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CENTER OF FOOD SCIENCE AND NUTRITION

DEPARTMENT OF COMMUNITY NUTRITION

Assessment of Formula Feeding Practices in Addis Ababa Mothers With Infants Under Six Months Old, and Factor Associated to It

By: -

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A Thesis Submitted to Addis Ababa University Collage of Natural and Computational Science, School of Graduate Studies and Department of Community Nutrition in Partial Fulfillment of The Requirement for The Degree of Master of Science in Community nutrition.

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Final Thesis Approval Form

As participants of the board of examiners of the final MSc thesis. Open defense, we declare that we have read and evaluated the thesis prepared by Firehiwot Alemu under the title allowed "**Assessment of Formula Feeding Practices in Addis Ababa Mothers With Infants Under Six Months Old, and Factor Associated to It** and recommend for the degree of Master of Science in Community Nutrition.

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LIST OF ACRONYMS AND ABBREVIATIONS

ANC	Antenatal Care
AF	Artificial Feeding
ACF	Administration for Children and Families
BMS	Breast Milk Substitute
CF	Complementary Feeding
CI	Confidence Intervals
EBF	Exclusive Breast Feeding
EFDA	Ethiopia Food and Drug Administration
EPI	Expanded Program of Immunization
EDHS	Ethiopia demographic and Health Survey
EMDHS	Ethiopian Mini Demographic and Health Survey
FMACHA	Food, Medicine, and Healthcare Administration and Control Authority
HP	Health professionals
MCH	Maternal and Child Health Center
MCOC	Midwifery Continuity of career.
NGO	Non-Governmental Organizations
OPD	Out Patient Department
PNC	Postnatal Care
SIDS	Sudden Infant Death Syndrome
SPSS	Statistical Package for Social Science
UNICEF	United Nation International Children's Emergency Fund
WHO	World Health Organization

ABSTRACT

Background: Infant formula feeding practice has been increased worldwide but 1.3 to 1.45 million childhood deaths were attributable to suboptimal breastfeeding practices in developing countries. However, there has been inadequate data related to the practice.

Objective: To assess formula feeding practice and associated factors among mothers who visited health facilities to seek for infant care services, Addis Ababa.

Methods: A health facility-based cross-sectional study was conducted from March 11– May 10, 2023. Data were collected from 403 randomly selected mothers with infants under 6 months of age. An interviewer-administered semi - structured questionnaire and an in depth interview was used to collect the data. The data were coded and entered into Epi-Data V 3.1 and exported to SPSS V 23 for analysis. Bivariable and multivariable logistic regression analysis were done to predict variables associated with formula feeding practice. Variables with a p-value < 0.05 in multivariable logistic regression were considered statistically significant.

Result: The prevalence of infant formula feeding was 39.7 % (95% CI: 35, 44.7). Single mothers [AOR = 0.323, 95% CI: (0.105-0.988)] and those who got information about formula feeding from health facilities [AOR = 0.321(0.141-0.731)] were 68% less likely to practice formula feeding. On the other hand, those mothers who gave birth at a private health facility [(AOR=3.29, 95% CI: 1.65, 6.56)] and mothers who initiated breastfeeding late [AOR = 3.93, (95%CI: 2.11, 7.33)] were 3 times more likely to feed formula to their children. Similarly, those mothers who did not have the knowledge regarding problems with early introduction of complementary foods were two times more likely to practice formula feeding [(AOR=2.14, 95% CI:1.16, 3.96)].

Conclusion: the capacity of health professionals to provide information about formula feeding should be strengthened. Also, promotion of proper infant feeding should be improved in addition to enhancing the knowledge of health professionals on marketing codes of breast milk substitutes. Further strong policy is required to avoid improper advertisement of infant formulas.

Key words: Addis Ababa, Breast feeding, formula feeding, infants ,health facilities.

1. INTRODUCTION

1.1. Background

Breast-milk feeding is considered the gold standard for optimal infant nutrition and health and a key to new-born and child survival interventions (WHO, 2023). Breast milk may be from the breast or may be expressed by hand and fed to the infant. While formula milk sales worldwide are expected to exceed $70.6 billion in 2019 (Rollins et al., 2016). Marketing tactics and strategies have evolved over time, becoming more sophisticated and varied (WHO, 2022). Ethiopia's market potential will no doubt be the tipping point for international infant formula companies due to growing urbanization, purchasing power, population, and the relatively low use of Breast milk substitute to date.

Despite sustaining double-digit economic growth rates during the last 12 years in Ethiopia, malnutrition remains high, with 37.1% of children under the age of 5 stunted (EPHI and ICF, 2019). Ethiopia has some of the highest numbers of children who are stunted and/or wasted worldwide (UNICEF, 2019).With this background, breastfeeding improves child development and lowers health related expenditures, resulting in economic benefits for both individual families and the nation (WHO, 2023). While unethical marketing of BMS might influence Ethiopian social norms in urban areas by making the use of formula more fashionable than breastfeeding and magnifying the health benefits of formula to appear comparable with breast milk, as is observed in many Asian countries (Piwoz and Huffman, 2015) this unethical marketing of BMS could reduce breastfeeding and increases the use of BMS.

Since 2016, the Ethiopian government has approved several orders, such as the "Infant Formula and Follow-Up Formula Directive No. 30/2016" and the "Food Advertisement Directive 33/2016," to support breastfeeding by restricting the promotion of BMS marketed for children less than 2 years of age. However, to date, no breaches to this order have been reported by Food, Medicine, and Healthcare Administration and Control Authority (FMHACA) and EFDA other inspectors indicating lack of or poor monitoring in many countries (Hou et al., 2019).

According to the World Alliance for Breastfeeding Action (2016), breastfeeding can help achieve many of the 17 Sustainable Development Goals. A method of safe nutrition in frail humanitarian contexts, breastfeeding is essential to support it for all children and women

affected by the migration crisis. It is linked with Goal 5 on gender equality, especially for working women who want to breastfeed but end up with breastfeeding cessation (Gribble et al 2023).

Moreover, breastfeeding contributes to environmental viability and food security, in contrast to breast milk substitutes that leave an ecological trace due to all the processes involved in the manufacture and waste disposal (Smith, 2019).

According to a study by Victoria et al. (2016), suboptimal breastfeeding results in over 11.6% of the total under-5 child mortality rates, amounting to over 800,000 infants annually. The Global Index report by Access to Nutrition Index (2018), the reasons cited for the suboptimal breastfeeding rates include the usage of breast milk substitutes due to female participation in the labor force of developing markets and increasing incomes, along with the adaptation of satisfaction-design lifestyles.

Knowledge of the breast milk substitute market and marketing practices is essential for understanding the competitive environment in which efforts to protect, promote, and support breast feeding. Health facilities have often been targeted through the provision of materials and equipment, which may lead to a direct or indirect approval of a company product (WHO, 2022). In addition, companies may offer assistance through the use of their personnel for capacity building or other activities. Such types of promotion in health care facilities are still common in many countries.

The problem is the industry's marketing practices, not the availability of formula products in supermarkets or the choices of women or families; we are all influenced by marketing in our daily lives, Marketing of formula products is definitely a significant part of the story (UNICEF, 2022). These approaches can influence our understanding and views and, therefore, totally interrupt our patients and the industry (Rollins et al., 2016). Despite widespread support for exclusive breastfeeding, only 44% of children worldwide (WHO, 2023) and only 59% of Ethiopian infants were exclusively breastfed during their first 6 months of life (EPHI and ICF, 2019).

Suboptimal breastfeeding practices in Ethiopia partly contribute for an estimated 70,000 infant deaths per year, which is 24% of the total infant deaths annually (MOH, 2015). The major reasons for formula - feeding practice include insufficient breast milk, the need to go back to work, maternal work load and illness, delayed ANC follow up, caesarean section

mode of delivery and improper birth spacing (Hassan et al., 2019). Among women intending to exclusively breastfeed, in-hospital formula supplementation was associated with a nearly 2-fold greater risk of not fully breastfeeding days 30-60 and a nearly 3-fold risk of breastfeeding cessation by day 60, even after adjusting for strength of breastfeeding intentions (Chantry et al., 2014). Pervasive marketing of BMS has been shown to adversely impact knowledge, intention, beliefs, self-efficacy, and social norms related to breastfeeding (Green et al., 2021). Other study found for Children were more likely to be given formula if their mother recalled advertising messages, or a doctor, or mother or relative recommended it and those using formula were 6.4 times more likely to stop breastfeeding (Howard et al 2011).

With the growing urban population and being the second papulose country in Africa, formula milk companies have been aggressively working in Ethiopia (Minten et al 2020). The reach and influence of marketing on infant feeding practice has to be examined in the urban centers of the country. Therefore, the present study investigates infant formula feeding practices among mothers with infants below six months of age and identifies factors associated with the practice in Addis Ababa, Ethiopia.

1.2. Statement of the Problem

In developing countries, 1.3 million to 1.45 million childhood mortality were attributed to suboptimal breastfeeding practices (woldie et al., 2014). In Ethiopia, sub-optimal breastfeeding practice contributed for 24% of the total annual infant death (Oot et al., 2015).Breast milk substitutes may be marketed unethically, which could reduce breastfeeding rates, risk the health of women and children, and drive up unneeded costs for households and nations. According to estimates, ideal breastfeeding techniques might help prevent 823,021 child deaths under five and 20,000 maternal fatalities per year worldwide (victoria et al, 2015). Marketing by the infant feeding industry and the "availability" of formula, including the distribution of free samples, increase rates of bottle-feeding (Ching et al., 2021).

The health system cost refers especially to the direct medical expense for the treatment of cases of childhood diarrhea and pneumonia and cases of type II diabetes in women that can be attributed to not breastfeeding (Walters et al., 2016). 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 on child’s cognitive development (Appleton et al.,

2018). Infants predominantly fed formula were more likely to be obese at later age relative to infants predominantly fed breast milk (Gibbs et al., 2012). Alterations of the neonatal gut environment from formula supplementation can be responsible for mucosal inflammation and disease, autoimmunity disorders and allergic conditions in childhood and adulthood (walker and Marsha, 2014). Concentrations of the essential elements (Ca, Fe, Zn, Mn and Mo) were significantly higher in most formulas than in breast milk that may be associated with adverse health effects (Almeida et al., 2022).

According to the Ethiopian Demographic and Health Survey (EDHS) 2016 report, only 58% of infants less than 6 months were exclusively breastfed (CSA, 2016) Formula feeding was 30% among the age of up to 1 month, it was 45% between two and 3 months and it increased to 68% in the infants from four to 5 months (Abebe et al 2016). The tendency to use the formula-feeding increased in relation to child or infant increasing age. About 17% of the infants under the age of 3 months were offered formula and it increased to 69% in infants from 4 to 6 months (Shamim et al 2015).

The benefits of exclusive breastfeeding are numerous. However, the prevalence of EBF is low in developing countries (39%), 35% in Africa and 28% in West Africa and 47% in eastern and central Africa. (CSA, 2011). According to studies, formula feeding increased the risks of adverse health outcomes particularly hospitalization by approximately 1.5-fold and early formula feeding before 6months results with an increased rate of antibiotic prescription (Di Mario et al., 2019).In addition to having more illnesses, formula-fed infants cost the health care system resources. Formula feeding is associated with annual economic losses of over US$ 300 billion worldwide or 0.5% of the world's gross income (WHO, 2017).

Misinformation about breastfeeding, together with the widespread promotion of BMS, can cause confusion among health workers, mothers, and families about feeding infants and young children. Assessing the prevalence and associated factors of the infant formula practice may provide insight into the current burden and nature of the problem, as well as guidance on how to direct prevention strategies. This study therefore may provide information on infant formula feeding practices and associated factors among mothers of infants less than 6 months age in the study area, in Addis Ababa Ethiopia.

1.3. Significance of the study

In our country as well as in the developing country many studies had reported that there are inappropriate formula feeding practice of infants and the burden of formula feeding for infants less than six month. Therefore, assessment of the current feeding practice of infants is very important to support policy and programming decisions at the national, regional, and district levels. In this regard, research on this topic is necessary in order to enhance the policy on the length of maternity leave or to find other potential solutions for the exclusive breastfeeding (EBF) practice because mothers are a key factor in influencing the effectiveness of this practice. The finding can be used in designing appropriate and effective breastfeeding intervention programs aimed at improving infant feeding practice.

The finding will contribute some extra knowledge in the study area and therefore serve as a basis for implementing child health policies. It will provide insight for EBF promotion programs for mothers in Addis Ababa. The study's findings will also provide relevant information to policymakers, implementers, and the Addis Ababa Health Bureau, the city health office, for future planning and interventions of appropriate strategies to prevent inappropriate formula feeding practice and to maintain breastfeeding practice.

To devise new strategies to promote optimal infant feeding and improve children's and mothers' health, what applies in Addis Ababa could also work for other more or less similar populations in Ethiopia. The study will also provide information to ongoing research efforts on infant and young child feeding

2. LITERATURE REVIEW

2.1. Prevalence of Formula Feeding Practice

According to UNICEF, 2016, nearly two out of every five infants worldwide did not receive exclusive breast milk for the required six months of life. In the first six weeks of life, 31.3% and 81.8% of new-borns in the US and Ireland, respectively, received formula feedings (Madan et al., 2016). According to some studies, the prevalence and length of breastfeeding are decreasing in developing nations, including Ethiopia, and are being replaced with formula milk. The prevalence of exclusive breastfeeding in Ethiopia is lower than the government and World Health Organization (WHO) standards, which are respectively 90% and 70%, according to all reports from demographic and health surveys conducted in Ethiopia and the findings of various literatures.

On the other hand, formula feeding is becoming more widespread in Ethiopia today, both in urban and rural regions, for a variety of socio-cultural reasons (CSA, 2016). Two years of exclusive breastfeeding are less expensive than the alternative of purchasing artificial or animal milk, which in certain countries makes up 15% to 20% of the health budget. In Ethiopia, poor breastfeeding causes 14,000 avoidable child deaths each year, 5 million instances of diarrhea and pneumonia, $190 million in household costs, and $2 million in treatment costs in the health care system. Exclusive breastfeeding was just 29.3 percent of the time in a cross-sectional survey in Addis Ababa, although predominant breastfeeding, partial breastfeeding, and no breastfeeding were 44.3 percent, 24.9 percent, and 1.5 percent, respectively (Shiferaw et al., 2015).

According to one study, the prevalence of exclusive breastfeeding (EBF) was 74.1 percent in one of the districts in the country's northwestern region (Mulatu and Sintayehu, 2020). In the Oromia regional state, a community-based cross-sectional survey found that 64.5% of women exclusively breastfeed their babies (Mamo et al., 2020). 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 (Abebe et al., 2019).

A cross-sectional survey conducted by an institution in Dire Dawa found that 21.4% of infants younger than six months were fed infant formula (Debebe and Nuri, 2018). Similarly, studies conducted in Mekelle and Gondar, Ethiopia, indicated that 68.8% and 12.4% of infants were exposed to formula feeding, respectively (Tadesse et al., 2018). According to the reporter, since 2021, infant formula has been one of the major products imported into the country but is rare on the market. About 616 tons of infant formula products have been imported into Ethiopia, amounting to over 231.6 million birr in a six-month span from September 2021 until February 2022. (Samuel, 2022). According to customs commission data, the government collected an import tax of approximately 16.2 million birr from the same product. Brands such as Liptomil, S-26, NAN, Similic, Mimi Lac, and Enfamil are the most popular infant milk products in Ethiopia. Glorious PLC, Mekuria Abera, Makfan PLC, Kare Pharmaceutical PLC, and SKY Industries PLC are some companies that import formula milk (Samuel, 2022).

2.2. Obstetrics and health facilities related factors

A study conducted in the United States, Egypt, and Dire Dawa found that infants born to moms who underwent caesarean sections had a statistically significant higher percentage of formula feeding practice (Zanardo et al., 2013). Women delivering in a private clinic provided their child with breast-milk substitute at 0–5.9 months, which is five times more than women delivering in the public sector (Prak et al., 2014).

In Ethiopia, the overall institutional rate was 18%, which varied between 46% in the private sector and 15% in the public sector (Getnet Gedefawet et al., 2020). Caesarean rate among women in urban area are approximately 3 times those among women in rural area. In Addis Ababa the rate of Caesarean section was increasing from 16%-22.9% as EDHS 2005-2014 report. It signifies the possibility of over-utilization of the service in the city Ethiopia (CSA, 2016). According to its 2016 Demographic and Health Survey, the Caesarian delivery rate was 2% based on births during the 5 years prior to the survey (CSA, 2016).

In 2014, 10.6% (9.0–12.0) was the estimated worldwide preterm birth rate, making a projected 14.84 million premature babies a live (12.65 million–16.73 million). Of these, 12 million (8.1%) preterm births took place in Asia and sub-Saharan Africa. In the sub-Saharan Africa the estimated preterm birth rate was 12.0 making the proportion of preterm birth 28.2% (Chawanpaiboon et al., 2019).

The overall pooled prevalence of preterm birth among mothers who gave birth at health institutions in Ethiopia was 11.4% (Senduku et al., 2021). In Ethiopia, 320,000 babies are born too soon each year, and 23,100 children under five die due to direct preterm complications (Ibrahim et al., 2021).

2.3. HIV Status

Ethiopia is one of the top 25 nations in the world for new HIV infections, according to MOH (2020). One reason for the drop in breastfeeding is the worry that HIV could be passed on through breast milk. Ethiopia has a total of 620,000 HIV-positive people, according to the Joint United Nations Program on HIV/AIDS (UNAIDS) 2020 country fact sheet. Out of these, 8,900 individuals were newly infected, with 360,000 of them being women of reproductive age (Gebremariam et al 2024).

Around 74% of pregnant women received ANC at least once, according to the EMDHS, 2019 data, but only 48% of them gave birth in a hospital (CSA, 2019). This suggests that a sizeable fraction of the women who were booked through ANC leave the midwifery continuity of career for a variety of reasons. In environments where there are no other feeding options available, breastfeeding is a significant risk factor for HIV MTCT. Literatures indicate that breastfeeding accounts for half of all MTCT. Antiretroviral medications are highly effective for preventing MTCT of HIV (Teshome et al., 2020).

2.4. Determinants of exclusive breastfeeding

In order to appreciate what underlies women's infant feeding choices, and to develop strategies to increase breastfeeding initiation and duration, it is important to understand what factors are associated with breastfeeding, and which women are at risk of discontinuing breastfeeding early. (Awoke and Mulatu 2021).The practice of breastfeeding is influenced by a variety of factors, including the socio-demographic of the mother, media advertisements for infant formula, factors related to breast feeding, behaviour, and factors related to knowledge. In order to properly inform, encourage, and protect the practice of exclusive breastfeeding, it is crucial to understand all of the influential factors.

2.5. Associated factors of formula feeding practice

2.5.1. Maternal socio-demographic factors

Infant feeding practices were influenced by a mother's employment status; in Cape Coast, working mothers were more likely to feed formula than unemployed ones (Sika-Bright, 2011). According to a study done in Vietnam using a mixed-methods approach, employed mothers returning to work have faced the challenge of continued breastfeeding leading to formula use (Henry et al., 2015). A study done in Agaro, Oromia region, showed mothers' return to work was one of the reasons reported by the mothers who started bottle feeding practices, including formula feeding (Seid et al., 2018).

Studies done in Vietnam, the United Arab Emirates, Egypt, Dire Dawa, and Jimma, Ethiopia, revealed that factors related to mothers like maternal educational status (illiterate), a high wealth index, and being a rural resident have a significant association with infant formula feeding practice (Abebe et al., 2019).

2.6. Source of infant formula information

2.6.1. Media advertisement of infant formula

The international endeavor to increase breastfeeding rates and duration is still being hampered by inappropriate marketing of breast-milk substitutes. The breast-milk substitutes industry is large and expanding, which has an impact on exclusive breastfeeding (UNICEF, 2016). Breast feeding rates decrease in line with increases in the frequency of formula milk advertising and the distribution of free samples of infant formula to nursing mothers in hospitals, according to the ACF's Infant and Young Child Feeding Programming Guide (ACF 2018). According to a review of the literature focusing on low- and middle-income countries, the marketing of breast milk substitutes has an impact on societal norms by making formula use appear widespread, modern, and on par with or even superior to breast milk (Piwoz et al., 2015). Mothers used infant formula in hospitals for many reasons, including poor infant breast feeding and in-hospital formula supplementation, which were associated with a nearly 2-fold greater risk of not being fully breastfed in the first 2 months and a nearly 3-fold greater risk of breastfeeding cessation at 2 months of age (Chantry et al., 2014).

2.6.2. Pressure from family/friends

Families and friends have influence on infant feeding choices, a Study in Hong Kong, showed women to be more likely to initiate discussions about infant feeding with family and friends because healthcare providers are perceived as not being supportive of formula-feeding (Sze et al., 2018). A similar study revealed that one of the key drivers of the introduction of formula feeding was pressure from the family or community (Piwoz et al., 2015). According to a study conducted in Vietnam, formula feeding was seen by family members as a means to give the mother some rest after giving birth (Henry et al., 2015).

2.7. Breast feeding related factors

According to a study, non-exclusive breastfeeding was substantially correlated with starting after one hour of birth and feeding colostrum's (Tadesse et al., 2016). Generally, the literature revealed that infant formula feeding is highly practiced in the world as well as in Ethiopia due to different social, environmental, and economic conditions across the studies. So, a customized study is mandatory for evidence-based planning and interventions in the study area (Alemu et al 2020).

2.8. Behaviour and knowledge related factors

2.8.1. Perception of insufficient breast milk

Studies conducted in Island, Vietnam, India, Egypt, and Dire Dawa found that one of the most common reasons for supplementing infant formula with formula in Ethiopia was the perception of an insufficient milk supply (Kera, 2023).

2.8.2. Maternal breast-feeding knowledge and attitude towards formula feeding

A statistically significant higher percentage of artificial feeding was noticed among infants born to mothers who think that formula feeding is better or that formula has a similar quality to breast milk (Tawfik et al., 2019). A study conducted in Jimma Zone on infants less than six months old revealed that mothers' attitudes toward formula feeding and their knowledge of breastfeeding increased the likelihood that they would not use formula by 74% (Abebe et al., 2019). Studies done in Ireland and Egypt showed a positive maternal attitude toward formula feeding was among the most frequently reported reasons underlying mothers' decisions to formula feed (Rosly, 2013). A study done in Egypt showed a significantly higher percentage of formula feeding practice among infants born to mothers who need their own body privacy

(Tawfik et al., 2019). Women who said they were more worried about their pre-pregnancy body shape or weight during pregnancy tended to have shorter exclusive periods than those who were less worried (Prak et al., 2014).

2.9. Conceptual Framework

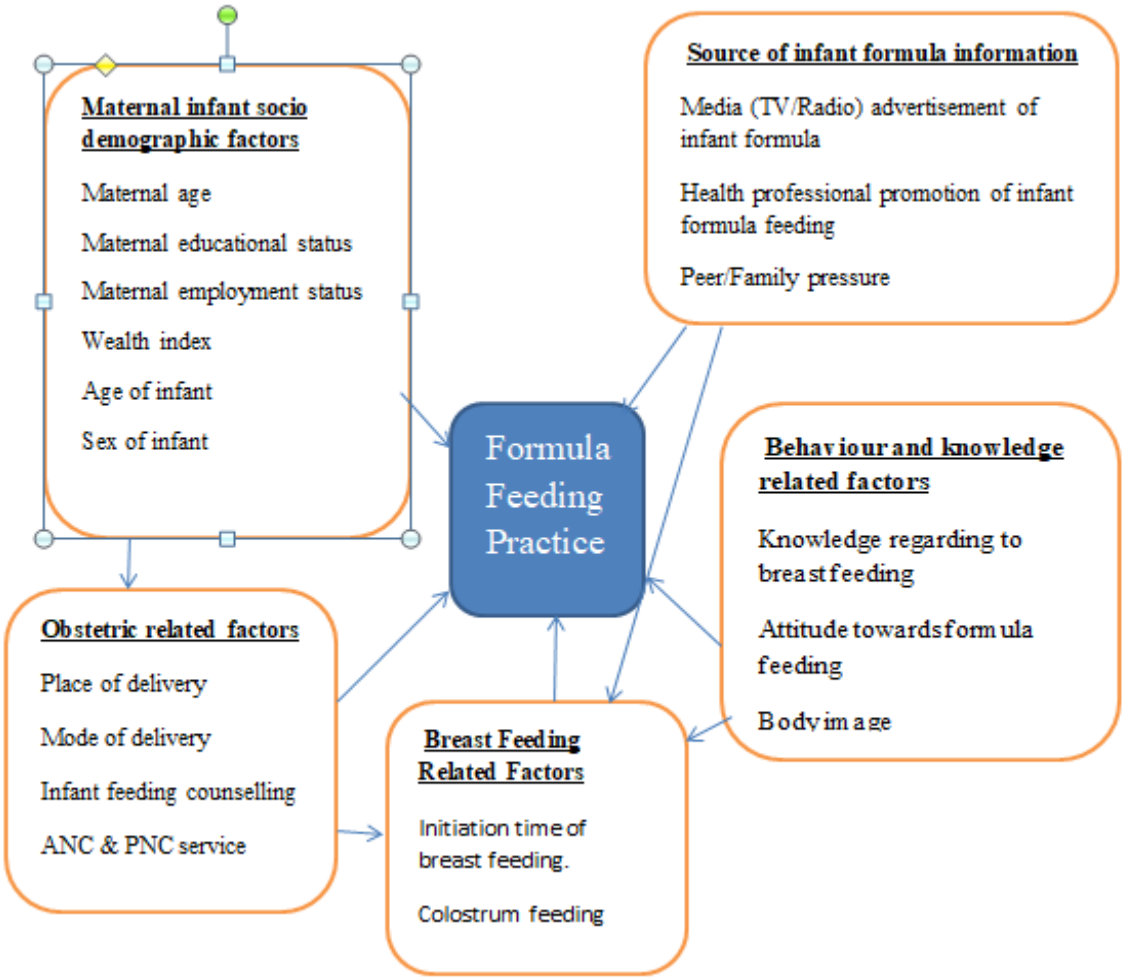


Figure 1: Conceptual framework relating factors to feeding of infants aged <6 months. Constructed by the author based on (Abebe et al., 2019; Debebe et al., 2020; CSA, (2014-2017); WHO, 2022.

3. OBJECTIVES

3.1. General objective

- ✓ To investigate infant formula feeding practices among mothers of infants below six months of age, and its associated factors in Addis Ababa, Ethiopia.

3.2. Specific objectives

- ✓ To estimate the prevalence of infant formula feeding practices among mothers of infants below 6 months in Addis Ababa, Ethiopia.
- ✓ To identify factors associated with infant formula feeding practices among mothers of infants below 6 months in Addis Ababa, Ethiopia.

4. METHODS & MATERIALS

4.1. Study area and design

Health facility based cross-sectional study was conducted in Addis Ababa, the capital and largest city of Ethiopia, and the diplomatic center of Africa. Addis Ababa holds 540 square kilometers of area, and it contains 11 sub-cities and 116 districts. There are 98 health centers, six referral hospitals, five specialized hospitals, and two military hospitals in Addis Ababa (Girma et al., 2021). According to world population review (2024), Close to half of the population is of the ethnic group Amhara, while the majority of the remaining population is split among the groups Oromo, Gurage, and Tigray, 71% of the population use Amharic, Oromo is in use with just over 10% of the people, with four additional languages ranking more than 1% use among the population. Approximately 82% of the population is of the Orthodox Christian religion, 12.7% of residents are Muslim, 3.9% Protestant, less than 1% Catholic, and a smaller percentage following other faiths. Adult literacy in the capital city is the highest among all of the country's cities, at over 93% for males and almost 80% for females, The city has a lower rate of infant mortality than the national average, and over 98% of homes in the city have access to clean drinking water.The study was conducted from March11 – May 10, 2023 with quantitative and qualitative design.

4.2. Study population and source of population

4.2.1. Source population

All mothers in Addis Ababa having infants below 6 months of age were the source population.

4.2.2. Study population

Mothers of infants below 6 months of age visiting health centers in Addis Ababa for PNC, immunization and under five OPD services during the study period were the study population.

4.3. Inclusion and Exclusion Criteria

4.3.1. Inclusion criteria

- ✓ All healthy mothers with infants below 6 months coming for PNC, immunization and under five OPD service during study period.

4.3.2. Exclusion criteria

- ✓ Mothers who were unable to communicate and mentally ill.
- ✓ Mother with medical conditions interferes with breastfeeding, and infants with congenital malformation that would interfere with breast feeding.

4.4. Study Variables

4.4.1. Dependent variables

- ✓ Formula Feeding practice.

4.4.2. Independent variables

Maternal and infant socio-demographic factors: -

- ✓ Maternal characteristics like age, education level, employment status, maternity leave, wealth index, residence as well as infant age and sex

Obstetric related factors: -

- ✓ Place of delivery, Mode of delivery & PNC service

Source of infant formula information: -

- ✓ Media/TV/Radio advertisement of infant formula, Promotion of infant formula by health professionals, Peer / family pressure,

Breast feeding related factors: -

- ✓ Timely initiation of breast feeding, colostrum feeding

Behaviour and knowledge related factors: -

- ✓ Attitude towards formula feeding, mothers breast feeding knowledge, Perception of breast milk volume and Body image perception.

4.4.3. Maternal knowledge About Breast Feeding

This was measured using a yes/no dichotomous questionnaire that consisted of six items. The answers to each question were analyzed as known and unknown. Each correct answer was coded as "1", which is known, and each wrong answer was "0" (do not know). The maximum attainable score was 6, and the minimum possible score was 0. Respondents whose knowledge scores were equal to or above the mean were categorized as having good knowledge, whereas those scoring below the mean score were categorized as having poor knowledge of formula feeding (Mekuria and Edris, 2015)

4.4.4. Operational Definitions and Terms

Infant formula-defined as a breast-milk substitute formulated industrially, prepared for infants aged less than six months.

Breast milk substitutes (BMS) – any industrially formulated milk which is prepared for children below six months up to one year and older which includes infant formula, and follow-up formula.

Timely initiation of breast feeding- putting the neonate on the mother's breast to suckle within one hour (including one hour).

Infant formula promotions - defined if a mother exposed to advertisement material including media, printing material which indicates material is good for infant or if sample is given to mother or other activities to encourage mothers to use the formula once in a life time.

Health professional promotion - Defined as if mothers receive recommendations/advice from a health professional, to use infant formula for their infants once in a life time of the mother.

Peer/family pressure: - Influence of family /friends on mothers to use formula feeding by telling the benefit of the product.

4.5. Sample size determination

Sample size of the study was determined by using the single population proportion formula

$$n = \frac{(Za/2)^2 P(1-P)}{D^2}$$

Where, n= estimated sample size

P= It is the proportion of mother who gave formula for their infants.

D= is margin of error (0.05)

Non-response rate, 10%

Z= z-score, z=1.96 at 95% confidence interval

P = 47.2% (P=0.472) prevalence of formula feeding practice from study done in Jimma, which was taken (Abebe et al., 2019, Aman et al., 2019).

Therefore, n = $[(1.96)^2$ 0.472 (1−0.472)] / $(0.05)^2$ = 382, by considering 5 % non-response rate, the required sample size was 403.

For qualitative data: The health care providers were selected to carry out in - depth interview until idea saturated.

4.6. Sampling Techniques and procedures

A multistage random sampling was employed (Figure 2). At first stage, from a total of 11 sub-cities in Addis Ababa, five were selected using a simple random sampling method. Since 30-40% of the study population represents the total population, an average of 45% of sub cities (SC) were used to represent the population.

Addis Ababa comprises health facilities owned by private and public, varied by level from health centers to tertiary referral hospitals. The city has a total of 97 health centers (HC), 21 maternal & child centers (MCH), 12 public and 25 private hospitals. Within the selected five sub-cities we stratified health facilities to represent the level and ownership type. Again, from these facilities, those providing immunization and under five OPD services were identified. Then, 19 health facilities were selected by proportion to size allocation using simple random sampling.

Accordingly, eight health facilities from private (2 hospitals and 6 maternity centers) and 11 public health facilities (10 health centers and 1 hospital) were selected. These facilities distributed across the five sub-cities: Arada (2 HC & 2 MCH), Bole (2 HC, 1 MCH, & 1 hospital), Nifas Silk Lafto (3 HC & 1 MCH), Yeka (1 HC & 1 MCH), Lideta (2 HC & 1 hospital). The following health facilities were selected by simple random sampling from each subcity. Arada and Ras Emeru health centers, Hemen and Ananaiya MCH from Areda sub city. Woreda 1, 5 and 3 health centers, Semah MCH, and Addis Hiwot hospital from Bole sub city. Woreda 2, 5 and 6 HC, & Care MCH from Nifas Silk Lafto sub city. Woreda 3 and 5 HC & Amin hospital from Lideta. Finally, woreda 6 HC, and Denberwa MCH from Yeka sub city were selected.

At the second stage, the calculated sample size (n=403) was proportionally allocated for each health facility according to pre-determined monthly client flow. The registration of mothers who have infants less than 6 months on the expanded program of immunization and PNC register was used to get a list of children from each health facility. A sample from each health facility was determined by using proportional allocation to the sample size. Finally, a systematic random sampling technique was used to select a representative population using list of women having children less than 6 months of age in the immunization and PNC register as a sampling frame. Finally, we reached at the following samples satisfying our

inclusion criteria: Bole (n_1 = 94), Yeka (n_2 = 36), NS Lafto (n_3 = 72), Arada (n_4 = 138), and Lideta (n_5 = 63).

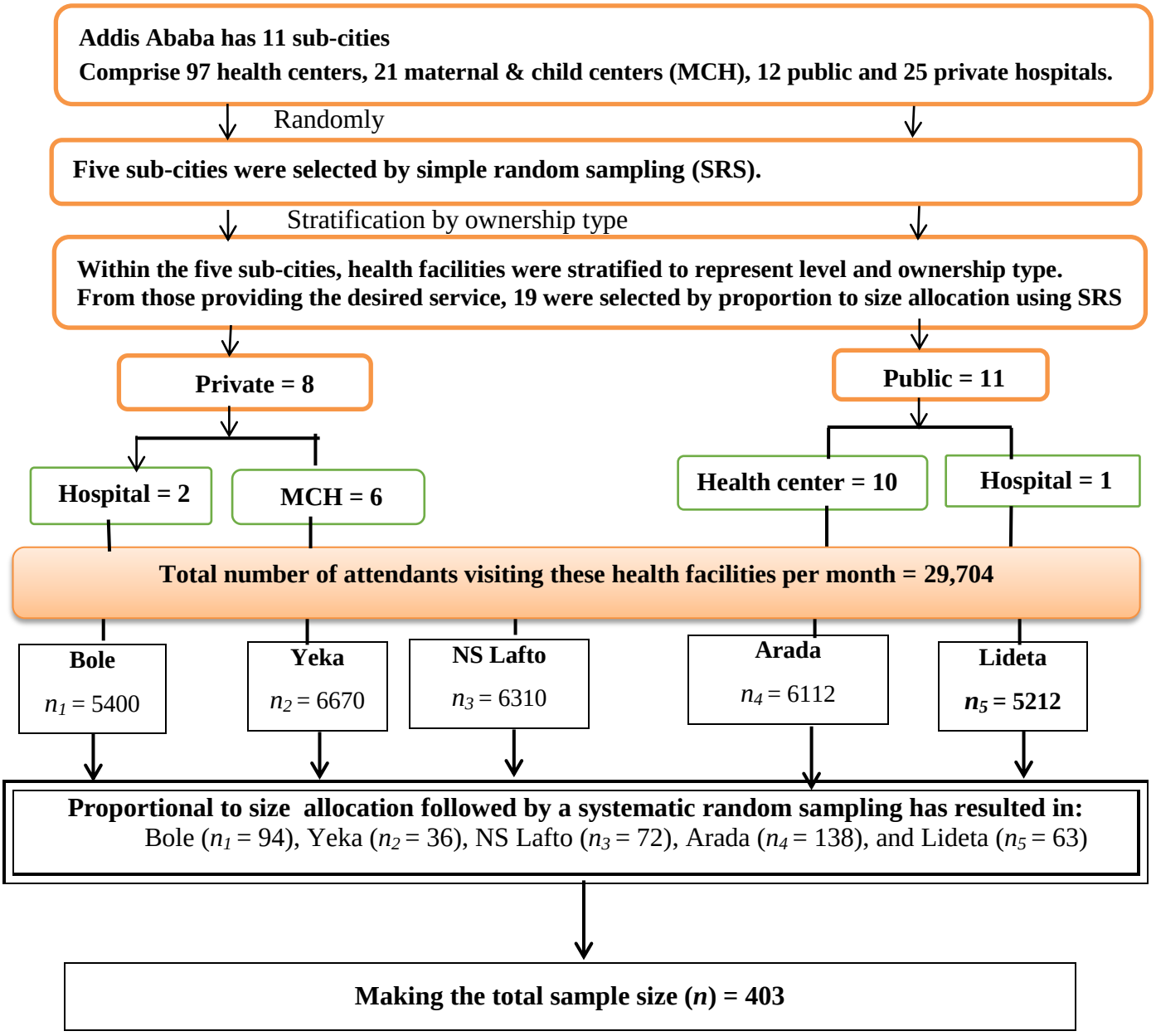


Figure 2: Schematic presentation of sampling procedure to select study participants.

4.7. Data collection instrument

Data were collected using a structured interviewer –administered pretested questionnaire, with both closed and open-ended questions. The questionnaire comprised questions related to socio demographic characteristics, socio economic and housing condition (wealth index), obstetric related characteristics, infant feeding practice, source of infant formula information and mother's behavior and knowledge related factors, exposures to breast milk substitute and breastfeeding promotion; source of exposure to advertisement; and source of BMS use recommendations. The questionnaire was adopted from the EDHS (2021) and different literatures. Three diploma holder nurses, with previous data collection experience, were recruited to collect data.

4.8. Data quality management.

The questionnaire was implemented through a face-to-face interview. The questionnaire was primarily prepared in English then translated to the local language Amharic and back translated to English to check consistency. Three diploma holder nurses were employed to collect the data. The data collection was supervised by BSc holder nurses working in a health facility. Also, two days training was given to the data collectors before the data collection. In addition; the questionnaire was pretested for its understandability 5% (n=20) on volunteer mothers in selected private and government health facilities that were not included in the actual data collection. The purpose of the pre-test was to ensure that the respondents were able to understand the questions and to check the wording, logic and skip order of the questions in a sensible way to the respondents, and then amendments were made accordingly after the pre-test.

4.9. Data Processing and Analysis

The collected data were checked for completeness then entered into a computer using Epi-Data version 3.1 and sent to the Statistical Package for the Social Sciences (SPSS) version 23 for analysis. The descriptive statistics were presented using tables, figures, and texts as frequencies, percentages and summary statistics such as mean, and standard deviation.

The association between the dependent and the independent variables was analyzed using the odds ratio with a 95% confidence interval. The relative contribution of each variable to the

outcome of interest was assessed using logistic regression analysis. Independent variables with P-value ≤ 0.25 during Bivariate analysis were entered into the multivariable analysis model (Lakens et al., 2021). Those variables with a p-value of less than 0.05 in multivariable analysis were considered as significant. Finally, Hosmer and Lemeshow goodness-of-fit test was applied to assess the fitness of the model.

For qualitative data

Data was transcribed carefully and arranged with the rhythm notes before thematic or content analysis was employed.

4.10. Ethical clearance

Letter certifying that the study protocols comply with research ethics was granted both from the institutional review board of the College of Natural & Computational Sciences, AAU (Ref. No: IBR/05/2015/2013), and AA city administration public health research and emergency management directorate (Ref. No: A/A/11035/227). A permission letter across the various administrative hierarchies was provided to the selected study sub cities and districts. After getting permission from selected health facilities, written informed consent was obtained from each of the study participants after informing them about the objective of the study.

4.11 Dissemination of the result

The result of the study will be presented in different workshops and seminars, and it will be shared to different sub-cities and districts. Also, it will be published to make it available to the scientific community. In addition, the document will be available at AAU library for students to use it as a reference.

5. RESULTS

5.1. Socio Demographic Characteristics of the Participants

A total of 403 mothers with an infant aged 0-6 months participated in the study, making the response rate 100%. The mean age of the respondents was 34.65 years ± 2.19, with a range of 18 to 42 years. Almost all of the mothers were married (96%) and ¾ of them were orthodox Christians (73.7%). Those mothers who attended secondary education and studied beyond were 39.2% while only 5.0% of the subjects had no formal education. However more than half (54.8%) of the participants were housewives but the monthly income of 65.3% of the subjects was > 6000 Ethiopian birr (Table 1)

Table 1:- **Background characteristics of mothers visiting health centers to seek infant care services, Addis Ababa, Ethiopia, 2023 (n= 403).**

Variable name	Formula feeding		Total	Percent
	Yes	**No**		
Mother's age				
15-24	16	46	62	15.4
25-34	113	146	259	64.3
35-44	29	44	73	18.1
>= 45	2	7	9	2.2
Total	**160**	**243**	**403**	**100%**
Marital status				
Married	151	236	387	96.0
Single	7	9	16	4.0
Total	**158**	**245**	**403**	**100%**
Gravidity				
1 to 3 times	134	193	327	81.1
4 to 6 times	26	47	73	18.1
≥ 7 times	0	3	3	0.74
Total	**160**	**243**	**403**	**100%**
Mother's education				
Primary (1-8)	28	40	68	16.8
Secondary (9-12)	41	116	157	39
Higher Education	83	75	158	39.2
No formal education	12	8	20	5
Total	**164**	**239**	**403**	**100%**
Spouse Education				
Primary	71	32	103	25.6
Secondary	70	36	106	26.3
Higher Education	94	91	185	45.9
No formal education	8	1	9	2.2

Total	**243**	**160**	**403**	**100%**
Number of children				
≤3	6	107	113	28
>3	15	275	290	72
Total	**21**	**382**	**403**	**100%**
Wealth index				
Low	5	128	133	33
Middle	8	129	137	34
High	8	125	133	33
Total	21	382	403	100%

5.2. Child Characteristics and Maternal Health Service Utilization

The mean age of the infants was 2.83 months (SD ± 1.793) with a range of 1 to 6 months. Of the participants 369 (91.6%) received ANC service at least four times while the remaining 8.4 % had only one or two follow ups. Also, more than half of the mothers (64.8%) visited government health facility to seek for ANC service and delivered the child by natural birth (60%). More than 90% of the mothers visited health facility for postnatal care (Table 2).

Table 2: Antenatal and postnatal service utilization of mothers of infants visiting health centers to seek infant health services, Addis Ababa, Ethiopia.

Variables Name	Formula feeding		Total	Percent %
	Yes	**No**		
Child sex				
Male	9	198	207	51.4
Female	12	184	196	48.6
Total	**21**	**382**	**403**	**100%**
Number of ANC care received				
<4 times	1	33	34	8.4
≥4 times	29	340	369	91.6
Total	**30**	**373**	**403**	**100%**
Type of facility visited for ANC				
Government	10	211	221	64.8
Private	11	171	182	45.2
Total	**21**	**382**	**403**	**100%**
Mode of delivery				

Normal	13	229	242	60
Caesarian section	8	153	161	40
Total	**21**	**382**	**403**	**100%**
Place of delivery				
Government facility	10	211	221	53.8
Private facility	11	171	182	46.2
Total	**21**	**382**	**403**	**100%**
Received post-natal care				
Yes	154	218	372	92.3
No	6	25	31	7.7
Total	**160**	**243**	**403**	**100%**

Additionally, those mothers who received counseling on breast feeding were only 338 (83.8%). Further, the advised breast feeding interval was not every 2-3hrs for almost 1/5 of the mothers (Table 3). Even though, the prevalence of timely initiation of breast feeding was 66% and greater than 90% of the mothers were with poor breast feeding knowledge. On the other hand, only 14% of the mothers got the information about formula feeding from a health facility but, majority of the mothers had knowledge on problems of early CF**.** The proportion of exclusive breastfeeding among the mothers was 60% but the remaining was practicing either formula or mixed feeding (Figure 7).

Variables Name	Formula feeding			
	Yes	No	Total	Percent
Received counseling on BF				
Yes	18	320	338	83.8
No	3	59	62	15.4
I don't remember	0	3	3	0.7
Total	**21**	**382**	**403**	**100%**
Timely initiation of Breast feeding				
Yes	9	258	267	66.3
No	12	125	137	33.4
Total	**20**	**383**	**403**	**100%**
Exclusive breastfeeding				
Yes	243	0	243	60.3
No	160	0	160	39.7
Total	**403**	0	**403**	**100%**
Advised BF interval				
2-3hrs	138	192	330	81.9
Other	22	51	73	18.1
Total	**160**	**243**	**403**	**100%**
Breast feeding knowledge				
Good	1	33	34	8.4
Poor	20	349	369	91.6
Total	**21**	**382**	**403**	**100%**
Source of formula feeding information				
Radio or TVs	36	115	151	37.5
Health professionals	16	23	39	9.67
Other	45	168	213	52.85
Total	**97**	**306**	**403**	**100%**
Knowledge on problems of early CF				
Yes	16	327	343	85.1
No	5	55	60	14.9
Total	**21**	**382**	**403**	**100%**

Table 3. Breast feeding related knowledge and practice of mothers of infants visiting health centers to seek infant care services, Addis Ababa, Ethiopia.

Figure 3: Source of infant formula promotions among mothers of infants aged 0-6monthes in Addis Ababa 2023

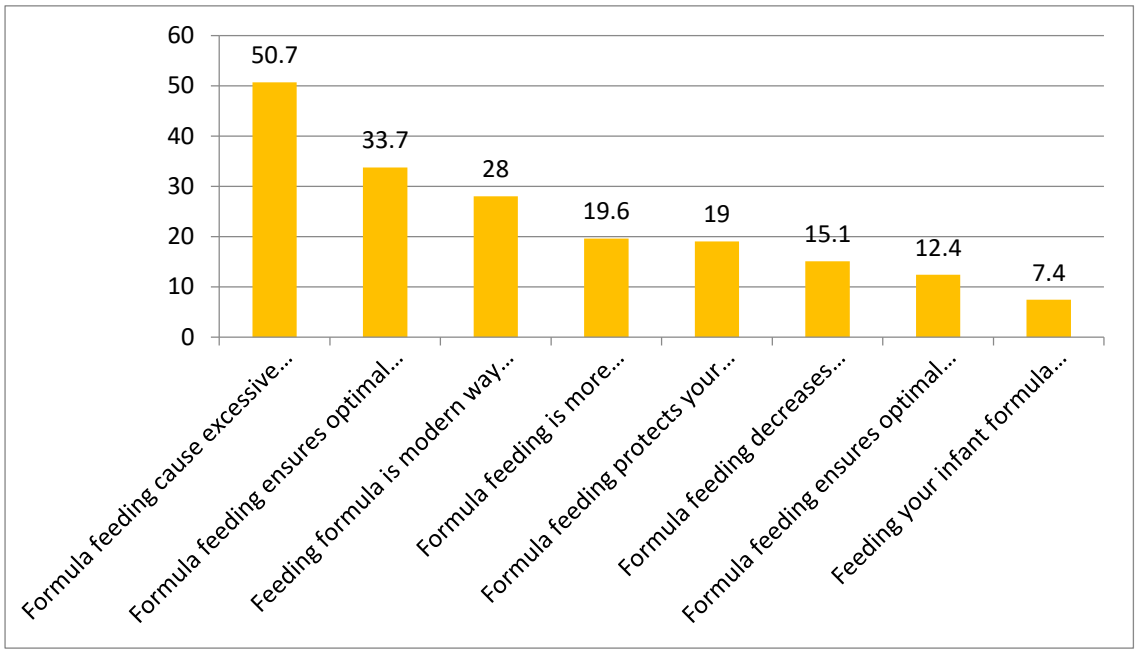
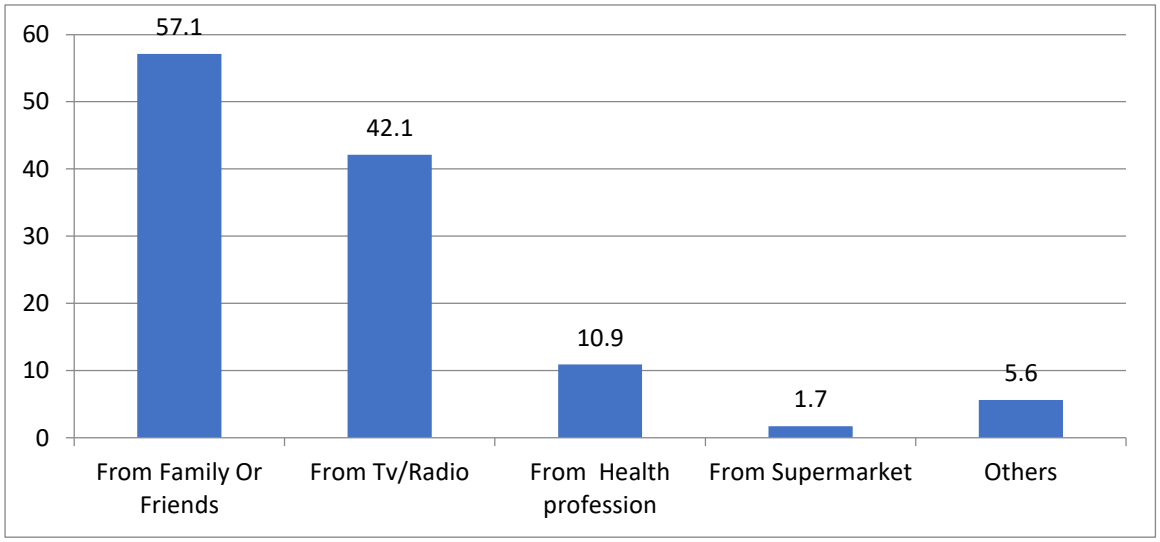


Figure 4: Infant formula information which mothers of infant aged 0-6 months exposed, Addis Ababa 2023



The proportion of exclusive breastfeeding among the Children was 60% but the remaining was practicing either formula or mixed feeding (Figure 5).

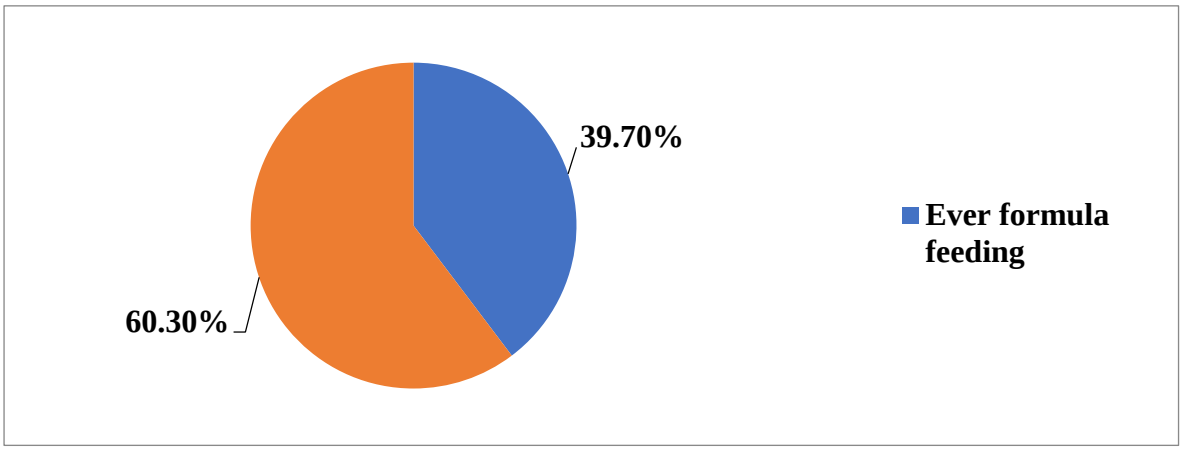


Figure 5. Type of infant feeding practice among mothers of infants 0- 6 months who visited health facilities for MCH services in selected health facilities in Addis Ababa, 2023.

5.3. Factors associated with formula feeding

Variables that had p-value < 0.25, following bivariate analysis with formula feeding, were used in multivariable logistic regression model to identify factors associated with formula feeding. The variables were family income, marital status, child birth place, timely initiation of breastfeeding, source of information about formula feeding, mothers' employment status, knowledge on problems of early CF introduction, type of delivery, knowledge about BF, mothers' educational status. Based on the result of the multivariable logistic regression, marital status, place of child birth, timely initiation of breastfeeding, source of formula feeding information, Knowledge on problems of early CF were associated with formula feeding (3). Table Single mothers [**AOR** = 0.323, 95% CI: (0.105-0.988)] and those who got information about formula feeding from health facilities [**AOR** = 0.321(0.141-0.731)] were 68% less likely to practice formula feeding compared to married mothers this might be due to the lack of support from her partner, and those mothers who received information about formula feeding from health facilities respectively. On the other hand, those children who were born in a private health facility [**(AOR**=3.29, 95% CI: 1.65,6.56)]and mothers who initiated breastfeeding late [**AOR** = 3.93, (95%CI: 2.11, 7.33)] were 3 times more likely to feed formula to their children than those who were born in a government facility, and those who initiated breastfeeding timely respectively. Similarly, those mothers who did not have

the knowledge regarding problems with early introduction of complementary foods were two times more likely to practice formula feeding [(AOR=2.14, 95% CI:1.16, 3.96)].

Table 3: Multivariate logistic regression analysis of factors associated with formula feeding, Addis Ababa, Ethiopia, 2023 (n = 403)

Variables	Formula feeding		COR (95% CI)	*p*-value	AOR (95% CI)	*p*-value
	No n (%)	Yes n (%)				
Marital status						
Married	236	151	**1**		**1**	
Single	7	9	2.009(0.733-5.510)	0.175	**0.323(0.105-0.988)**	**0.048**
Place of child birth						
Government facility	156	58	**1**		**1**	
Private facility	85	101	3.19 (2.106-4.851)	0.0001	**3.293 (1.653-6.558)**	**0.001*** **
Home	2	1	1.34 (0.120-15.113)	0.810	2.154 (0.105-44.41)	0.619
Timely initiation of BF						
Yes	182	85	**1**		**1**	
No	61	75	2.663 (1.721-4.026)	0.001	**3.929(2.106-4.026)**	**0.000**
Source of formula feeding information						
Radio or TVs	72	53	**1**		**1**	
HP	26	29	1.515(0.801-2.866)	0.201	**0.321(0.141-0.731)**	**0.007**
Others	105	74	1.243 (0.398-3.882)	0.708	1.095 (0.265-4.517)	0.900
BF knowledge						
Good	8	26	**1**		**1**	
Poor	152	217	2.276 (1.004-5.164)	0.049	0.584(0.228-1.495)	0.262
Received education on BF						
2-3 hours	192	138	**1**		**1**	
Others	51	22	0.600 (0.348-1.036)	0.067	1.405 (0.728-2.712)	0.311
Knowledge on problems of early CF						
Yes	82	41	**1**		**1**	
No	160	119	1.487 (0.955-2.318)	0.079	**2.143 (1.159-3.960)**	**0.015** **
Mothers' education						
Primary	40	28	1.05 (0.380-2.902)	0.925	1.05 (0.382-2.90)2	0.568
Secondary	116	41	0.53 (0.202-1.389)	0.196	0.530 (0.202-1.389)	0.298
Higher Education	75	83	0.166(0.644-4.282)	0.294	1.660 (0.644-4.282)	0.432
No formal education	12	8	**1**		**1**	
Type of delivery						
Normal	158	84	**1**		**1**	
Caesarean section	85	76	1.682(1.119-2.527)	0.012	1.067 (0.593-1.926)	0.829

BF Breast feeding, CF Complementary feeding, COR crude odds ratio, AOR Adjusted odds ratio

5.4. Qualitative Finding

Firstly, we randomly selected health professionals from both private and government health centers for each department (nurse, pediatrician, pharmacist, midwifery, metron and surgeon) and then we asked questions about infant formula feeding practice and associated factors until the idea saturated. Finally, we interpreted the idea.

Based on the qualitative study, marketing codes of breast milk substitutes were not known by all interviewed health professionals. Also, when the professionals were asked about the criteria that were set to recommend formula feeding, they indicated that inadequate breast milk production, health problem with the mother like breast cancer, and if there is wound on the breast. Also, mother's death and infection with HIV were mentioned as a reason to recommend formula feeding for an infant. According to professionals working in a private health facility, on average 2-3 infant formula promoters contact their office in person or through phone per week and for some of them it was just once in a month. The respondents also stated that the information presented by the infant formula advocates is not genuine or scientific, one midwife nurse described the situation as "…the promoters does not tell the truth about formula feeding, if they do it will ruin their business".

Another health professional stated that "…promoters tend to provide false information while marketing the product because they are dealing with people working in the media rather than health professionals". However, some professionals believed that the promoters provide scientific information about infant formula; a pediatrician stated that "…promoters rely on science because they want to show the product difference from breast milk". On the other hand, the promoters did not contact government health facilities at all.

The infant formula promoters provide promotional materials to the health workers in private facilities such as notebook, gown, milk bottle, cup and pen unlike that working in government facility. Based on the result of the assessment, all professionals were aware of the negative consequences of infant formula promotion on breast feeding, except a pharmacist who said that, ''...Infant formula has no effect on Breast Feeding rate''. Most of the respondents believed that currently mothers are exposed to infant formula promotion in different ways, but have little information about the problem therefore, they tend to use it, especially if she has short maternity leave or give birth by caesarean section.

A pediatrician said that ‘’…Unlike other countries, there is no lactation consulting office in our country and the supporting system is weak’’. However the health experts indicated the absence of contact between the promoters and the mothers at the health facilities. Unfortunately, all health workers stated they received no training related to marketing codes of breast milk substitutes.

Based on the qualitative study, marketing codes of breast milk substitutes were not known by all interviewed health professionals. Also, when the professionals were asked about the criteria that were set to recommend formula feeding, they indicated that inadequate breast milk production, health problem with the mother like breast cancer, and if there is wound on the breast. Also, mother’s death and infection with HIV were mentioned as a reason to recommend formula feeding for an infant.

6. DISCUSSION

This study assessed the prevalence of formula feeding and associated factors among mothers having infants 0–6 months of age in Addis Ababa city. The prevalence of formula feeding was almost 40%. Place of birth, time of BF initiating, source of information about formula feeding and knowledge on the risk of early CF introduction (<6mo) were significantly associated with formula feeding.

The prevalence of formula feeding in this study is comparable with studies conducted in Addis Ababa (47 %) (Elyas et al., 2017), Nigeria (38.3 %) (Leshi and Sanusi, 2014), Pakistan (38%) (Ijaz et al., 2015), Cambodia (43.1%) (Pries et al., 2016) and Poland (42 %) (Rozensztrauch et al., 2021). The prevalence was found to be higher than the studies done in Dire Dawa (21.5 %) (Debebe et al., 2018), Holeta (13.5 %) (Kebebe et al., 2017) and Gonder (12.4 %) (Asefaw 2016). Whereas it is lower than the studies conducted in urban Jimma (65%) (Abebe et al., 2017) China (88%) (Tang et al., 2015) and Malaysia (73.7%) (Yee and Chin, 2007).

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, health service utilization (PNC/ANC), accessibility and availability of infant formula and the knowledge and awareness of the mothers. (Taye et al., 2021).

Concerning factors associated with formula feeding, mothers who did not receive education about problems of early CF were practicing formula feeding more than their counterparts While this finding is comparable with studies conducted in Nepal (Paudel et al., 2018), and Eastern Ethiopia (Semahegn et al., 2014). Counseled mothers were less likely to feed infant formula because the counseling will make them make informed decision. The other possible justification could be that breastfeeding counseling also improves mothers' skills and helps them to solve difficulties that may arise during breastfeeding.

This study also showed that mothers who got information from the HP were 68% less likely to practice formula feeding compared to those that got the information from TV/radio. This finding was consistent with the study done in Dire Dawa (Debeb et al., 2018) and Hong Kong (Tang et al., 2015). The reason could be information from health professionals include both risk of infant formula milk and importance of exclusive breast feeding. However, advice from friends, neighbors, and family members influenced mothers to initiate infant formula feeding

because most mothers practice what their friends and families do and greatly influenced by informal advice.

Also, marital status of the mother was associated with formula feeding practice. Mothers who were single had less chance to practice formula feeding than married women. Similarly, a survey done in Agaro Town (Seid et al., 2019), Southwest Ethiopia, indicated the association between mother's marital status with formula feeding. Children from mother-only households were more likely to grow up in financially challenged circumstances compared to married-parents (Chavda & Nisarga, 2023). In this study significant proportion of single parent households (75%) were under the lower wealth index that will make the formula unaffordable to the parents. Likewise, untimely initiation breast feeding was significantly associated with formula feeding practice. Mothers who initiate breast feeding untimely were 4 times more likely to practice formula feeding than mothers who initiate breast feed immediately after birth (within one hour). This result is in line with studies done in Mettu (Gedifaw et al., 2022), Dbere Birhan (Tilahun et al.,2016). Mothers who practiced early initiation of breastfeeding may relatively have good knowledge, attitude, and practice towards exclusive breastfeeding. Additionally, when the time interval between delivery and initiation of breastfeeding increases, there will be a chance for the initiation of formula feeding that will in turn lead to decreased newborn-mother bonding and then inadequate maternal breast milk secretion.

Furthermore, the study revealed that, mothers who gave birth at private health facilities were 3.293 times more likely to feed infant formula compared to the mothers who gave birth at government health facilities. This finding is comparable with the study done in Cambodia (Pries et al., 2016) and WHO (2021).

The possible reasons include the high exposure of health professionals from private health facilities to infant formula advertisement as indicated in the qualitative study that will make the products available on the shelves of the private health facilities which would affect mothers decision on infant formula.

7. STRENGTH AND LIMITATION

7.1. Strength of the Study

The use of pre tested questionnaires and standard questionnaires from EDHS to assure quality of data was strengths of this study.

The study contains both qualitative and quantitative design.

7.2. Limitation of the Study

Recall bias may occurred during interviewing questions regarding to infant formula feeding practice.

8. CONCLUSION

ANC service utilization among the mothers was higher than the national average and most of them were receiving the service from government facility. Similarly, majority of the mothers received postnatal care and were counseled on breastfeeding. However, substantial number of mothers received wrong advice on breast feeding interval. Early initiation of breastfeeding was sub optimal but it was close to the target set by WHO. Still, majority of the mothers were

with poor breast feeding knowledge; nevertheless, most of the mothers were aware of problems of early introduction of complementary foods. Formula feeding was practiced by substantial number of mothers but majority of mothers received the information from sources other than a health facility. Being a single mothers and receiving information about formula feeding from health professionals were negatively associated with formula feeding practice; though, giving birth at a private health facility, untimely initiation of breastfeeding, and lack of Knowledge on problems of early CF were positively associated with formula feeding. The only situation that made health professionals recommend formula feeding were inadequate breast milk production, disease, and presence of wound on the breast. In addition, marketing codes of breast milk substitutes were not known by all interviewed health professionals; but infant formula promoters contact private health facilities frequently to promote their product unlike government facility and the codes were not in practice. Besides, the promoters did not provide genuine or scientific information about the product to the consumers. Unfortunately the health workers received no training related to marketing codes of breastmilk substitutes.

8. RECOMMENDATIONS

ANC service utilization should be strengthened, especially at government facilities. Also, the capacity of health professionals to counsel on breast feeding should be enhanced. In addition, early initiation of breastfeeding should be promoted to meet the target set by WHO and improve mothers' poor proper breastfeeding knowledge. Dangers of formula feeding practice should be strongly emphasized especially in private health facilities in addition to making the health professionals aware of the international codes of marketing of breast milk substitutes. Further, advertising infant formulas through different channels should be banned in combination with early introduction of complementary foods in addition to caring out a longitudinal research including different population groups in the study.

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ANNEXES

Annex I: Questioners

English version the result of the study will be presented and submitted to AAU, the college of natural and computational science, and the department of community nutrition. Results will be submitted to selected woredas. The study summary will be presented to an association like the Ethiopian Child and Maternal Health Association, and the thesis summary will be submitted to an international or national peer-reviewed journal for publication. Result of the study will also be disseminated to Addis Ababa public health research and emergency management directorate.

Participant Information sheet

Title of the Research Project: - Formula Feeding Practices of Mothers of Infants Below 6 Months and Factors Associated with the Practice in Addis Ababa Ethiopia.

Name of Investigator: Firehiwot Alemu (BSc.)

Name of the Organization: Addis Ababa UniversityCollege of Natural and computational science, Center of Food Science and Nutrition, Department of community nutrition.

Introduction

Purpose of the Research Project

To investigate infant formula feeding practices among mothers of infants below six months of age, and to identify factors associated with the practice in Addis Ababa, Ethiopia.It is important to determine the prevalence of formula feeding practice that will helpful to provide baseline information for designing and implementing specific effective interventions to promote exclusive breast feeding.

Procedure: In order to perform the study, you are invited to take part in this project. If you are willing to participate, you need to understand the purpose of the study and give your consent. The required data will be collected by a nurse. Then, you are requested to give your consent to the data collector

Risks and Discomforts

There are no known hazards associated with your participation.

Benefits of the study

The result of the study will be beneficial to design effective measures for exclusive breast-feeding practice under the age of 6 months. Hence, you are indirectly benefiting society in this respect.

Compensation for participation: You will not receive any payment for your participation in this research study.

Confidentiality: There is no sensitive issue that you will be asked related to your social desirability, but any information that is obtained in connection with this study and that can be identified with you will remain confidential.

Participation and withdrawal: you can choose whether to be a part of this study or not. You may withdraw at any time without consequences of any kind. You may also refuse to give any information.

Person to contact: If you have any questions, you can contact any of the following (Investigators and Advisors) and you may ask at any time you want.

Firehiwot Alemu (investigator), Telephone: +251-9-28-69-45-10

E-mail: firehiwotalemu8@gmail.com

1. Dr Zeweter Abebe (Advisor), Telephone: +251-9-11-87-80-94

E-mail: zeweter ab@gmail.com

2. Mr. Habtamu Guja (Advisor), Telephone: +251- 9-66- 90-47-68

E-mail: habtamugujab@yahoo.com / habtamu.guja@aau.edu.et / hgbayu@utwente.nl

Annex II: Subject Consent Form

Addis Ababa University Collage of Food science and Nutrition

My name is …….. I am here on behalf of Firehiwot Alemu student of Addis Ababa University Department of Community Nutrition. She is conducting formula feeding practice and associated factors among mothers of infants aged less than 6 months in Addis Ababa for the partial fulfillment of master's in Community nutrition in Addis Ababa school of Food science and Nutrition. She received permission from Addis Ababa university school of public health and the regional health bureau for administrators to conduct this study.

You are selected purposively to participate in this study because you are a mother with a child age less than 6 months. Your participation is purely based on your willingness. You have the right to choose not to take part in this study. If you choose to take part, you have the right to stop at any time. If you are willing to participate or refuse or decide to withdraw later, you will not be subjected to any ill-treatment.

If you agree to participate in the study, you will be asked to answer some questions about yourself, your household and your breastfeeding practice. The interview with you will take about 20 minutes.

The study will help you to practice the recommended breastfeeding practice for proper nutritional care of your child. It can also provide base line data for policy makers and other researchers for further improvements on exclusive breastfeeding. The information that you provide will be kept confidential by using only code numbers and locking the data. Do not give your name. No one will have access to the non-coded data except the principal investigator and the data will not be used for purposes other than the study. Your willingness and active participation is very important for the success of this study.

Questionnaires ID_____

Could I have your Permission to continue?

1. If yes, continue the interview.
2. If no, skip to the next participant by writing reasons for his/her refusal. _____

Informed consent Certified by: Respondent's Name _____Signature_____

Interviewer: Code_____Name_____signature_____

Date of interview _____Time started _____Time completed_____

Result of interview:

1. Completed
2. Respondent not available
3. Refused
4. Partially Completed

Checked by: Supervisor: Name _____ Signature_____

Date of visit [_____|_____| _____| CODE _____

DD |MM |YYYY Site in which the interview is being conducted _____

ተ.ቁ	ጥያቄዎች	መልሶች	
101	how old are you	___year I don't know [999]	

102	Marital status?	Married/Cohabiting [01] Single [02] She lost her spouse [03] Divorced [04] Miscellaneous [05]	
103	Job Status	No formal education [0] Section_____ [1 - 12] Technical [13] University/College Diploma [14] University/College Degree and above [15]	
104	Religion?	Orthodox Christian [01] Protestant [02] Catholic [03] Muslim [04] Unbelievers [05] If different, mention_____ [06]	
105	Job status?	Farmer/Farmer [01] Unskilled worker [02] Unskilled worker [03] Merchant [04] Trained Professional [05]	

		Homework [06] Unemployed/seeking [07] If different, it should be mentioned _____ [08]	
106	Education level of your spouse?	No formal education [0] Class_____ [1-12] Technical [13] University/College Diploma [14] University/College Degree and above [15]	
107	How old is the baby?	_____ Month	
108	Child's date of birth	[_____|_____|_____] Day Month Year I don't know/I'm not sure.....[88]	
109	Gender of the baby?	Male [01] Female [02]	
110	Is the baby a baby for the family?	_____	
111	The age difference between the current child and the previous child	_____ yr.	
112	The baby's birth weight in the mother's/caregiver's view?	Less than average [01] Average/Medium [02] Higher than average/larger [03]	

		I don't remember/I'm not sure [04]	
113	How much did your last child weigh?	_…….. [in grams or kilograms]	
114	Where did the baby's birth weight information come from?	From Immunization Card [01] From the health records [02] From birth certificate [03] If different, please specify…… [99]	
115	Number of children born in the last pregnancy?	one [01] two [02] If different, mention ……. [99]	

የ ቤተሰቡየማህበራዊእናኢኮኖሚያዊ (wealth index) እንዱሁምየቤትሁኔታ

ሀ . ቋሚየ ቤትእቃዎች (Assets)

ተ.ቁ	ጥያቄዎች	መልሶች
201	Whose house do you live in?	private [01] Rental [02] Unpaid Private Home [03] If different, mention _____[04] 04]
202	What are the walls of the house made of?	It has no walls [01] mud, wood, reeds, leaves [02] Traditionally built of stone [03] Cement, block, cement-bonded stone, tin [04] If different, mention……. [05]

203	What is the roof of the house made of?	Cement [01] from tin[02] If different, mention it. [05]
204	What is the floor of the house made of?	Natural soil (soil, sand...) [01] Wood/Reed [02] Such as cement, tiles, ceramics, etc. [03] If different, mention: ……. [04]
205	Is your bedroom separate?	1. Yes 2. No
206	Is your kitchen separate?	1. Yes 2. No
207	Do you have pets?	1. Yes 2. No
208	There is a separate room for animals	1. Yes 2. No
209	Tell me if you have the following items in your house	Wall clock? 1 Cycle/Bike? 9 Television? 2 Home phone? 10 Cell phone? 3 Refrigerator? 11 Seat/chair? 4 water tank 12 Motorcycle/Bajj?5 Sofa?13 Radio?14 Electric pan? 6 table? 15 Washing machine 7 satellite/dish 16 Bed and cotton/sponge mattress? 8 Car? 17

210	What is your family's total monthly income? (Total monthly income of family members with income)	≤ 1,000 birr [01] 1,001 - 2,000 birr [02] 2,001 - 4,000 birr [03] 4,001 - 6,000 birr [04] > 6,000 birr [05] I don't remember/I'm not sure [06]
211	Where does the family mainly get drinking water?	Indoor tap water (01) Pipeline (02) Pipeline Outdoor (03) Protected well/spring water (04) Unexpected well/spring (05) If different, specify (06)
212	What kind of toilet do you use?	Traditional Pit Toilet (01) Improved pit toilet with ventilation (02) Toilet (03) No/Field/Forest (04) If different, mention _____ (05
213	Is there any family (neighbor) other than your family that shares this toilet?	1. Yes 2. No
	How do you get rid of your child's eyesight?	If my child defecates, I will flush the toilet. [01] I throw the eye down the drain [02]

		I throw the eye in the trash [03] I will throw the eye in an open area around the house [04] If different, mention _____ _____[99]
214	What kind of stove do you use for cooking? (can answer more than one)	Electricity [01] Metallurgical Gases (LGP) such as Gyonggas [02] Biogas [03] [04] Coal [05] wood [06] grass, leaf, bush [cube] [07] Cubes / Cubes Cleaning [08] If different, mention …….[09]

Section III. Obstetrics and related health service questions.

ተ.ቁ	ጥያቄዎች	መልሶች	
301	How many children do you have currently?	----------ልጆች	
302	How many times of pregnancy did you have?	----------	
303	Did you receive ANC service during your current child pregnancy?	1.Yes 2.No	
304	How many times did you receive ANC during last pregnancy?	Once[01] Two times[02] Three times [03] Four times and above[04]	
305	During these visits, the health professional will give you any information on the following	The importance of having physical contact (skin-to-skin) with your child immediately after birth? [01]	

	topics	The importance of having your child in your room or bed with you 24 hours a day?[02] Risks of giving your baby water, formula or other complementary foods in the first six months if you are breastfeeding? [03	
306	If yes where did you receive ANC service?	1.Gov.t Health Facilities 2.Private Health facilities 3.other--	
307	Did you receive counselling about breast feeding?	yes [01] No [02 I don't remember [03]	
308	Where did you give birth of this infant?	1. Gov.t Health Facilities 2.Private Health Facilities 3.Home 4..Other,speify----------	
309	When you gave birth to your last child, which way did you give birth?	Labor / Normal [01] in Surgery/CS [02] If it is different, mention it... [03]	
310	Where was your baby while you were in postnatal care?	My son was always with me, day and night.[01] There was a time when my son was not with me [02]	
311	If it takes some time before you hold your baby after giving birth, why?	Because my son was in the NICU for medical care [01] I didn't wake up right away because I was given anesthesia.[02] I didn't want or have the energy to hold my baby.[03] My son was not given to me	

		immediately, I don't know why [04] I don't remember [05]	
312	Did you have a postpartum follow-up?	Yes [1] No[2]	
313	Have you been advised how (how often) to breastfeed your baby?	No advice given [1] Whenever my child seems hungry (as much as he wants) [2] Hourly [3] Every 1-2 hours [4] Every 2-3 hours [5] Other (please tell us)_____ 6]	
314	Before leaving the health facility, have you been given advice on how to breastfeed your baby?	Yes [1] No[2]	
315	Did the health professional give you practical demonstrations/explanations or enough information on how to express your breast milk?	Yes [1] No[2]	
316	Was your baby given any fluids other than breast milk in the health facility after birth?	Yes [1] No[2]	
317	If yes, what was given?	Baby Powdered Milk/Formula [1] water[2] Other Liquids[3]	

		[check all that apply]	I don't know[4]	
318		If yes, why is your baby not breastfed? [check all that apply]	I asked him/her to ask[1] I was advised by a health professional [2] Other (specify)_____ [3] I don't know [4]	
319		If the baby is given infant formula milk in the health facility, after giving adequate advice on the benefits and harms of different options including breast milk, did they make a fully informed choice?	Yes [1] No[2]	
320		Have you ever been given pamphlets promoting breast-milk-substitutes?	Yes [1] No[2]	
321		Have you ever been offered breast-milk-substitutes at low cost or for free?	Yes [1] No[2]	

Section IV: -Infant health and breast-feeding related practice

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	Have you ever breast fed your current baby?	1.Yes 2.No	
	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----------	
	If yes, to ever breast fed has your infant fed breast milk currently?	1.Yes 2.No	
	Have you fed the first breast milk?	1.Yes 2.No	
	If you did not feed first milk/ colostrums what was the reason?	1.Infant unable to feed 2.Is not good for infant health 3.It‟s a tradition/culture 4.If other----------	
	How are you currently feed your child?	Breast milk only[01] Breast milk and formula (both)[02] Formula milk only[03] Other----------	
	Which of the following symptoms has your child experienced in thepast 2 weeks? [Read the symptoms to them and record all the symptoms mentioned]	symptoms	
		Fever ……..….. Cough/flu…… Shortness of breath/Rapid breathing……. Diarrhoea…… … Stomach Ache…….. Vomiting…… A rash on the body …….. Legacy…….. Ear ache …….. Constipation……..	
	Since your baby was born, have you tried or pumped your breast milk?	Yes ,I got milk[01] Yes, I haven't got milk[02] No I never tried[03]	
	How to use pump?	With the help of a manual breast pump[01] Electric / Battery Powered Breast pump[02] By hand (With out pump)[03]	
	Why did you express your breast milk using a pump?	To relieve congestion when my breasts are stretched [01]	

		To increase my milk supply[02] To get milk from someone else to feed my child[03] To feed my child[04] Other (Specify):_____	
	Are you in the habit of feeding your baby with bottle milk?	1.Yes 2.No	
	How long do you usually keep breast milk at room temperature (out of the fridge) before feeding it to the baby?	< 2 ሰዓት [01] 3-4 ሰአት [02] 5-8 ሰአት [03] 9-12 ሰዓት [04] > 12 ሰዓት [05] Do not wait at room temperature [06]	
	How long do you usually keep breast milk in the fridge before feeding it to the baby?	< 2 ቀናት [01] 3-4 ቀናት [02] 5-8 ቀናት [03] > 8 ቀናት [04] I do not put in the refrigerator [05]	
	Do you fast while breastfeeding your baby?	1.Yes 2.No	
	If yes, what are the following dietary patterns during fasting?	Eliminating ASF alone without skipping regular meals [02] Avoiding (ASF) and skipping breakfast[01] Avoiding ASF and fasting till 9 hours 03] Other (Specify): :----------	

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406	Have you ever heard/seen any infor mation talking about infant formula?	1.Yes 2.No
407	If you heard/seen, what kind of infor mation 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 intelligen ce 4.Infant formula has same nutritional benefits as breast feeding 5.If other----------
408	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_----------

409	Have you ever fed infant formula to your current infant?	1.Yes 2.No
410	If Yes, at what age of the child did you begin formula feeding?	_____[day/month]
411	What was your reason to start formula milk to your infant?	1.Due to insufficient breast milk 2.Mathernl 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----------
412	If Yes for Question no 409, Have you fed infant formula milk currently?	1.Yes 2.No
413	If you're 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. _____
414	Did your previous infants ever feed an infant formula milk?	1.Yes 2.No 3. I have never had a child before
415	Would you recommend formula feeding to anyone?	1.Yes 2.No
416	Do you think formula milk has any downsides compared to breast milk?	1.Yes 2.No
417	Do you know the side effects of formula feeding to your baby?	1.Yes 2.No
418	If Yes, what are these side effects that you know?	---------- _____----------
419	Did your family /friends push you to use infant formula for your infant?	1.Yes 2.No
420	Have you ever been given advice / information from experts promoting powdered milk products from different organizations regarding infant formula / formula in a health facility?	1.Yes 2.No
421	Do you think short maternity leave leads to formula feeding practice?	1.Yes 2.No

Section V: Knowledge and Attitude of mothers toward s breast and Formula feeding questions

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ነጥቦች	**መልስ**
1. Is feeding breast milk only adequate to babies in the 1 st 6month s of life?	1. Yes 2.No know 3. I do not
2 ፡Does breast milk protective the child from childhood illnesses?	1. Yes 2.No know 3. I do not
3 .Does Feeding only formula or other food to babies is expensive than breast milk?	1. Yes 2.No not know 3. I do
4 Does Breast milk is nutritious?	1. Yes 2.No know 3. I do not
5. Does Breast feeding increases bonding between mother and infant?	1. Yes 2.No know 3. I do not
6. .Does breast feeding has contraceptive benefit?	1. Yes 2.No know 3. I do not
7 Does breast feeding have better advantage than formula feeding?	1.Yes 2.No 3. I do not know

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ነጥቦች	**መልስ**		
1 Formula-feeding ensures optimal health for the baby.	1.Agree 2.Neutral 3.Disagre	1.Agree 2Neutr3Disagre	1.Agree 2 .Neutral 3.Disagre
2. Formula feeding cause excessive weight gain for baby.	1.Agree 2Neutral 3.Disagre	1.Agree 2Neutral 3.Disagre	1.Agree 2 .Neutral 3.Disagre
3. Formula-feeding is more convenient than breastfeeding	1.Agree 2Neutral 3.Disagre	1.Agree 2 .Neutral 3.Disagre	1.Agree 2 .Neutral 3.Disagre
4. . Formula-feeding ensures optimal health for the mother.	1.Agree 2Neutral 3.Disagre	1.Agree 2Neutral 3.Disagre	1.Agree 2 .Neutral 3.Disagre

5. Feeding formula is modern way of infant feeding.	1.Agree 2Neutral 3.Disagre	1.Agree 2Neutral 3.Disagre	1.Agree 2 .Neutral 3.Disagr e
6. Formula feeding decreases strain on my family/ personal life.	1.Agree 2Neutral 3.Disagre	1.Agree 2 .Neutral 3.Disagre	1.Agree 2Neutral 3.Disagre
7. . Feeding your infant formula makes you feel guilty.	1.Agree 2Neutral 3.Disagre	1.Agree 2Neutral 3.Disagre	1.Agree 2Neutral 3.Disagre
8. Formula feeding protects your body.	1.Agree 2Neutral 3.Disagre	1.Agree 2 .Neutral 3.Disagre	1.Agree 2.Neutral 3.Disagre