**Control**	**X^2**
		Number (%)	**Number (%)**	
Place of Delivery	Government hospital Health center Private clinic	15(28.8%) 25(48.1%) 12(23.1%)	39(37.9%) 51(49.5%) 13(12.6%)	3.16
Number of ANC follow up	Once Twice Three times Four times and above	11(21.2%) 15(28.8%) 26(50.0%) 0(0.00%)	10(9.7%) 18(17.5%) 24(23.3%) 51(49.5%)	38.82
Mode of delivery	Vaginally Caesarian section	23 (44.2%) 29 (55.7%)	81(78.6) 22(21.4%)	18.53
Time of breastfeeding Initiation	immediately within the 1st hr. 1hr up - 1sday After 1st days -3 days After 3 days	45(86.5%) 7(13.4%) 0(0.0%) 0(0.0%)	80(78.6%) 7(6.8%) 14(13.6%) 2(1.9%)	10.11
Exposure of bottle information to the mother	Yes No	48(92.3%) 4(7.7%)	79(76.7%) 24(23.3%)	5.68
Have you ever fed your child in the first 6 month	Yes No	35(67.3%) 17(32.7%)	47(45.6%) 56(54.4%)	6.51
What was the initiation to breast milk	Never fresh animal milk infant formula milk plain water powdered milk other	0 (0.0%) 39 (75%) 13 (25%) 0 (0.0%) 0 (0.0%) 0 (0.0%)	52(50.5%) N/A 6(5.8%) 25(24.3%) 3(2.9%) 17(16.5%)	136.58
Did your child had an illness the last six months	Never Pneumonia Allergy Diarrhea Cold and flu Asthma	22(42.3%) 2(3.8%) 4(7.7%) 22(42.3%) 2(3.8%) 0(0.00%)	52(50.5%) 12(11.7%) 15(14.6%) 10(9.7%) 6(5.8%) 8(7.8%)	26.23

How frequently did they have an infection	Never Once in a month Twice a month Twice a week	11(21.2%) 15(28.8%) 18(34.6%) 8(15.4%)	49(47.6%) 36(35%) 13(12.6%) 5(4.9%)	19.54
How is the frequency stool of the child	Greater than 3 stool per day Less than 3 stool per day	38(73.1%) 14(26.9%)	47(45.6%) 56(54.6%)	10.51
How many times child bottle-fed per day	Once Twice Three times Four times	3(5.8%) 16(31.4%) 24(47.1%) 8(15.7%)	N/A	
How many times do you clean the bottle per day	Daily Twice Every fed	8(15.7%) 32(62.7%) 11(21.6%)	N/A	
How do you keep clean the bottle	Boiling Rinsing with soap and water	32(62.7%) 19(37.3%)	N/A	
Did you offer additional food with the bottle	of cow milk expressed breast milk	42(82.4%) 9(17.6%)	N/A	
How long are you plan the bottle-feeding	until the baby discontinues up to a year	28(53.9%) 24 (46.1%)	N/A	
Wasting	Wasting Normal	28(53.8%) 24(46.2%)	30(29.1%) 73(70.9%)	9.07
Stunting	Stunting Normal	28(53.8%) 24(46.2%)	41(39.8%) 62(60.2%)	2.75
Underweight	Underweight Normal	18(34.6%) 34(65.4%)	31(30.1%) 72(69.9%)	0.32
Food consumption score	Acceptable Borderline Poor	17(32.7%) 28(53.8%) 7(13.5%)	52(50.5%) 31(30.1%) 20(19.4%)	8.28

Table 2: Obstetric and Health Facility-Related Factors

3.3. Factors Associated with Bottle-Feeding Practice

In a bi-variate study, the practice of bottle-feeding was linked to factors like marital status, mother's age, husband's profession, the number of children, the manner of delivery, illness during the previous six months, frequency of infection, frequency of stools, wasting, underweight, and food intake score. When compared to women who were over 35 years old, the likelihood that a mother in the age range of 25 to 34 would use a bottle to breastfeed her child was 2.117 times higher. This study found that bottle feeding was 4.74 times more common among government employees than among privately employed men. Compared to mothers who gave birth vaginally, cesarian section mothers were 0.215 times less likely to bottle-feed their infants. In comparison to the control group, the bottle-fed groups experienced higher rates of diarrhea, underweight, and wasting, respectively (Table 3).

In a multivariate logistic regression study, the husband's occupation, the mother's delivery method, diarrhea, and wasting were all found to be significantly related to the practice of bottle feeding. AOR=5.032 (95% CI: 1.866, 13.567, the p-value is .000502) shows that husbands who worked for the government were 5.03 times more likely to use bottle feeding than husbands who worked for private companies. When compared to mothers who gave birth vaginally, mothers who had their kid by cesarian section were 4.09 times more likely to bottle-feed their child (AOR= 4.09, 95% C.I. (1.59,10.53), The p-value is .000017). Infants who were bottle-fed had odds of diarrhea that were 3.47 times higher than those who weren't (AOR =3.47, 95% C.I.: (1.08, 11.16, The p-value is .00026) and wasting that were 3.38 times higher than those who weren't (AOR =3.38, 95% C.I.:(1.33, 8.61), The p-value is .002675) (Table 3).

Obstetric and health facility-related factors		Bottle feeding practice		#COR (95% CI)	@AOR (95% CI)
		Case	Control		
Age of the mother (years)	15-24 25-34 Above 35	7(13.5%) 31(59.6%) 14(26.9%)	12(11.7%) 75(72.8%) 16(15.5%)	0.67(0.21,2.16) 0.47(0.21,1.08) * 1	1.46(0.34,6.26) 0.55(0.181,1.68)
Husband Occupation	Governmental Own business Private employed	22(52.4%) 9(21.4%) 11(26.2%)	19(19.6%) 33(34%) 45(46.4%)	4.74(1.92-11.66) * 1.12(0.41,2.99) 1	5.03(1.86,13.56) ** 1.15(0.39,3.38) 1
Number of Children	One Two Three Four and above	27(51.9%) 11(21.2%) 10(19.2%) 4(7.7%)	48(46.6%) 36(34.9%) 17(16.5%) 2(1.9%)	1 0.54(0.2, 1.24) * 1.05(0.4,2.60) 3.56(0.61,20.70) *	1 0.55(0.20,1.48) 1.72(0.57,5.17) 1.40(0.19,9.91)
Mode of Delivery	Vaginally Caesarian section	23 (44.2%) 29 (55.7%)	81(78.6) 22(21.4%)	1 0.22(0.11,0.44) *	1 4.09(1.59,10.53) **
Marital status	Married divorced Single Widow	42(80.8%) 5(9.6%) 2(3.8%) 3(5.8%)	97(94.2%) 1(0.97%) 3(2.9%) 2(1.9%)	1 11.55(1.31-101.88) * 1.54(0.25-9.55) 3.46(0.56-21.49) *	
Did your child had an illness the last six months	Never Pneumonia Allergy Diarrhea Cold and flu Asthma	22(42.3%) 2(3.8%) 4(7.7%) 22(42.3%) 2(3.8%) 0(0.00%)	52(50.5%) 12(11.7%) 15(14.6%) 10(9.7%) 6(5.8%) 8(7.8%)	1 0.39(0.08,1.91) 0.63(0.19,2.11) 5.20(2.12,12.77) * 0.79(0.15,4.21) 0.000	1 0.61(0.09,3.74) 0.42(0.10,1.75) 3.47(1.08,11.16) ** 0.81(0.13,5.25) 0.000
How is the frequency of stool of the child	>3 stool per day <3 stool per day	38(73.1%) 14(26.9%)	47(45.6%) 56(54.6%)	3.23(1.57,6.68) * 1	1.83(0.69,4.89) 1
How frequently did they have an infection	Never Once in a month Twice a month Twice a week	11(21.2%) 15(28.8%) 18(34.6%) 8(15.4%)	49(47.6%) 36(35%) 13(12.6%) 5(4.9%)	1 0.14(0.04,0.51) * 0.26(0.07,0.93) * 0.86(0.23,3.25)	1 3.15(0.92,10.76) 3.59(0.93,13.83) 3.98(0.68, 23.16)
Wasting	Wasting Normal	28(53.8%) 24(46.2%)	30(29.1%) 73(70.9%)	2.84(1.42,5.67) * 1	3.38(1.33,8.61) ** 1
Stunting	Stunting Normal	28(53.8%) 24(46.2%)	41(39.8%) 62(60.2%)	1.76(0.90,3.46) * 1	1.52(0.62,3.73) 1
Food consumption score	Acceptable Borderline Poor	17(32.7%) 28(53.8%) 7(13.5%)	52(50.5%) 31(30.1%)20(19.4%)	1 2.76(1.31,5.84) * 1.07(0.38,2.97)	1 2.53(0.88,7.25) 0.53(0.14,1.94)
*Significant at p value <0.2		**statistically significant at p value <0.05			

#COR=Crude Odds Ratio @AOR=Adjusted odds ratio

Table 3: Multivariate Binary Logistic Regression

4. Discussion

95.6% of the 155 mothers who had children between the ages of 6 and 23 months who participated in the study responded. There were 103 controls (mothers who were not feeding their children with a bottle) and 52 cases (mothers who were feeding their infants with a bottle). In total, 28 kids (53.8%) in the study group were female, compared to 56 (54.4%) in the control group. Both 42 (80.8%) and 97 (94.2%) of the mothers in the study group and control group were wed and living with their husbands. The mother's educational level is lower in the research group than in the control groups, at 22 (42.3%) compared to 41 (39.8%).

According to this study, bottle feeding was linked to greater rates of diarrhea, underweight status, and wasting. The investigation's findings revealed a strong link between bottle feeding and diarrheal diseases. This result was analogous to that

of a study conducted in the southern areas of Ethiopia, which discovered that bottle-fed children had a roughly 1.5 times greater probability of experiencing diarrhea than those who were not [34]. This is also in line with past research done in India, where it was discovered that children who used bottle feeding had a higher percentage of diarrhea [35]. This may be because to the difficulties in adequately sanitizing the nipples, and since many germs may build up around them and enter an infant's body, the likelihood of diarrhea may be significant.

Additionally, it was discovered that children who are bottle-fed have much higher rates of wasting. This finding is also consistent with a case-control study conducted at Rajasthan, India which showed that bottle feeding was more commonly observed in severely acute malnourished children than the control groups [36]. It is also similar with a study conducted in Nairobi, Kenya which states bottle-fed children were 1.6 times more likely to have wasting than non-bottle-fed children [37]. The reason might be the poor hygiene associated with the bottle and infections caused by contamination of bottles, leading to diarrhea and other diseases, which likely led to malnutrition.

In this study, vaginal delivery mothers were 4 times more likely to practice bottle feeding than cesarean section mothers were 4.091(1.590,10.529). This runs counter to a study done in Indonesia that found a strong correlation between bottle feeding and cesarean deliveries [38]. The anaesthetic, wound, and unpleasant breastfeeding posture in that study suggest that cesarean birth can delay breastfeeding in comparison to vaginal birth. Compared to husbands who worked for private businesses, husbands who worked for government agencies were more likely to practice bottle-feeding. This finding is similar to the finding of the study conducted in Agaro, Jimma, South West Ethiopia, which might be due to the income of the parents in which they can easily afford bottles [10].

4.1. Limitation and Strength of the Study

Given that this is a retrospective case-control study, recall bias may still be a possibility despite efforts to mitigate it through the use of several questions. Concerns about the generalizability of study outcomes to the general public are raised by small, single-site study sample sizes. Additionally, the target age range was 6 to 23 months, however the majority of the participants were older than 8 months. Again, no generalizations or inferences can be made on the rural community, which actually comprises 80% of Ethiopians. Given that diarrheal sickness is one of the most serious issues in poor nations, the study's purpose was to discover the risk factors for developing the disease. It also attempted to evaluate additional related elements that might encourage bottle feeding. In addition, it sought out medical professionals to serve as data collectors in an effort to lessen recollection biases.

5. Conclusions

This study discovered that bottle feeding was substantially correlated with wasting, diarrheal illnesses, mode of birth, and spouse occupation, which may subsequently result in malnutrition and growth retardation. It is important to look for an intervention and preventative action that could lessen the habit of bottle-feeding. The mothers would benefit more from IYCF counseling, including information on the hazards of bottle feeding, during the ANC follow-up, as this can help them choose more effective feeding strategies once the baby is 6 months old. To enhance the conclusions drawn from this study and to further the understanding, additional community-based intervention studies are required.

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